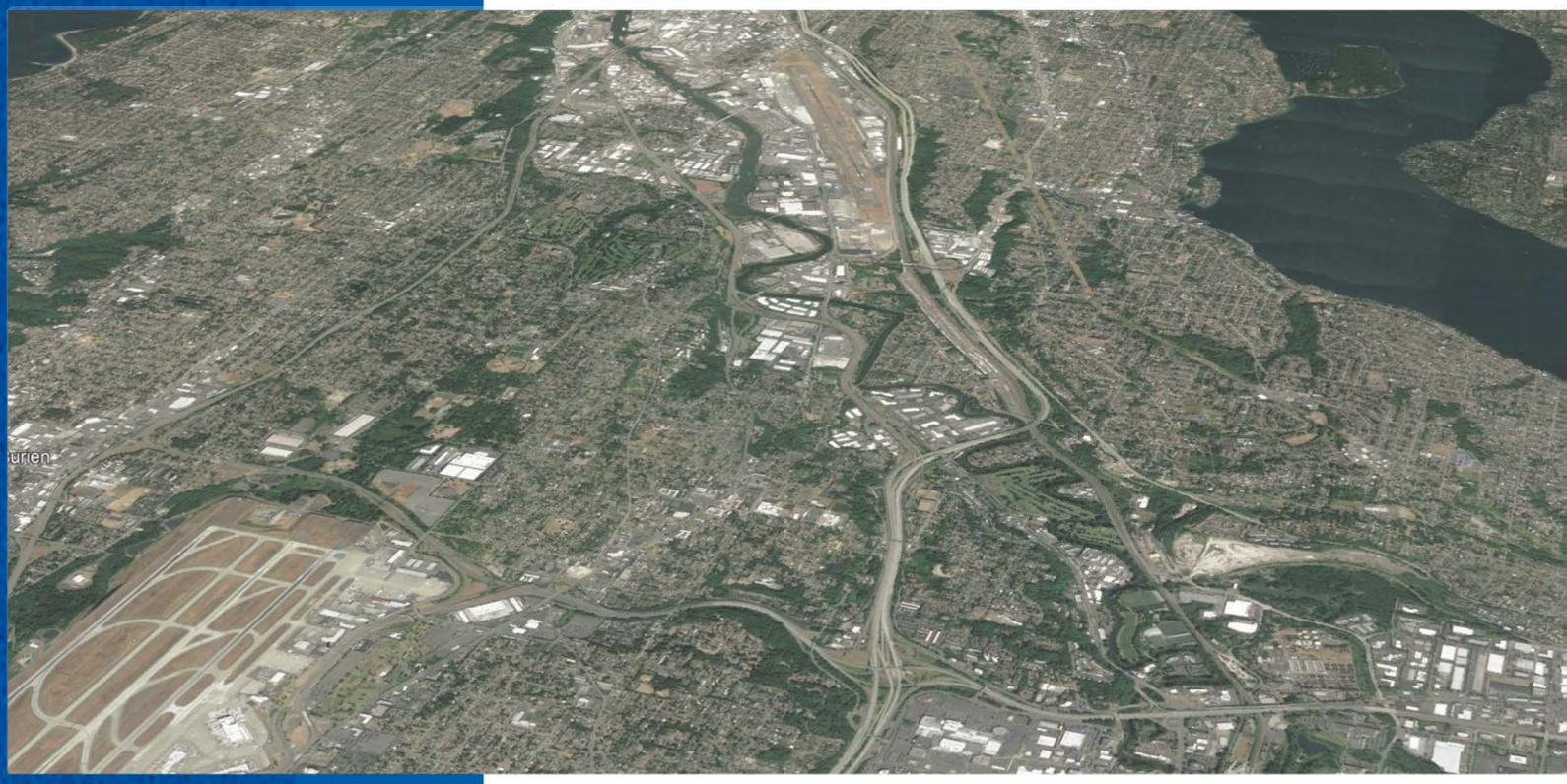
COMPREHENSIVE WATER SYSTEM PLAN 2020 UPDATE

AGENCY REVIEW DRAFT | January 2022



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City of Tukwila

COMPREHENSIVE WATER PLAN 2020 UPDATE

DRAFT | January 2022

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Abbreviations

AACE	American Association of Cost Estimators
AC	asbestos cement
ADD	average day demand
AL	action level
APE	Andover Park East
BPS	booster pump station
Carollo	Carollo Engineers, Inc.
Cascade	Cascade Water Alliance
ccf	one hundred cubic feet
CCI	Construction Cost Index
CCP	Cross Connection Control Program
CCR	Consumer Confidence Report
CCS	Cross-Connection Control Specialist
CDBG	Community Development Block Grant
CERB	Community Economic Revitalization Board
CEU	continuing education unit
CFR	Code of Federal Regulations
CI	cast iron
CIP	Capital Improvement Program
City	City of Tukwila
CMP	comprehensive master plan
COVID-19	coronavirus disease 2019
CPR	Conservation Planning Requirements
CRPL	Cedar River Pipeline
CWSP	Comprehensive Water System Plan
D/DBPR	Disinfectants and Disinfection By-Products Rule
DI	ductile iron
DNS	Determination of Non-Significance
DOH	Washington State Department of Health
DSL	distribution system leakage
DWSRF	Drinking Water State Revolving Fund
E. coli	*Escherichia coli*
Ecology	Washington State Department of Ecology
EGB	elected governing board
ELA	engineering, legal, and administrative
ENR	engineering news record

EPS	extended period simulation
ES	Equalizing Storage
ERU	equivalent residential unit
FF	fire flow
FP	Foster Point
FPM	financial planning model
fps	feet per second
FSS	fire suppression storage
ft	feet
GIS	geographic information system
gpd	gallons per day
gpd/ERU	gallons per day per equivalent residential unit
gpm	gallons per minute
GMA	Growth Management Act
GWR	Ground Water Rule
HAA	haloacetic acid
HAA5	sum of 5 haloacetic acid concentrations (Monochloroacetic Acid [ClAA], Monobromoacetic Acid [BrAA], Dichloroacetic Acid [Cl_2AA], Trichloroacetic Acid [Cl_3AA], and Dibromoacetic Acid [Br_2AA])
HP	horsepower
hr	hour(s)
HWD	Highline Water District
I-5	Interstate 5
I-405	Interstate 405
IACC	Infrastructure Assistance Coordinating Council
IDSE	Initial Distribution System Evaluation
KCWD	King County Water District
Kent	City of Kent
LCR	Lead and Copper Rule
LF	linear foot
LID	low impact development
LRAA	locational running annual average
MCL	maximum contamination level
MDD	maximum day demand
MFR	multi-family residential
µg/L	micrograms per liter
MG	million gallons
mgd	million gallons per day
mg/L	milligrams per liter

MHI	median household income
MRDL	maximum residual disinfectant level
MT	medium-term
N/A	not applicable
O&M or M&O	Operations and Maintenance
P+I	principal plus interest
PFAS	per- and polyfluoroalkyl substances
PHD	peak hour demand
ppb	parts per billion
PRV	pressure reducing valve
PS	pump station
PS&E	plans, specifications, and estimates
psi	pounds per square inch
PSRC	Puget Sound Regional Council
PVC	polyvinyl chloride
PWB	Public Works Board
PWTF	Public Works Trust Fund
PZ	pressure zone
RAA	running annual average
RCW	Revised Code of Washington
Renton	City of Renton
ROE	Report of Examination
ROW	right-of-way
RR	railroad
RTCR	Revised Total Coliform Rules
RTU	remote telemetry unit
RUL	remaining useful life
SCADA	supervisory control and data acquisition
SDWA	Safe Drinking Water Act
Seattle	City of Seattle
SEPA	State Environmental Policy Act
SFR	single-family residential
Skyway	Skyway Water & Sewer District
SMA	Satellite Management Area
SMP	Standard Monitoring Program
SOP	Standard Operating Procedure
SPU	Seattle Public Utilities
SS	Supply Station

SSS	System-Specific Study
ST	short-term
State	State of Washington
TCR	Total Coliform Rule
THM	trihalomethane
THM4	four specific trihalomethane compounds (chloroform, bromodichloromethane, dibromochloromethane, and bromoform) regulated by the USEPA
TPSE	Transmission and Supply Plan Extension
UCMR	Unregulated Contaminant Monitoring Rule
UCMR3	Unregulated Contaminant Monitoring Rule 3
UCMR4	Unregulated Contaminant Monitoring Rule 4
UCMR5	Unregulated Contaminant Monitoring Rule 5
USEDA	US Department of Commerce Economic Development Administration
USEPA	United States Environmental Protection Agency
UV	ultraviolet
VPN	virtual private network
WAC	Washington State Administrative Code
WDM	Water Distribution Manager
WDS	Water Distribution Specialist
WFI	Water Facilities Inventory
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation
WSPL	West Seattle Pipeline
WTPO-IT	Water Treatment Plant Operator
WUE	water use efficiency

EXECUTIVE SUMMARY

ES.1 Introduction

The City of Tukwila (City) prepared this Comprehensive Water System Plan (CWSP) to document the status and analyze the future needs of the water utility system. This CWSP is largely an updated version of the City's 2015 Plan. The purpose of this CWSP 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 CWSP is required to meet the regulations of the Washington State Department of Health (DOH) and the requirements of the Washington State Growth Management Act. This CWSP complies with the requirements of DOH as set forth in the Washington Administrative Code (WAC) 246-290-100, Water System Plan.

A well-developed planning document 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 CWSP was developed from May 2020 through February 2021. This CWSP will be used as a guide in maintaining and improving the water system in the short-term over the next ten years and also provide a planning framework over the long-term 20-year planning horizon.

This CWSP contains timeframes, which are the intended framework for future funding decisions and within which future actions and decisions are intended to occur. However, these timeframes are estimates, and depending on factors involved in the processing of applications and project work, and availability of funding, the timing may change. The framework presented in this CWSP does not represent actual commitments by the City.

Key points of the CWSP including analysis results and recommendations are emphasized below, with more detail provided in the chapters.

ES.2 Existing System

The City 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 44 miles of transmission and distribution pipelines. The City maintains a total of nine interties with four adjacent water purveyors. 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 Seattle under a declining block contract, with the first block of 30.3 million gallons per day (mgd) extending through December 31, 2023.

The existing water system map showing the City's water system facilities, retail water service area, and pressure zones is presented in Figure ES.1. Figure ES.2 presents the hydraulic profile of the system.

Seattle Intertie (E. Marginal Way at North City Limit)
PRV 8
Oxbow (PRV 10A)
Seattle Intertie (47th Avenue S and Victor Street)
Seattle
PRV 9
SS 10 (East Marginal) & PRV 10
SS 169 (Ryan Hill)
KCWD 125 Intertie (Duwamish)
KCWD 125 Intertie (131st pl.)
North Hill Pump Station, Reservoir & PRV
SS 15 (Christensen) & PRV 15
SS 13 (South Center) & PRV 13
SS 16 (Crystal Springs) & PRV 16
SS 14 (West Valley) & PRV 14
Renton Intertie
Kent Intertie

Legend

- Supply Station
- Back-up Supply Station
- PRV
- Check Valves
- Emergency Intertie
- Reservoir & Pump Station
- Retail Water Service Area

Modeled Pipeline by Diameter

- 6" or Less
- 8"
- 10" - 12"
- 16" or Greater
- Roadways

Pressure Zones

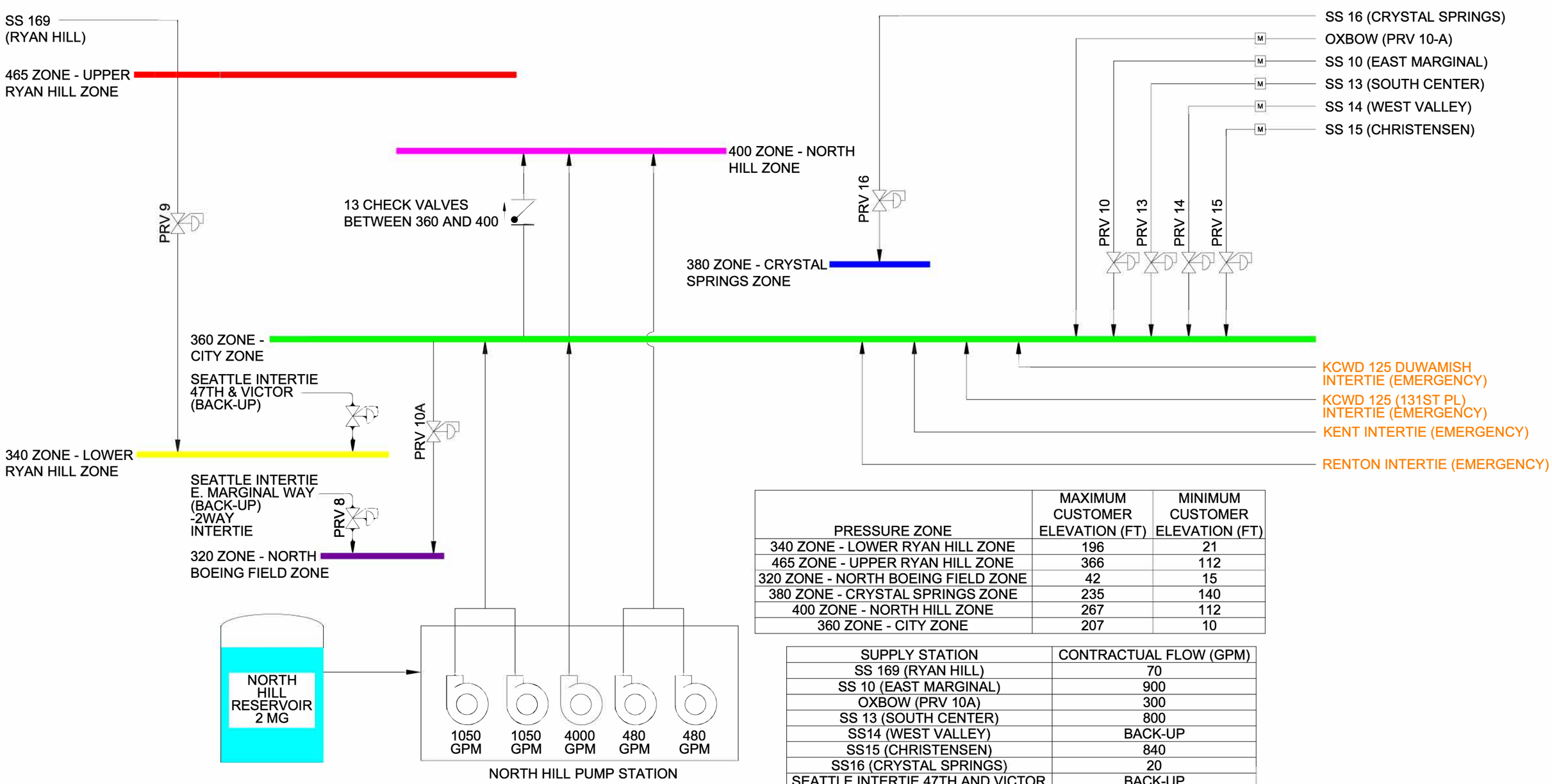
- Pressure Zone 320 (North Boeing Field Zone)
- Pressure Zone 340 (Lower Ryan Hill Zone)
- Pressure Zone 360 (City Zone)
- Pressure Zone 380 (Crystal Springs Zone)
- Pressure Zone 400 (North Hill Zone)
- Pressure Zone 465 (Upper Ryan Hill Zone)

Feet
0 1,500 3,000

Data Sources: City of Tukwila, King County GIS, ESRI

Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.

Figure ES.1 Existing Water System



PRESSURE ZONE	MAXIMUM CUSTOMER ELEVATION (FT)	MINIMUM CUSTOMER ELEVATION (FT)
340 ZONE - LOWER RYAN HILL ZONE	196	21
465 ZONE - UPPER RYAN HILL ZONE	366	112
320 ZONE - NORTH BOEING FIELD ZONE	42	15
380 ZONE - CRYSTAL SPRINGS ZONE	235	140
400 ZONE - NORTH HILL ZONE	267	112
360 ZONE - CITY ZONE	207	10

SUPPLY STATION	CONTRACTUAL FLOW (GPM)
SS 169 (RYAN HILL)	70
SS 10 (EAST MARGINAL)	900
OXBOW (PRV 10A)	300
SS 13 (SOUTH CENTER)	800
SS14 (WEST VALLEY)	BACK-UP
SS15 (CHRISTENSEN)	840
SS16 (CRYSTAL SPRINGS)	20
SEATTLE INTERTIE 47TH AND VICTOR	BACK-UP
SEATTLE INTERTIE E. MARGINAL WAY	BACK-UP

Note: Contractual flows are as stated in the "2nd Amended and Restated Declining Block Water Supply Agreement between the City of Seattle and the Cascade Water Alliance (Including Management Agreements #7 dated 7/15/2013 and #9 dated 3/27/2014)".

FIGURE ES.2
EXISTING SYSTEM HYDRAULIC PROFILE
Comprehensive Water System Plan
City of Tukwila

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ES.3 Policies and Criteria

The City guides the development and financing of the infrastructure required for water services and ensures consistency in service levels and customer relations. While the City has discretion in setting the performance, design criteria, and standards for its water system, these must meet or exceed the minimum standards for public water supplies set by DOH through WAC 246-290. Together, policies and criteria provide the desired level of services to utility customers.

The policies that govern the City's water system are based on City policies as defined in the City of Tukwila Comprehensive Plan (2015) and the water system design criteria as defined by the City. The policies and criteria relevant to the City's water system are summarized in Chapter 3 – Policies and Criteria and are organized according to the following categories:

- Service policies.
- Source criteria.
- Booster pump station (BPS) criteria.
- Distribution storage criteria.
- Fire flow requirements.
- Financial policies.

ES.4 Water Requirements

Projecting future water demand is a key part of the water system planning process. Demand projections are used to identify the system improvements required for supply, pumping, storage, and piping infrastructure. Historical water purchase and consumption and Puget Sound Regional Council (PSRC) demographic projections data were used to develop the demand projection parameters used to estimate the City's water demands through the planning period.

Historical supply and consumption data showed fairly constant values, therefore, only one demand scenario was developed for this CWSP.

Between 2015 and 2019 (excluding 2017 and 2018 data), the City's average day demand (ADD) was approximately 1.93 mgd. During that time, historical maximum day demands (MDD) were approximately 3.2 mgd. On average, the City's typical Single-Family household consumes 147 gallons per day (gpd).

For this analysis, water demand projections were developed using the following steps:

1. Grow historical water service accounts for each pressure zone and customer category by the zone-specific population and employment growth rates from a combination of the demographic analysis using PSRC data and the City's vacant parcel data.
2. Convert water service account projections into equivalent residential unit (ERU) projections.
3. Convert ERU projections to ADD projections using demand projection parameters derived from historical data consisting of the City's ERU value, distribution system leakage (DSL), other authorized use, and large consumer data.
4. Apply the MDD to ADD peaking factor to convert ADD to MDD.

Figure ES.3 also summarizes these steps.

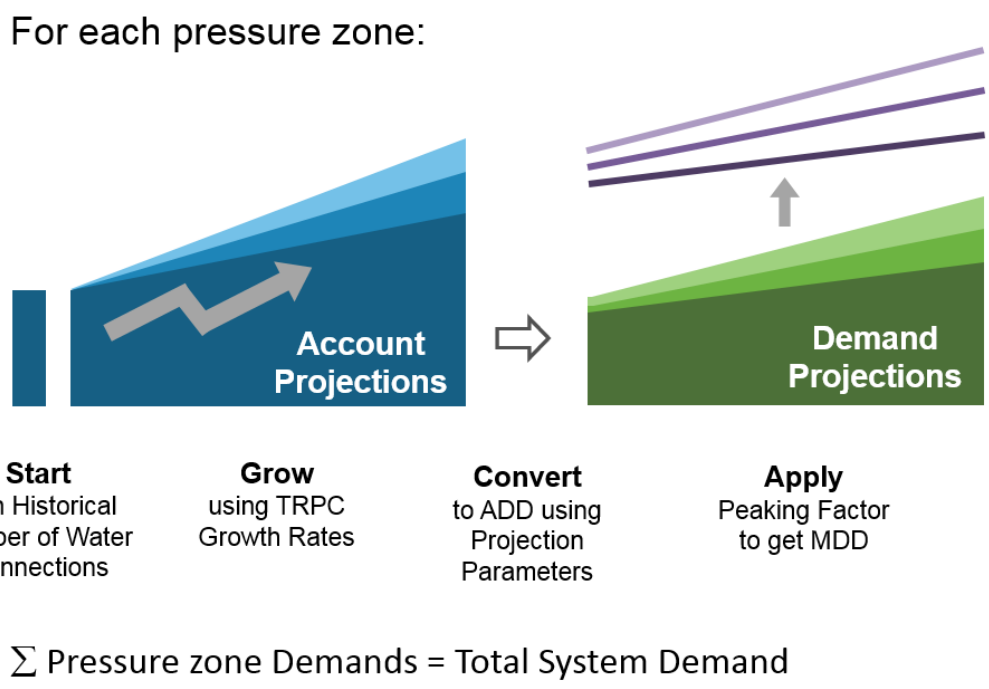


Figure ES.3 Demand Projection Methodology

Numerous factors and assumptions affect the accuracy of projected future water demands. To project the City's future ADD and MDD, several parameters were used, which are listed in Table ES.1. These parameters include ERU value, DSL, other authorized use, and the MDD/ADD peaking factor.

Table ES.1 Water Demand Projection Factors

Parameter	Value	Notes
ERU Value (gpd/ERU)	147	Historical Average
DSL (Percent of Purchase)	5.4%	Historical Average
Other Authorized Use (Percent of Consumption)	0.8%	Historical Average
MDD/ADD Peaking Factor	1.77	Historical Average

Figure ES.4 shows a graph of City-wide demand projections. The City's ADD was projected to be 2.06 mgd in 2020. In 2040, it is estimated to be 3.04 mgd. In 2040, MDD is estimated to be 5.37 mgd. These demands are the basis for the water system evaluation presented in Chapter 5 – System Analysis.

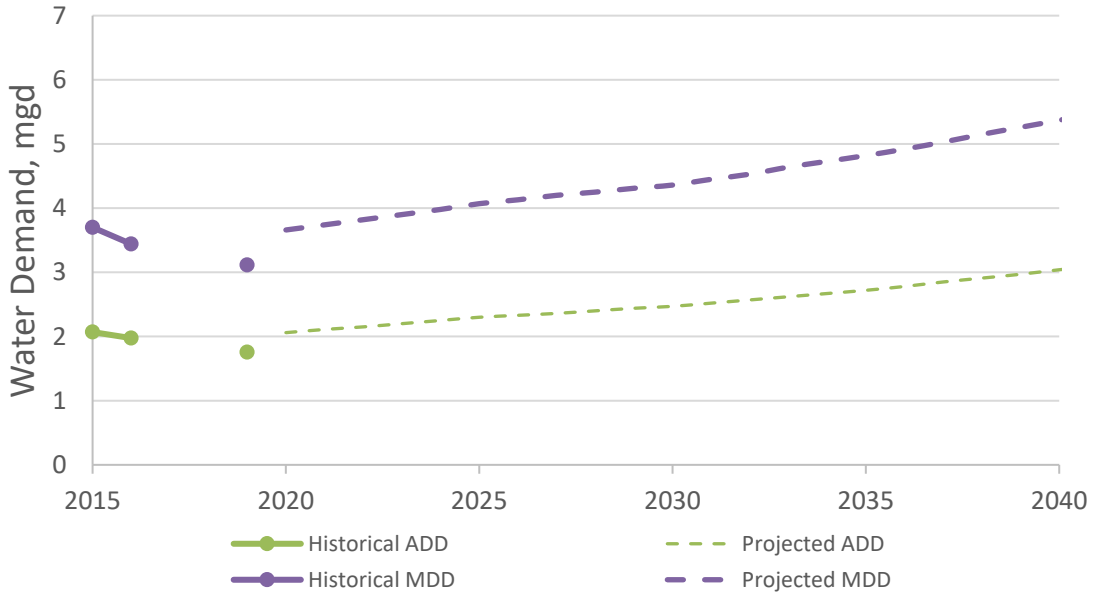


Figure ES.4 Projected Water Demands

ES.5 System Analysis

The system analysis identified potential future system deficiencies in the City's water distribution and based on the analysis results, improvements to the system were recommended. The pipeline capacity evaluation was conducted using the City's updated and calibrated WaterCAD hydraulic model. The supply, pump station, and storage capacity evaluations were conducted in Microsoft Excel. Improvements identified in the system analysis are summarized in the Capital Improvements Program (CIP) in Chapter 9.

ES.5.1 Supply Analysis

The supply analysis compared the City's contractual flows from Cascade with the projected demands. Based on the results of the supply analysis, it is recommended that the City work with Cascade to increase its contractual flow by 1.5 mgd to improvement supply reliability so that contractual flows are sufficient to meet the City's projected MDD while concurrently refilling the fire suppression storage.

ES.5.2 Pumping Analysis

The pumping analysis compared the City's existing pumping capacity against the City's pumping criteria. There were no recommendations based on the pumping capacity evaluation, but it is recommended that the City add back-up power to the North Hill pump station for pumping reliability and system resiliency.

ES.5.3 Distribution System Analysis

The calibrated WaterCAD model of the City's distribution system was used to analyze the system for future planning years, and projected system demands were added for the 2020, 2030, and 2040 planning years.

Key parameters evaluated with the model included system pressure during normal operations and fire flow conditions, and system velocities. During normal operations, the minimum pressure criteria was set at 30 pounds per square inch (psi) in the distribution system during MDD and peak hour demand (PHD) and 20 psi during a fire event. The City's goal is to provide a maximum of 120 psi.

Improvements such as pipe upsizing and main looping were recommended to address identified deficiencies. Each of the recommended improvement requires a further site-specific and project-level engineering analysis before implementation. Distribution pipeline recommendations are shown in Figure ES.5.

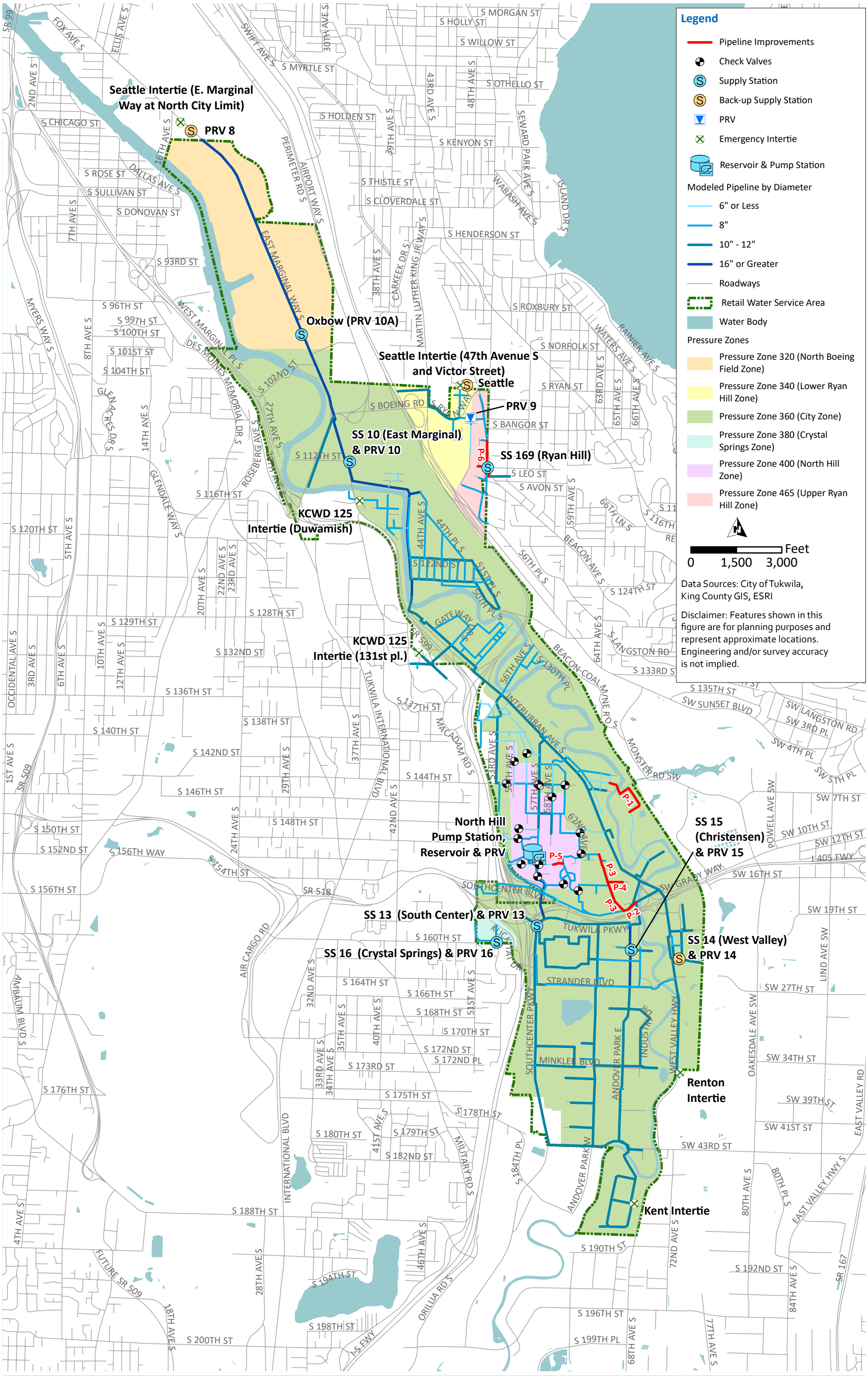


Figure ES.5 Pipeline Improvement Projects

ES.5.4 Storage Analysis

The City currently operates a 2 million gallon (MG) storage tank at North Hill (15045 57th Avenue South). The tank is the sole storage facility for the City. The City's water storage volumes are comprised of five components:

- Operational storage.
- Equalizing storage.
- Standby storage.
- Fire-suppression storage.
- Dead storage.

Storage deficits were identified in all the City's service levels. The City has different options to consider for meeting their storage requirements. Five options were compared, potential storage sites were identified, and proposed alternatives were evaluated with the hydraulic model. Four site locations and five system configurations were developed, including:

- Alternative 1A: North Hill Gravel Site with BPS to 465 Zone.
- Alternative 1B: North Hill Gravel Site with Separate 465 Tank.
- Alternative 2: Beacon Ave Reservoir.
- Alternative 3: Ryan Hill 2 Acre Site Reservoir.
- Alternative 4: Ryan Hill 0.65 Acre Site Reservoir.

Potential layouts and simplified schematics were created for each alternative. Figures ES.6 and ES.7 show examples of these figures for Alternative 2. The City's hydraulic model was then used to confirm the sizing of the new infrastructure, including pump station and transmission pipes. Two representative storage sites (three system configurations) were carried forward to the CIP for cost development:

- Alternative 1A: North Hill Gravel Site with BPS to 465 Zone.
- Alternative 1B: North Hill Gravel Site with Separate 465 Tank.
- Alternative 2, Beacon Ave Site.
- Alternative 3, Ryan Hill 2 Acre Site.

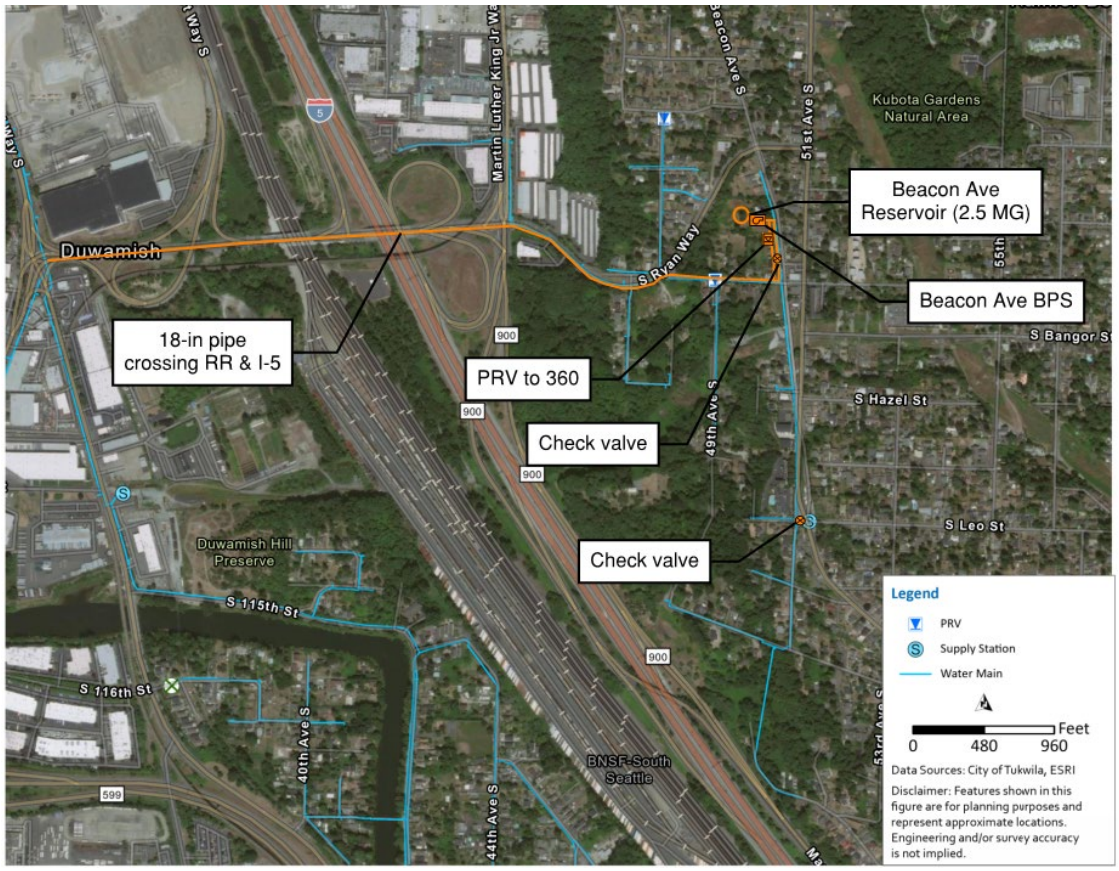


Figure ES.6 Storage Alternative 2 Beacon Ave Reservoir: Potential Layout

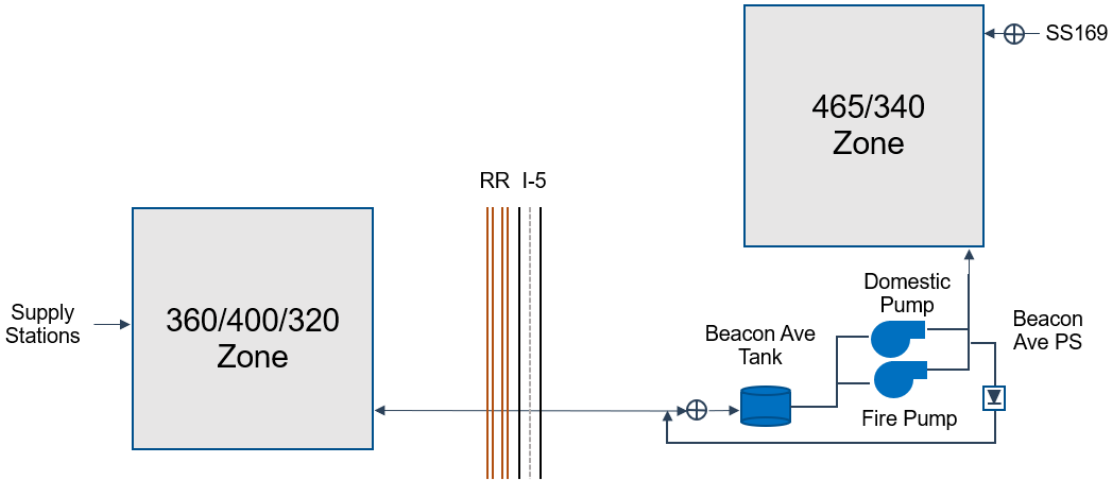


Figure ES.7 Storage Alternative 2 Beacon Ave Reservoir: Simplified Schematic

ES.6 Water Use Efficiency

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.

Cascade included conservation as a key factor in the 2019 update to the Transmission and Supply Plan Extension (TPSE). A major result of the changes described in the 2019 TPSE is to postpone the need to develop the Lake Tapps Reservoir as a municipal water supply for at least another 10 years.

In 2019, Cascade adopted a savings goal of 0.4 mgd on an average annual basis from 2019 to 2022 as outlined in the 2019 TPSE. The program objectives for Cascade's 2019-2022 Regional Water Efficiency program include the following:

1. Achieve the necessary savings to meet Cascade's adopted Water Use Efficiency Rule savings goal.
2. Pursue cost-effective program measures that provide the greatest benefit for the greatest number of ratepayers.
3. Offer program measures that represent all Cascade members in the distribution of program resources.
4. Create innovative and impactful education opportunities and campaigns that promote the value of water and the conservation ethic.
5. Enable high-volume peak season water users to help themselves use water more efficiently and integrate sustainable landscaping techniques.

The City's historical DSL values have been lower than the DOH requirement to achieve a standard of no more than 10 percent water loss (the average DSL from 2015, 2016, and 2019, as noted in Chapter 4, is 5.4 percent). Similarly, the City's historical ERU values have been lower than DOH's general value of 200 gpd/ERU, which is to be used by utilities without detailed water use data (the average ERU from 2014 through 2019 is 147 gpd/ERU, as noted in Chapter 4). The City will continue its conservation efforts and follow Cascade's goals and recommendations through participation in Cascade's Water Conservation Program.

Cascade provides water efficiency programs and services on behalf of its members. In 2019, Cascade administered more than a dozen conservation program measures or activities including the following:

- Rebates for EnergyStar and WaterSense labeled showerheads, clothes washers, and faucets.
- Showerhead and aeration installation at multifamily accounts.
- Free conservation items delivered upon request to multifamily properties and Cascade members for distribution to customer.
- Participation in 16 community events to promote the value of water and the "We Need Water Because…" campaign (also provided through media).

These programs and services promoted water efficiency and water stewardship resulting in approximately 25,000 direct customer interactions representing all Cascade members.

The City Water Department conducts a leak detection survey of the entire distribution system annually as part of its valve and hydrant maintenance program in order to identify and repair leaks. To further reduce demand, the City promotes the use of reclaimed water in the portion of the service area where it is available. To assist the City's customers in conserving water, each month after the meter reading cycle, the City generates a list of accounts with higher than normal consumption based on historical information and visits these properties to notify customers of potential leaks.

ES.7 Water Quality

The City benefits from the inclusion in the City of Seattle's (Seattle's) Regional Monitoring program for many current water quality regulations. Per the Cascade Interlocal contract, 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 the City. The City is directly responsible for the quality within the distribution system; the CWSP, therefore, provides a summary of distribution system water quality only.

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

The City prepares an annual Water Quality Report (CCR) that documents regulated contaminants detected during monitoring to ensure consumers know what's in their drinking water. The City's Water Quality Monitoring Reports from 2010-2019 showing compliance are included in Appendix Q.

ES.8 Operations and Maintenance

The City's Public Works Department is responsible for water, sewer, drainage, construction, engineering, construction inspection, fleet and facilities, and street functions. 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 the City's service area.

The operations and maintenance (O&M) responsibilities and tasks outlined in Chapter 8 – Operations and Maintenance include:

- Inspections, Preventive Maintenance, Repair and Replacement.
- Water Quality Operations.
- Cross Connection Control Program.
- Emergency Response Operations.
- Department Coordination.
- Records Documentation.
- Standard Plans and Specifications.

Chapter 8 also summarizes future operations and maintenance needs and the remaining useful life analysis, which was previously performed during the 2014 pipeline asset management study. Minor edits were made to ensure consistency with the City's latest GIS database. Figure ES.8 present the total length of pipe reaching the end of its assumed useful life by decade.

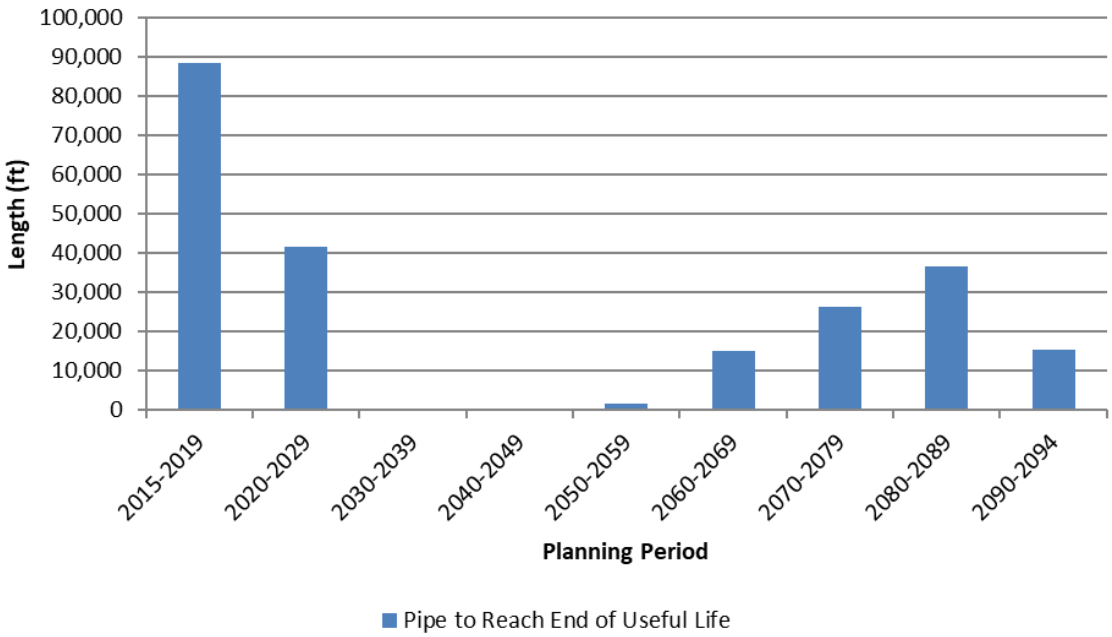


Figure ES.8 Length of Pipe Replacement by Decade

ES.9 Capital Improvement Program

The various projects recommended in the Plan were summarized in a comprehensive CIP. With this CIP, the City will have a guideline to plan and budget for the water system over the next 20 years, as well as the recommended timing and cost estimates for each identified project. Project phasing is described as short term (0 to 5 years, which corresponds to 2021-2025), medium-term (5 to 10 years, which corresponds to 2026-2030) or long term (10 to 20 years, which corresponds to 2031-2040).

The Plan's capital projects are categorized by the following infrastructure:

- Distribution pipeline (P).
- Pump Station (PS).
- Storage (ST).
- Supply (S).
- General (G).

Several distribution pipeline projects (P) were identified to address fire flow deficiencies in the distribution system and are shown in Figure ES.11. One pump station project (PS) was identified to add back-up power to the North Hill BPS, which is also shown in Figure ES.11.

The main storage project (ST) includes constructing or acquiring a minimum of 2.5 MG of additional storage in the 360 PZ and/or the 465 PZ to mitigate storage deficiencies identified in the storage analysis. Four site locations and five system configurations were reviewed as part of the storage alternatives evaluation. Since the recommended storage project does not include storage for the 380 PZ, two options for addressing the storage deficiency in the 380 PZ were also identified as part of the CIP.

Two supply projects (S) were also identified, but no costs are associated with the projects. General projects (G) include annual pipeline replacement programs based on high priority and

medium priority pipes identified in the remaining useful life analysis, as shown in Figure ES.12. Additional general projects include large meter replacements, intertie projects, and water system plan updates.

Tables ES.2 and ES.2 summarize the CIP projects by project type and category, respectively. Figures ES.9 and ES.10 summarize the percent of each project identified by project category and project type, respectively. Specific project details can be found in the Detailed CIP Table in Appendix R.

The total Water CIP cost over the next 20 years is approximately $85.1 million, which equates to approximately $4.3 million annually in current dollars. Of the total cost, $24.6 million is budgeted for the short-term, $26.7 million is budgeted for the medium-term, and $33.9 million is budgeted for the long-term.

When considering CIP cost by project type, as shown in Table 9.8 and Figure 9.4, approximately 51 percent of the CIP costs are repair and replacement projects. Improvement projects make up approximately 29 percent of the CIP costs, and capacity projects make up about 20 percent of the CIP costs.

When considering CIP costs by project category, as shown in Table 9.9 and Figure 9.5, 51 percent of the CIP costs are general projects, mostly from the pipeline repair and replacement programs, and approximately 41 percent of the CIP costs are storage projects. Distribution pipeline projects make up approximately seven percent of the CIP costs, and the pump station project makes up the remaining one percent of the CIP costs.

Table ES.2 CIP Summary by Project Type

Project Type	Total CIP Cost Estimate	CIP Prioritization		
		Short-term (2021-2025)	Medium-term (2026-2030)	Long-term (2031-2040)
Repair & Replacement	$43,227,000	$6,393,500	$5,050,500	$31,783,000
Improvement	$24,485,000	$10,859,000	$11,541,000	$2,085,000
Capacity	$17,390,000	$7,305,000	$10,085,000	$0
Total Cost	**$85,102,000**	**$24,557,500**	**$26,676,500**	**$33,868,000**
Average Annual Cost	*$4,255,100*	*$2,455,750*	*$2,667,650*	*$3,386,800*

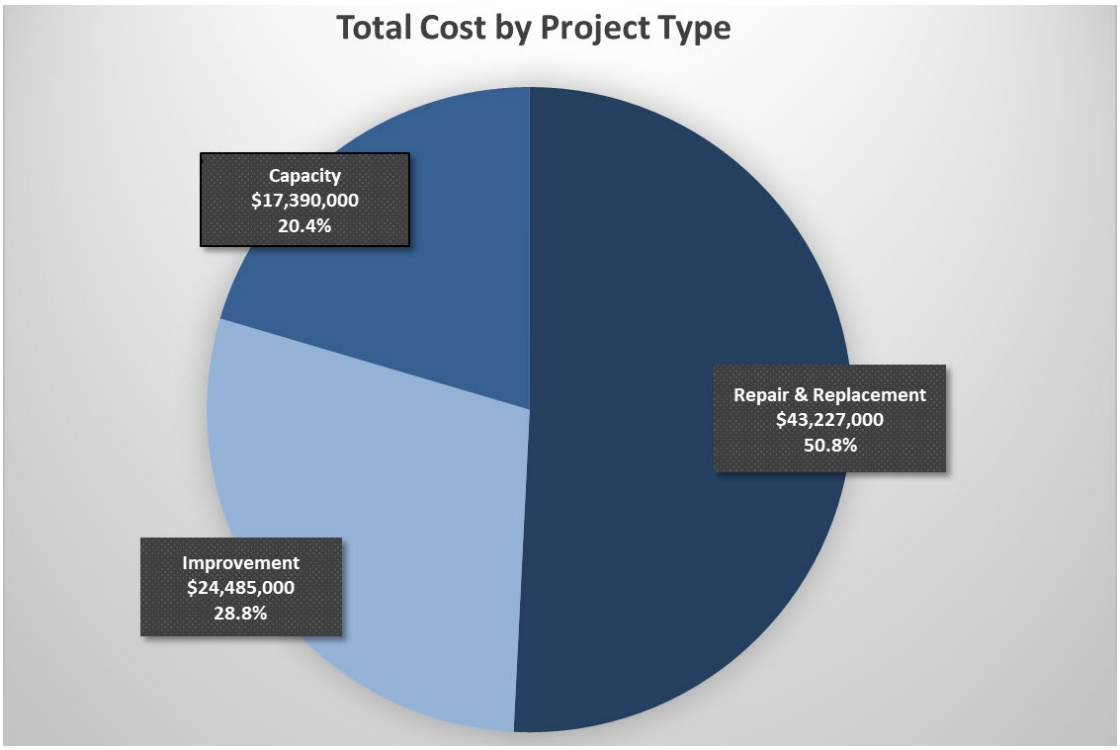


Figure ES.9 CIP Summary by Project Type

Table ES.3 CIP Summary by Project Category

Project Category	Total CIP Cost Estimate	CIP Prioritization		
		Short-term (2021-2025)	Medium-term (2026-2030)	Long-term (2031-2040)
Distribution Pipeline (P)	$5,578,000	$4,322,000	$1,256,000	$0
Pump Station (PS)	$1,131,000	$0	$0	$1,131,000
Storage (ST)	$34,705,000	$14,535,000	$20,170,000	$0
Supply (S)	$0	$0	$0	$0
General (G)	$43,688,000	$5,700,500	$5,250,500	$32,737,000
Total Cost	**$85,102,000**	**$24,557,500**	**$26,676,500**	**$33,868,000**
Average Annual Cost	*$4,255,100*	*$4,911,500*	*$5,335,300*	*$3,386,800*

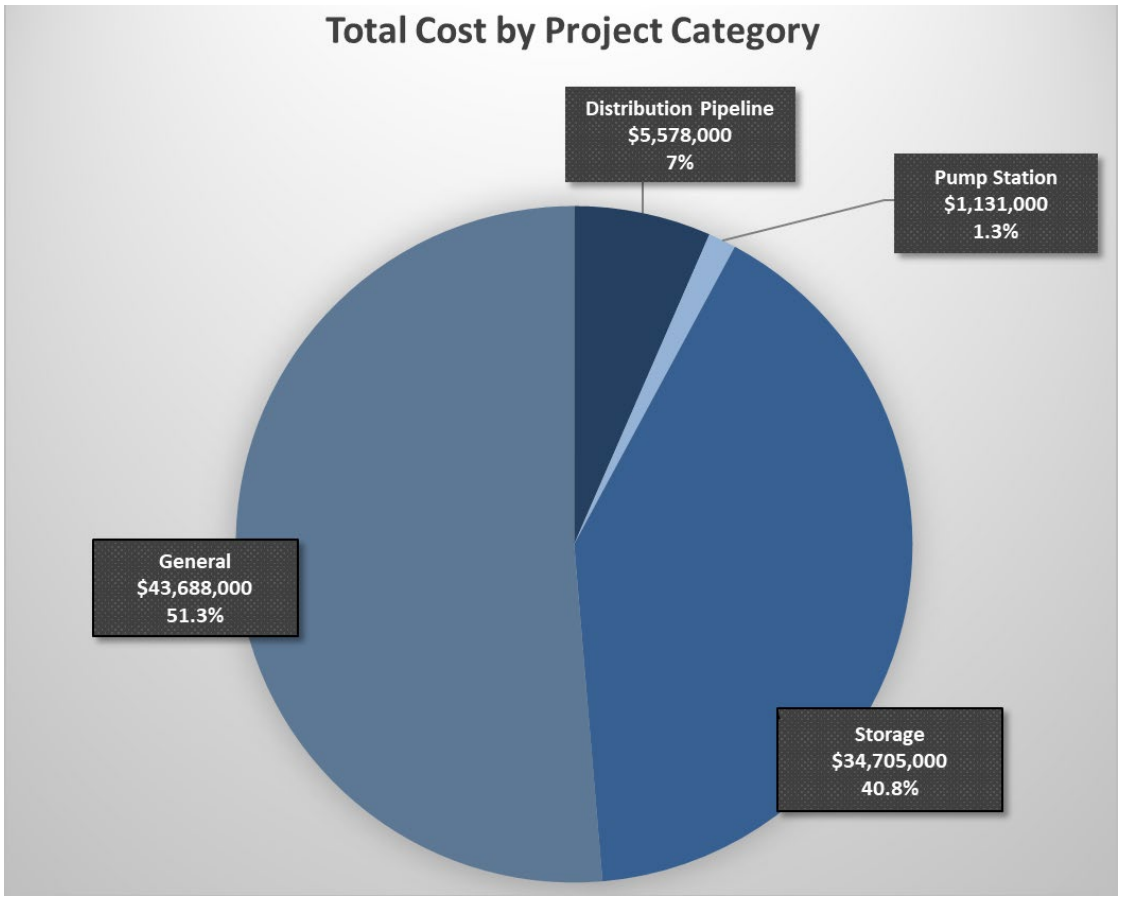


Figure ES.10 CIP Summary by Project Category

Figure ES.11 illustrates the locations of the specific projects identified and illustrates the project priority by timeframe. Figure ES.12 shows the locations of pipeline included in the Annual Pipeline Replacement Program projects.

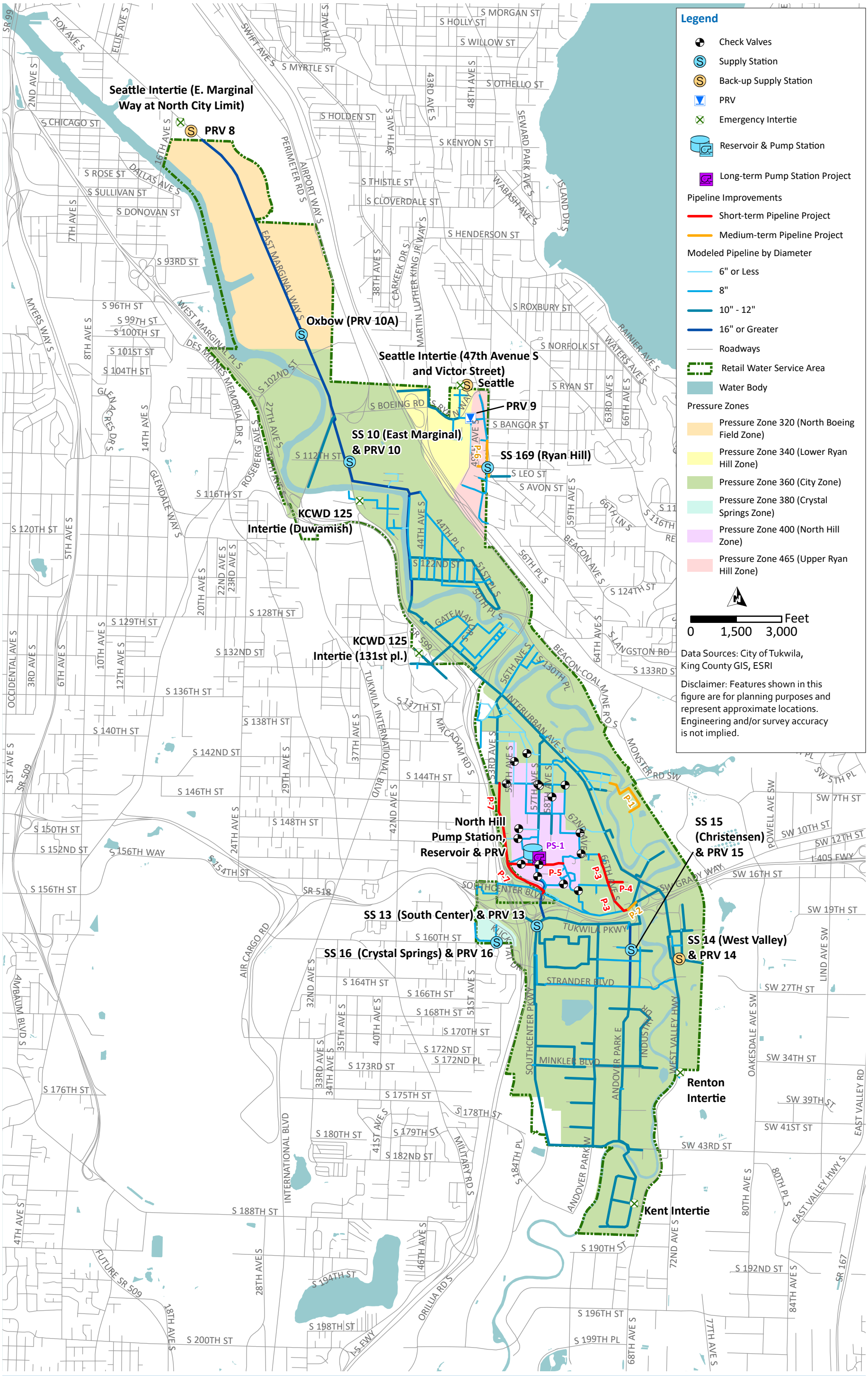


Figure ES.11 Specific CIP Project Priority

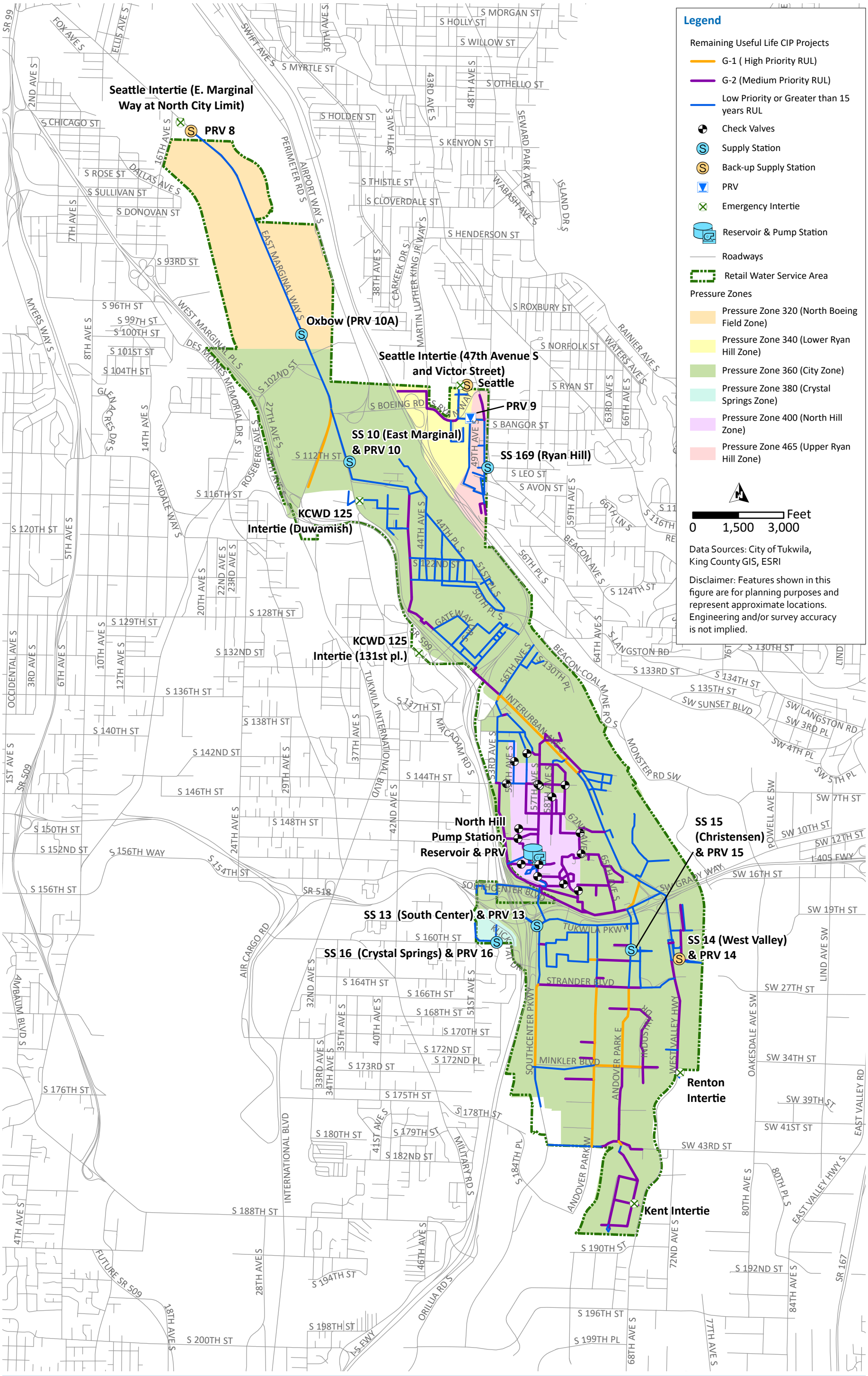


Figure ES.12 Remaining Useful Life CIP Projects

ES.10 Financial Program

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 debt repayment in each year and has been maintaining a level of reserves for emergency and future replacement.

Chapter 10 represents the financial program, including financial history, outstanding debt, fees, and charges, and capital improvement funding. The City's ten-year water financial plan proposed in Chapter 10 includes an additional rate increase of 2 percent in 2021, 5 percent in 2022 and 2023, and 6 percent per year from 2024 through 2030 for CIP, positive cash flow, and to rebuild the reserves.

Chapter 1

INTRODUCTION

1.1 Purpose

The City of Tukwila (City) prepared this Comprehensive Water System Plan (CWSP) to document the status and analyze the future needs of the water utility system. This CWSP is largely an updated version of the City's 2015 Plan. The purpose of this CWSP 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 CWSP is required to meet the regulations of the Washington State Department of Health (DOH) and the requirements of the Washington State Growth Management Act. This CWSP complies with the requirements of DOH as set forth in the Washington Administrative Code (WAC) 246-290-100, Water System Plan.

A well-developed planning document 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 CWSP was developed from May 2020 through February 2021. This CWSP will be used as a guide in maintaining and improving the water system in the short-term over the next ten years and also provide a planning framework over the long-term 20-year planning horizon.

1.2 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 CSWP. In 2020, the City selected Carollo Engineers to prepare the updated CSWP in accordance with applicable rules and regulations governing planning for water utility systems.

1.3 Objective

This CSWP has been prepared to serve as a guide for planning and designing the future water system. Identified in this CSWP are system improvements intended to meet the expanding and changing needs of the City. Specific objectives of this CSWP 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 Service Area 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.
- Evaluate future storage siting and corresponding necessary pipe upsizing improvements.
- Summarize the system improvements identified through the system analysis.
- Develop the recommended capital improvement program (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 State Environmental Policy Act (SEPA) and agency approval process.

1.4 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.

1.5 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.

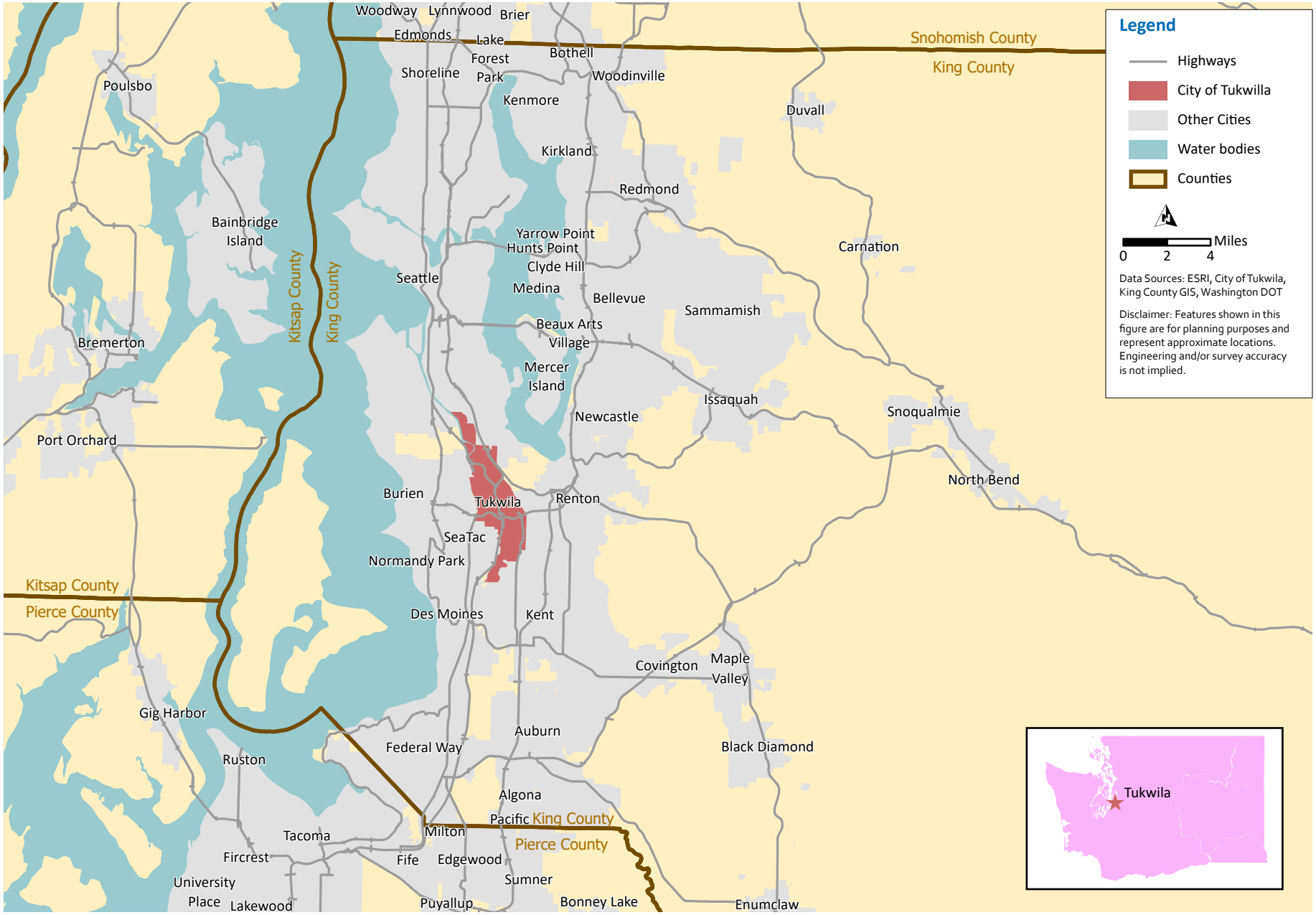


Figure 1.1 Vicinity Map

1.6 Ownership and Management

The City owns their water system (DOH ID 89500F) and serves the majority of the City as delineated by the Service Area. The Service Area boundary is 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:

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

The emergency contact for the water system is the Operations Manager, who can be reached at (206) 433-1863.

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 2015 Water System Plan Update: The previous Water System Plan provided evaluation of needs and recommended improvements to the City's system. The 2015 plan constitutes the basis for this CSWP.
- Comprehensive Plan, City of Tukwila Planning Department, 2015: 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 guide for designating the use of land, implementing flexible regulations, investing in infrastructure, and developing programs and 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, 2016 Water System Plan (Carollo Engineers).
- King County Water District No. 20, 2004 Comprehensive Water System Plan (CHS Engineers).
- King County Water District No. 125, Water System Plan 2016 (PACE Engineers, Inc.).
- Skyway Water and Sewer District, 2013 Comprehensive Plan.
- City of Renton, Water System Plan 2012 (Carollo Engineers, City of Renton).
- City of Kent, 2011 Water System Plan (PACE Engineers).
- City of Seattle, 2019 Water System Plan (Seattle Public Utilities).

1.8 Approval Process

This CSWP is required to meet state, county, and local requirements. It will comply with the requirements of the Washington State Department of Ecology (Ecology), the DOH, and the Revised Code of Washington (RCW) as shown in Table 1.1. The CSWP will address all comments and will be consistent with local government plans and regulations. The Local Consistency

Statement will be included in Appendix B. Additionally, the CSWP will be 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) will be prepared for this CSWP. The City anticipates this CSWP does not have probable significant adverse impacts on the environment in accordance with the DNS. Many of the projects that will be proposed within the CSWP will require subsequent project specific environmental review and SEPA checklists as part of their preliminary and final design process. The SEPA checklist and DNS will be included in Appendix A (to be inserted later).

The City will submit this CSWP to DOH, King County, adjacent utilities, and local governments for review. Comment letters will be attached in Appendix B (to be inserted later). As required by WAC 246-290-108, a local government consistency review checklist has been prepared and is included in Appendix C (to be inserted later).The Adopting Resolution will be included in Appendix D (to be inserted later), upon Plan approval by the City Council.

Table 1.1 WAC 246-290-100 Water Plan Requirements

Required	Content Description	Plan Location
	Description of Water System	
(✓)	Ownership and management	Section 1.6
(✓)	System history and background	Section 1.5, Chapter 2
(✓)	Inventory of existing facilities	Chapter 2
(✓)	Related Plans: CWSP, Comp./Community	Section 1.7
(✓)	Information & Maps: Service area, retail service area, designated land use and zoning, future comprehensive plan request for changes to land use, and agreements for plan approval period	Figure 2.1, Section 4.2, Figure 4.1, Figure 4.2
(✓)	Policies: Service area, SMA, conditions of service, annexation	Section 3.2, Table 3.1
(✓)	Duty to Serve requirement: identify process, timeframes, conditions, appeals	Section 3.2, Table 3.1
(✓)	Consistency from local planning agency	Appendix C
	Basic Planning Data	
(✓)	Current water use: Population, customer classes, and ERUs	Section 4.3, Section 4.4
(✓)	Demand forecast for plan approval period and a minimum of a 20 year period for population, service connections, and demand forecasts with and without expected efficiency savings	Section 4.5
(✓)	Monthly and annual production. Totals per source. Water supply characteristics and demand characteristics. Add subtitles with description and discussion on effect of water use.	Section 4.3
(?)	Annual usage for water supplied to other systems	N/A
(✓)	Annual usage by customer class	Section 4.3
(✓)	Historical water loss (DSL) – Percent and volumes	Section 4.3
(✓)	>1000, seasonal variations in consumption by customer class	Section 4.3

Required	Content Description	Plan Location
	System Analysis	
(✓)	Capacity analysis with water right self-assessment: Existing, plan approval period, and 20th year projections	Chapter 5
(✓)	System design standards	Chapter 3, Appendix P
(✓)	Water quality analysis	Chapter 7
(✓)	System inventory, description and analysis:	
(✓)	Source	
(✓)	Treatment	Chapter 5
(✓)	Storage	
(✓)	Distribution system/hydraulics	
(✓)	Summary of system deficiencies	Chapter 5
(✓)	Analysis of possible improvement projects	Chapter 5, Chapter 9
	Water Use Efficiency Program and Water Resource Analysis	
(✓)	Water Use Efficiency Program per WAC 246-290-810. <1,000 Estimate water savings from measures past six years	Chapter 6
(✓)	If DSL is > 10%, water loss control action plan required for compliance with a schedule and activities to minimize leakage in budget	Chapter 6
(?)	Source of supply analysis and evaluation of supply alternatives	Section 5.2
(?)	Interties	Chapter 2
( )	≥ 1,000 connections explore reclaimed water opportunities	Section 6.5
	Source Water Protection	
( )	Wellhead protection program	N/A
	Operation and Maintenance Program	
(✓)	Water system management and personnel	Section 8.2, Figure 8.1
(✓)	Operator certifications	Section 8.3
(✓)	Routine operating procedures and preventive maintenance	Section 8.4
(✓)	Water quality sampling procedures and program – Identify water quality public notification requirements	Section 8.4, Chapter 7, Appendix L, Appendix M, Appendix N
(✓)	CMP plan/map: Add RTCR and GWR narrative, actions	Section 7.2, Appendix L
(✓)	Emergency program, water shortage plan, service reliability per WAC 246-290-420	Section 8.7, Appendix O
(✓)	Address sanitary survey findings	Section 8.4
(✓)	Cross-connection control program – summarize next actions to address	Section 8.6, Appendix P
(✓)	Recordkeeping, reporting, and customer complaint program	Section 8.9
(✓)	Summary of O&M deficiencies	Section 8.11

Required	Content Description	Plan Location
	Distribution Facilities Design and Construction Standards	
(?)	Standard construction specification for distribution mains	Appendix P
	Improvement Program	
(✓)	Capital improvement schedule for the identified planning period and within a 20-year planning period at a minimum	Chapter 9
	Financial Program	
(✓)	Balanced budget for the planning period and demonstrating financial viability	Chapter 10
(✓)	Revenue and cash flow stability to fund capital and emergency improvements	Chapter 10
(✓)	Evaluation of affordable rate structure that encourages water demand efficiency. Budget line item if Water Loss Control Action Plan is required.	Chapter 10
	Miscellaneous Documents	
(✓)	Meeting of the consumers (documentation). Approval by EGB prior to DOH approval	Appendix D
(✓)	County/Adjacent Utility Correspondence	Appendix B, Appendix C
( )	≥ 1,000 connections – SEPA Determination	Appendix A
(?)	Agreements (intertie, service area, franchise, etc.)	Appendix F
(?)	Satellite Management Program	N/A

Notes:
Abbreviations: CMP - comprehensive master plan; DSL - distribution system leakage; EGB - elected governing board; ERU - equivalent residential unit; GWR - Ground Water Rule; N/A - not applicable; O&M - Operations and Maintenance; RTCR - Revised Total Coliform Rules; SMA - Satellite Management Area.

1.9 Acknowledgements

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

- Adib Altallal, Utilities Engineer/Project Manager.
- Hari Ponnekanti, City Engineer.
- Jason Bates, Water Superintendent.
- Bryan Still, Operations Manager.
- Roman Linsao, GIS Coordinator.
- Henry Hash, Public Works Director.

Chapter 2

EXISTING SYSTEM

2.1 Introduction

This chapter presents an overview of the City of Tukwila's (City's) existing water distribution facilities including the existing supply and transmission facilities, system interties, 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 2015 Comprehensive Water Plan.

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 44 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, retail water service area, and pressure zones is presented in Figure 2.1. A plotter-sized version of the City's existing water system can be found in Appendix H. Figure 2.2 presents the hydraulic profile of the system.

General water system facility data is summarized on the Washington State Department of Health's (DOH's) Water Facilities Inventory (WFI) form. Appendix E provides the City's 2020 WFI.

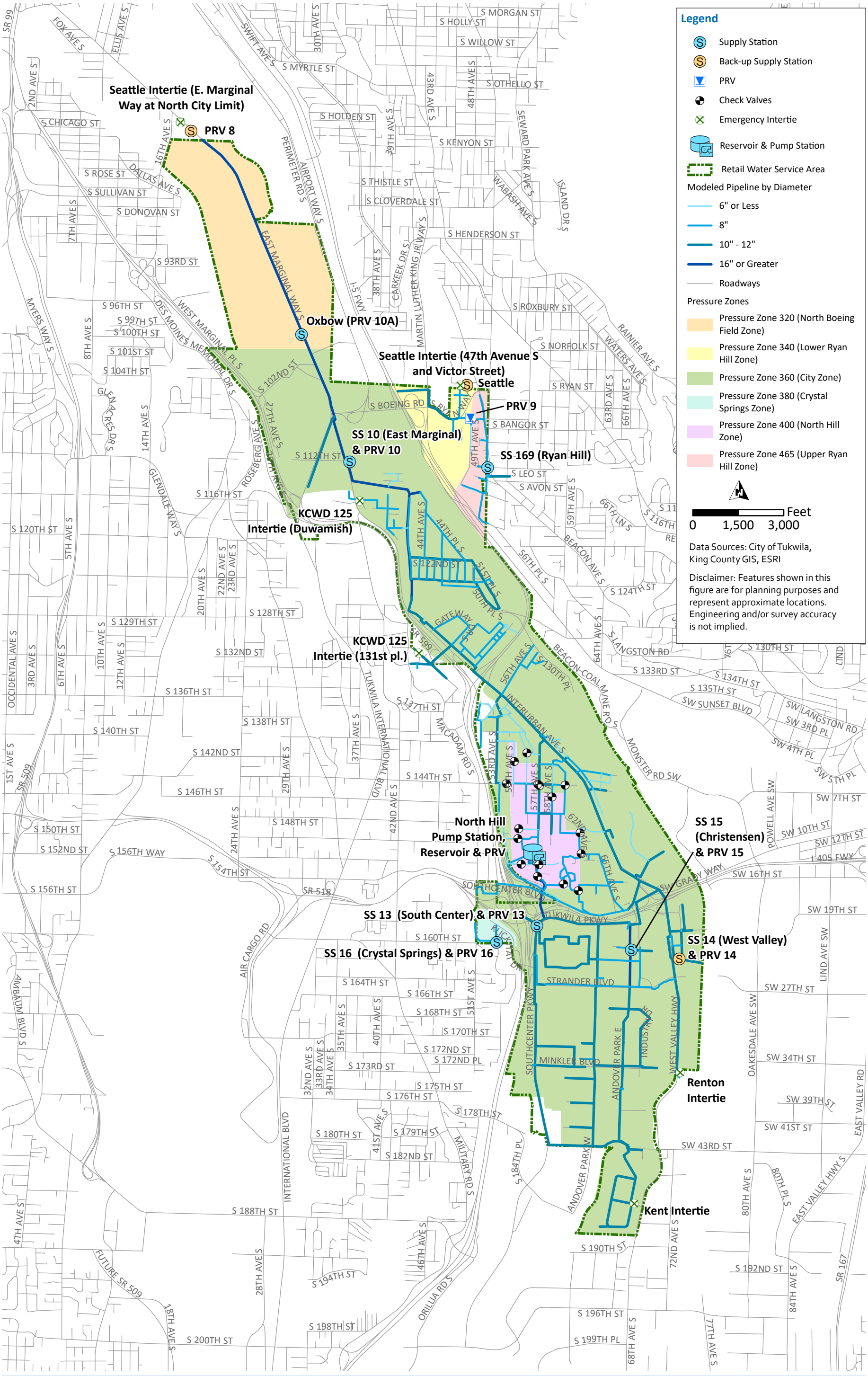
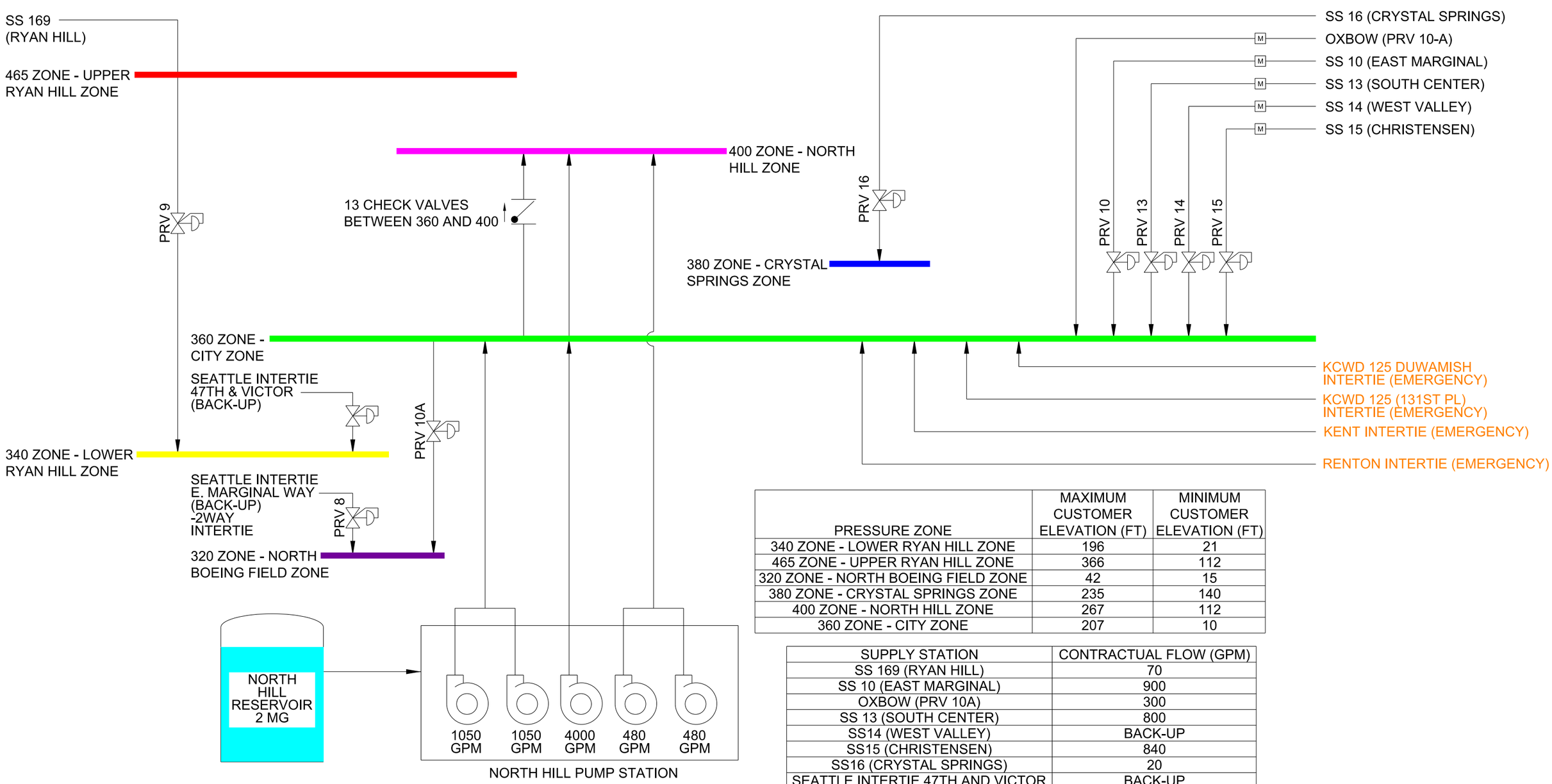


Figure 2.1 Existing System



PRESSURE ZONE	MAXIMUM CUSTOMER ELEVATION (FT)	MINIMUM CUSTOMER ELEVATION (FT)
340 ZONE - LOWER RYAN HILL ZONE	196	21
465 ZONE - UPPER RYAN HILL ZONE	366	112
320 ZONE - NORTH BOEING FIELD ZONE	42	15
380 ZONE - CRYSTAL SPRINGS ZONE	235	140
400 ZONE - NORTH HILL ZONE	267	112
360 ZONE - CITY ZONE	207	10

SUPPLY STATION	CONTRACTUAL FLOW (GPM)
SS 169 (RYAN HILL)	70
SS 10 (EAST MARGINAL)	900
OXBOW (PRV 10A)	300
SS 13 (SOUTH CENTER)	800
SS14 (WEST VALLEY)	BACK-UP
SS15 (CHRISTENSEN)	840
SS16 (CRYSTAL SPRINGS)	20
SEATTLE INTERTIE 47TH AND VICTOR	BACK-UP
SEATTLE INTERTIE E. MARGINAL WAY	BACK-UP

Note: Contractual flows are as stated in the "2nd Amended and Restated Declining Block Water Supply Agreement between the City of Seattle and the Cascade Water Alliance (Including Management Agreements #7 dated 7/15/2013 and #9 dated 3/27/2014)".

FIGURE 2.2
EXISTING SYSTEM HYDRAULIC PROFILE
Comprehensive Water System Plan
City of Tukwila

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2.2 Water Supply

The City's water system was first established in 1929 with the construction of a six-inch diameter steel water line to connect the City of Seattle's (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 King County Water District (KCWD) 125 and the City of Renton (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 Seattle under a declining block contract, with the first block of 30.3 million gallons per day (mgd) extending through December 31, 2023 (Appendix F). The City's water audit and agreement with Cascade can also be found in Appendix F.

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.

Appendix G includes the City's Water Rights Self-Assessment Form.

2.2.1 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.

2.2.2 Reclaimed Water

The City receives reclaimed water from King County's South Treatment Plant, located in Renton. Reclaimed water is defined by the Revised Code of Washington (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 6.

2.2.3 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.

2.3 Emergency Interties

The City maintains a network of emergency interties with KCWD 125, Renton, Seattle, and the City of Kent (Kent). These interties provide a network of redundant supplies that give the City operational flexibility under emergency conditions. Table 2.1 presents the City's existing system interties. The City's emergency intertie agreement with the Highline Water District was terminated in the first quarter of 2020.

Table 2.1 Emergency 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)
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

Note:
Abbreviation: psi - pounds per square inch.

2.3.1 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 gallons per minute (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 F. Two additional interties were subsequently added: a 3-inch and 8-inch intertie at South 116th Street and Interurban Avenue South.

2.3.2 Renton

In 1978, the City entered into an agreement with 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 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 F.

2.3.3 Seattle

The City has two emergency interties with Seattle. One intertie is at the boundary between the two cities on East 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 Seattle and the Cascade Water Alliance (Appendix F).

2.4 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 40 to 120 psi under maximum and average day demand conditions. Zone boundaries are shown in Figure 2.1 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 pressure reducing valves (PRVs). Supply Station (SS) 10 is located in the north and taps from the West Seattle Pipeline, while SS 13, SS 14, and SS 15 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 Interstate 5 (I-5) and Highway 518/Interstate 405 (I-405) junction. This zone is supplied through a PRV from SS 16 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 SS 169 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.

2.5 Existing Infrastructure

2.5.1 Supply Stations

The City's water system consists of seven supply stations and two emergency supply interties from Seattle's 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 2.2 presents the locations and sources of these

supply stations, the meter size, the contractual flow, and the actual flow based on the existing infrastructure.

Table 2.2 Supply Stations

Supply Station	Source	Location	Meter Size (inches)	Contractual Flow (gpm)
SS 169 (Ryan Hill)	CRPL 3	Beacon Avenue S. & S. Leo Street	8	70
SS 10 (East Marginal)	WSPL	E. Marginal Way & S. 112th Street	12	900
Oxbow (PRV 10a)	WSPL	10190 E. Marginal Way	12	300
SS 13 (South Center)	CRPL 4	Southcenter Parkway & Tukwila Parkway	10	800
SS 14 (West Valley)	CRPL 4	West Valley Highway & S. 158th Street	8	Back-Up(1)
SS 15 (Christensen)	CRPL 4	Christensen Rd. & Black Drive	8	840
SS 16 (Crystal Springs)	CRPL 4	S. 158th Street & 53rd Avenue S.	6	20
SEATTLE	CRPL 3	47th & Victor	6	Back-Up(1)
PRV 8	CRPL 3	E. Marginal Way & Seattle City Limits	12	Back-Up(1)

Note:
(1) Back-up supply sources are not primary supply sources.

2.5.2 Piping System

According to the City's recently compiled data, the City has approximately 44 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, polyvinyl chloride (PVC), and steel. An inventory of the existing waterlines in the City's system, excluding private laterals, is provided in Table 2.3. 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 78 percent of the system.

Table 2.3 Existing Pipe Lengths by Diameter and Material(1)

Diameter	Length (ft)					Percentage
	Cast Iron	Ductile Iron	Steel	Unknown	Total	
2-inch	1,377				1,377	0.6%
4-inch		293			293	0.1%
6-inch	15,318	2,916			18,234	7.9%
8-inch	43,651	39,427			83,078	35.8%
10-inch	21,780	7,683	319		29,781	12.8%
12-inch	25,088	26,399	512		52,000	22.4%
16-inch		6,440			6,440	2.8%

Diameter	Length (ft)					Percentage
	Cast Iron	Ductile Iron	Steel	Unknown	Total	
18-inch		17,255			17,255	7.4%
Unknown	1,853	40	828	20,998	23,719	10.2%
Total	109,067	100,452	1,659	20,998	232,178	100.0%
Percentage	47.0%	43.3%	0.7%	9.0%	100.0%	

Note:
Abbreviations: ft - feet; GIS - geographic information system.
(1) Source: Data from GIS received April 17, 2020 (Water_Line layer, Owner = COT, Type = M).

2.5.3 Storage Reservoirs

The City water system currently operates 2 million gallons (MG) of storage at North Hill (15045 57th Avenue South), which is supplied by SS 13 and 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 2.4 provides a summary of the North Hill Reservoir.

Table 2.4 North Hill Reservoir

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

2.5.4 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 2.5 presents a summary of the existing pumping facilities.

Table 2.5 North Hill Pump Station

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

Note:
Abbreviation: HP - horsepower.

2.5.5 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 2.6. Table 2.7 lists the check valve inventory.

Table 2.6 Pressure Reducing Valves

PRV Name	Elevation (ft)	Size (inches)	Pressure Setpoint (psi)	Location and Comments
320 Zone				
PRV # 10A	16	16	115	E. Marginal Way & S. Norfolk St.; Active Running
		4	125	
PRV # 8	18	14	118	E. Marginal Way at north City limit; Seattle Emergency Intertie
340 Zone				
PRV # 9	200	8	50	S. 107th St. & 49th Avenue S.; Active Running
		3	55	
		1/2	60	
Seattle Intertie	188	6	42	47th Avenue S. and Victor Street; Seattle Emergency Intertie
		2	N/A	
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	150	
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	
		1/2	N/A	

Table 2.7 Check Valves

Location	Size (inches)	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

2.6 Summary of Updates to System Since 2015 Plan

The following is a list of updates and improvements completed by the City since the completion of the last Comprehensive Water System Plan in 2015:

- Water Reservoir – Siting Study (2014).
- Water Pipeline Asset Management Program (2014).
- Water Resource Inventory Area (WRIA) 9 Watershed Plan (2014).
- Andover Park West Water Main (2015).
- Water Asset Management Update (2016).
- 58th Ave S Water Line Replacement – Base Map (2016).
- Water Reservoir & Pump Station Feasibility Study (2018).
- Andover Park East (APE) Water & Sewer Replacement (2019).
- Andover Park West Water Main Improvements (2019).
- APE Water Improvements – Design (2019).
- Martin Luther King Jr Way S Water Main – Design (2019).
- Macadam Rd S Water Upgrade – Design (2019).
- GIS Inventory Water (2019).
- Installation of chlorine analyzers at SS 10A and SS 9 (2020).
- Installation of supervisory control and data acquisition (SCADA) at SS 9 for monitoring pressure and flow (2020).
- 52nd Ave S / 53rd Ave S Water Main Improvements (2021).

Chapter 3

POLICIES AND CRITERIA

3.1 Introduction

The City of Tukwila (City) manages and operates its water system in accordance with all known federal, state and local regulations. The City guides the development and financing of the infrastructure required for water services and ensures consistency in service levels and customer relations. While the City has discretion in setting the performance, design criteria, and standards for its water system, these must meet or exceed the minimum standards for public water supplies set by the Washington State Department of Health (DOH) through Washington Administrative Code (WAC) 246-290. Together, policies and criteria provide the desired level of services to utility customers.

The policies described in this chapter are established by the City to provide the framework for planning, designing, operating, and managing its system. In addition, the City has a compilation of substantial rules of general applicability and statements of general policy or interpretations adopted by the City Council, that are not included in this Comprehensive Water System Plan (CWSP). The goal of the policies in this CWSP is to provide uniform treatment to all City customers and to provide documentation of the commitments to existing and potential water system customers.

The policies that govern the City's water system are based on City policies as defined in the City of Tukwila Comprehensive Plan (2015) and the water system design criteria as defined by the City. The policies and criteria relevant to the City's water system are summarized in this chapter and are organized according to the following categories:

- Service policies.
- Source criteria.
- Booster pump station criteria.
- Distribution storage criteria.
- Fire flow requirements.
- Financial policies.

3.2 Service Policies

The City's water system service policies are outlined in Table 3.1. The service policies consist of policies relating to the service, growth, and management of the City's water system.

Table 3.1 Service Policies

Subject	Policy	Source
Policies for City Managed Utilities - Service Extension	• Ensure that the City utility functional plans and operations meet applicable federal, State, regional and county requirements and regulations to address health and safety requirements, address deficiencies, and assure quality of service. • Require the use of the City's applicable service standards to design and construct all utility service extensions. • Base the extension and sizing of utility system components on applicable design standards and Comprehensive Plan development priorities. • Ensure that new development, redevelopment, and other actions within the City's jurisdiction do not cause significant adverse upstream or downstream impacts on flooding, erosion, and natural resources within and outside of the City's jurisdiction. • Details for this policy remain by Public Works director's direction.	Comprehensive Plan (2015), Policies 12.1.1 - 12.1.4
Policies for City Managed Utilities - Coordination of Service Providers	• Coordinate with service providers for reliable and cost-effective utility services to the public. • 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 by or within the Districts occur, or to achieve efficiencies and minimum levels of service for customers of the Districts. • Allow utility service outside City boundaries only when required by adjustments to City limits or to provide temporary service due to 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 City residents and businesses, when appropriate.	Comprehensive Plan (2015), Policies 12.1.5 - 12.1.11

Subject	Policy	Source
Policies for City Managed Utilities - Concurrency and Implications for Growth	• 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 (2015), Policies 12.1.12 - 12.1.13
Policies for City Managed Utilities - Environmental Sustainability	• Provide environmentally sound and sustainable 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. • Promote energy efficiency, conservation methods, and sustainable energy sources in utility operations to support climate change reduction goals. • Consider the City's Urban Forest together with other infrastructure systems – during utility planning, design, installation and/or maintenance – to ensure that trees are protected.	Comprehensive Plan (2015), Policies 12.1.14 - 12.1.17
Policies for City Managed Utilities - Residential Neighborhood and Sub-Area Vitality	• Give priority to the City's regional growth and manufacturing/industrial centers, while balancing the needs of residential neighborhoods for City-planned utility improvements and extensions. • Design, construct and maintain facilities to minimize impacts on adjacent neighborhoods and businesses.	Comprehensive Plan (2015), Policy 12.1.18 - 12.1.19
Policies for City Managed Utilities - Water Utility	• Actively participate in determining a regional solution to the City's water supply and addressing the potential impacts of climate change on regional water resources. • Provide safe, reliably-maintained and sustainable water service for domestic, commercial, industrial, fire flow and water emergency uses to meet present and future needs.	Comprehensive Plan (2015), Policy 12.1.20 - 12.1.21

Subject	Policy	Source
Policies for Non-City Owned Utilities	• Actively coordinate project implementation with individual utilities, based on the City's Comprehensive Plan and development regulations. • Require new development that uses non-City-owned water and sewer utilities to obtain a letter of service availability as a condition of receiving a City permit. • 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 federal, State, and local regulations. • Encourage utilities to consolidate facilities, use existing transportation corridors, and minimize visual impacts of facilities, where technically feasible. • Encourage communication between the City, the Washington Utilities and Transportation Commission, and the utilities regarding cost distribution and rate-setting for existing and proposed facilities and services. • All new electrical and communication facilities shall be constructed underground, unless specifically exempted by the City Municipal Code or determined by the City Council to be financially impractical. • If a utility relocation is required by a public works project – such as a street widening project, utility repairs or upgrades – or any major replacement of aerial facilities, the relocated/replaced facilities shall be underground, unless the City determines that doing so is not in the best interest of the public.	Comprehensive Plan (2015), Policy 12.1.30 - 12.1.36
Annexation -	Proposed annexations have been largely accomplished, and remaining annexation-related issues are addressed through policies in the "Community Image and Identity" and "Tukwila South" elements of the 2015 Comprehensive plan update.	

Subject	Policy	Source
Policies for City Managed Utilities - Duty to Serve and Timely and Reasonable Service	The City 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, DOH 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: • 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

Note:
Abbreviations: RCW - Revised Code of Washington; GMA – Growth Management Act.

The City has a policy regarding private wells in Section 7.0.4 of their Infrastructure Design and Construction Standards stating that "New private wells or sources of water will not be allowed. Existing facilities covered by a current water right permit form 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".

It is recommended that this policy be included as a codified ordinance in the Tukwila Municipal Code in Chapter 14.04 Water Rates and Regulations.

3.3 Sources Criteria

The City's water source criteria are outlined in Table 3.2. The source criteria are based on the DOH Water System Design Manual (2019 Update).

Table 3.2 Sources Criteria

Subject	Policy	Source
Source Criteria	The system must be able to meet the water system's MDD. For reliability purposes, supply sources should be able to replenish deleted fire suppression storage within 72 hours (or sooner if required by the local fire authority) while concurrently supplying the MDD of the water system.	DOH Water System Design Manual (2019 Update), Section 5.4

Note:
Abbreviation: MDD - maximum day demand.

3.4 Booster Pump Stations Criteria

The City's booster pump station criteria are outlined in Table 3.3. The booster pump station criteria are based on the DOH Water System Design Manual (2019 Update).

Table 3.3 Booster Pump Stations Criteria

Subject	Policy	Source
Reliable Power Supply	Reliable power supply is defined as follows: • Frequency: On average, three or fewer power outages occur per year based on data for the three previous years, and no more than six outages occur in a single year. Power loss for 30 minutes or more qualifies as an outage. • Duration: On average, outages last less than four hours based on data for the three previous years, and no more than one outage exceeded eight hours during the same timeframe.	DOH Water System Design Manual (2019 Update), Section 5.11.1
Minimum pressure at Pump Station	System should provide a minimum of 30 psi at the intake of the pumps under PHD or a minimum of 20 psi under fire flow-plus-MDD-rate conditions.	DOH Water System Design Manual (2019 Update), Section 8.1

Note:
Abbreviations: psi - pounds per square inch; PHD - peak hour demand.

3.5 Distribution Storage Criteria

The City's distribution storage criteria are outlined in Table 3.4. The distribution storage criteria are based on the DOH Water System Design Manual (2019 Update) and the City's 2015 Water System Plan Update.

Table 3.4 Distribution Storage Criteria

Subject	Policy	Source
Storage Alarms	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 (2019 Update), Section 7.5.2
Storage Components	Storage facilities will be sufficient to provide the following storage components: • Operational Storage. • ES: Based on the following equation (DOH Equation 7-1) and must be able to provide PHD at no less than 30 psi: $ES = (PHD - Qs)(150\ minutes)$ where Q_s is the sum of all installed and active supply source capacity except emergency supply. • Standby Storage: A minimum standby volume of 200 gallons per ERU is provided regardless of the capacity of the sources available. • FSS: Based on the following equation (DOH Equation 7-3) and must be sufficient to ensure that fire suppression service will be available while not allowing pressure to drop below 20 psi at any service connection: $FSS = (FF)(tm)$ where FF is the required fire flow rate and tm is the duration of FF rate.	DOH Water System Design Manual (2019 Update), Section 7.1.1; Water System Plan Update, 2015

Note:
Abbreviations: ERU - equivalent residential unit; ES - equalizing storage; FF - fire flow; FSS - fire suppression storage.

3.6 Distribution System Criteria

The City's distribution system criteria are outlined in Table 3.5. The distribution system criteria are based on the DOH Water System Design Manual (2019 Update), the City's Infrastructure Design and Construction Standards, and the City's 2015 Water System Plan Update.

Table 3.5 Distribution System Criteria

Subject	Policy	Source
Pipe Looping	If possible, for purposes of meeting fire protection and water quality standards, water systems are to be looped.	City of Tukwila Infrastructure Design and Construction Standards 7.0.6.
Pipe Velocities	Design velocities for new water mains will be less than or equal to 10 fps, under maximum flow conditions.	City of Tukwila Infrastructure Design and Construction Standards 7.2.1.3.

Subject	Policy	Source
Flushing Pipe Velocities	All pipelines should be capable of being flushed at a flow velocity of at least 3.0 fps.	DOH Water System Design Manual (2019 Update), Section 6.4.3
Pipe Corrosion Protection	All mains and distribution lines should be constructed with appropriate internal and external corrosion protection.	DOH Water System Design Manual (2019 Update), Section 6.3.6
Pipeline Diameters	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.	City of Tukwila Infrastructure Design and Construction Standards 7.2.1
Minimum Pressure during PHD	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 (2019 Update), Section 6.2.3
Pressure Ranges	Distribution system pressures would optimally be maintained between 40 psi and 120 psi during ADD	Water System Plan Update, 2015

Note:
Abbreviations: ADD - average day demand; fps - feet per second.

3.7 Fire flow Requirements

The City's fire flow requirements are outlined in Table 3.6. The fire flow requirements are based on the 2015 Water System Plan Update, the DOH Water System Design Manual (2019 Update) and the International Building Code.

Table 3.6 Fire Flow Requirements

Subject	Policy	Source
Fire Flow Criteria	The City has established minimum fire flow criteria of: • 1,000 gpm for all residential areas and • 1,500 gpm for all commercial areas. Fire flows may be higher in specific areas as designated by the City. 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, 2015
Minimum Pressure during Fire Flow	Fire flows are to be provided at MDD while maintaining a minimum system pressure of 20 psi.	Water System Plan Update, 2015; DOH System Design Manual (2019 Update), Section 6.2.2.

Subject	Policy	Source
Fire Flow Requirements	The time duration for which a fire flow is to be provided is based on the quantity of fire flow required as described below: • 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

Note:
Abbreviation: gpm - gallons per minute.

3.8 Financial Policies

The City's financial policies related to the water system are outlined in Table 3.7. The financial policies are consistent with the City's 2015 Comprehensive Plan.

Table 3.7 Financial Policies

Subject	Policy	Source
Capital Facilities - General Policies	• The City shall use non-capital and regionally-shared capital options to meet its public facility needs when there are financial or space economies of scale to be gained. • The City's management of its capital facilities shall follow this order: 1. Regular inspection of systems for evaluation and to ensure conformity with current safety standards; 2. Prioritizing projects when making improvements, if the public health and safety is at risk; 3. Preventive maintenance and cost-effective replacement of aging elements; and 4. Planning for the orderly extension and upgrading of capital systems. • Projects listed for the 7–20 year time frame shall be generally developed, described, estimated and evaluated using Comprehensive Plan goals, while projects in the six-year CIP/FPM shall be more specifically described. • The City shall ensure that capital facilities are provided within a maximum of six years of the occurrence of impacts that will degrade standards. • Prioritize and fund residential street improvements whenever financially feasible. • A dedicated facility fund and allocation for building needs shall be included in the CIP/FPM. • Continue to fund the correction of single-family residential neighborhood infrastructure deficiencies, including transportation, surface water, sewer and water, through interfund loans or general fund transfers, in order to address emergency and public health and safety issues. • No capital improvement projects located outside the city limits shall be approved without specific City Council approval.	Comprehensive Plan (2015), Policies 14.1.1 - 14.1.8
Capital Facilities - Paying for Facilities	• If the City determines that the public's health, safety and welfare will be benefited, or if funding is available through external sources such as development or grant funds, the City shall allocate funding for preliminary engineering and design of commercial and residential street projects. • Late-comer agreements shall be considered an acceptable means of funding capital projects, improvements and replacements, in whole or in part when requested by a developer. • The City shall initiate property negotiations in all projects with a request for donation of the property needed for rights-of-way and easements. • Arterial street improvements listed in the six-year CIP/FPM may be funded through a LID or financing external to the City. The City may participate using operating revenues, grants or bonds, based on health and safety needs or public benefit. • The City shall consider paying for local improvement district formation costs in addition to the preliminary and construction engineering costs, in order to provide a more timely option for residential street improvements. To initiate this action, a majority of affected property owners must petition the City for creation of a local improvement district. Residents shall pay the other costs such as: for undergrounding utilities in the street and undergrounding from the street to their house; for the actual construction contract cost; and for any improvements on private property such as rockeries, paved driveways, or roadside plantings. Both the process and requirement for initiating a local improvement district by petition are set forth in State and local law.	Comprehensive Plan (2015), Policies 14.1.9 - 14.1.22

Subject	Policy	Source
Capital Facilities - Paying for Facilities *(continued)*	• The City shall, whenever practical and advantageous, apply for grants, loans or other external financing sources. Grant applications for capital facilities shall be made: – Only for projects listed in the CIP/FPM, and – After approval of the appropriate Council Committee, who shall report to the full Council on any pending grant. • Full Council approval is required for any grant acceptance. • The City shall continue to target a minimum of 33% of total sales tax proceeds to pay for capital projects. • Transportation, fire and parks impact fees shall be collected so that "growth may pay for growth" and growth-caused improvements may be constructed. • Impact fees shall be adjusted periodically based upon an appropriate capital cost index and/or other relevant data, to ensure that the fees reflect the cost of planned system improvements related to growth and shall be subject to City Council approval. • The City shall consider issuance of bonds for facilities, if repayment can be made from revenue allocations and if it is more cost-effective. • The City shall consider projects identified in the CIP/FPM for general operating revenues if substantial funding from grants, developers, other jurisdictions or other funding sources becomes available. • Non-transportation capital projects and improvements (i.e., new fire station, parks, trails, City offices) shall be funded by general revenues, impact fees, grants or bonds as determined in the biennial CIP/FPM review process. • The first 1/4-cent real estate transfer tax shall be dedicated to park and open space land acquisition. The second 1/4-cent tax, along with the parking tax revenues, shall be used for arterial streets.	
Capital Facilities - Prioritizing Facility Construction	• Residential streets with safety issues, high traffic volumes, high pedestrian activity and poor roadway conditions shall be considered the highest priority projects. • Capital improvements shall be coordinated, whenever feasible, with related improvements by other jurisdictions. • Transportation improvements shall be coordinated with related improvements such as utility, landscaping, sidewalks, etc. • Capital facility projects shall be prioritized using Comprehensive Plan and Strategic Plan goals and policies.	Comprehensive Plan (2015), Policies 14.1.23 - 14.1.26
Capital Facilities - Financial Planning and Plan Maintenance	• Capital planning decisions shall be linked to City-wide goals, by tracking actual growth and evaluating growth targets and level-of-service standards. • The CIP/FPM shall be updated biennially and include reviews of forecasts and actual growth, revenue and cost totals. • Capital Facility policies shall be reviewed biennially during revisions to the CIP/FPM. Desirable changes shall be implemented during the annual Comprehensive Plan amendment process. • Policies and practices of sound governmental budgeting and accounting principles, revenue diversity, and promoting the economic well-being of the City shall be used, in order to maintain an A-1 bond rating or better for the City. • In the event that anticipated funding falls short of meeting existing and/or anticipated needs, the City shall reassess and revise the following, as needed: – The land uses in the Comprehensive Plan; – Funding alternatives; and/or – The level of service standards of the City.	Comprehensive Plan (2015), Policies 14.1.27 - 14.1.31

Subject	Policy	Source
Capital Facilities - Enterprise Funds Policies	• Utility rates and charges shall be structured to ensure adequate infrastructure development, in addition to compliance with operation, maintenance, and federal and State requirements. • Adequate reserved working capital balances shall be maintained for each enterprise fund's annual expenditures. The fund balance for enterprise funds, at the close of each fiscal year, shall equal or exceed 20% of the previous year's revenue, exclusive of significant nonoperating, non-recurring revenues such as real estate sales, transfers in from other funds, or debt proceeds. • Rate increases shall be small, applied frequently, and staggered to avoid an overly burdensome increase and undue impact in any given year. • Each enterprise fund shall be reviewed at least biennially and shall have a rate structure adequate to meet its operations & maintenance and long-term capital requirements. • Rate increases of external agencies (i.e., King County secondary wastewater treatment fees) shall be passed through to the users of the utility. • For safety and health reasons, the City shall provide sewers to all residential and commercial areas in the City's service area by using a combination of operating revenues, grants, loans, bonds, voluntary local improvement district formations, and/or interfund loans. • Interfund loans shall be permissible if practical. Interest rates shall be computed based on the discounted market rate that is based on the US Treasury note rate(s) corresponding to the term of the loan, in order to adequately compensate the loaning fund. • When there is a general long-term benefit to the respective enterprise fund and its customers, the City shall use bonded indebtedness as a funding alternative.	Comprehensive Plan (2015), Policies 14.1.32 - 14.1.39
Capital Facilities - Level-of-Service Standards	• Sufficient system capacity for surface water, water, sewer and transportation is required prior to approval of any new development. (Standards for surface water, water and sewer are codified in the City's Municipal Code, and the transportation standards are in the Transportation Element of this Plan.) New development must pass the concurrency tests before development may be permitted. • The City shall monitor the capacity and maintain the water, sewer, surface water and transportation systems at the adopted standards	Comprehensive Plan (2015), Policies 14.1.40 - 14.1.41

Note:
Abbreviations: CIP - capital improvement program; FPM – financial planning model; LID – low impact development.

Chapter 4

WATER REQUIREMENTS

4.1 Introduction

The purpose of this chapter is to present historical water data from 2010 to 2019, and provide projections for the planning period of 2020 to 2040 for the City of Tukwila (City). Historical water purchase and consumption and Puget Sound Regional Council (PSRC) demographic projections data were used to develop the demand projection parameters used to estimate the City's water demands through the planning period. The future water demands are used for the analysis of the water system and for development of the recommended capital improvement program (CIP).

4.2 Land Use

The City's water service area encompasses the majority of the Tukwila city limits. The City is predominantly manufacturing industrial in the north section, residential in the middle section, and commercial in the southern section.

Figure 4.1 shows the City's existing land use, while Figure 4.2 shows future land use based on zoning of the City. For this Comprehensive Water System Plan (CWSP), the City's zoning and land use data was compiled into 16 land use designations as follows:

- Low Density Residential.
- Medium Density Residential.
- High Density Residential.
- Mixed Use Office.
- Office.
- Residential Commercial Center.
- Neighborhood Commercial Center.
- Regional Commercial.
- Regional Commercial Mixed Use.
- Commercial Light Industrial.
- Light Industrial.
- Heavy Industrial.
- Manufacturing Industrial Center/Light Industrial.
- Manufacturing Industrial Center/Heavy Industrial.
- Tukwila Valley South.
- Tukwila Urban Center.

Much of the number of City's vacant parcels are zoned for single-family, but the majority of the acreage of vacant parcels is zoned for commercial purposes.

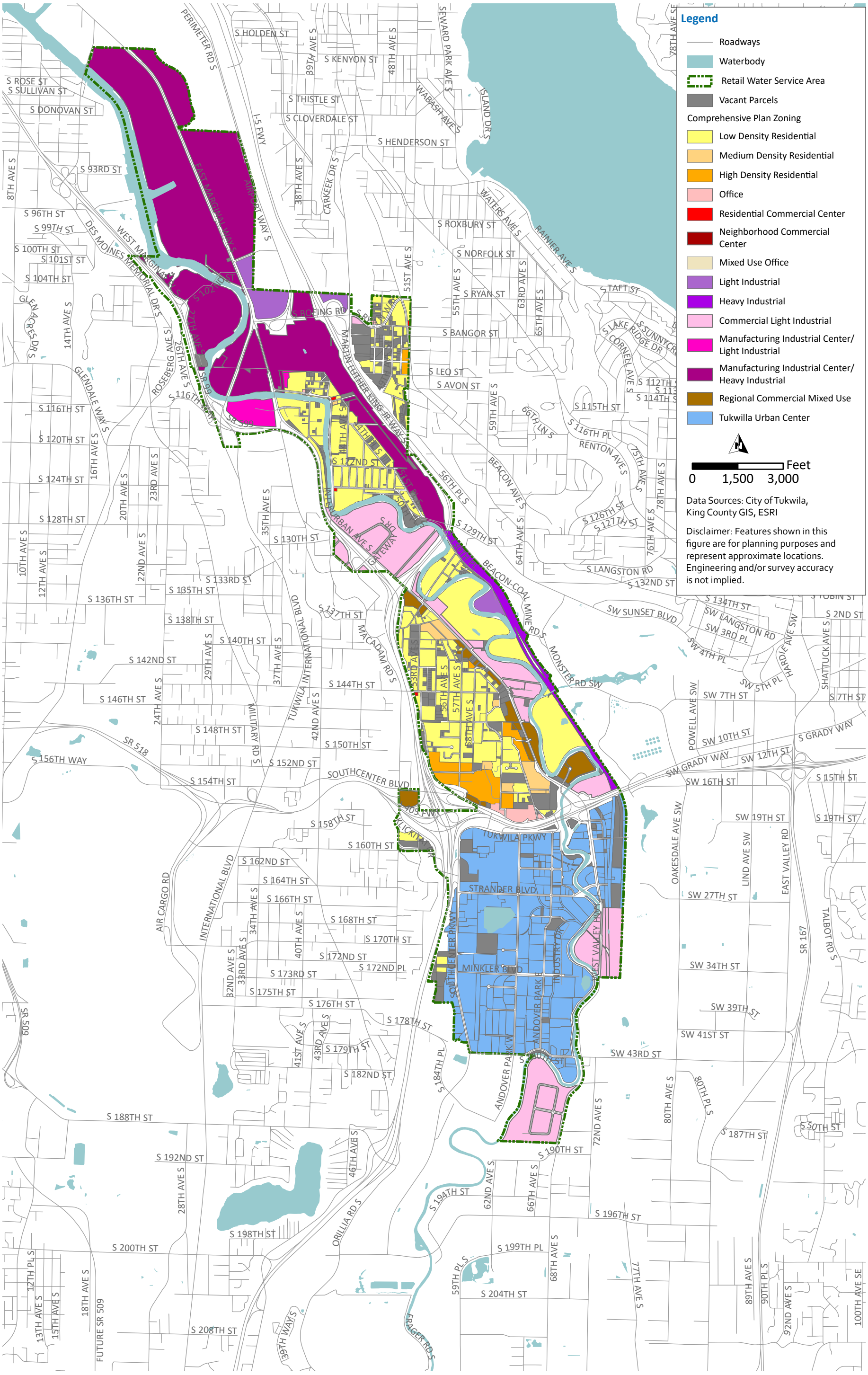

Figure 4.1 Existing Land Use

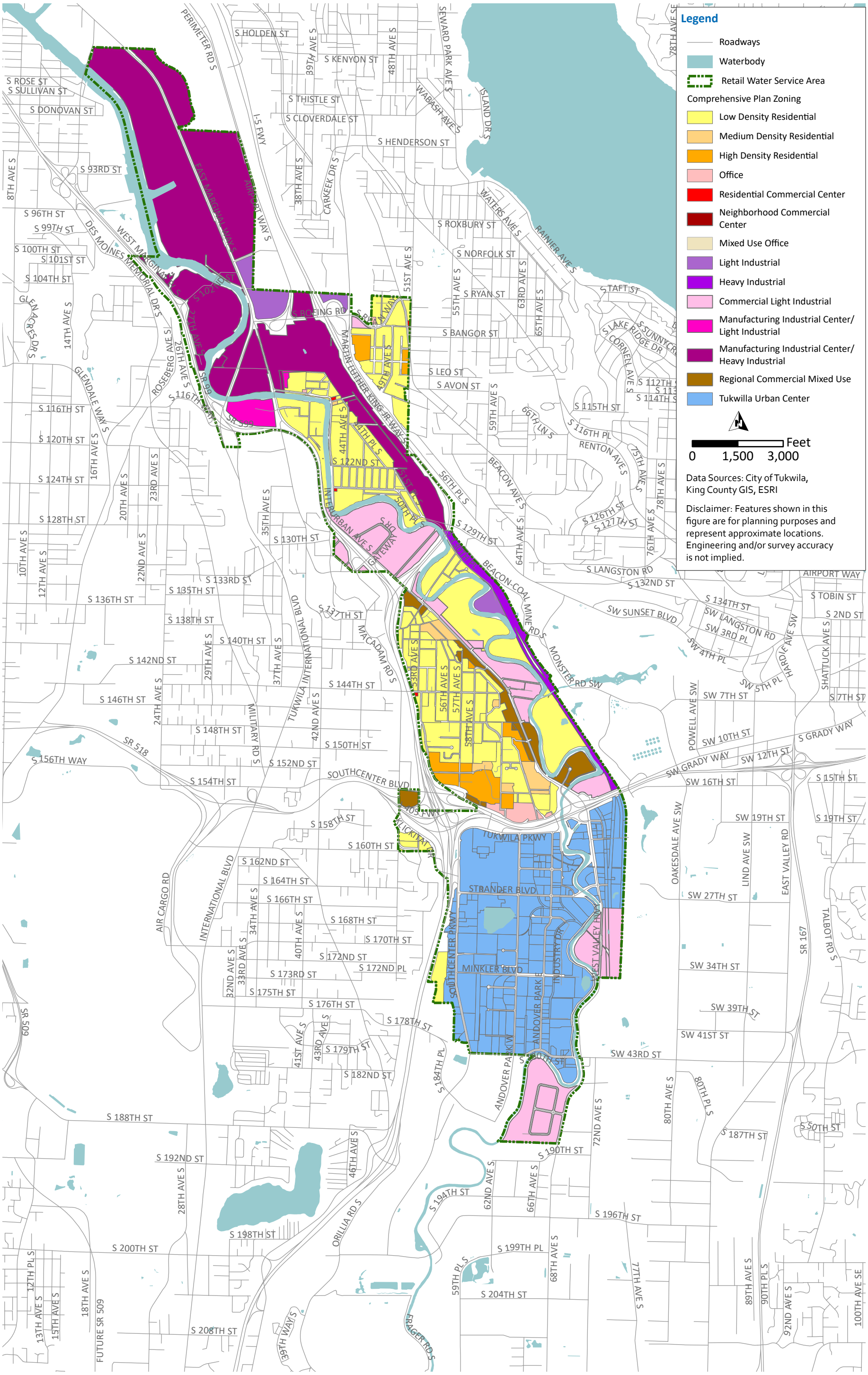

Figure 4.2 Future Land Use Based on Zoning

4.3 Historical Supply and Consumption

The City purchases all of its water from Cascade Water Alliance (Cascade) through its supply taps, as summarized in Chapter 2. This section presents the historical water purchase and consumption including number of water service accounts.

4.3.1 Historical Water Purchase

The annual quantity of water purchased (in million gallons [MG]) by source from 2010 through 2019 is summarized in Table 4.1. Note, water purchase data in 2017 and 2018 is not included in the CWSP due to issues with the City's intertie with the Highline Water District.

Table 4.1 Historical Annual Water Volume Purchase by Supply Tap (MG)

	2010	2011	2012	2013	2014	2015	2016	2019
Oxbow (PRV 10a)	8.4	8.0	7.7	8.4	7.2	6.6	7.9	5.4
SS 169 (Ryan Hill)	13.4	10.0	9.9	10.1	11.3	10.1	10.6	12.0
SS 10 (East Marginal)	152.6	289.1	279.0	262.3	201.8	220.0	161.3	149.4
SS 13 (South Center)	3.3	0.1	0.0	0.2	0.4	0.4	165.6	0.2
SS 15 (Christensen)	509.8	397.7	408.3	431.0	502.7	517.5	373.7	475.4
SS 16 (Crystal Springs)	0.6	0.5	0.5	0.5	0.5	0.6	0.6	1.1
TOTAL	**688**	**705**	**705**	**712**	**724**	**755**	**720**	**644**

Notes:
Abbreviation: PRV - pressure deducing valve.
(1) Historical data from 2017 and 2018 is not included.
(2) The Allentown #11 and West Valley #14 supply taps were not used in 2010 to 2019.

Table 4.1 shows that the SS 10 (East Marginal) and SS 15 (Christensen) sources supplied the majority of the City's water from 2010 through 2019. Table 4.1 also shows that the City's historical water use peaked in 2015 with 755 MG purchased.

Figure 4.3 shows the monthly water purchase by supply tap for 2019 to show the seasonal fluctuations in water use where water use is higher in the summer months and lower in the winter months.

4.3.1.1 Average Day Demand

The Average Day Demand (ADD) is a water system's average daily demand for a year. To calculate ADD, the total water purchased by the City in a year is divided by the number of days in a year. Figure 4.4 show ADD values for 2015 through 2019, excluding 2017 and 2018 data. The City's average historical ADD from the last five years is 1.93 million gallons per day (mgd).

4.3.1.2 Maximum Day Demand

Historical Maximum Day Demand (MDD) values are the largest water purchase in a single day in a given year, usually during the summer when irrigation use is highest. MDD must be established to determine system requirements for supply capacity and storage capacity. Figure 4.4 shows the City's recorded MDD and date of occurrence. As shown in the figure, MDD has fluctuated around 3.2 mgd with no definitive trend moving up or down.

The historical MDD to ADD peaking factor is a key parameter used to develop future MDD projections and is shown in Figure 4.4. The City's average MDD to ADD peaking factor is 1.77, while the peaking factor fluctuated between 1.74 in 2016 to 1.79 in 2015, showing limited variation.

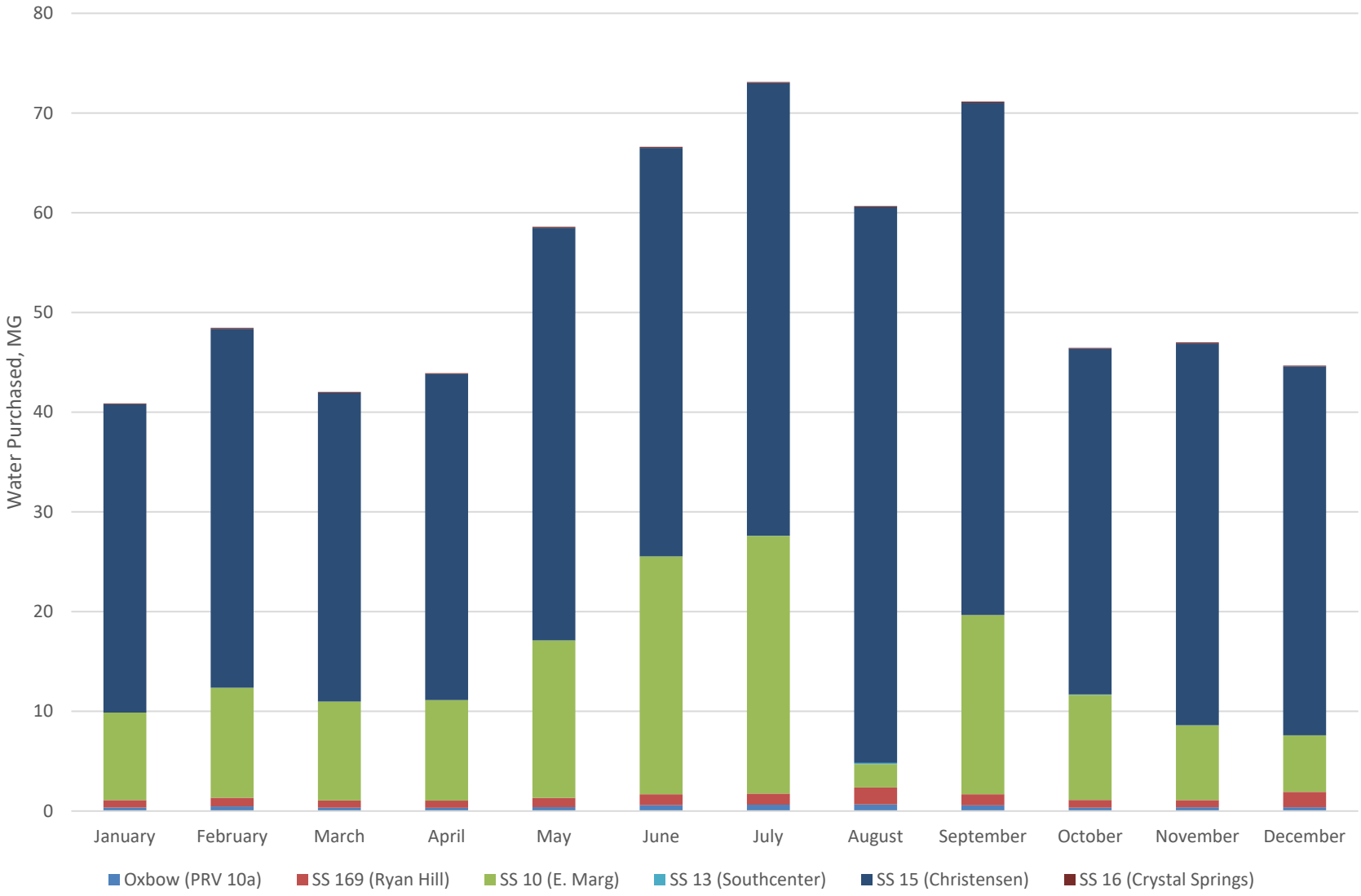

Figure 4.3 2019 Supply Purchase by Month

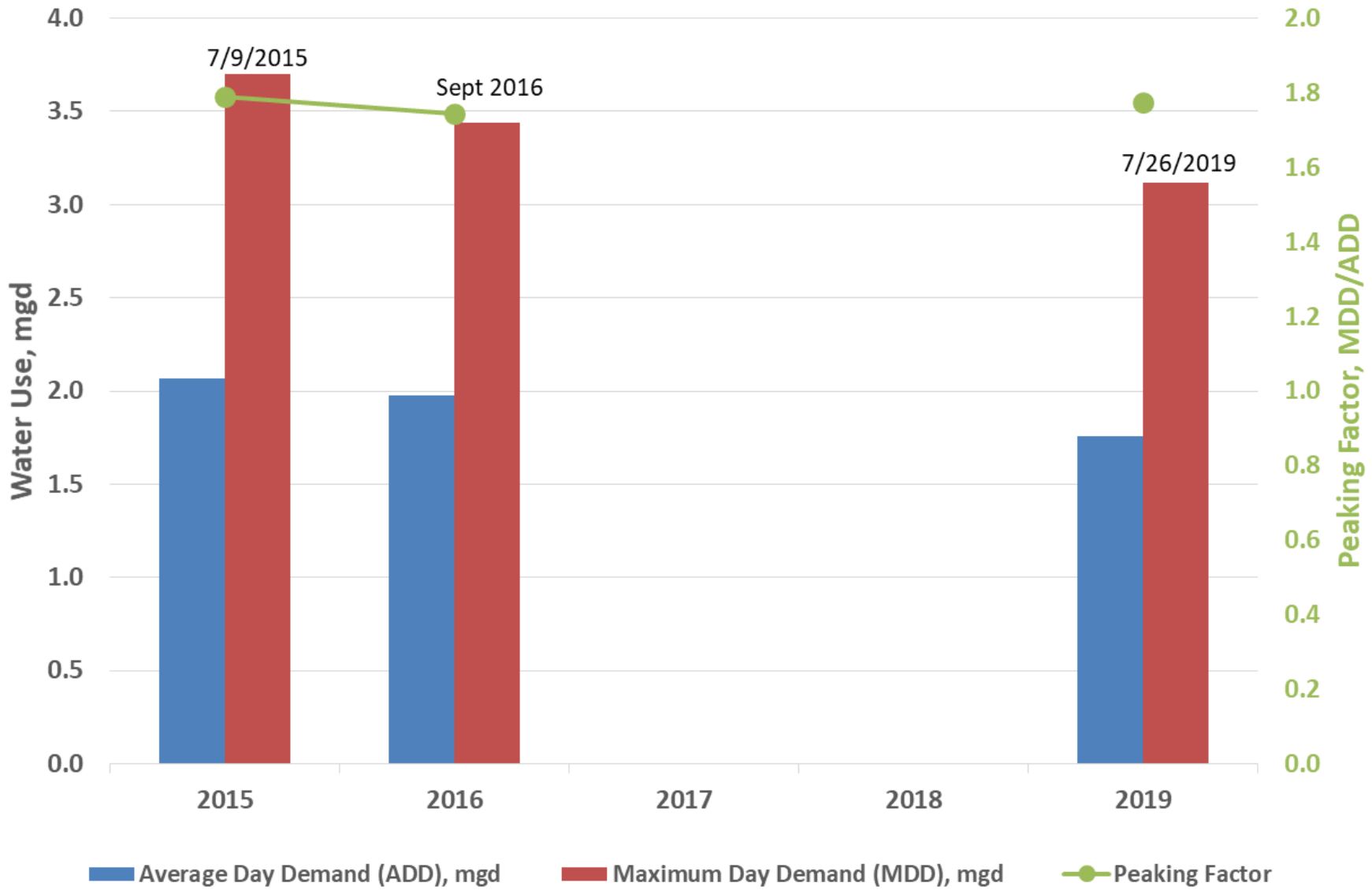

Figure 4.4 Historical Average and Maximum Day Water Use (2015-2019)

4.3.2 Historical Water Service Accounts

The City tracks its number of water service customers and consumption based on three different customer categories: single-family residential (SFR), multi-family residential (MFR), and Commercial, Industrial & Governmental.

To more accurately predict the magnitude and location of future demands, the City's top water consumers were separated into another customer category called "large consumers". This category includes ten largest consumers: eight commercial users and two MFR users. Each of these customers has an annual water demand exceeding 7 MG. The eleventh largest consumer used less than 6.5 MG, making the top ten a natural cutoff for customers that must be evaluated in more detail. The ten largest consumers include the following, and Figure 4.5 shows the locations of the City's large consumers:

- Westfield Southcenter.
- Shasta Beverage.
- Boeing Company Store #DC Main.
- Boeing Company Store #9-51.
- Boeing Company-Wind Tunnel.
- Hilton Hotels.
- CHA Tukwila LLC.
- Seafood City.
- Canyon Estates Condo Association.
- Terrace Apartments.

The City provided water to 2,195 retail water consumers as of the end of 2019. Table 4.2 shows the number of water service accounts from 2013 to 2019 for the four customer categories. From 2013 to 2019, number of water service accounts increased by 3.6 percent. By the end of 2019, the City provided water to 2,195 accounts.

Table 4.2 Historical Water Service Accounts

	2013	2014	2015	2016	2017	2018	2019	Growth Rate from 2013 to 2019
SFR	1,238	1,246	1,259	1,270	1,276	1,290	1,295	4.6%
MFR	170	170	170	170	178	179	180	5.9%
Commercial, Industrial & Governmental	700	700	706	738	712	706	710	1.4%
Large Consumers	10	10	10	10	10	10	10	0%
TOTAL	**2,118**	**2,126**	**2,145**	**2,188**	**2,176**	**2,185**	**2,195**	**3.6%**

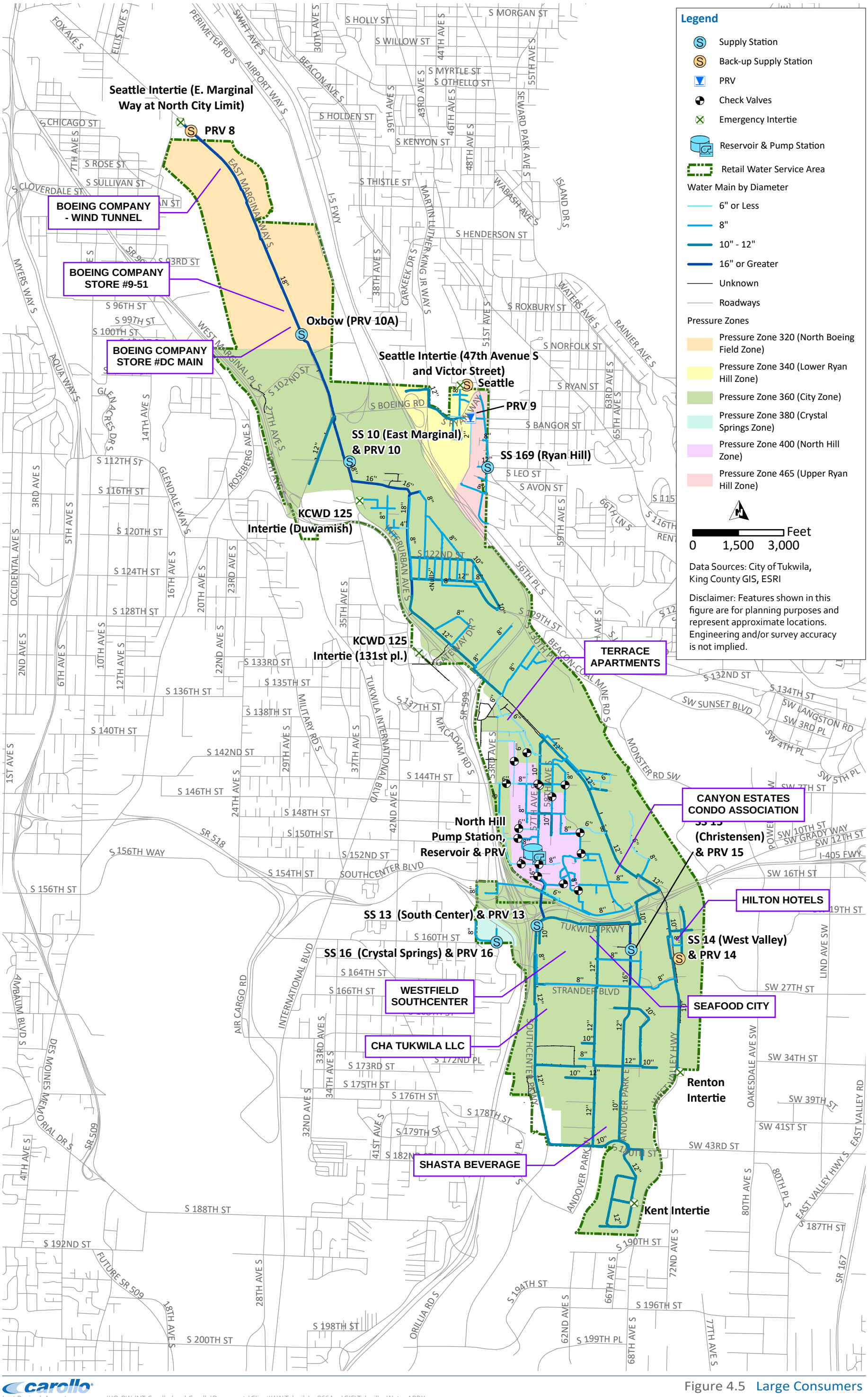

Figure 4.5 Large Consumers

Table 4.3 shows the number of water service accounts by customer category and pressure zone for 2019.

Table 4.3 2019 Number of Accounts by Customer Category and Pressure Zone

	380 Zone	340 Zone	465 Zone	320 Zone	360/400 Zone	Total[1]
SFR	10	43	76	0	1,166	1,295
MFR	0	0	15	0	165	180
Commercial, Industrial & Governmental	2	6	6	3	693	710
Large Consumers	0	0	0	3	7	10
TOTAL	**12**	**49**	**97**	**6**	**2,031**	**2,195**

Note:
(1) Individual counts for the 380, 340, 465, and 320 Zones were provided. It was assumed that the remaining number of water service accounts were in the 360/400 Zone.

4.3.3 Historical Water Consumption

Historical water consumption for each customer category data was obtained from the City's annual reports to Cascade. Table 4.4 summarizes the historical water consumption by customer category from 2014 to 2019. Table 4.4 also includes other authorized use, which is non-revenue water use. For the City, this includes water main flushing, sampling, and Fire Department training. The other authorized use for 2014 includes a leak on a private water main. The historical average for the City's other authorized use is approximately 0.8 percent of total water consumption. Table 4.4 includes historical distribution system leakage, which will be summarized in Section 4.3.5.

Table 4.4 Historical Water Consumption by Customer Category (mgd)

	2014	2015	2016	2017	2018	2019
SFR	0.18	0.19	0.18	0.19	0.19	0.19
MFR	0.18	0.18	0.18	0.19	0.17	0.16
Commercial, Industrial & Governmental	1.03	1.04	1.01	1.04	0.99	0.89
Large Consumers	0.48	0.49	0.43	0.49	0.49	0.45
Other Authorized Use	0.05	0.01	0.02	0.01	0.00	0.00
DSL	0.06	0.14	0.15	--[1]	--[1]	0.07
Total Consumption	**1.98**	**2.05**	**1.97**	**1.92[2]**	**1.84[2]**	**1.76**

Notes:
Abbreviation: DSL – distribution system leakage.
(1) DSL not included for the 2017 and 2018 years due to issues with Highline Intertie.
(2) Total Consumption for 2017 and 2018 does not include DSL.

As shown in Table 4.4, the majority of water consumption is from Commercial, Industrial & Governmental customers. In 2019, water consumption from the Commercial, Industrial & Governmental customers was approximately 53 percent of the City's total water consumption.

The City's ten largest consumers alone accounted for 27 percent of the total water consumption in 2019.

Figure 4.6 shows the annual water use for the large consumers from 2014 to 2019.

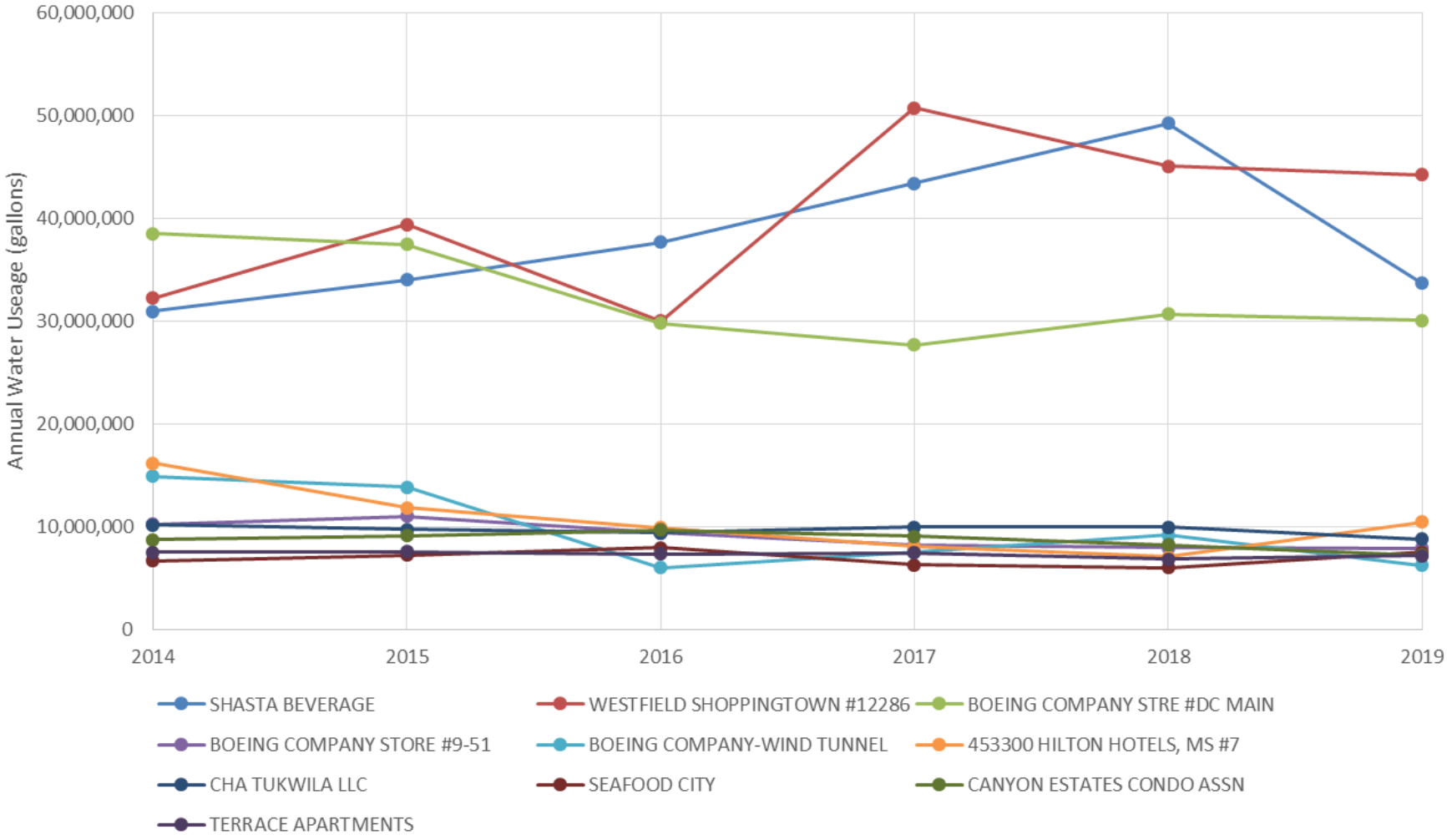

Figure 4.6 Large Consumers Historical Annual Water Use

4.3.4 Historical Consumption per Account

The annual water consumption per water service account for each customer category is shown in Table 4.5.

Table 4.5 Historical Water Consumption per Account by Customer Category (gpd/ account)

	2014	2015	2016	2017	2018	2019	Ave	ERUs per account
SFR	149	150	141	151	145	149	147	1.0
MFR	1,058	1,090	1,034	1,049	939	918	1,015	6.9
Commercial, Industrial & Governmental	1,469	1,473	1,364	1,465	1,409	1,252	1,405	9.6
Large Consumers	48,176	49,600	42,876	48,802	49,306	44,686	47,241	n/a(1)

Notes:
Abbreviations: ERU – equivalent residential unit; gpd – gallons per day.
(1) The ERUs per account for large consumers is not used for developing demand projections.

4.3.4.1 Equivalent Residential Units

An equivalent residential unit (ERU) is the amount of water consumed by a typical full-time single-family residence. The Washington Administrative Code (WAC) 246-290-010 defines an ERU to express water use by non-residential customers as a multiple of the demand of a typical SFR customer.

To calculate ADD water use per ERU, also called the "ERU value", the total annual volume of water consumed in the SFR customer category is divided by the total number of active SFR accounts. This value defines the average annual SFR water use per account. To determine the number of ERUs used by other customer categories, the volume of water used by other customer classes is divided by the ERU value.

Table 4.5 shows the average daily consumption per account for each customer category between 2014 and 2019. The average SFR daily consumption volume was 147 gallons. This means the City's ADD ERU value is 147 gallons per day (gpd). As shown in Table 4.5, the City's ERU value for SFR remained fairly consistent since 2014, with a lowest value of 141 gallons per day per equivalent residential unit (gpd/ERU) and highest value of 151 gpd/ERU. The historical water consumption per account for MFR has decreased overall from 1,058 gpd/ERU in 2014 to 918 gpd/ERU in 2019. Similarly, the historical water consumption per account for commercial, industrial and governmental customers has decreased overall from 1,469 gpd/ERU in 2014 to 1,252 gpd/ERU in 2019. The consumption per account for large consumers has fluctuated more between 2014 and 2019 with a high of 49,600 gpd/ERU in 2015 to a low of 42,876 gpd/ERU in 2016.

The last column in Table 4.5 shows the average number of ERUs per account for each customer category the City serves. The typical MFR account consumes 6.9 ERUs while commercial, industrial, and governmental accounts equal 9.6 ERUs on average.

4.3.5 Distribution System Leakage

Distribution system leakage (DSL) is all water not authorized for consumption, which includes apparent and real losses. It equals the total water produced minus the total authorized consumption. Apparent losses include water theft, meter inaccuracies, and data collection

errors. Real losses are physical losses from the distribution system, such as water main breaks and water main leaks. Table 4.6 shows total water production, total authorized consumption, and DSL between 2014 and 2019, excluding the years 2017 and 2018. The historical average DSL is 5.4 percent of the total water purchased.

Utilities must report annual leakage volume and annual leakage percent to the Washington State Department of Health (DOH). The City's DSL values reported to DOH in the annual water use efficiency (WUE) report slightly differ from the calculated values reported in Table 4.6. The difference is due to the fact that the City uses the raw consumption values for the WUE Report without any billing adjustments whereas the data in Table 4.6 have been adjusted. It is recommended that the City use the adjusted consumption for its future WUE Reports.

DOH requires that utilities achieve a standard of no more than 10 percent water loss. As shown in Table 4.6, the City's DSL remained below this threshold since 2014.

Table 4.6 Distribution System Leakage

	2014	2015	2016	2019
Total Water Purchased (gallons)	723,970,500	755,283,276	719,662,020	643,502,156
Authorized Consumption (gallons)	701,767,424	702,403,416	663,035,428	619,734,456
DSL (gallons)	22,203,076	52,879,860	56,626,592	23,767,700
DSL (mgd)	3.1%	7.0%	7.9%	3.7%

4.4 Demographic Analysis

To determine future demands for the City's service area, current and projected demographic trends were developed using data provided by the PSRC as well as the City's vacant parcels information. PSRC publishes population, household, and employment projections by census tracts. The projections include the total population and number of employees in each census tracts for the following years: 2020, 2025, 2030, 2035, and 2040.

The City's service area and pressure zone boundaries do not coincide with the PSRC's census tracts boundaries. As a result, the key demographic and employment variables (population and employees) were allocated to each pressure zone within the service area using geographic information system (GIS) techniques. The census tracts were overlaid in the City's pressure zone boundaries to determine the population and employment projections by census tracts. The percent of the census tract that is within each pressure zone was determined and used to develop the projections by pressure zones. Table 4.7 summarizes the overall population and employment projections for the City's water service area.

Table 4.7 Population and Employment Projections

	2020	2025	2030	2035	2040
Population	7,293	8,173	9,125	9,821	10,338
Employment	27,138	27,888	28,170	29,114	30,564

Using PSRC's population and employment projections for each pressure zone, annual growth rates were calculated to forecast future City water accounts for each customer category. Additionally, the City's vacant parcels data was used to compare growth with remaining vacant single-family residential and multi-family residential parcels. This combined methodology ensured growth was conservative enough to account for remaining vacant land in each pressure zone. Household growth rates and vacant parcel data were used to project SFR and MFR

accounts. Employment growth rates were used to forecast accounts for the Commercial, Industrial & Governmental customer categories. Tables 4.8 and 4.9 show the annual growth rates by pressure zone for population and employment, respectively.

Table 4.8 Population Annual Growth Rates by Pressure Zone

Pressure Zone	2020-2025	2025-2030	2030-2035	2035-2040
380 Zone	1.1%	1.2%	0.8%	0.0%
340 Zone	1.3%	1.8%	0.6%	0.0%
465 Zone	1.4%	1.9%	0.7%	0.0%
320 Zone	1.4%	1.9%	0.7%	0.0%
360/400 Zone	2.5%	2.3%	1.6%	1.2%

Table 4.9 Employment Annual Growth Rates by Pressure Zone

Pressure Zone	2020-2025	2025-2030	2030-2035	2035-2040
380 Zone	0.0%	0.0%	0.0%	0.1%
340 Zone	0.0%	0.0%	0.4%	0.8%
465 Zone	0.2%	0.1%	0.9%	1.3%
320 Zone	0.0%	0.0%	0.2%	0.6%
360/400 Zone	0.6%	0.2%	0.7%	1.0%

As shown in Table 4.8, the overall population growth is projected to occur at a higher rate from 2020 to 2030 and a lower rate from 2030 to 2040 in all zones. The 360/400 Zone is projected to have the most annual population growth in the City's water service area.

Conversely, as shown in Table 4.9, employment is projected to occur at a lower rate from 2020 to 2030 and a higher rate from 2030 to 2040 in all zones. Between 2030 and 2040, the 360/400 Zone is projected to have the most annual employment growth, whereas between 2030 and 2040, the 465 Zone is projected to have the most annual employment growth.

4.4.1 Projected Number of Water Service Accounts

To project the number of water service accounts, the City's existing number of accounts in each pressure zone (Table 4.3) was grown using a combination of growth rates presented in Tables 4.8 and 4.9 and the City's vacant parcel data. In the 380 Zone, 340 Zone, and 465 Zone, it was assumed that all existing vacant parcels zoned as residential would be developed in the 20-year planning horizon. In the 360/400 Zone, it was assumed that all existing vacant parcels zoned as SFR would be developed by 2040 and additional projected residential accounts would be MFR. This provides a more conservative demand projection approach than only using the PSRC data. Table 4.10 shows the water service account projections for the planning years. These account projections are the first step in estimating the City's future water demand.

In order to account for new commercial, industrial, and governmental accounts that may have higher water demands, a "high demand" commercial, industrial and governmental customer category was developed. It was assumed that 30 percent of new commercial, industrial, and governmental accounts in the 360/400 Zone would be part of this "high demand" category. This assumption was based on the existing portion of water demand for the large consumers to the commercial, industrial, and governmental category.

Table 4.10 Projected Number of Water Service Accounts by Customer Category

Customer Category	2020	2030	2040
SFR(1)	1,316	1,556	1,666
MFR(2)	195	355	451
Commercial, Industrial & Governmental - Regular(2)	713	732	776
Commercial, Industrial & Governmental – High Demand(2)	1	9	28
Large Consumers(3)	10	10	10
TOTAL	**2,235**	**2,662**	**2,931**

Notes:
(1) The population growth rates and vacant parcels data were used.
(2) The employment growth rates were used.
(3) The number of large consumers remains the same.

4.5 Projected Water Demand

Projecting future water demand is a key part of the water system planning process. Demand projections are used to identify required system improvements to supply, pumping, storage, and piping infrastructure.

This section summarizes the ADD and MDD projections developed for the City's water system from historical water demand trends and future demographic growth assumptions.

4.5.1 Demand Projection Methodology

For this analysis, the water demand projections were developed in the following steps, which are also summarized in Figure 4.7:

1. Grow historical water service accounts for each pressure zone and customer category, shown in Table 4.3, by the zone-specific population and employment growth rates from the demographic analysis, shown in Tables 4.8 and 4.9 and the City's vacant parcel data. Table 4.10 shows the resulting water service accounts projections.
2. Convert water service account projections into ERU projections.
3. Convert ERU projections to ADD projections using demand projection parameters derived from historical data consisting of the City's ERU value, DSL, other authorized use, and large consumer data.
4. Apply the MDD to ADD peaking factor to convert ADD to MDD.

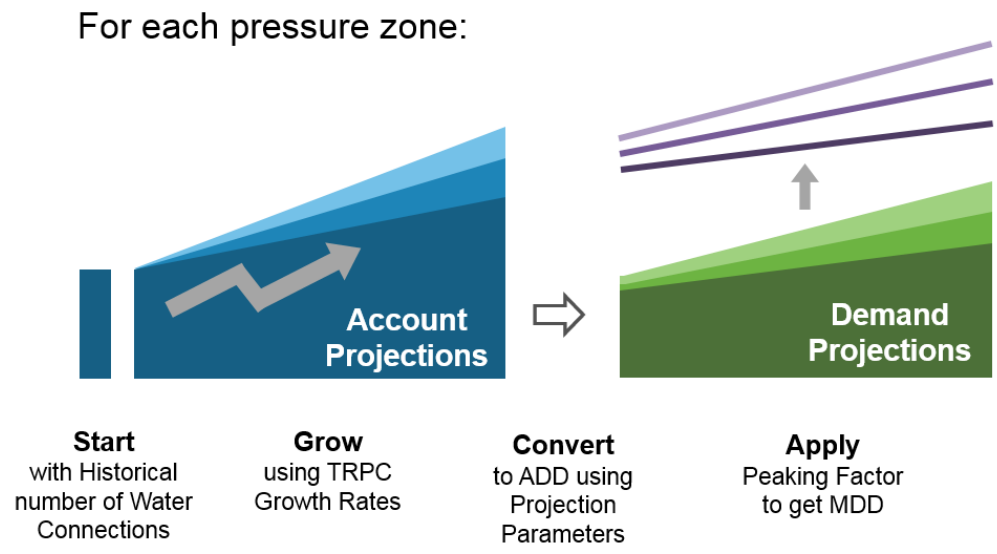

Figure 4.7 Demand Projection Methodology

4.5.2 Water Demand Projection Factors

Numerous factors and assumptions affect the accuracy of projected future water demands. To project the City's future ADD and MDD, several parameters were used, which are listed in Table 4.11. These parameters include ERU value, DSL, other authorized use, and the MDD/ADD peaking factor.

Table 4.11 Water Demand Projection Factors

Parameter	Value	Notes
ERU Value (gpd/ERU)	147	Historical Average
DSL (Percent of Purchase)	5.4%	Historical Average
Other Authorized Use (Percent of Consumption)	0.8%	Historical Average
MDD/ADD Peaking Factor	1.77	Historical Average

As shown in Table 4.11, all water demand projection factors were chosen to be the historical average for each parameter.

4.5.2.1 Commercial, Industrial, and Governmental – High Demand

In order to account for new commercial, industrial, and governmental accounts that may have higher water demands, a "high demand" commercial, industrial and governmental customer category was developed specifically for the 360/400 Zone. The projected demand for this category were developed by calculating the average historical demand from the second tier of large consumers (below the top 10 large consumers). The ERU value for this new customer category is 131 gpd/ERU.

4.5.2.2 Largest Consumers Demand

Using analyses of the City's historical consumption, Carollo developed, with guidance from the City, individual demand projections for each of the largest consumers.

Consumption from most large consumers has remained constant in the past six years, according to the historical data (see Figure 4.6). With the exception of Shasta Beverage, the historical average demands from 2014 to 2019 were assumed to continue into the future for large consumers.

Shasta Beverage currently has two bottling lines and is planning to expand to three bottling lines by 2021. It is assumed that this expansion will result in Shasta Beverage's water demands to increase by 150 percent. This increase was added to the historical average annual water use (from 2014 to 2018) for Shasta Beverage to project their water demand in the future. Note, data from 2019 was not included in determining the historical average annual water use for Shasta Beverage as the facility was down for maintenance.

There are no plans for specific future large consumers that will have a large impact on the water demand projections.

4.5.3 Projected ERUs

When converting account projections to demand projections, the first step is to convert the number of accounts into the number of ERUs. To calculate the projected number of ERUs for each pressure zone, the projected number of accounts shown in Table 4.10 were multiplied by the number of ERUs per account shown in Table 4.5. Table 4.12 shows the ERU projections.

These ERU projections include ERUs corresponding to DSL and other authorized use that were calculated by dividing the DSL and other authorized use ADD projections by the ERU value. Since large consumer demands were projected using historical water use, ERUs for this customer category were calculated from dividing the ADD projection by the ERU value. The section below describes how DSL and other authorized use ADD projections were calculated.

Table 4.12 ERU Projections

Pressure Zone	2020	2030	2040
380 Zone	31	37	9
340 Zone	109	163	179
465 Zone	253	314	335
320 Zone	1,027	1,027	1,028
360/400 Zone	12,447	15,033	18,793
Total	**13,868**	**16,574**	**20,375**

4.5.4 Projected Average and Maximum Day Demands

To calculate the average day demand projections for each customer class, the ERU projections were multiplied by the ERU value (147 gpd/ERU) as presented in Table 4.11. Non-revenue water consumption, including other authorized use and DSL, was then added to establish total ADD projections. Finally, MDD projections were established by multiplying ADD projections by the MDD/ADD peaking factor.

Table 4.11 shows ADD and MDD projections for each pressure zone. Figure 4.8 shows a graph of City-wide demand projections.

The City's ADD was projected to be 2.06 mgd in 2020. In 2040, it is estimated to be 3.04 mgd. In 2040, MDD is estimated to be 5.37 mgd as shown in Table 4.11. These demands are the basis for the water system evaluation presented in Chapter 5 – System Analysis. Appendix I shows detailed demand projections by year.

Table 4.13 ADD and MDD Projections

Pressure Zone	ADD Projections (mgd)			MDD Projections (mgd)		
	2020	2030	2040	2020	2030	2040
380 Zone	0.005	0.006	0.006	0.01	0.01	0.01
340 Zone	0.02	0.02	0.03	0.03	0.04	0.05
465 Zone	0.04	0.05	0.05	0.07	0.08	0.09
320 Zone	0.15	0.15	0.15	0.27	0.27	0.27
360/400 Zone	1.85	2.24	2.80	3.28	3.96	4.95
Total	**2.06**	**2.47**	**3.04**	**3.66**	**4.36**	**5.37**

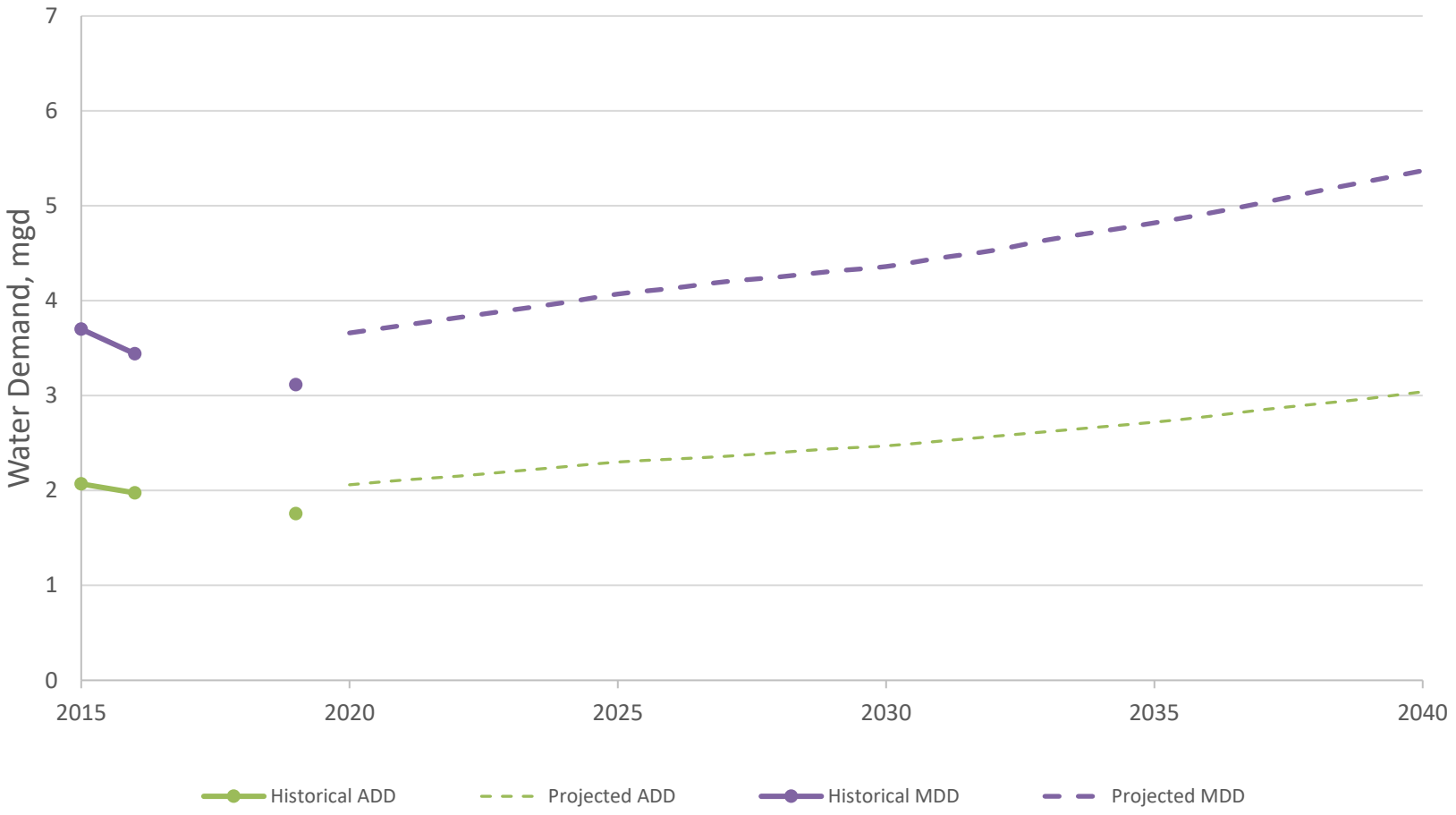

Figure 4.8 Projected ADD and MDD

Chapter 5

SYSTEM ANALYSIS

5.1 Introduction

The purpose of this chapter is to summarize the City of Tukwila (City)'s water distribution system deficiencies by evaluating the sources of supply, pump stations (PS), storage facilities, and pipelines against the selected criteria presented in Chapter 3 – Policies and Criteria. The evaluation focuses on confirming adequate system capacity is available for future water demands in the City, and recommending improvements as needed. The pipeline capacity evaluation was conducted using the City's updated and calibrated WaterCAD hydraulic model. The supply, pump station, and storage capacity evaluations were conducted in Microsoft Excel. Improvements identified in this chapter are summarized in the Capital Improvements Program (CIP) in Chapter 9.

5.2 Supply Evaluation

The supply evaluation compares the supply available to the City according to contractual flows with the Cascade Water Alliance (Cascade), which are listed in Appendix H, against the City's supply criteria.

The City has nine supply stations (SSs), but three are designated as back-up supply sources. The contractual flows available from the six primary supply sources equal 2,930 gallons per minute (gpm), or 4.2 million gallons per day (mgd), as outlined in Table 2.2 in Chapter 2.

The supply evaluation was completed system-wide to review the overall available supply. The following sections detail the method and results of the evaluation as well as recommendations that may be implemented to secure ample water for the City's system.

5.2.1 Supply Evaluation Criteria

As described in Table 3.2 or Chapter 3, the City has the following two supply analysis criteria:

- **Criterion 1**: The City's system must be able to meet the system's maximum day demand (MDD). This criterion is a Department of Health (DOH) requirement.
- **Criterion 2**: The supply sources should be able to replenish depleted fire suppression storage (FSS) within 72 hours while concurrently supplying the MDD. This criterion is a City goal.

5.2.2 Supply Evaluation Results

Table 5.1 summarizes the supply evaluation for Criterion 1 by comparing the projected MDD to the total maximum flow to the City under the Cascade contract. Table 5.2 summarizes the supply evaluation for Criterion 2 by comparing the project MDD plus flows to refill depleted FSS against the total maximum flow to the City under the Cascade contract.

Table 5.1 Supply Evaluation Criterion 1

	2020	2030	2040
Average day demand (mgd)	2.1	2.5	3.0
MDD (mgd)	3.7	4.4	5.4
Total maximum flow to the City from Cascade contract (mgd)	4.2	4.2	4.2
Excess/(deficit)	**0.5**	**(0.2)**	**(1.2)**

As shown in Table 5.1, MDD projections begin to exceed contractual flow rates between the planning years 2020 and 2030, specifically 2028. The City acknowledges that the contractual flow shown in Table 2.2 in Chapter 2 is less than the MDD as shown in Table 5.1.

Table 5.2 Supply Evaluation Criteria 2

	2020	2030	2040
MDD (mgd)	3.7	4.4	5.4
Rate to refill FSS in 3 days(1) (mgd)	0.3	0.3	0.3
Total flow required (mgd)	4.0	4.7	5.7
Total maximum flow to the City from Cascade contract (mgd)	4.2	4.2	4.2
Excess/(deficit)	**0.2**	**(0.5)**	**(1.5)**

Note:
(1) The largest FSS requirement is 0.96 million gallons (MG).

As shown in Table 5.2, the supply reliability becomes deficient between the planning years 2020 and 2030. Note that Criterion 2 will always be more severe than Criterion 1 because it includes the additional goal of refilling FSS.

5.2.3 Supply Recommendations

Given the results of the supply evaluation, working with Cascade to increase the contractual flows by 1.5 mgd is recommended to improve the supply reliability. The City will work with Cascade to update the management agreement, which is presented as Exhibit II in Appendix G, so that contractual flows are sufficient to meet the City's projected MDD while concurrently refilling FSS.

5.3 Pumping Evaluation

The pumping evaluation compares the City's existing pumping capacity against the City's pumping criteria. The following sections detail the method and results of the pumping evaluation for the City's system.

The City currently has three pump stations that boost water from the North Hill Reservoir to the distribution system: Low Pumps, High Pumps, and Fire Pumps. Table 2.5 in Chapter 2 – Existing System summarizes the pumps and capacities in each of these pump stations.

The pumps are used to serve different pressure zones (PZs) and service levels. The High Pumps are used to meet demands of the 400 PZ. The Low Pumps are used to supplement demands in the 360 service level, which for the pumping evaluation includes the 360 PZ and 320 PZ. This

service level has several other supply sources; thus, the pumps are supplemental. The fire pump can boost water to the 400 PZ, 360 PZ, and 320 PZ.

5.3.1 Pumping Criteria

Table 3.3 in Chapter 3 presented criteria for booster pump stations (BPSs). The first criterion relates to power outages, and the second relates to pump station capacity.

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 (FF) demands during a maximum demand day. These two criteria were evaluated differently for closed zones and open zones. A closed zone is a pressure zone with no storage or supply. An open zone is a pressure zone, or service level, with storage and supplies. The 400 PZ is a closed zone and was evaluated against the two criteria outlined above. The required pumping in the 400 PZ was evaluated against these two criteria.

For the 360 service level, the criteria were revised to reflect the fact that the service level is an open zone and 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 the 360 service level are only required to provide peak hour demand (PHD) minus MDD. MDD plus maximum FF is not required for the 360 service level because it has storage.

The following summarizes the pumping capacity evaluation criteria used:

- **400 zone (Closed Zone – No Storage/Supply):**
  - Provide PHD.
  - Provide MDD + Maximum FF.
- **360 service level (Open Zone with Storage/Supply):**
  - Provide Equalizing Storage (PHD – MDD).
  - Provide Equalizing Storage + Maximum Fire Flow (PHD – MDD + FF).

5.3.2 Pumping Evaluation

Table 5.3 summarizes the total, firm, and reliable pump capacities for the 400 PZ and the 360 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 with the largest pump out-of-service. The reliable capacity is defined as the total pumping capacity of pumps with back-up power. As shown in Table 5.3, no reliable capacity is available since none of the pumps have back-up power. The pumping evaluation compares the required capacity to the total capacity available.

Table 5.3 Existing Pump Station Capacity

Pump Capacity	Total Capacity (gpm)	Firm Capacity[(1)] (gpm)	Reliable Capacity[(2)] (gpm)
400 Zone			
High Pumps	960	480	0
Fire Pump	4,000	0	0
Total 400 Zone	**4,960**	**480**	**0**
360 Service Level			
Low Pumps	2,100	1,050	0
Fire Pump	4,000	0	0
Total 360 Service Level	**6,100**	**1,050**	**0**

Notes:
(1) Firm capacity is the total pumping capacity with the largest pump out-of-service.
(2) Reliable capacity is the total capacity of pumps with back-up power.

5.3.2.1 400 Pressure Zone

Tables 5.4 and 5.5 summarize the pumping evaluation for the 400 PZ for Criteria 1 and 2, respectively.

Table 5.4 400 Pressure Zone: Criterion 1

	2020	2030	2040
PHD (gpm)	289	349	437
High Pumps Firm Capacity (gpm)	480	480	480
Excess/(Deficit) (gpm)	**191**	**131**	**43**

Table 5.5 400 Pressure Zone: Criterion 2

	2020	2030	2040
MDD (gpm)	228	275	344
Maximum FF (gpm)	4,000	4,000	4,000
MDD + Maximum FF (gpm)	4,228	4,275	4,344
High Pumps + Fire Pump Total Capacity (gpm)	4,960	4,960	4,960
Excess/(Deficit) (gpm)	**723**	**685**	**616**

Table 5.4 compares the PHD for the 400 PZ to the firm capacity of the High Pumps and shows that there is sufficient pumping to meet the requirements of Criterion 1. Table 5.5 compares the MDD plus FF to the total capacity of the High Pumps plus the Fire Pump and shows that there is sufficient pumping to meet the requirements of Criterion 2.

5.3.2.2 360 Service Level

Tables 5.6 and 5.7 summarize the pumping evaluation for the 360 service level for Criteria 1 and 2, respectively. Table 5.6 compares the PHD minus MDD for the 360 service level to the firm capacity of the Low Pumps. Table 5.7 compares the PHD minus MDD plus FF to the total capacity of the Low Pumps plus the Fire Pump.

Table 5.6 360 Service Level: Criterion 1

	2020	2030	2040
MDD (gpm)	2,237	2,663	3,282
PHD (gpm)	2,841	3,382	4,168
PHD – MDD (gpm)	604	719	886
Low Pumps Firm Capacity (gpm)	1,050	1,050	1,050
Excess/(Deficit) (gpm)	**446**	**331**	**164**

Table 5.7 360 Service Level: Criterion 2

	2020	2030	2040
MDD (gpm)	2,237	2,663	3,282
PHD (gpm)	2,841	3,382	4,168
Maximum FF (gpm)	4,000	4,000	4,000
PHD - MDD + Maximum FF (gpm)	4,604	4,719	4,886
Low Pumps + Fire Pump Total Capacity (gpm)	6,100	6,100	6,100
Excess/(Deficit) (gpm)	**1,496**	**1,381**	**1,214**

Table 5.6 shows that there is sufficient pumping capacity to meet Criterion 1 for the 360 service level, and Table 5.7 shows that there is sufficient pumping capacity to meet Criterion 2 for the 360 service level.

5.3.3 Pumping Recommendations

There are no recommendations based on pumping capacity evaluation, but it is recommended that the City add back-up power to all existing pump stations and future pump stations for pumping reliability.

5.4 Hydraulic Model Update and Calibration

The City's hydraulic model is the primary tool for evaluation the City's distribution system. The model evaluates how the City's water infrastructure handles future demands and verifies that recommended improvements will eliminate system deficiencies.

As part of the Comprehensive Water System Plan (CWSP), the City's WaterCAD hydraulic model was updated and calibrated. Appendix J is a technical memorandum summarizing both the hydraulic model update and the model calibration results.

5.5 Distribution System Evaluation

The updated and calibrated WaterCAD model was used to analyze the system for future planning years. Projected system demands (from Chapter 4 – Water Requirements) were added for the 2020, 2030, and 2040 planning years. The hydraulic model was used to evaluate typical system conditions during normal operations and FF conditions.

5.5.1 Distribution System Evaluation Criteria

Chapter 3 – Policies and Criteria discussed system policies and criteria in detail. Key parameters evaluated with the model are summarized below:

- The City's goal is to maintain pressures between 40 pounds per square inch (psi) and 120 psi during average day demand (ADD) conditions.
- The City's requirement is to maintain a minimum of 30 psi during PHD conditions.
- The City's requirement is to maintain a maximum velocity of 8 feet per second (fps) during PHD conditions.
- The City's requirement is to maintain a minimum residual pressure of 20 psi throughout the system during MDD + FF conditions.

5.5.2 Maximum Pressure Results

The model was run in extended period simulation (EPS) under ADD conditions to evaluate the maximum pressures in the system in the near-term and long-term planning years. Figure 5.1 shows the nodes with maximum pressures outside of the planning criteria for 2020, which represents the worst-case scenario planning year for high pressures. Figure 5.1 is shown to aid the City in operations and future development. No recommended improvements are made based on high system pressures.

5.5.3 Minimum Pressure Results

The model was run in EPS under PHD conditions to evaluate the minimum pressures in the system for the near-term and long-term planning years. Figure 5.2 shows that there are no nodes with minimum pressures below 30 psi during PHD in 2040, which represents the worst-case scenario planning year for low pressures (i.e. the most headloss in the distribution system). No recommended improvements are made based on the results.

5.5.4 Velocity Results

The City's goal is to maintain velocities under 8 fps in distribution pipes under PHD conditions. Figure 5.3 shows that only one pipe, the connecting pipe from SS 15, reaches 8 fps under 2040 PHD conditions. The figure also shows pipes with velocities between 5 and 8 fps for reference.

5.5.5 Fire Flow Analysis

Fire flow demand is the quantity of water required in general by each customer type for firefighting as defined by City staff in coordination with the Fire Marshall.

Firefighting often places the highest demand on a water system because a large volume of water must be supplied to a specific location over a short period of time. During any fire event, the minimum pressure must be greater than 20 psi throughout the distribution system per the Washington Administrative Code (WAC). The required FF and duration of the FF in the hydraulic model were assigned based on land use designations and specific locations as shown in Figure 5.4. Only junctions near hydrants were assigned a FF.

The model was used to perform a general system-wide fire analysis for all system junctions with service connections for 20 psi in both 2030 and 2040 planning years. Figure 5.5 shows junctions that do not meet the 20-psi requirement under FF conditions in the 2030 and 2040 planning years. Note, the FF deficiencies are the same for both planning years.

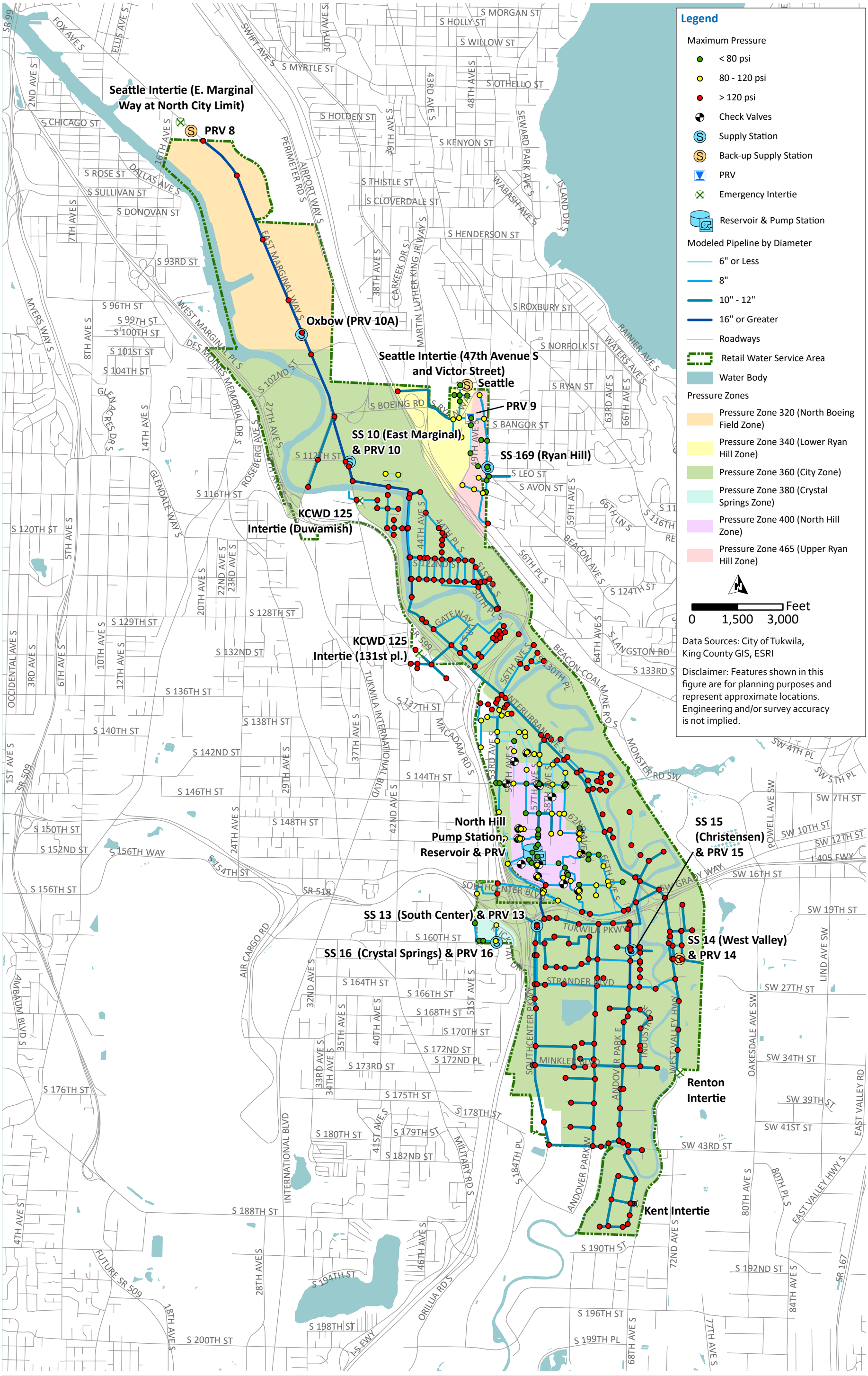

Figure 5.1 Maximum Pressure during 2020 ADD Conditions

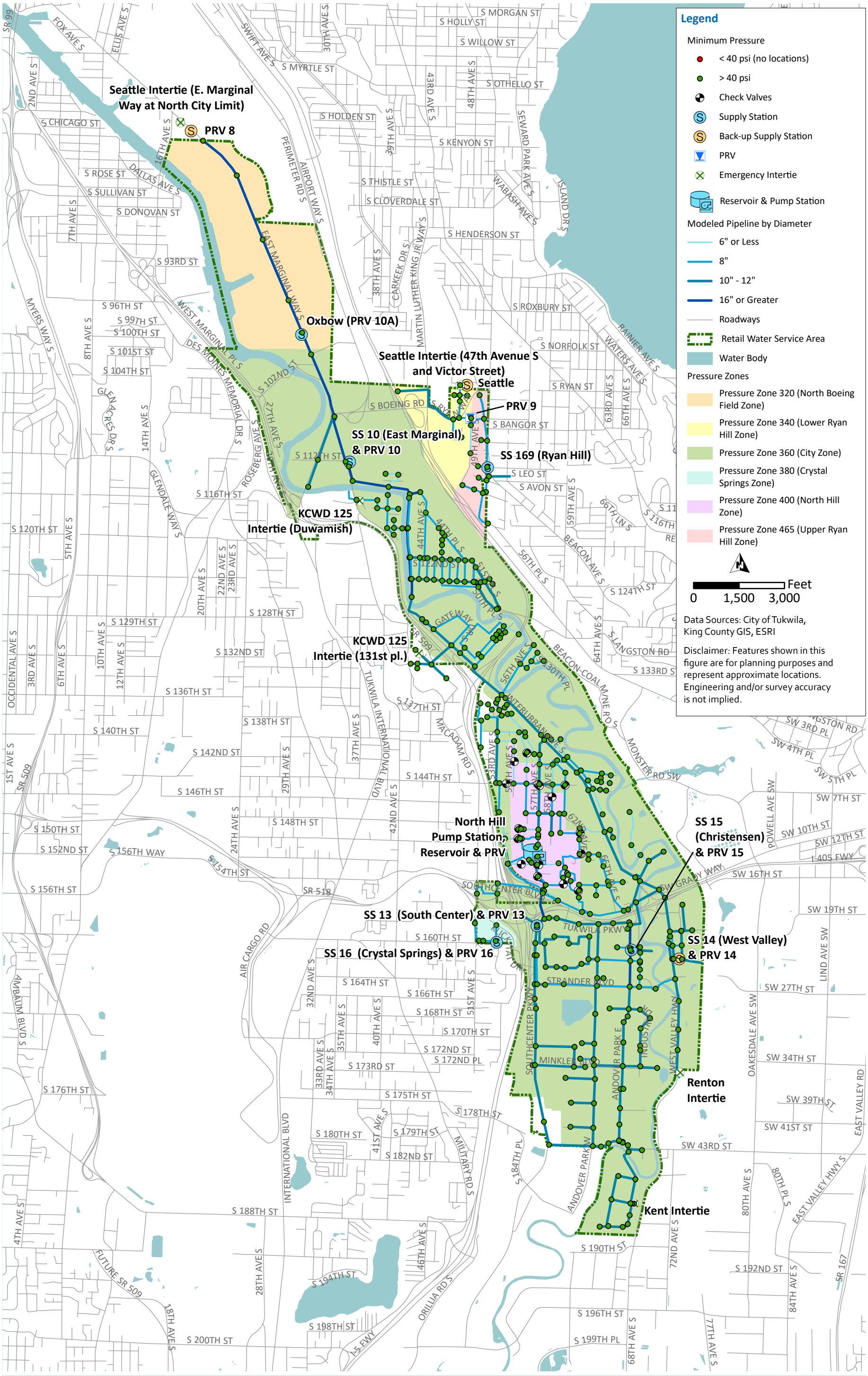

Figure 5.2 Minimum Pressure during 2040 PHD Conditions

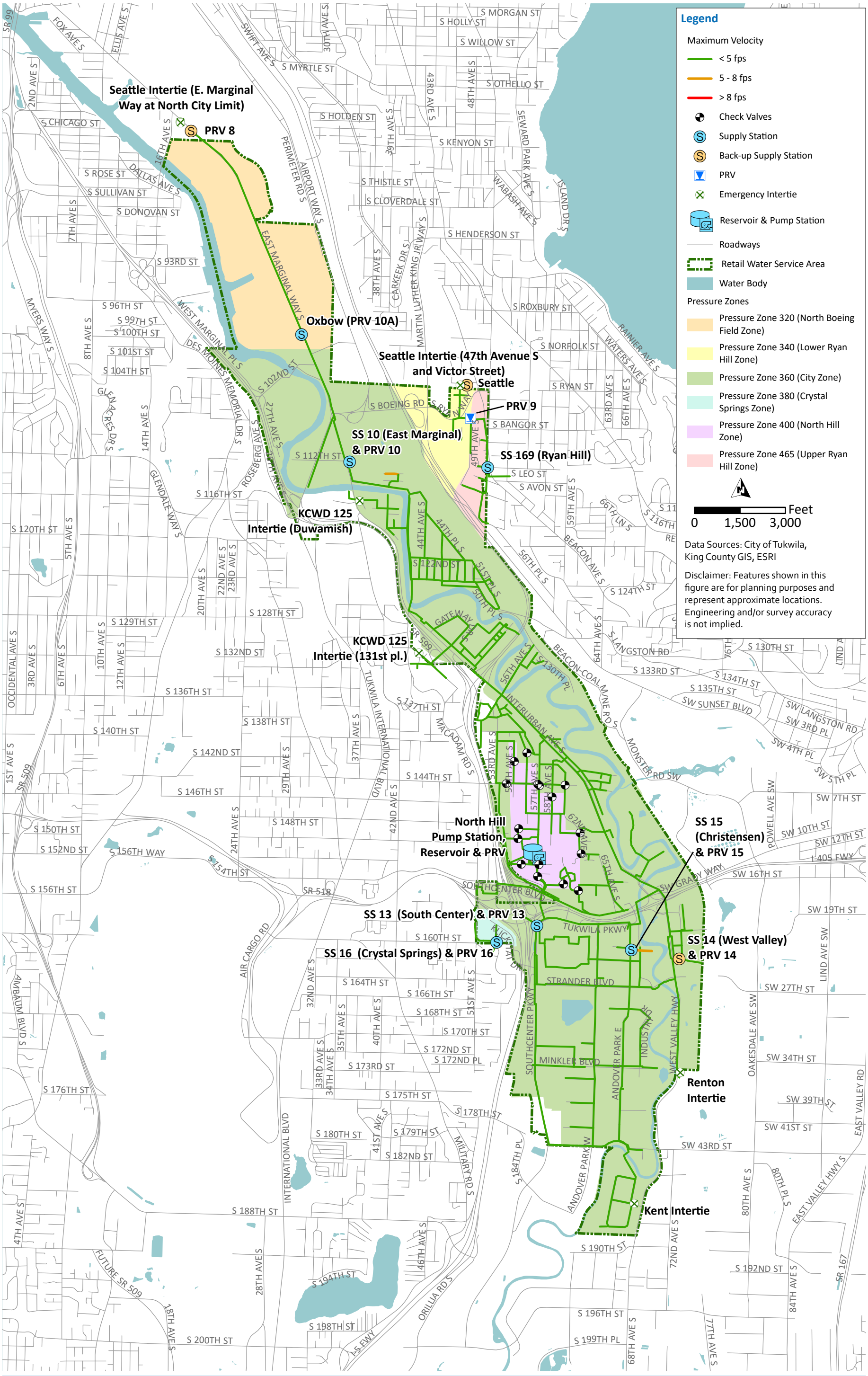

Figure 5.3 Maximum Velocity during 2040 PHD Conditions

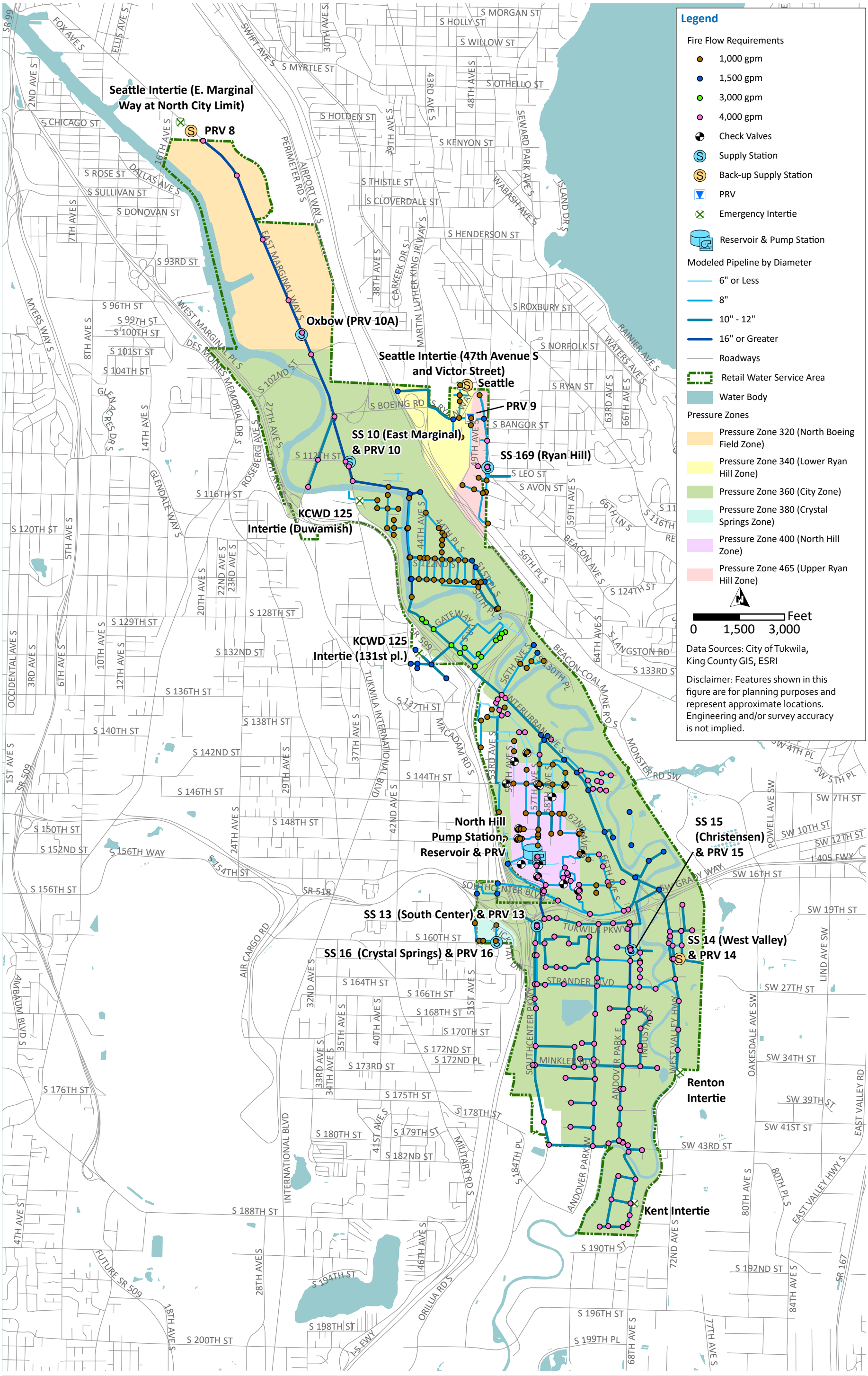

Figure 5.4 Fire Flow Requirements

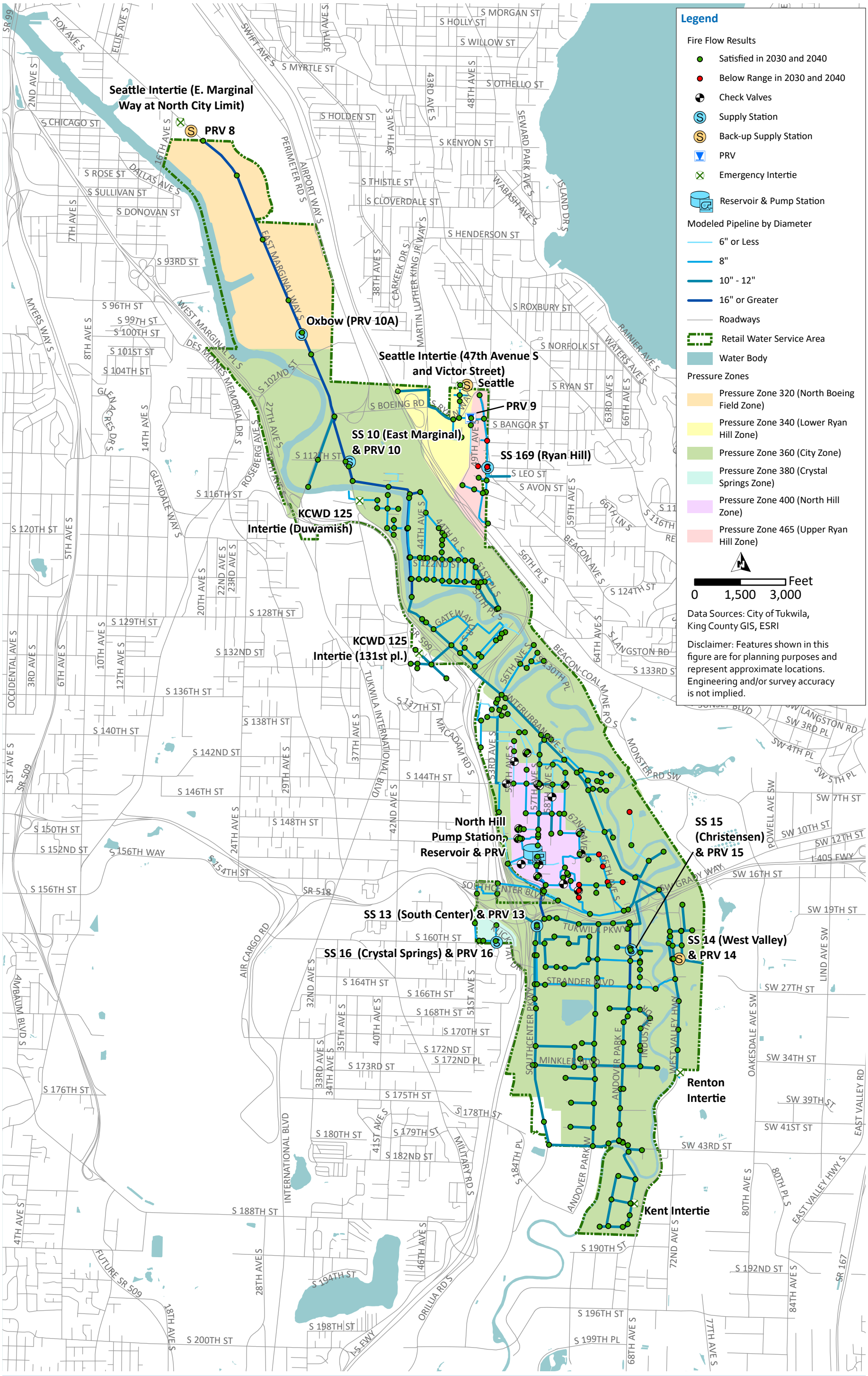

Figure 5.5 Fire Flow Deficiencies during Future MDD + FF Conditions

5.5.6 Distribution System Recommendations

This section summarizes the recommended improvements based on the deficiencies identified during the distribution system analysis.

5.5.6.1 Recommended Improvement for High Velocity

The one section of pipe with a velocity reaching 8 fps is at the connection from SS 15 to the City's distribution system. Currently, SS 15 it the City's lead supply. It is recommended that supply operational changes are implemented to use a different lead supply or limit the amount of flow supplied by SS 15 when velocity reaches 8 fps in the future. No infrastructure improvements are recommended to address this deficiency.

5.5.6.2 Recommended Improvements for Fire Flow Deficiencies

Improvement projects are commended to address the FF deficiencies identified in Figure 5.5. Figure 5.6 shows the locations of the recommended improvements for the following projects:

- **Starfire Park:** Install approximately 2,000 feet of 8-inch diameter pipe from the existing pipe on Starfire Way north (across the pedestrian bridge) to connect to the existing pipe on S 143rd Place (P-1 in Figure 5.6). This project is recommended to address FF deficiencies that are due to 1,500 gpm FF demand on a long 6-inch diameter dead-end pipe.
- **Southcenter Boulevard and S 153rd Street:**
  - Install approximately 350 feet of 12-inch diameter pipe on Southcenter Boulevard from 66th Avenue S north to the existing pipe (P-2 in Figure 5.6). This project is recommended to address FF deficiencies for 4,000 gpm FF demands in the area and to loop pipe for connectivity.
  - Upsize approximately 2,200 feet of 8-inch diameter pipe to 12-inch diameter pipe on Southcenter Boulevard from 66th Avenue S to 65th Avenue S, and from 65th Avenue S from Southcenter Boulevard to S 151st Street (P-3 in Figure 5.6). This project is recommended to address FF deficiencies for 4,000 gpm FF demands in the area. This pipeline was also identified as a medium priority pipe from update to the Remaining Useful Life Analysis Technical Memorandum completed in November 2014 (2014 RUL Analysis).
  - Upsize approximately 500 feet of 8-inch diameter pipe to 12-inch diameter pipe on S 153rd Street from 65th Avenue S east to end of street (P-4 in Figure 5.6). This project is recommended to address FF deficiencies for 4,000 gpm FF demands in the area. This pipeline was also identified as a medium priority pipe from update to the 2014 RUL Analysis.
  - Upsize approximately 200 feet of 6-inch diameter pipe to 8-inch diameter pipe and install approximately 200 feet of 8-inch diameter pipe on S 152nd Street from City hydrant east to Sunwood Boulevard to create a pipe loop (P-5 in Figure 5.6). This project is recommended to address FF deficiencies for 4,000 gpm FF demands (multi-family residential [MFR]) in the area. The existing 6-inch diameter pipe was also identified as a high priority pipe from the 2014 RUL Analysis.
- **51st Avenue S and S 112th Street**: Upsize approximately 1,500 feet of 8-inch diameter pipe to 12-inch diameter pipe on the connection from SS 169 to 51st Avenue S, 51st Avenue S from S 112th Street to S 109th Street, and S 112th Street from 51st Avenue S west to end of street (P-6 in Figure 5.6). This project is recommended to address FF deficiencies for 4,000 gpm FF demands (MFR) in the area.

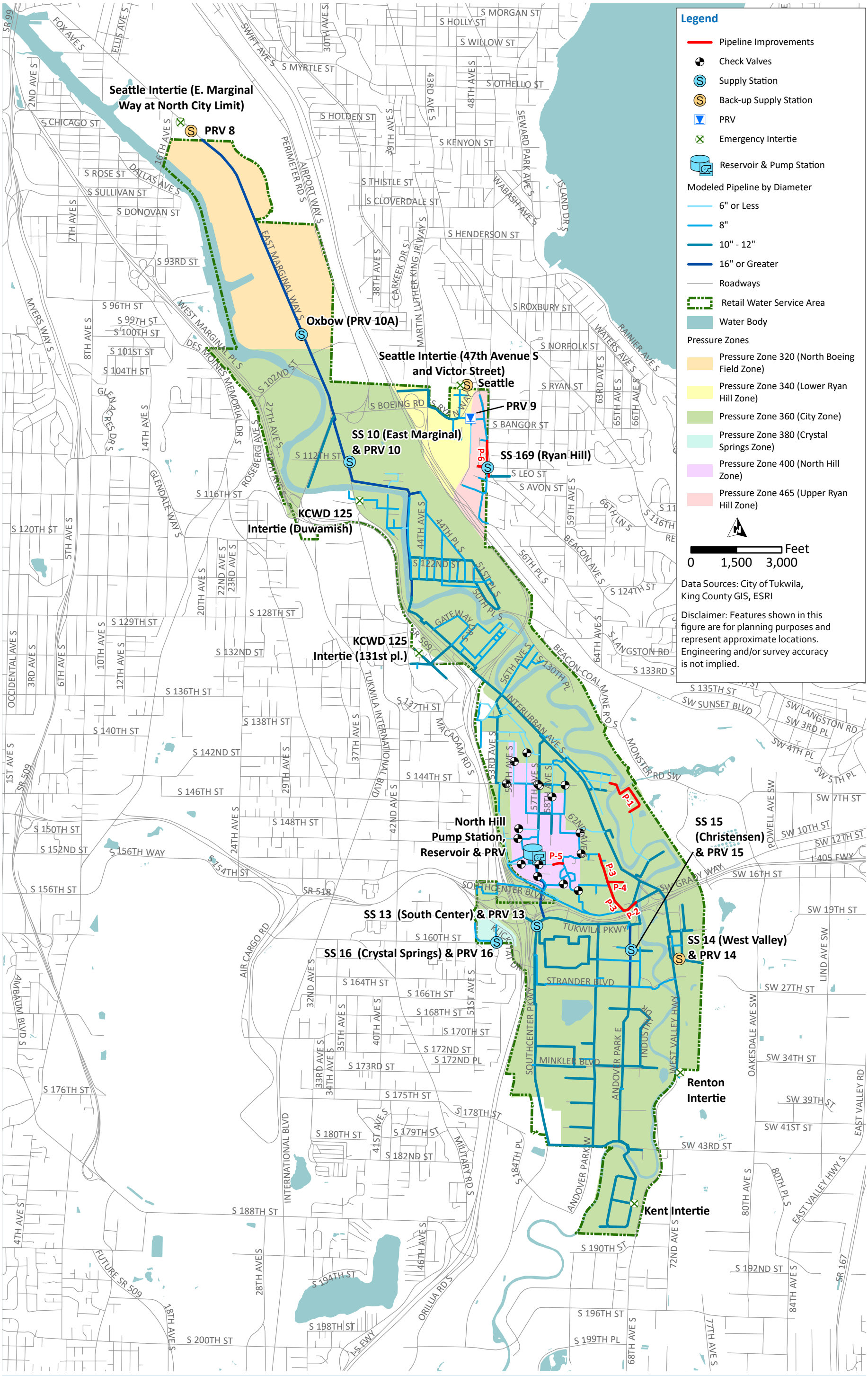

Figure 5.6 Pipeline Improvement Projects

5.6 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. These are described as follows:

- **360 service level**: This service level includes the 360, 320, and 400 pressure zones. This area is served by the North Hill Reservoir.
- **465 service level**: This service level includes the 465 and 340 pressure zones. This service level was previously served by the Seattle Public Utilities (SPU).
- **380 service level**: This service level includes only the 380 pressure zone. This area was previously served by Highline Water District (HWD).

5.6.1 Storage Requirements

Chapter 3 presented the distribution storage criteria, as summarized in Table 3.4, which includes the DOH standard storage requirements. As outlined in the Water System Design Manual (2019 Update), the DOH requires consideration of the following five components of storage for any water system:

- Operational Storage.
- Equalizing Storage.
- Standby Storage.
- Fire Suppression Storage.
- Dead Storage.

Figure 5.7 schematically shows these components.

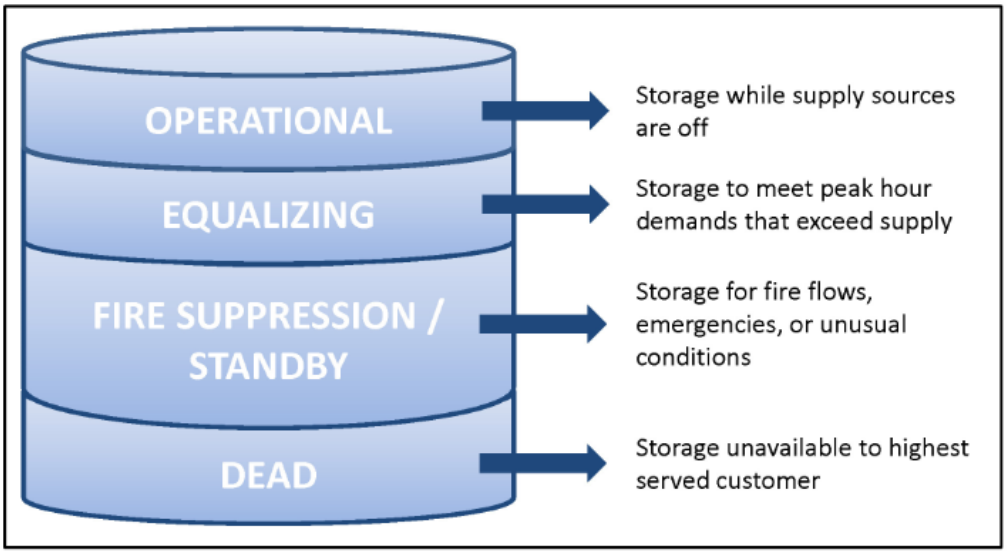

Figure 5.7 Storage Components

5.6.1.1 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.

The DOH Water System Design Manual states that the operational storage component is not applicable for continuous pumping systems. The City sources are operated continuously, not "called" based on tank level so operational storage is not required for the majority of the system. The 400 PZ does not have supplies so operational storage is required to serve the 400 PZ. It was assumed that 10 percent of the City's existing reservoir is dedicated to operational storage for the 400 PZ.

5.6.1.2 Equalizing Storage

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

ES = (PHD – Qs)*150 minutes, but in no case less than zero.

Where: ES = Equalizing storage component, in gallons.

PHD = Peak hourly demand, in gpm.

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

The equalizing storage requirement for each service level was 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"

Therefore, Qs 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, gallons per day per equivalent residential unit (gpd/ERU).

C = Coefficient Associated with Ranges of ERUs.

N = Number of ERUs.

F = Factor Associated with Ranges of ERUs.

Table 5.8 identifies the appropriate coefficients and factors for use with the above equation.

Table 5.8 Coefficients and Factors for PHD Equation

Number of ERUs (N)	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

Note:
(1) Reference: Table 3-1 from the DOH Water System Design Manual.

Table 5.9 summarizes the required equalizing storage by service level.

Table 5.9 Required Equalizing Storage (MG)

Service Level	2020	2030	2040
360 Service Level	0.21	0.25	0.30
465 Service Level	0.01	0.02	0.02
380 Service Level	0.01	0.01	0.01

5.6.1.3 Standby Storage and Fire Suppression 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. Calculating standby storage requirements includes considering 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 Washington State DOH Water System Design Manual recommends a minimum standby storage of no less than 200 gallons per ERU. This City uses the DOH recommendation of 200 gallons per ERU to calculate standby storage, as summarized in Table 5.10.

Table 5.10 Required Standby Storage (MG)

Service Level	2020	2030	2040
360 Service Level	2.63	3.12	3.84
465 Service Level	0.07	0.09	0.10
380 Service Level	0.00	0.01	0.01

FSS is the volume of storage required to deliver FFs 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. FF demand is the quantity of water required for firefighting as defined by applicable water system criteria and fire codes.

FFs required by existing structures vary within the water service area. Table 5.11 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 FF rate and required duration.

Table 5.11 Maximum Fire Demand by Service Level

Service Level	Maximum FF (gpm)	Duration (hours)	Fire Volume (MG)
360 Service Level	4,000	4	0.96
465 Service Level	4,000	4	0.96
380 Service Level	1,000	2	0.12

Either standby storage or fire suppression storage, whichever volume is smaller, can be excluded from each zone's total storage requirement (this is also known as "nested" storage). Table 5.12 outlines the nested standby storage and fire suppression storage for each service level.

Table 5.12 Nested Standby Storage and Fire Suppression Storage

Service Level	Storage Volume (MG)			Controlling Component		
	2020	2030	2040	2020	2030	2040
360 Service Level	2.63	3.12	3.84	Standby	Standby	Standby
465 Service Level	0.96	0.96	0.96	FSS	FSS	FSS
380 Service Level	0.12	0.12	0.12	FSS	FSS	FSS

5.6.1.4 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 can draw the water out of the reservoir completely.

5.6.2 Storage Analysis

This section summarizes the storage analysis, which was performed for each service level.

The City's storage was analyzed by service level to determine the storage deficits. Because the three service levels are hydraulically disconnected, each service level is required to have its own nested standby/FSS. Table 5.13 shows the storage deficit for each service level for the planning years.

The 360 service level is currently served by North Hill Reservoir, which has a capacity of 2.0 MG. The City does not currently provide storage for the 465 and 380 service levels.

Table 5.13 Required Storage by Service Level and Planning Year

Year	Operational Storage (MG)	Equalizing Storage (MG)	Nested Standby Storage/ FSS (MG)	Total Required Storage (MG)	Total Existing Storage (MG)	Storage Surplus / (Deficit)
360 Service Level						
2020	0.20	0.21	2.63	3.04	2.0	(1.04)
2030	0.20	0.25	3.12	3.57	2.0	(1.57)
2040	0.20	0.30	3.84	4.34	2.0	(2.34)
465 Service Level						
2020	0(1)	0.01	0.96	0.97	0	(0.97)
2030	0(1)	0.02	0.96	0.98	0	(0.98)
2040	0(1)	0.02	0.96	0.98	0	(0.98)
380 Service Level						
2020	0(1)	0.01	0.12	0.13	0	(0.13)
2030	0(1)	0.01	0.12	0.13	0	(0.13)
2040	0(1)	0.01	0.12	0.13	0	(0.13)

Note:
(1) No operational storage is required for the 465 and 380 service levels because both service levels have sources that are operated continuously.

As shown in Table 5.13, each service level has storage deficiencies. Improvements projects were developed to address the City's storage deficiencies.

5.6.3 Storage Recommendations

The City has many options to address the storage deficiencies outlined in Table 5.13. Currently, the three service levels are hydraulically disconnected, and each service level has a separate, required storage capacity. If the City hydraulically connects two or more service levels, the service levels can share the nested standby/FSS. The City has also identified several potential sites for the new storage reservoir. This section outlines the process for choosing potential storage alternatives to meet the City's storage needs outlined in Section 5.6.2.

5.6.3.1 Storage Recommendation Methodology

Several options to build the additional storage needs and potential representative locations for the storage reservoirs were compared and narrowed down to three potential storage alternatives using the following steps:

- Step 1: Determine overall storage options to meet storage deficiencies by service level.
- Step 2: Review the 2014 Water Reservoir Siting Study to identify potential storage sites. Include additional storage sites to consider per City recommendation.
- Step 3: Identify advantages and disadvantages of all potential sites.
- Step 4: Narrow down to four potential sites for further analysis.
- Step 5: Perform hydraulic modeling of four potential sites to evaluate feasibility.
- Step 6: Choose two alternatives to carry forward to the CIP.

5.6.3.2 Overall Storage Options

The overall storage options for the City differ for each service level.

For the 360 service level, the storage options include the following:

- Build a new reservoir in the 360 service level to meet future storage deficiencies.
- Build a new reservoir in the 380 service level or the 465 service level and construct transmission pipe to connect the service levels to share storage.

For the 465 service level, the storage options include the following:

- Build a new reservoir in the 465 service level to meet future storage deficiencies. Potentially share new storage with 360 service level and construct transmission pipe to connect the service levels or build separate storage in 360 service level.
- Lease storage from the Skyway Water & Sewer District (Skyway). This option does not appear to be feasible due to Skyway's limited existing storage capacity.

For the 380 service level, the storage options include the following:

- Build a new reservoir in the 380 service level to meet storage deficiencies.
- Transfer customers in the 380 service level to HWD. This would include approximately eleven residential customers.
- Replace pipe connection from 360 PZ to the 380 service level to meet Washington Department of Transportation (WSDOT) requirements for depth below a roadway. The service level could then share storage from the 360 service level.

Currently, the City's three service levels are hydraulically disconnected, so each service level is required to have its own standby/FSS, but to maximize storage efficiency, the storage recommendations considered combining the required storage for two service levels. The combined service levels would share the standby/FSS so less overall storage is required for the City. The 360 service level can be hydraulically connected to either the 465 service level or the 380 service level with pipe crossings of Interstate 5 (I-5) and the railroad (RR) or I-405. Table 5.14 summarizes the required storage for the 360/465 combined service levels and the 360/380 combined service levels.

Table 5.14 Required Storage for Combined Service Levels by Planning Year

Year	Operational Storage (MG)	Equalizing Storage (MG)	Nested Standby Storage/ FSS (MG)	Total Required Storage (MG)	Total Existing Storage (MG	Storage Surplus / (Deficit)
360/465 Combined Service Levels						
2020	0.20	0.22	2.70[(1)]	3.12	2.0	(1.12)
2030	0.20	0.26	3.21[(1)]	3.67	2.0	(1.67)
2040	0.20	0.31	3.94[(1)]	4.45	2.0	(2.45)
360/380 Combined Service Levels						
2020	0.20	0.22	2.63[(2)]	3.05	2.0	(1.05)
2030	0.20	0.26	3.13[(2)]	3.59	2.0	(1.59)
2040	0.20	0.31	3.85[(2)]	4.36	2.0	(2.36)

Notes:
(1) Includes total standby storage for the 360 service level and 465 service level.
(2) Includes total standby storage for the 360 service level and 380 service level.

The storage deficits outlined in Table 5.14 determine the recommended storage reservoir size for each location based on the service level(s) the new storage reservoir will serve.

5.6.3.3 Potential Storage Sites

As part of developing storage recommendations, potential sites for storage were identified and reviewed. A study was completed in 2014 to evaluate locations for a new storage reservoir and documented in the Water Reservoir Siting Study Technical Memorandum (2014 Siting Study). The 2014 Siting Study identified the following preferred locations for a future storage reservoir:

- **Cerini Hill**: The address for this location is 11030 E Marginal Way S. The site is in the 360 PZ. This location was identified as the preferred location in the 2014 Siting Study, but the City has concerns with buying or leasing the land from the City of Seattle. The location has access to existing pipes and provides the City with storage at the northern end of the system.
- **North Hill Private:** The site is in the 360 PZ near the existing North Hill Reservoir just east of 57th Ave S. The site is privately-owned and may be difficult to acquire.
- **Crystal Springs:** The address for this site is 15832 51st Avenue S. The site is in the 380 PZ. The property is owned by the City so acquisition would not be necessary. Per the 2014 Siting Study, construction was deemed difficult due to the wet soil on site.
- **Crestview Park:** The address for this site is 16200 42nd Avenue S. The site is outside of the City's water distribution system. This site could provide a good alternative to the Crystal Springs Park Site due to potential construction issues at the Crystal Springs Site.

The City also identified additional storage sites to review as follows:

- **Duwamish Hill:** This general location is in the 360 PZ north of 115th Street and east of Marginal Way. No specific parcel was identified for the reservoir location. The reservoir at this location would need to be an in-ground tank as it is in the flight path for Boeing Field. It is a very rocky location so excavation could be difficult. There is also Tribal Tie-In on the hill so it may be difficult to work in this location.
- **North Hill Gravel Site:** This site is in the 360 PZ near the existing North Hill Reservoir and is privately-owned. It is directly north of the North Hill Private site identified in the 2014 Siting Study. The City anticipates it will be easier to acquire this site than the North Hill Private site.
- **Ryan Hill (0.65 Acre) Site**: This site is on 49th Avenue S in the 465 PZ. The site is privately-owned and would need to be acquired by the City. A reservoir in the 465 PZ could allow for more development in the area.
- **Ryan Hill (2 Acre) Site**: This site is also on 49th Avenue S in the 465 PZ. The site is privately-owned and would need to be acquired by the City. A reservoir in the 465 PZ could allow for more development in the area.
- **Beacon Ave Site**: This site is between Beacon Ave S and S Ryan Way, north of S 107th St. in the 465 PZ. The site is privately-owned and would need to be acquired by the City. A reservoir in the 465 PZ could allow for more development in the area.

The initial potential sites for a future reservoir considered for this evaluation are shown in Figure 5.8.

5.6.3.4 Potential Storage Site Comparison

Table 5.15 summarizes the advantages and disadvantages for each potential location considered for a future reservoir site. The site that is selected will impact storage recommendations for the other service levels as follows:

- If a location in 465 service level is selected, it is recommended that the City work with HWD to transfer their existing customers in the 380 service level to be served by HWD.
- If a location in the 380 service level is selected, it is recommended that the City build a separate storage facility in the 465 Zone to serve the 465 service level.
- If a location in the 360 service level is selected, the following is recommended:
  - The City work with HWD to transfer their existing customers in the 380 service level to be served by HWD.
  - The City perform a study for replacing the existing pipe connection to 380 PZ.
  - The City should either build a separate storage facility in the 465 Zone to serve the 465 service level or build a BPS to serve the 465 service level from the new reservoir in the 360 service level.

Table 5.15 Potential Storage Locations Summary

Site	Service Level of Location	Ease of Construction	Acquisition	Freeway/Railroad Crossing	Operation & Maintenance	Potential to combine storage zones	Comments
Beacon Ave	465	Unknown	Privately owned	Requires I-5 and Railroad Crossing	High – requires pumping to 465 service level	Yes (360 and 465 service levels)	Would require additional storage recommendation for 380 service level.
Cerini Hill	360	No apparent construction issues	Owned by City of Seattle	May be required is sharing storage with 465 service level	High – requires pumping in 360 service level	Yes (360 and 465 service levels)	Would require additional storage recommendation for 465 service level (if not sharing storage) and 380 service level.
Crestview Park	Outside Service Area	Unknown	City owned (HWD has 5 MG tank in park already)	Not required if existing connection can be re-established	Low – gravity fed to 360 and 380 service levels	Yes (360 and 380 service levels)	Would require additional storage recommendation for 465 service level.
Crystal Springs Park	380	Wet Soil at Crystal Springs Park	City owned	Not required if existing connection can be re-established	Low – gravity fed to 360 and 380 service levels	Yes (360 and 380 service levels)	Would require additional storage recommendation for 465 service level.
Duwamish Hill	360	Very rocky and required in-ground tank	Privately owned	May be required is sharing storage with 465 service level	High – requires pumping in 360 service level	Yes (360 and 465 service levels)	Would require additional storage recommendation for 465 service level (if not sharing storage) and 380 service level.
North Hill Gravel Site	360	Unknown	Privately owned	May be required is sharing storage with 465 service level	High – requires pumping in 360 service level	Yes (360 and 465 service levels)	Would require additional storage recommendation for 380 service level.
North Hill Private Site	360	Lots of solid rock	Privately owned – Difficult to acquire	May be required is sharing storage with 465 service level	Low – gravity fed with elevated reservoir	Yes (360 and 465 service levels)	Would require additional storage recommendation for 465 service level (if not sharing storage) and 380 service level.
Ryan Hill 2 Acre	465	Unknown	Privately owned parcel	Requires I-5 and Railroad Crossing	High – requires pumping to 465 service level	Yes (360 and 465 service levels)	Would require additional storage recommendation for 380 service level.
Ryan Hill 0.65 Acre	465	Unknown	Privately owned parcel	Requires I-5 and Railroad Crossing	High – requires pumping to 465 service level	Yes (360 and 465 service levels)	Would require additional storage recommendation for 380 service level.

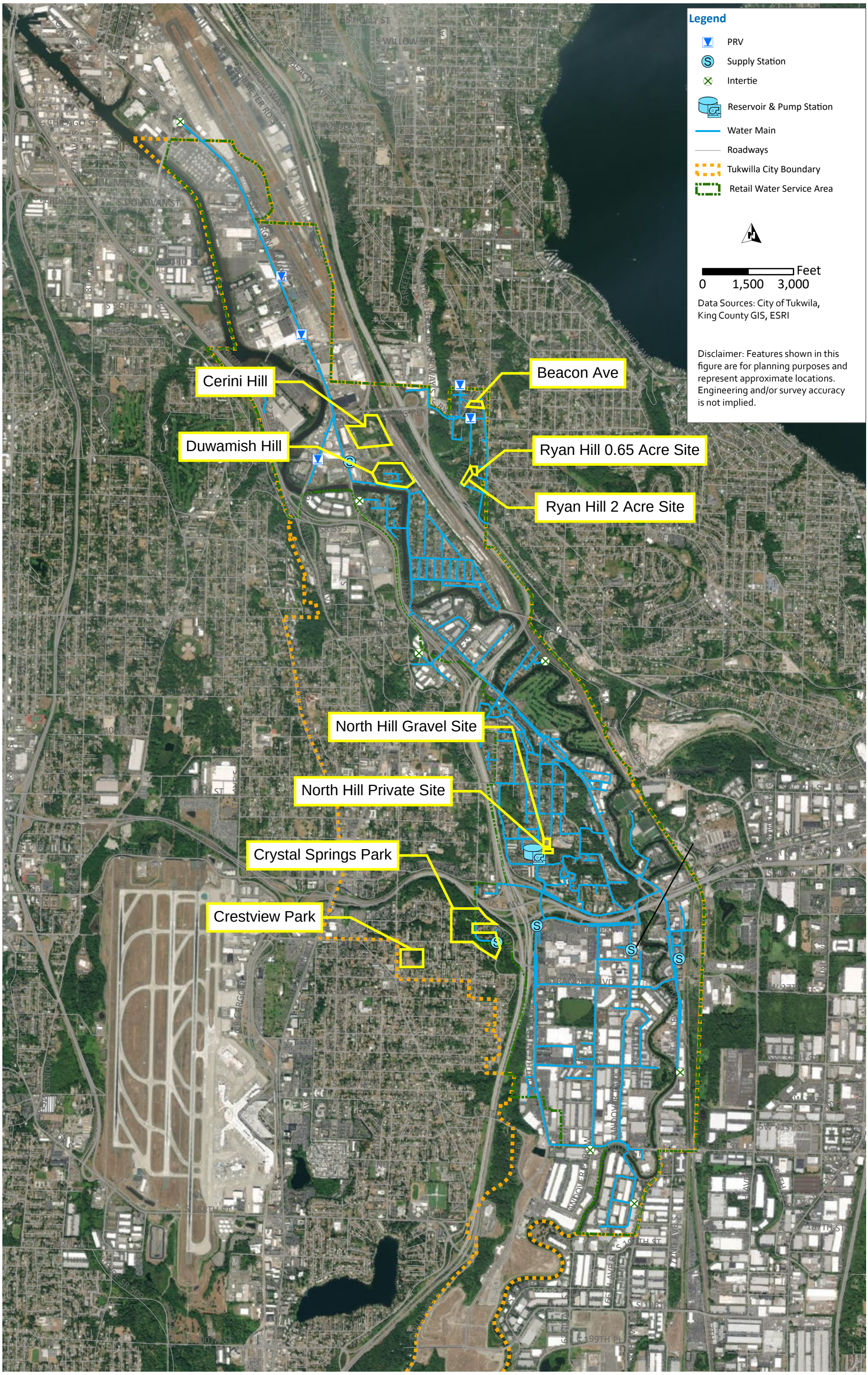

Figure 5.8 Potential Storage Locations

5.6.3.5 Four Sites Chosen for Further Evaluation

After reviewing the advantages and disadvantages of each potential storage site, the City selected the following four sites for further evaluation:

- **Alternative 1, North Hill Gravel Site**: This storage site has two options:
  - Alternative 1A: North Hill Gravel Site with a BPS to 465 zone.
  - Alternative 1B: North Hill Gravel Site with a separate tank in the 465 service level.
- **Alternative 2, Beacon Ave.**
- **Alternative 3, Ryan Hill**: 2 acres.
- **Alternative 4, Ryan Hill**: 0.65 acres.

None of the chosen alternatives will provide storage to the 380 service level; therefore, customers in this service level are recommended to be transferred to HWD. An appropriate agreement with HWD will need to be developed.

The following sections describe each option in detail. Each section includes a figure showing the alternative as well as a schematic showing simplified operations.

Alternative 1A: North Hill Gravel Site with BPS to 465 Zone

This alternative constructs a new tank that will serve as a storage reservoir at the North Hill Gravel Site and fills it using existing supply stations in the 360 service level. A new BPS will also be constructed to serve the 360 service level, namely customers in the 360 PZ and 400 PZ. In addition, a new, separate BPS will be constructed to serve customers in the 465 service level. Note that a pipe crossing of I-5 and the railroad will be required for the 465 service level to utilize this new reservoir.

Figure 5.9 shows this alternative's potential layout while Figure 5.10 shows a schematic of its operations. As can be seen, the following elements comprise Alternative 1A's operations:

- **North Hill Gravel Site tank**: A 2.5 MG capacity reservoir will provide the required storage for both the 360 and 465 service levels (see Table 5.14 for requirement). This reservoir will likely be a ground tank with an altitude valve. Due to low onsite elevations, the tank will require a BPS to serve the 360 service level. Approximately 1,100 feet of 16-inch piping will connect the tank to the distribution system at the intersection of 57th Avenue and S 152nd Street.
- **North Hill Gravel Site BPS**: Due to onsite elevations, a BPS must serve the 360 service level from the North Hill Gravel Site tank. The pumps within this station are recommended to have the following capacities:
  - **Domestic pumps**: 250-gpm firm capacity.
  - **FF pumps**: 4,000-gpm firm capacity.
- **Beacon Ave BPS**: Since this alternative requires shared storage across the two service levels, a BPS must serve the 465 service level from the 360 service level. The pumps within this station are recommended to have the following capacities:
  - **Domestic pumps**: 140-gpm firm capacity.
  - **FF pumps**: 4,000-gpm firm capacity.
- **Pipe crossing of I-5 and railroad**: A new pipe will be required to connect the 465 service level to the 360 service level across I-5 and the railroad. This cross can occur at multiple locations, each with different constraints and concerns. The pipeline configuration shown in Figure 5.9 is approximately 3,000-feet long.

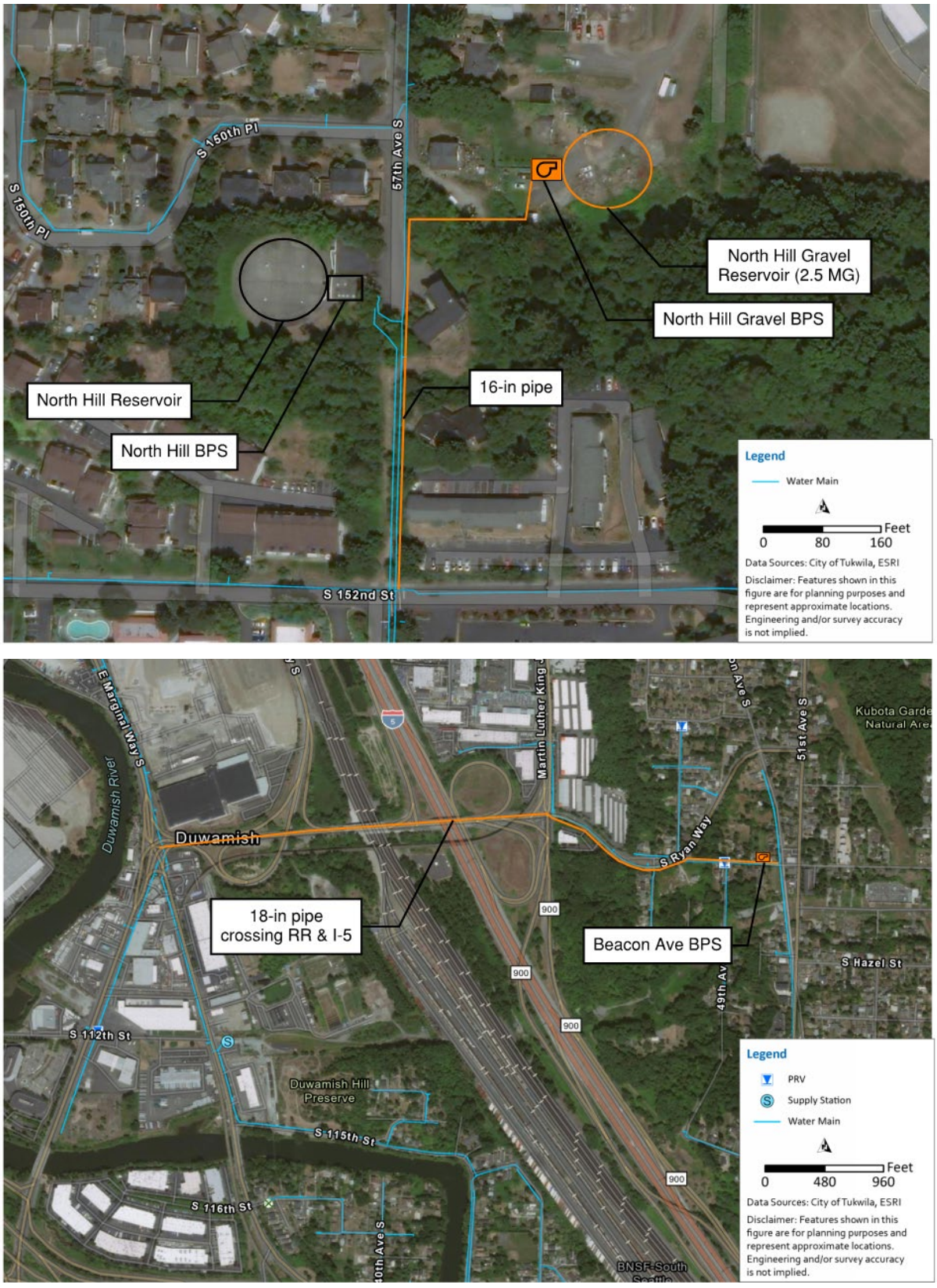

Figure 5.9 Alternative 1A: Potential Layout (Top: North Hill Area; Bottom: Connection to 465 Service Level)

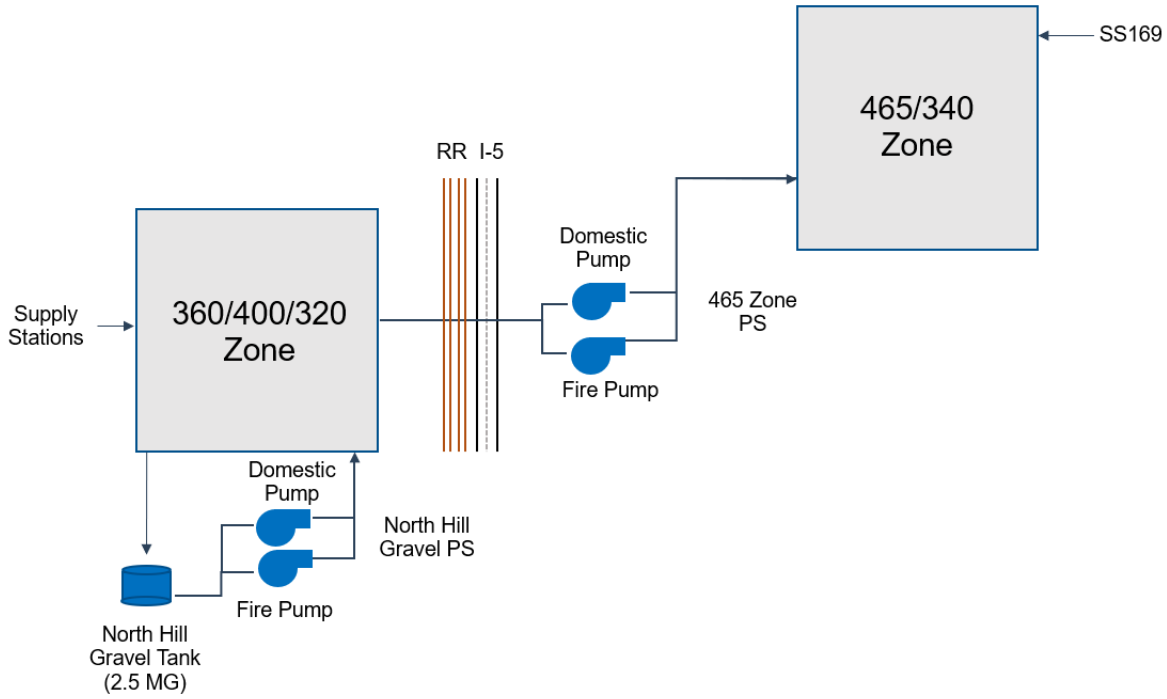

Figure 5.10 Alternative 1A North Hill Gravel Site with BPS to 465 Zone: Simplified Schematic

Alternative 1B: North Hill Gravel Site with Separate 465 Tank

This alternative constructs two new tanks: one that will serve as a storage reservoir at the North Hill Gravel Site that is filled using existing supply stations in the 360 service level and one that will serve as a storage reservoir at the Beacon Avenue Site that is filled using existing supply stations in the 465 service level. Two new BPSs will also be constructed to serve customers in the respective service levels.

Figure 5.11 shows this alternative's potential layout while Figure 5.12 shows a schematic of its operations. As can be seen, the following elements comprise Alternative 1B's operations:

- **North Hill Gravel Site tank**: A 2.4-MG capacity reservoir will provide the required storage for the 360 service level (see Table 5.13 for requirement). This reservoir will likely be a ground tank with an altitude valve. Due to low onsite elevations, the tank will require a BPS to serve the 360 service level. Approximately 1,100 feet of 16-inch piping will connect the tank to the distribution system at the intersection of 57th Avenue and S 152nd Street.
- **North Hill Gravel Site BPS**: Due to onsite elevations, a BPS must serve the 360 service level from the North Hill Gravel Site Tank. The pumps within this station are recommended to have the following capacities:
  - **Domestic pumps**: 250-gpm firm capacity.
  - **FF pumps**: 4,000-gpm firm capacity.
- **Beacon Ave tank**: A 1.1-MG capacity reservoir will provide the required storage for 465 service level (see Table 5.13 for requirement). This reservoir will likely be a ground tank with an altitude valve. Due to low onsite elevations, the tank will require a BPS to serve the 465 service level.
- **Beacon Ave BPS**: Due to onsite elevations, a BPS must serve the 465 service level from the Beacon Ave Tank. The pumps within this station are recommended to have the following capacities:
  - **Domestic pumps**: 140-gpm firm capacity.
  - **FF pumps**: 4,000-gpm firm capacity.

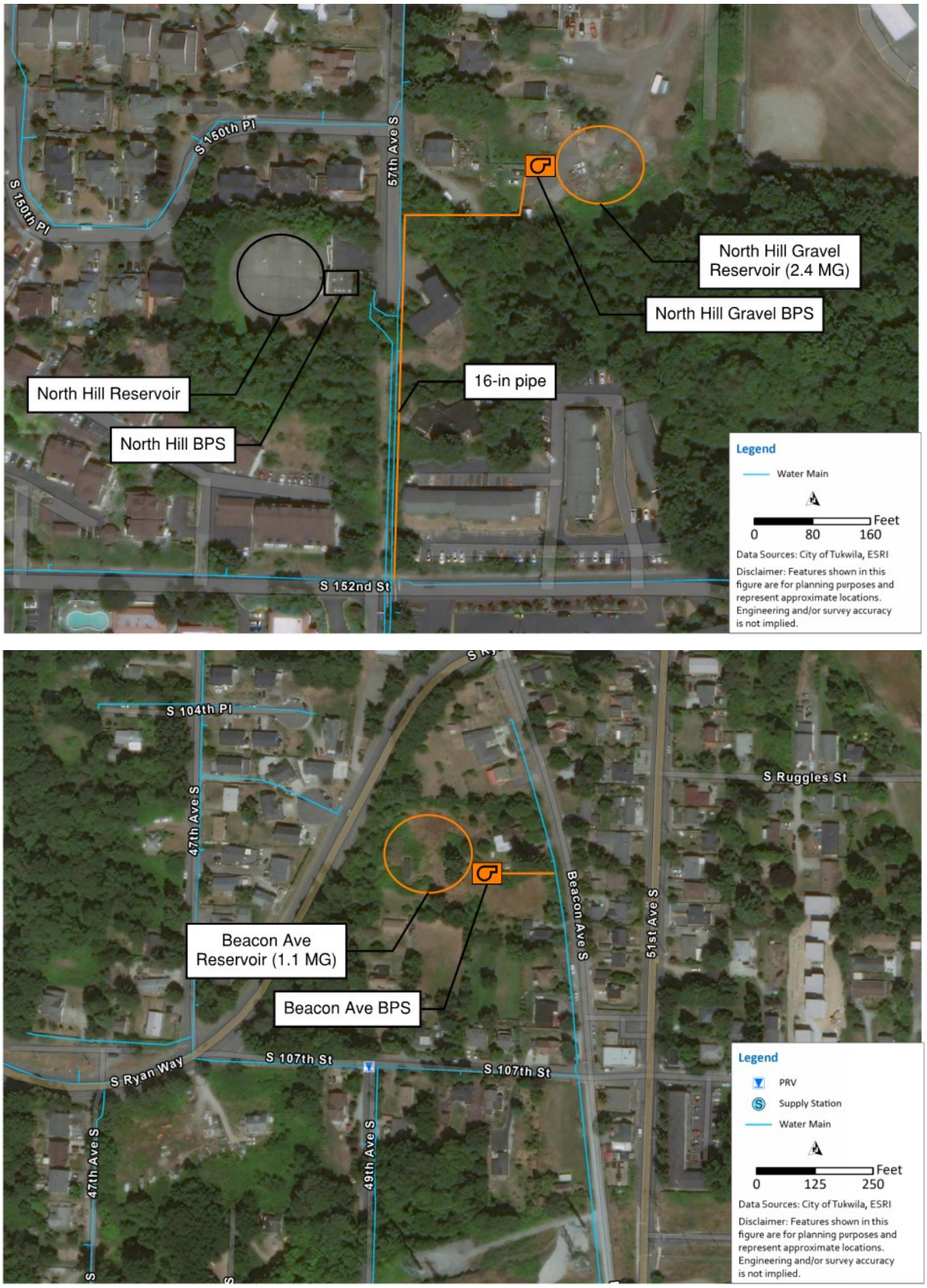

Figure 5.11 Alternative 1B: Potential Layout (Top: North Hill Area; Bottom: Beacon Ave Area)

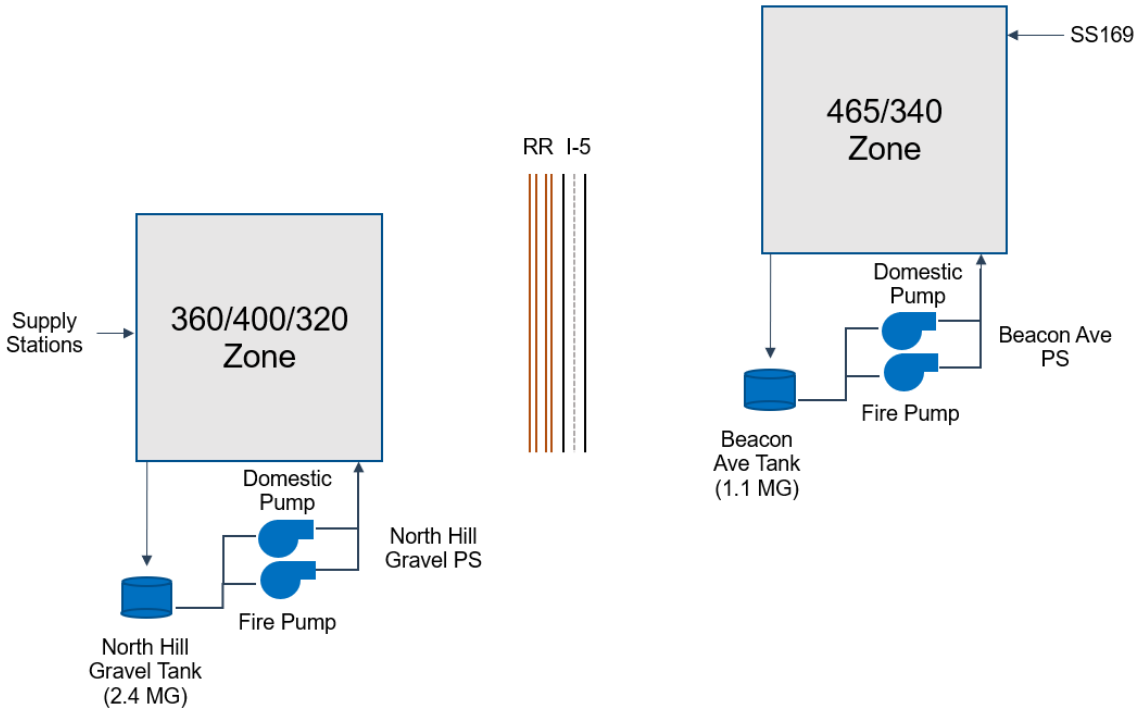

Figure 5.12 Alternative 1B North Hill Gravel Site with Separate 465 Tank: Simplified Schematic

Alternative 2: Beacon Ave Reservoir

This alternative constructs a new tank that will serve as a storage reservoir at the Beacon Ave Site in the 465 service level and fills it using existing supply stations in the 360 and 465 service levels. In addition, a new BPS will be constructed to serve the 465 service level. Note that a pipe crossing of I-5 and the railroad will be required so the 360 and 465 service levels can share the new storage and so that the supply stations in the 360 service level can fill the tank. A new pressure reducing valve (PRV) will be required to reduce pressure from the BPS down to the 360 service level. New check valves will be required at SS 169 in the 465 service level and the fill line to the tank from the 360 service level.

Figure 5.13 shows this alternative's potential layout while Figure 5.14 shows a schematic of its operations. As can be seen, the following elements comprise Alternative 2's operations:

- **Beacon Ave tank**: A 2.5-MG capacity reservoir will provide the required storage for 360 and 465 service levels (see Table 5.14 for requirement). This reservoir will likely be a ground tank with an altitude valve. Due to low onsite elevations, the tank will require a BPS to serve the 465 service level.
- **Beacon Ave BPS**: Due to onsite elevations, a BPS must serve the 465 service level from the Beacon Ave Tank. The pumps within this station are recommended to have the following capacities:
  - **Domestic pumps**: 200-gpm firm capacity.
  - **FF pumps**: 4,000-gpm firm capacity.
- **Pipe crossing of I-5 and railroad**: A new pipe will be required to connect the 360 service level to the 465 service level across I-5 and the railroad. This cross can occur at multiple locations, each with different constraints and concerns. The pipeline configuration shown in Figure 5.13 is approximately 3,000-feet long.

- **Valves**: A PRV to the 360 service level is recommended to reduce pressure from the Beacon Ave BPS. Two check valves are also recommended: one at SS 169 in the 465 service level, and one on the fill line to the Beacon Ave tank from the 360 service level.

Figure 5.13 Alternative 2: Potential Layout

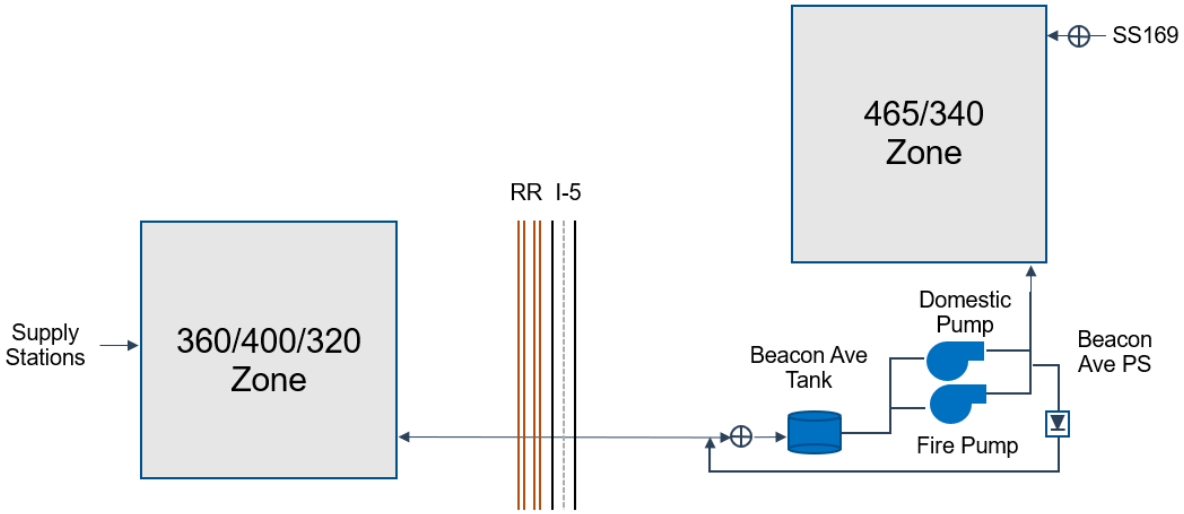

Figure 5.14 Alternative 2 Beacon Ave Reservoir: Simplified Schematic

Alternative 3: Ryan Hill 2 Acre Site Reservoir

This alternative constructs a new tank that will serve as a storage reservoir at the Ryan Hill 2 Acre Site in the 465 service level and fills it using existing supply stations in the 360 and 465 service levels. In addition, a new BPS will be constructed to serve the 465 service level. Note that a pipe crossing of I-5 and the railroad will be required so the 360 and 465 service levels can share the new storage and so that the supply stations in the 360 service level can fill the tank. A new PRV will be required to reduce pressure from the BPS down to the 360 service level. New check valves will be required at SS 169 in the 465 service level and the fill line to the tank from the 360 service level.

Figure 5.15 shows this alternative's potential layout while Figure 5.16 shows a schematic of its operations. As can be seen, the following elements comprise Alternative 3's operations:

- **Ryan Hill 2 Acre tank**: A 2.5-MG capacity reservoir will provide the required storage for 360 and 465 service levels (see Table 5.14 for requirement). This reservoir will likely be a ground tank with an altitude valve. Due to low onsite elevations, the tank will require a BPS to serve the 465 service level.
- **Ryan Hill 2 Acre BPS**: Due to onsite elevations, a BPS must serve the 465 service level from the Beacon Ave Tank. The pumps within this station are recommended to have the following capacities:
  - **Domestic pumps**: 200-gpm firm capacity.
  - **FF pumps**: 4,000-gpm firm capacity.
- **Pipe crossing of I-5 and railroad**: A new pipe will be required to connect the 360 service level to the 465 service level across I-5 and the railroad. This crossing can occur at multiple locations, each with different constraints and concerns. The pipeline configuration shown in Figure 5.15 is approximately 6,000-feet long.
- **Valves**: A PRV to the 360 service level is recommended to reduce pressure from the Ryan Hill 2 Acre BPS. Two check valves are also recommended: one at SS 169 in the 465 service level, and one on the fill line to the Ryan Hill 2 Acre tank from the 360 service level.

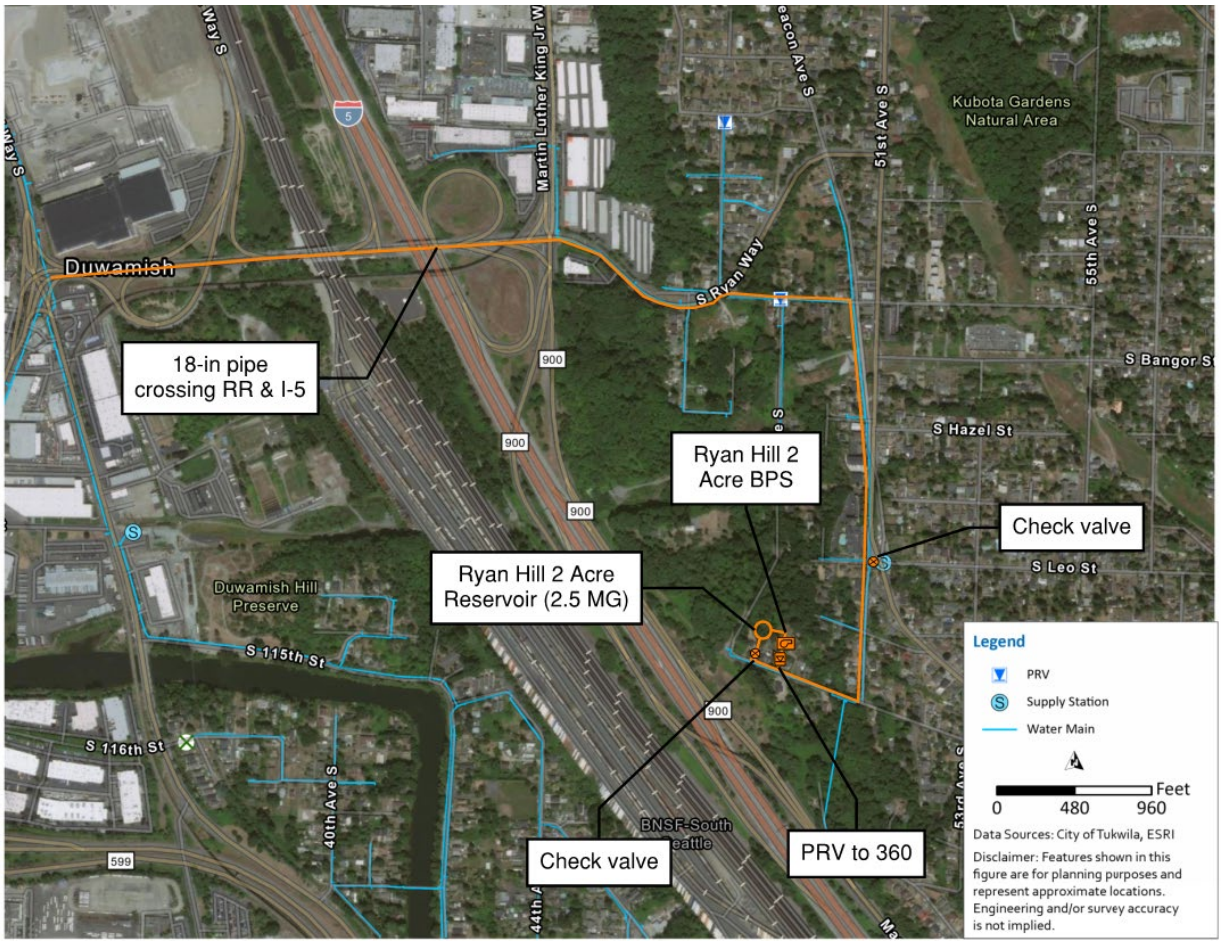

Figure 5.15 Alternative 3: Potential Layout

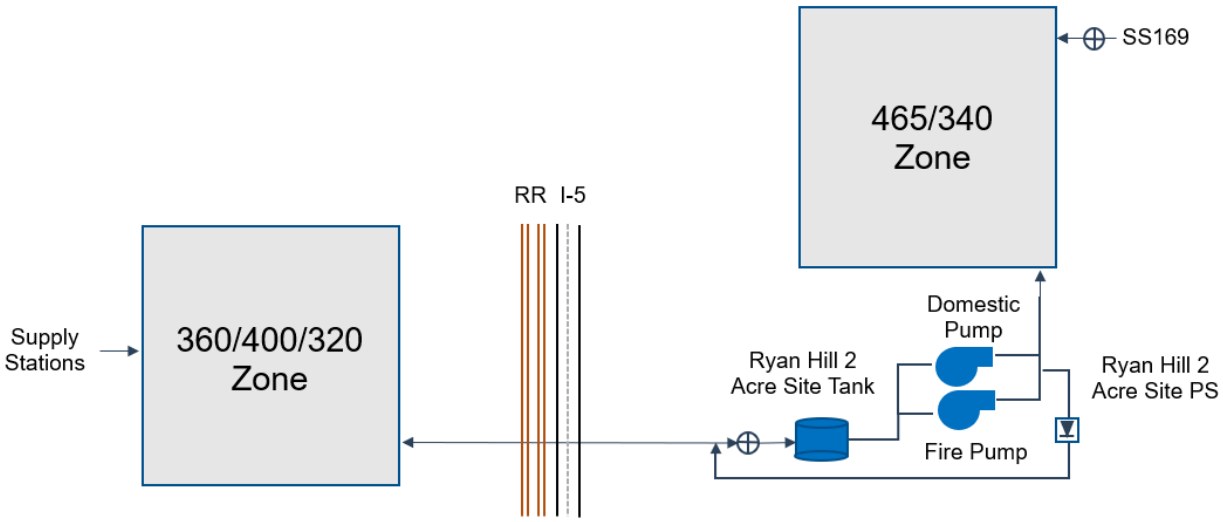

Figure 5.16 Alternative 3 Ryan Hill 2 Acre Site Reservoir: Simplified Schematic

Alternative 4: Ryan Hill 0.65 Acre Site Reservoir

This alternative constructs a new tank that will serve as a storage reservoir at the Ryan Hill 0.65 Acre Site in the 465 service level and fills it using existing supply stations in the 360 and 465 service levels. In addition, a new BPS will be constructed to serve the 465 service level. Note that a pipe crossing of I-5 and the railroad will be required so the 360 and 465 service levels can share the new storage and so that the supply stations in the 360 service level can fill the tank. A new PRV will be required to reduce pressure from the BPS down to the 360 service level. New check valves will be required at SS 169 in the 465 service level and the fill line to the tank from the 360 service level.

Figure 5.17 shows this alternative's potential layout while Figure 5.18 shows a schematic of its operations. As can be seen, the following elements comprise Alternative 3's operations:

- **Ryan Hill 0.65 Acre tank**: A 2.5-MG capacity reservoir will provide the required storage for 360 and 465 service levels (see Table 5.14 for requirement). This reservoir will likely be a ground tank with an altitude valve. Due to low onsite elevations, the tank will require a BPS to serve the 465 service level.
- **Ryan Hill 0.65 Acre BPS**: Due to onsite elevations, a BPS must serve the 465 service level from the Beacon Ave Tank. The pumps within this station are recommended to have the following capacities:
  - **Domestic pumps**: 200-gpm firm capacity.
  - **FF pumps**: 4,000-gpm firm capacity.
- **Pipe crossing of I-5 and railroad**: A new pipe will be required to connect the 360 service level to the 465 service level across I-5 and the railroad. This cross can occur at multiple locations, each with different constraints and concerns. The pipeline configuration shown in Figure 5.17 is approximately 5,500-feet long.
- **Valves**: A PRV to the 360 service level is recommended to reduce pressure from the Ryan Hill 0.65 Acre BPS. Two check valves are also recommended: one at SS 169 in the 465 service level, and one on the fill line to the Ryan Hill 0.65 Acre tank from the 360 service level.

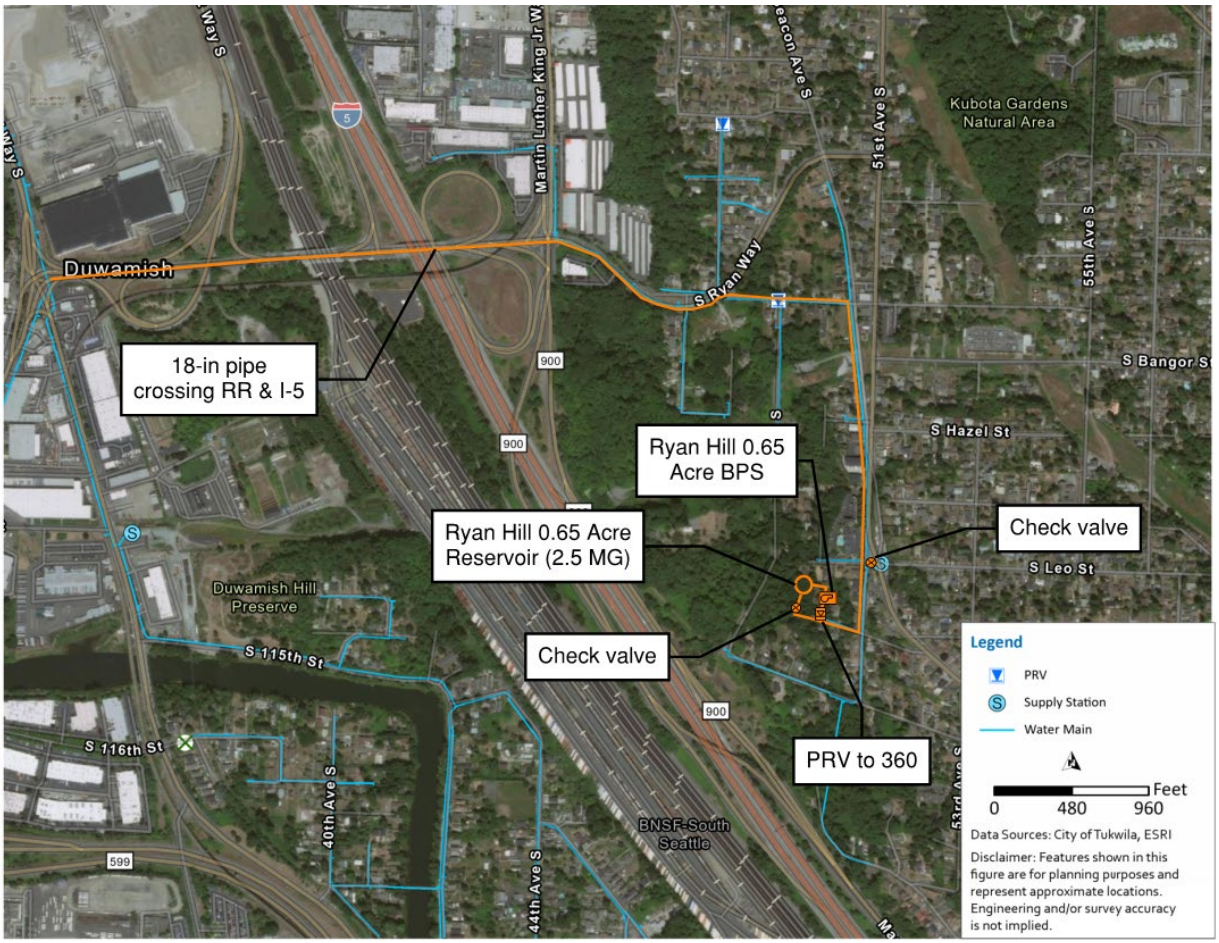

Figure 5.17 Alternative 4: Potential Layout

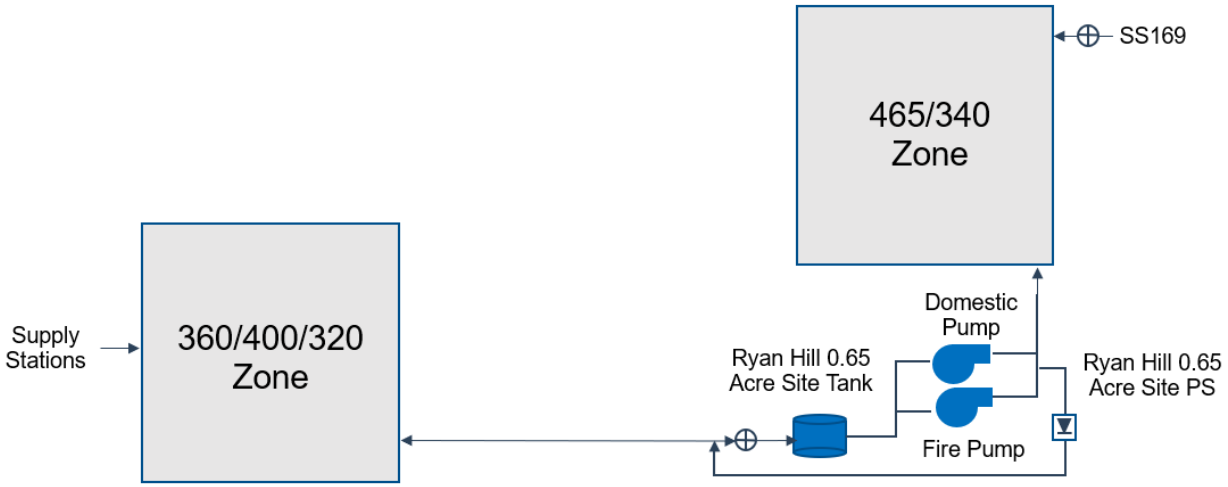

Figure 5.18 Alternative 4 Ryan Hill 0.65 Acre Site Reservoir: Simplified Schematic

5.6.3.6 Hydraulic Modeling Results for Storage Evaluation

The hydraulic model was used to evaluate the four storage sites outlined in Section 5.6.3.5. Facilities for each of the alternatives were added to the model. The 2040 MDD and 2040 MDD plus FF scenarios were run to evaluate the future system with each of the storage alternatives. Since the City does not have deficiencies for low system pressures, only the FF conditions were reviewed for compliance with DOH requirements.

The 2040 MDD scenarios were used to review tank, pump station, and valve cycling. Figure 5.19 shows an example of tank level cycling from the Beacon Ave tank, based on the altitude valve and pump station flows, that was typical to all storage sites.

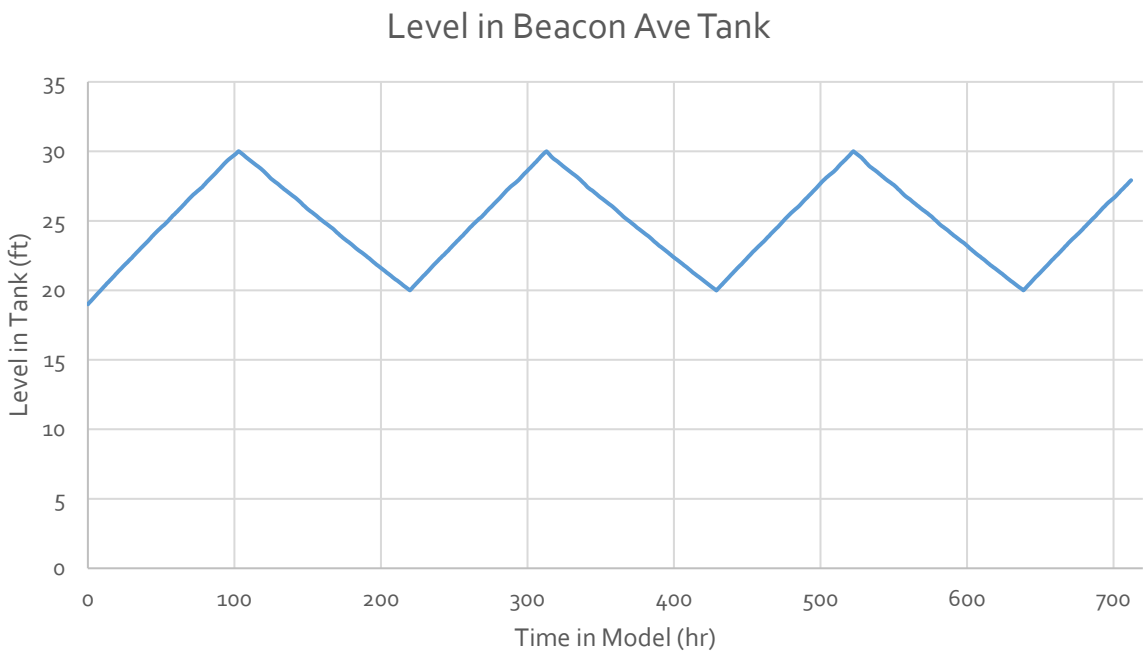

Figure 5.19 Example Tank Cycling from Hydraulic Model

The results for the hydraulic modeling for each scenario as summarized below.

Alternative 1A: North Hill Gravel Site with BPS to 465 Zone

- The modeled North Hill Gravel Site tank cycles based on the altitude valve and the North Hill Gravel Site BPS controls. The modeled tank can replenish FSS in less than 72 hours. The domestic flow for the North Hill Gravel Site BPS was set so the tank has a 7- to 10-day turnover (250 gpm).
- The Beacon Ave BPS domestic pump capacity was set to provide a portion of the 2040 PHD for the 465 service level (140 gpm), with the rest of the 2040 PHD provided by SS 169. The Beacon Ave BPS fire pump was set to 4,000 gpm to meet the largest FF requirement in the 465 service level.
- The existing 8-inch diameter pipe on 51st Avenue S from S 107th Street to S Leo Street is recommended to be upsized to address FF deficiencies in the area.

Alternative 1B: North Hill Gravel Site with Separate 465 Tank

- The modeled North Hill Gravel Site tank cycles based on the altitude valve and the North Hill Gravel Site BPS controls. The modeled tank can replenish FSS in less than 72 hours. The domestic flow for the North Hill Gravel Site BPS was set so the tank has a 7- to 10-day turnover (250 gpm).
- The Beacon Ave tank level cycles based on the altitude valve and the Beacon Ave BPS controls. To replenish the 0.96 MG FSS in 72 hours, the City needs at least 220 gpm flow from SS 169. Currently, the contractual flow is 70 gpm, which equates to FSS replenishment in approximately 8 days. The Beacon Ave BPS fire pump capacity was set to 4,000 gpm to meet the largest FF requirement in the 465 service level.
- The existing 8-inch pipe on 51st Avenue S from S 107th Street to S Leo Street is recommended to be upsized to address FF deficiencies in the area.

Alternative 2: Beacon Ave Reservoir

- The modeled Beacon Ave tank is filled by gravity from the supply sources in the 360 service level. Flow from supply source SS 169 in the 465 service level supplements the gravity supply. The tank level cycles based on the altitude valve and the Beacon Ave BPS controls. The tank can replenish FSS in less than 72 hours. The domestic pump capacity for the Beacon Ave BPS was set so the tank has a 7 to 10-day turnover (200 gpm).
- The modeled Beacon Ave tank is used to serve FFs in the 360 and 465 service levels. A separate PRV to serve FFs to the 360 service level is recommended.
- The existing 8-inch pipe on 51st Avenue S from S 107th Street to S Leo Street is recommended to be upsized to address FF deficiencies in the 465 PZ.

Alternative 3: Ryan Hill 2 Acre Site Reservoir

- The modeled Ryan Hill 2 Acre tank is filled by gravity from the supply sources in the 360 service level. Flow from supply source SS 169 in the 465 service level supplements the gravity supply. The tank level cycles based on the altitude valve and the Ryan Hill 2 Acre BPS controls. The tank can replenish FSS in less than 72 hours. The domestic pump capacity for the Ryan Hill 2 Acre BPS was set so the tank has a 7 to 10-day turnover (200 gpm).
- The modeled Ryan Hill 2 Acre tank is used to serve FFs in the 360 and 465 service levels. A separate PRV to serve FFs to the 360 service level is recommended.
- The existing 8-inch pipe on 51st Ave S from S Hazel Street to S 114th Street is recommended to be upsized to address FF deficiencies in the 465 PZ.

Alternative 4: Ryan Hill 0.65 Acre Site Reservoir

- The modeled Ryan Hill 0.65 Acre tank is filled by gravity from the supply sources in the 360 service level. Flow from supply source SS 169 in the 465 service level supplements the gravity supply. The tank level cycles based on the altitude valve and the Ryan Hill 0.65 Acre BPS controls. The tank can replenish FSS in less than 72 hours. The domestic pump capacity for the Ryan Hill 0.65 Acre BPS was set so the tank has a 7 to 10-day turnover (200 gpm).
- The modeled Ryan Hill 0.65 Acre tank is used to serve FFs in the 360 and 465 service levels. A separate PRV to serve FFs to the 360 service level is recommended.
- The existing 8-inch pipe on 51st Avenue S from S Hazel Street to S 113th Street is recommended to be upsized to address FF deficiencies in the 465 PZ.

5.6.3.7 Storage Recommendations for CIP

The following three representative storage alternatives will be carried forward to the CIP for cost estimate development:

- Alternative 1A: North Hill Gravel Site with BPS to 465 Zone.
- Alternative 1B: North Hill Gravel Site with Separate 465 Tank.
- Alternative 2, Beacon Ave Site (location used to represent the three storage site alternatives in the 465 service level).

Note, the City is also considering alternative options for additional storage, including identifying new sites for storage or partnering with adjacent purveyors for shared storage space.

5.7 Limiting Capacity Analysis

The capacity of many water system components can be expressed as the number of ERUs that can be served. As described in Chapter 4, an ERU for the City's system is one that consumes 147 gpd on an average demand day. On a maximum day, an ERU consumes 260 gpd.

The limiting capacity of the City's physical water system was determined for the 2040 planning year with the assumptions that all recommended improvement projects will be online. The limiting capacity analysis uses the methodology described in DOH Water System Design Manual (June 2020) Worksheet 4-1. Table 5.16 describes the method used to calculate capacity for each component and the 2040 ERU value for each component.

Table 5.16 Limiting Capacity Calculations for 2040 with Recommended Improvements

Water System Component	2040 ERU Value	Equation / Notes
2040 ERUs	19,430	Projected number of ERUs for the City's water system by planning year 2040.
Sources	36,530	N = $\frac{Source\ Capacity}{ADD\ ERU\ value}$
Treatment	Not Limiting	City does not treat water received through supply sources from Cascade.
Equalizing Storage	19,740	N = $\frac{1}{C}[(\frac{1440}{MDD})(\frac{ES}{150} + Q_s - 18) - F]$ where MDD = MDD, gpd/ERUs C = Coefficient associated with ranges of ERUs F - Factor associated with ranges of ERUs Q_s = Total source pumping capacity, gpm
Standby Storage	19,970	N = $\frac{SB_t}{(SB_i)(t_d)}$ where SB_t = total volume of water in standby storage component (gallons) SB_i = Design level of standby storage to meet reliability considerations per ERU (gpd/ERU) t_d = time that storage is to be used (days)

Water System Component	2040 ERU Value	Equation / Notes
Transmission	Not Limiting	Not considered capacity limited because the City has planned projects to address all identified deficiencies and design standards confirm all new development meets City standards.
Water Rights	Not Limiting	City's supply sources are received through Cascade.

As presented in Chapter 4, the City predicts serving approximately 19,430 ERUs in 2040. Considering sources, equalizing storage, and standby storage, the City's water system is anticipated to have sufficient capacity to meet expected growth within the 20-year planning period with the recommended improvements.

5.8 Summary of Recommendations

The system analysis yielded several recommended improvements for supply sources, BPSs, and reservoirs as summarized below by category:

- **Supply Projects:**
  - **S-1:** Work with Cascade to increase contractual flows at supply stations.
  - **S-2:** Implement supply operational changes to use a different lead supply when velocities in the SS 15 connection pipe reach 8 fps in the future.
- **Pumping Project:**
  - **PS-1:** Add back-up power to all existing and future BPSs.
- **Storage Projects:**
  - **ST-1:** Select one of the recommended alternatives to build or acquire storage to meet the City's storage requirements.
  - **ST-2:** Transfer customers in 380 PZ to be served by the HWD.
  - **ST-3:** Perform a study/replacing pipe connection to the 380 PZ.

The system analysis also identified pipeline improvements, which are summarized in Table 5.17. Figure 5.19 shows all deficiencies mitigated with the recommended improvements.

Table 5.17 Recommended Improvements for Fire Flow Deficiencies

Project Number	Location	Length (ft)	Existing Diameter (in)	New Diameter (in)	Description
P-1	From Starfire Way north (across pedestrian bridge) to S 143rd Pl	2,000	n/a	8	1,500 gpm FF demand on 6-inch dead end pipe.
P-2	Southcenter Blvd from 66th Ave S north to existing pipe.	350	n/a	12	FF deficiencies in area
P-3	Southcenter Blvd from 66th Ave S to 65th Ave S, 65th Ave S from Southcenter Blvd to S 151st St	2,200	8	12	FF deficiencies in area

Project Number	Location	Length (ft)	Existing Diameter (in)	New Diameter (in)	Description
P-4	S 153rd St from 65th Ave S east to end of street	500	8	12	FF deficiencies in area
P-5	S 153rd St from City hydrant east to Sunwood Blvd	200 200	6 n/a	8 8	FF deficiencies for MFR
P-6	Connection from SS 169 to 51st Ave S, 51st Ave S from S 112th to S 109th St, S112th St from 51st Ave S west to end of street.	1,500	8	12	FF deficiencies in area

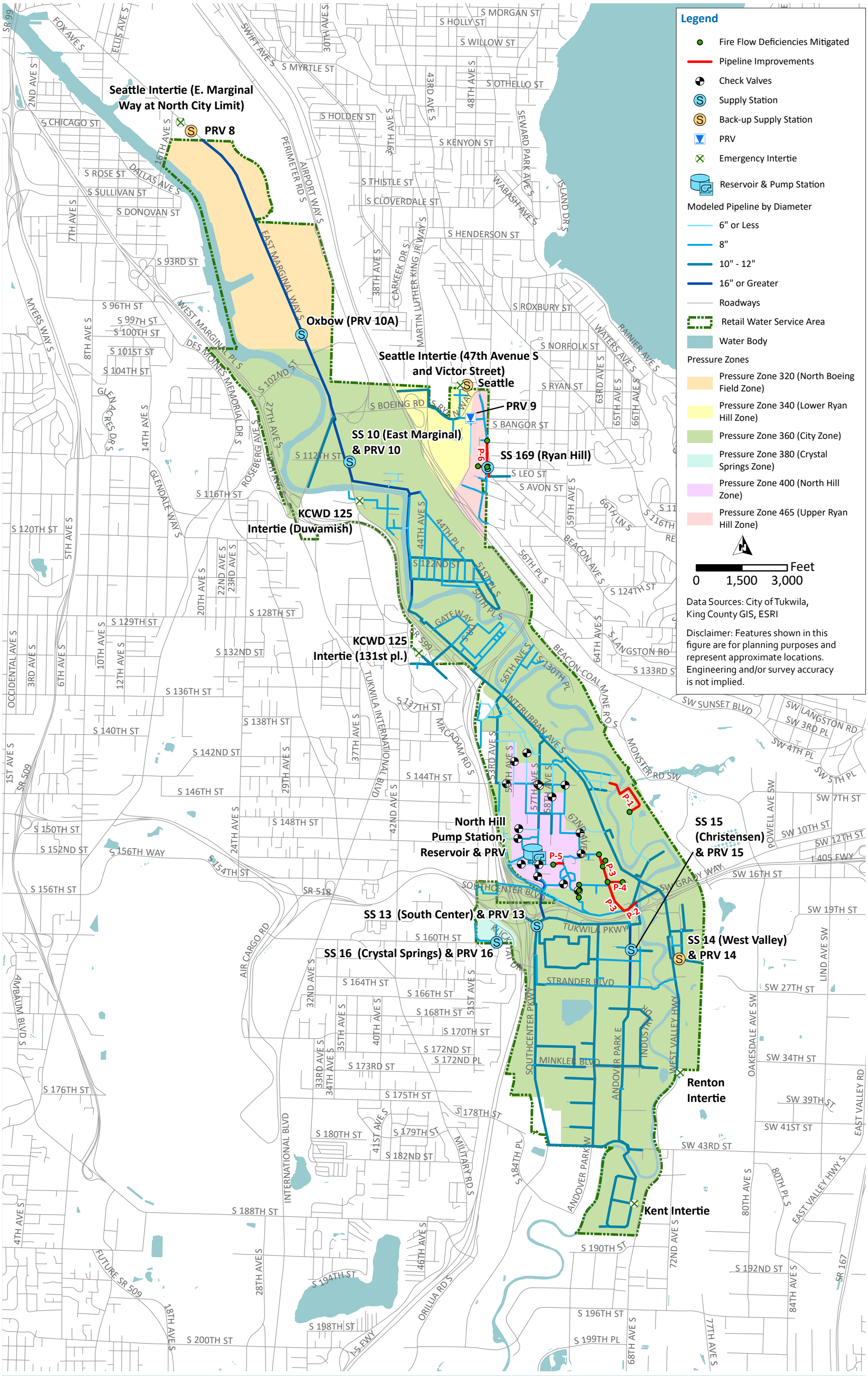

Figure 5.20 Mitigated Deficiencies with Recommended Improvements.

Chapter 6

WATER USE EFFICIENCY

6.1 Introduction

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 of Tukwila (City) well into the future. It is important to the City to not only conserve water, which reduces use, but also promote efficient use; both conserve water and reduce wasteful uses. This chapter summarizes the City's Water Use Efficiency (WUE) Program.

6.2 History

Since the inception of Cascade Water Alliance (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.

Cascade included conservation as a key factor in the 2019 update to the Transmission and Supply Plan Extension (TPSE). A major result of the changes described in the 2019 TPSE is to postpone the need to develop the Lake Tapps Reservoir as a municipal water supply for at least another 10 years. Since 2012, Cascade's demand forecast has been adjusted downwards due to many factors, including continued success and improved cost-effectiveness of the water-efficiency program.

As outlined in the Cascade Water Efficiency Program 2019 Annual Report, Cascade's water use efficiency savings goal from 2014 to 2019 was a cumulative savings of 0.6 million gallons (MG) per day on an average annual basis. In 2019, Cascade achieved a savings of 142,469 gallons per day or about 24 percent of its six-year savings goal. Along with savings from 2014-2018, Cascade achieved approximately 169 percent of its annual savings goal, slightly more than one million gallons per day. Appendix K includes the Cascade Water Efficiency Program 2019 Annual Report.

In 2019, Cascade adopted a savings goal of 0.4 million gallons per day on an average annual basis from 2019 to 2022 as outlined in the 2019 TPSE. The program objectives for Cascade's 2019-2022 Regional Water Efficiency program include the following:

1. Achieve the necessary savings to meet Cascade's adopted Water Use Efficiency Rule savings goal.
2. Pursue cost-effective program measures that provide the greatest benefit for the greatest number of ratepayers.
3. Offer program measures that represent all Cascade members in the distribution of program resources.
4. Create innovative and impactful education opportunities and campaigns that promote the value of water and the conservation ethic.

5. Enable high-volume peak season water users to help themselves use water more efficiently and integrate sustainable landscaping techniques.

The City's historical distribution system leakage (DSL) values have been lower than the Washington State Department of Health (DOH) requirement to achieve a standard of no more than 10 percent water loss (the average DSL from 2015, 2016, and 2019, as noted in Chapter 4, is 5.4 percent). Similarly, the City's historical equivalent residential unit (ERU) values have been lower than DOH's general value of 200 gallons per day per equivalent residential unit (gpd/ERU), which is to be used by utilities without detailed water use data (the average ERU from 2014 through 2019 is 147 gpd/ERU, as noted in Chapter 4). The City will continue its conservation efforts and follow Cascade's goals and recommendations through participation in Cascade's Water Conservation Program, as outlined below in Section 6.4.

6.3 Regulatory Requirements

The Washington Water Utilities Council, DOH, and the Washington State Department of Ecology (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 6.1) 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 6.1 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	**Purveyor Assistance:** Assist wholesale customers to develop and implement conservation programs.	Not applicable. The City does not have wholesale water customers.
	Customer Assistance: Provide assistance and information to customers, which facilitate water conservation.	Addressed as a part of the Cascade program. In addition, the City's staff meet with customers to help manage irrigation demand.
	Bill Showing Consumption History: Show percentage increase or decrease in water use over the same period from the previous year.	City water bills include difference in consumption from the same period on the previous year.
System Measures	**Source Meters:** Use master source meters for all sources and maintain periodic meter testing and repair program.	All potable water has source meters, which are maintained by Cascade. The water used for irrigating the Foster Golf Course is not metered.
	Service Meters: Use individual meters for all water uses and maintain periodic meter testing and repair program.	All water users are metered, and the City has a meter testing and maintenance program. All commercial meters are tested every three years.
	Unaccounted Water / Leak Detection: If unaccounted water is in excess of 20 percent, conduct a regular and systematic program of finding and repairing leaks.	The average unaccounted water for 2015, 2016, and 2019 was 5.4 percent. The City proactively conducts regular leak detection surveys as part of valve and hydrant maintenance program.

Category	Item	City of Tukwila Status
Incentives / Other Measures	**Single Family / Multifamily Kits:** Distribute kits containing easily installed water saving devices to single family and multifamily residences.	Addressed as a part of the Cascade program.
	Nurseries / Agriculture: Encourage and/or require the use of current technology for large agricultural/irrigation operations.	Not applicable. The City does not have large scale nurseries or agriculture.
	Landscape Management / Playfields: Promote low water demand landscaping in all retail customer classes.	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.
	Conservation Pricing: Use a rate structure that provides economic incentives to conserve water.	The City uses seasonal rates, which is a recognized conservation pricing technique.

6.4 Water Conservation Program for 2019 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 2019 and beyond program will be a continuation of the 2014-2018 conservation program.

Cascade provides water efficiency programs and services on behalf of its members. In 2019, Cascade administered more than a dozen conservation program measures or activities including the following:

- Rebates for EnergyStar and WaterSense labeled showerheads, clothes washers, and faucets.
- Showerhead and aeration installation at multifamily accounts.
- Free conservation items delivered upon request to multifamily properties and Cascade members for distribution to customer.
- Participation in 16 community events to promote the value of water and the "We Need Water Because…" campaign (also provided through media).

These programs and services promoted water efficiency and water stewardship resulting in approximately 25,000 direct customer interactions representing all Cascade members.

6.4.1 City-Specific Measures

The Tukwila Water Department conducts a leak detection survey of the entire distribution system annually as part of its valve and hydrant maintenance program in order to identify and repair leaks. To further reduce demand, the City promotes the use of reclaimed water in the portion of the service area where it is available. To assist the City's customers in conserving water, each month after the meter reading cycle, the City generates a list of accounts with higher than normal consumption based on historical information and visits these properties to notify customers of potential leaks.

6.5 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 Washington State Administrative Code (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 L - 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.

6.5.1 Reclaimed Water Purchase

The ten most recent years of reclaimed water purchases from King County are shown in Table 3.4. Purchases have ranged from a low of 1.75 MG in 2013 to a high of 3.38 MG in 2018.

The average monthly distribution of reclaimed water is presented in Figure 6.1. Reclaimed water was purchased almost exclusively for irrigation of ballfields at the Starfire sports complex until 2016, when the City began using reclaimed water at the 14426-14699 Interurban Ave S location. The reclaimed water purchases are used for irrigation and 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.

Table 6.2 Reclaimed Water Purchases (gallons)

Month	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
January	-	-	-	-	-	-	-	748	-	-
February	-	-	-	-	-	-	-	-	-	-
March	43,384	-	-	748	4,488	41,140	5,236	19,448	24,684	4,488
April	84,524	20,196	5,236	36,652	58,344	26,180	108,460	26,928	17,952	68,816
May	179,520	267,784	168,300	283,492	21,692	201,212	225,896	34,408	254,320	243,100
June	244,596	324,632	213,928	281,996	341,836	490,688	376,992	411,400	472,736	638,792
July	427,856	537,064	447,304	536,316	470,492	637,296	403,172	583,440	952,952	500,412
August	609,620	513,128	555,764	394,944	403,172	504,900	628,320	825,044	843,744	605,880
September	561,748	453,288	415,140	183,260	334,356	138,380	452,540	808,588	517,616	449,548
October	162,316	49,368	195,976	19,448	50,864	71,808	196,724	98,736	195,228	69,564
November	23,188	8,976	2,992	11,220	748	6,732	4,488	26,928	-	-
December	-	-	-	1,496	-	-	3,740	2,244	102,476	-
Total	**2,336,752**	**2,174,436**	**2,004,640**	**1,749,572**	**1,685,992**	**2,118,336**	**2,405,568**	**2,837,912**	**3,381,708**	**2,580,600**

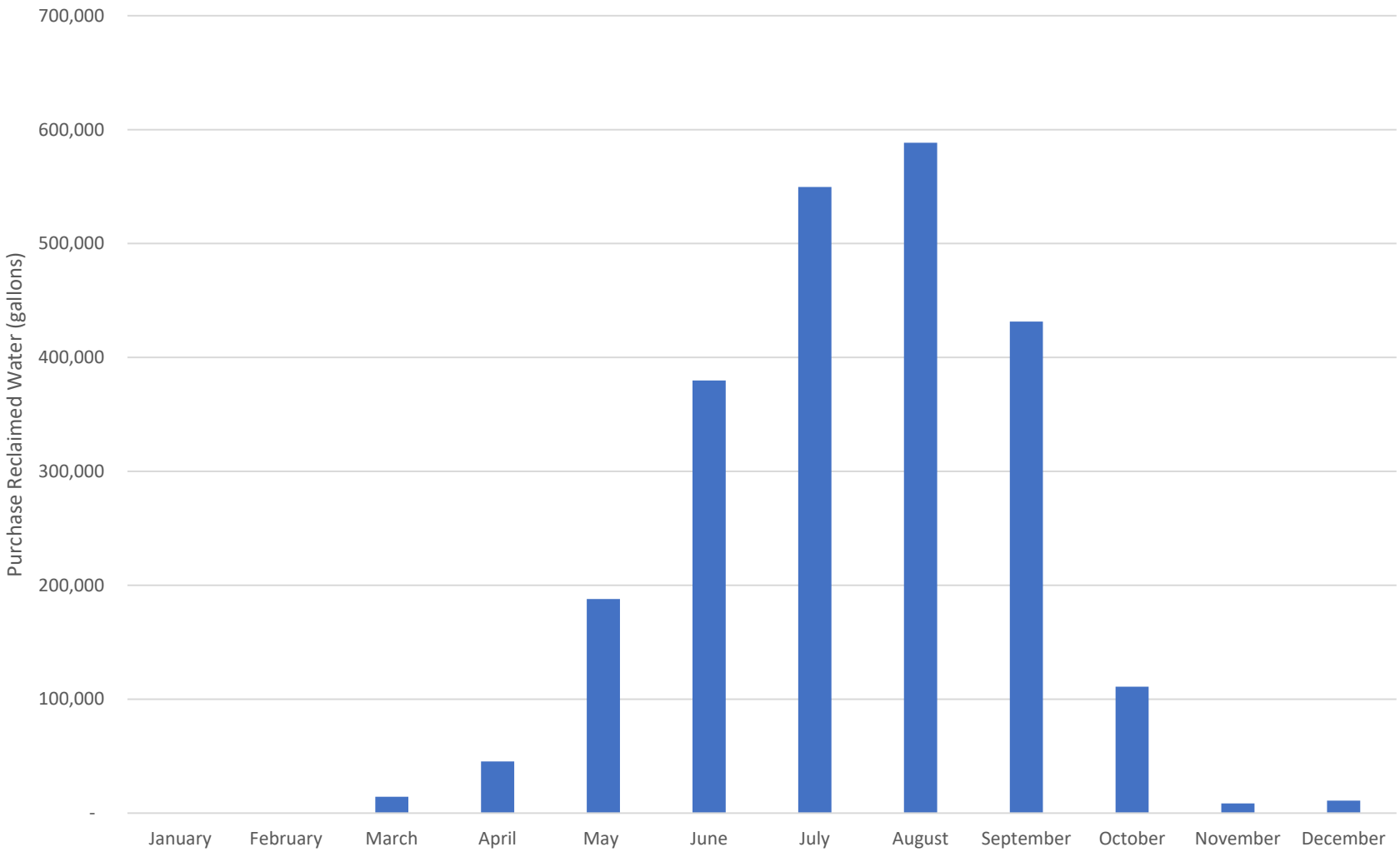

Figure 6.1 Monthly Distribution of Reclaimed Water

Chapter 7

WATER QUALITY

7.1 Distribution System Water Quality

The City of Tukwila (City) benefits from the inclusion in the City of Seattle's (Seattle's) Regional Monitoring program for many current water quality regulations. Per the Cascade Water Alliance (Cascade) Interlocal contract (Appendix F), 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 the City. The City is directly responsible for the quality within the distribution system; this section, therefore, 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 (CCRs).
- Recommendations.

7.2 Current State and Federal Regulatory Requirements

Regulations that address distribution system water quality are described herein. This section presents the water quality standards of the Department of Health (DOH) and the United States Environmental Protection Agency (USEPA) through the Safe Drinking Water Act (SDWA). The SDWA, which was enacted in 1974 (and amended in 1986 and 1996), is the main federal law that establishes standards for drinking water quality for public water systems. The DOH has adopted the federal drinking water regulations under Washington State Administrative Code (WAC) 246-290 and has accepted primary responsibility (or "primacy") for enforcement of water quality monitoring and reporting. All existing and anticipated drinking water regulations that apply to the City are summarized in the following subsections and shown in Table 7.1 below.

7.2.1 Revised 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 Revised Total Coliform Rule (RTCR), which replaced the 1989 TCR, requires monitoring to demonstrate that a water system is minimizing the risk of bacterial growth. Drinking water samples must be collected for bacteriological analysis from representative points in the distribution system at regular time intervals. The number of water samples is dependent upon the population being served by the system.

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. The City is required to have a Coliform Monitoring Plan that identifies coliform monitoring locations and sampling procedures. The City's Coliform Monitoring Plan is included in Appendix M.

7.2.1.1 Monitoring Requirements

Monitoring requirements are described in the City's *Coliform Monitoring Plan*, as presented in Appendix M. The City currently collects 50 samples per month based on the requirements for the residential population served. These samples are taken at the following locations:

- TU-1. 65th Avenue South, north of Southcenter Boulevard in Tukwila's North Hill.
- TU-2. South 122nd Street, west of 46th Avenue South in the Allentown area.
- TU-3. 1232 Andover Park West north of South 180th Street.
- TU-4. 14028 53rd Avenue South, south of South 140th Street.
- TU-5. 14700 59th Ave South.
- TU-9. 4610 South Ryan Way.
- TU-10. 9050 East Marginal Way South.
- TU-11. 13301 57th Ave South.
- TU-12. 18375 Cascade Ave South.
- TU-13. 17200 Southcenter Parkway.

7.2.2 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.

7.2.2.1 Monitoring Requirements

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

7.2.3 Stage 1 Disinfectants and Disinfection By-Products Rule

The Stage 1 Disinfectants and Disinfection By-Products Rule (D/DBPR) was promulgated in December 1998 and is applied to systems that apply a chemical oxidant/disinfectant. The portions of the Stage 1 D/DBPR relevant to the City are the MCLs for trihalomethanes (THMs) and haloacetic acids (HAAs) of 0.080 and 0.060 milligrams per liter (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 D/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.

7.2.3.1 Monitoring Requirements

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

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

The Stage 2 D/DBPR was promulgated by the USEPA on January 4, 2006. The key provisions of the Stage 2 D/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 four specific trihalomethane compounds (chloroform, bromodichloromethane, dibromochloromethane, and bromoform) [THM4] and the sum of five haloacetic acid concentrations (Monochloroacetic Acid [ClAA], Monobromoacetic Acid [BrAA], Dichloroacetic Acid [Cl_2AA], Trichloroacetic Acid [Cl_3AA], and Dibromoacetic Acid [Br_2AA]) [HAA5] remain unchanged from the Stage 1 D/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 D/DBPR compliance. Its intent is to identify sampling locations for Stage 2 D/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 micrograms per liter (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.

7.2.4.1 Monitoring Requirements

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

Monitoring requirements under the Stage 2 Rule are based on the population served. Compliance monitoring for the D/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 South 147th Street and 59th Avenue South.
- H-1: SS-8 at 7755 East Marginal Way South.
- 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.

7.2.5 Lead and Copper

In 1991, the USEPA 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:

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.
    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 Code of Federal Regulations (CFR) 141.86(a). The number of sample sites is based on system size.

7.2.5.1 Monitoring Requirements

Monitoring requirements for lead and copper are described in the City's *IDSE Standard Monitoring Plan*, as presented in Appendix N. The latest residential monitoring in the City occurred in May 2021, the results of which are provided in Appendix N. All samples were well below the action level of 0.015 mg/L for lead and 1.30 mg/L for copper.

7.2.6 Arsenic Rule

The Arsenic Rule was adopted by the DOH as a revision to the arsenic MCL under WAC 249-290-310. The City samples for arsenic and reports any detections in the CCRs. Arsenic has been detected in the past testing cycle with an average concentration of 0.4 parts per billion (ppb) which is well below the MCL of 10 ppb.

7.2.7 Unregulated Contaminant Monitoring Rule

The SDWA establishes periodic monitoring of contaminants that are suspected to be in drinking water, but not yet subject to drinking water regulations. This is the fourth cycle of monitoring for unregulated contaminants (UCMR4). Because the City uses surface water supply sources, UCMR4 monitoring consists of 20 unregulated chemical contaminants: two metals, eight pesticides plus one pesticide manufacturing byproduct, three brominated haloacetic acid disinfection byproducts groups, three alcohols, and three semivolatile organic chemicals. The UCMR4 monitoring also consists of 10 cyanotoxins: nine cyanotoxins and one cyanotoxin group.

Unregulated contaminants that were detected during these UCMR4 sampling events will be reported in the CCRs. While these contaminants do not have established drinking water standards, the data collected during UCRM4 provides a basis for potential future regulatory actions to protect public health.

Table 7.1 Existing and Future Requirements of the Safe Drinking Water Act

Regulation	Effective / Compliance Dates	Regulation Summary and City Status
Existing Requirements		
RTCR	Effective February 2013. Compliance by April 2016.	The City meets the requirements of this rule.
Arsenic Rule	Effective February 2002. Compliance by January 2006.	The City meets the requirements of this rule.
LCR	Effective June 1991 with minor revisions in 2000.	The City meets the requirements of this rule.
Stage 1 D/DBPR	Effective December 1998. Compliance by January 2004.	The City meets the requirements of this rule.
Stage 2 D/DBPR	Effective January 2006. Compliance by October 2012.	The City meets the requirements of this rule.
LCR Short-term Revisions	Effective October 2011	The City meets the requirements of this rule.
Fluoride	Effective May 2016	The City maintained average of 0.7 mg/L in accordance with new DOH rule.
UCMR3	Effective May 2012. Compliance Period 2013 to 2015.	UCMR3 monitoring is not required due to population size.
UCMR4	Effective December 2016. Compliance Period 2018 to 2020.	UCMR4 monitoring is not required due to population size.
CCR Rule	Effective December 2012	The City meets the requirements of this rule.
Public Notification Rule	Effective May 2000	The City meets the requirements of this rule.
Potential Future Requirements		
Perchlorate	In February 2011, USEPA decided to regulate perchlorate	The City is monitoring the development of the rule.
PFAS	DOH began rulemaking for PFAS in drinking water in late 2017	The City is monitoring the development of the rule.
Strontium	USEPA is considering issuing a regulatory standard based on UCMR3 results	The City is monitoring the development of a national primary drinking water regulation for strontium.
LCR Long-Term Revisions	USEPA is considering additional revisions to the LCR	The City is monitoring the development of the rule revisions.
UCMR5	Anticipating final rule in 2021, with a compliance period of 2023 to 2025.	

Note:
Abbreviations: UCMR3 / UCMR5 - Unregulated Contaminant Monitoring Rules 3 and 5; PFAS - per- and polyfluoroalkyl substances.

7.3 Future Regulatory Requirements

Anticipated future regulatory requirements and rule changes are summarized below:

- Revisions to the LCR are being monitored and changes to the City's LCR activities will be made if necessary.
- Proposed Strontium Monitoring - not anticipated to affect the City.
- Proposed PFAS Monitoring - not anticipated to affect the City.
- Proposed Perchlorate Monitoring - not anticipated to affect the City.

7.4 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. The City estimates that they receive less than 20 water quality complaints each year. In the past, the City has received seasonal taste and odor complaints due to seasonal algae at the Cedar River source. However, after 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.

7.5 Consumer Confidence Reports

Under the CCR Rule promulgated in 1998, community water systems are required to provide an annual 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.
- If USEPA requires it, information on levels of unregulated contaminants.

The City is in compliance with the CCR Rule. Annual CCRs have been published as required. CCR from 2010-2019 showing compliance are in Appendix O.

7.6 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.

Chapter 8

OPERATIONS AND MAINTENANCE

8.1 Introduction

This chapter provides an overview of the City of Tukwila (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.

8.2 Responsibility, Authority, and Organization Structure

8.2.1 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 the City's service area.

8.2.2 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 8.1 shows the organizational structure for the City's Public Works Department. The City's Water Utility operates under the direction of the Director/City Engineer. The Utilities Maintenance 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 Department Superintendent who reports to the Utilities Maintenance Manager. The Water Quality Specialist oversees water quality monitoring and cross-connection control. The Water/Sewer Project Manager 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.

8.2.3 Tasks and Responsibilities

The following sections describe the tasks and responsibilities of the operations and maintenance (O&M) staff.

8.2.3.1 Director/City Engineer

The Director/City Engineer directs all activities and programs within the Public Works Department including the City's services for potable water. The Director/City Engineer also plans, organizes, staffs, and manages the Engineering Division. Responsibilities involve development of the six-year capital improvement program for the water utilities. The Director/City Engineer is also responsible for annual capital projects including development of scopes of work and consultant selection.

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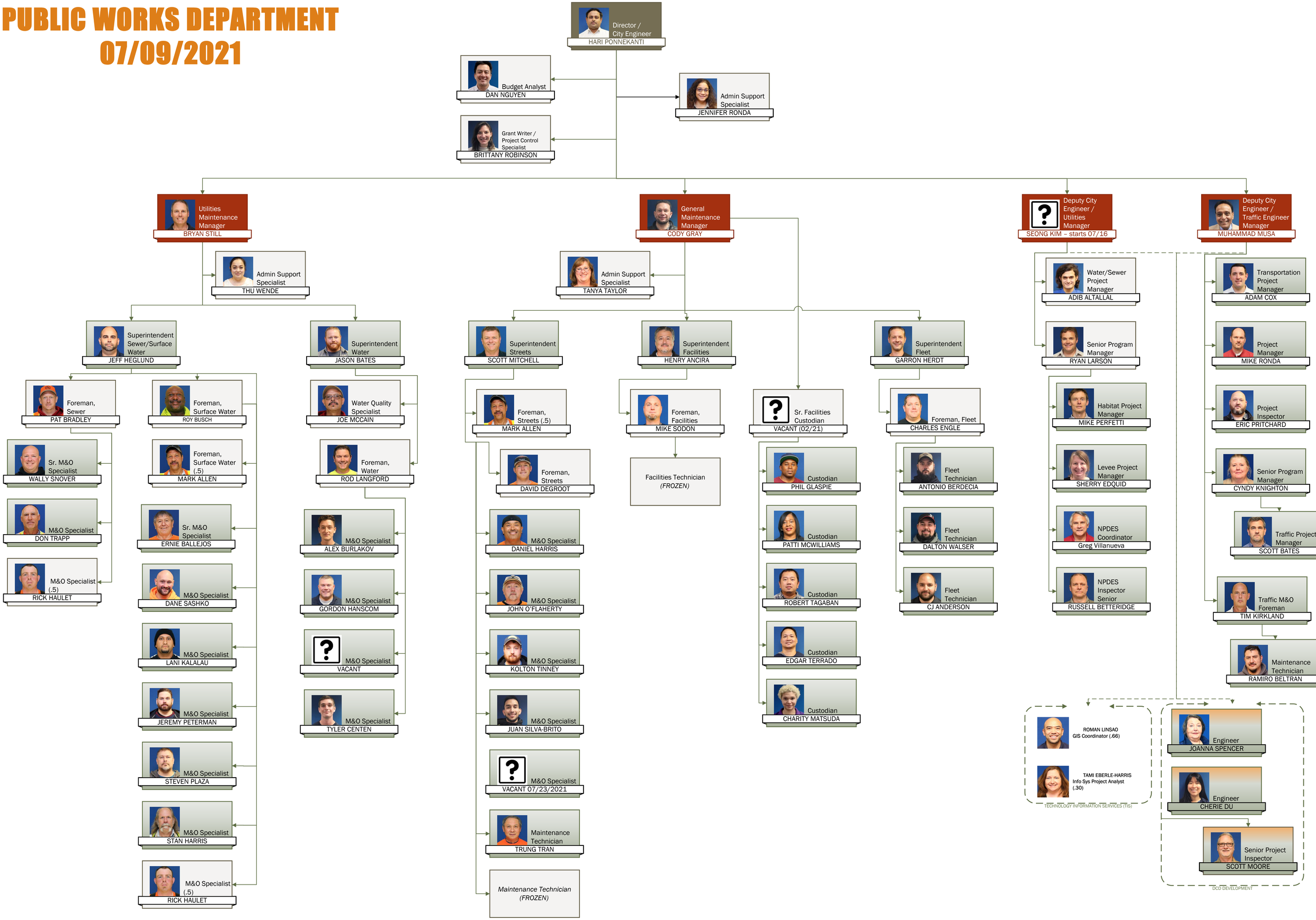
07/09/2021



8.2.3.2 Water/Sewer Project Manager

The Water/Sewer Project Manager, under the direction of the Director/City Engineer, is responsible for overseeing assigned annual capital projects. Tasks include development of project schedules, scopes of work, and consultant selection. The Water/Sewer Project Manager 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.

8.2.3.3 Utilities Maintenance Manager

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

8.2.3.4 Water Department Superintendent

The Water Department 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.

8.2.3.5 Water Department Foreman

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

8.2.3.6 Water Quality Specialist

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

8.2.3.7 Water Department Maintenance and Operations (M&O) Specialist

Water Department M&O Specialists, along with the foreman, perform all field maintenance and operation functions for the City's water utility.

8.2.4 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 Department Superintendent. If the initial call-out attempt is unsuccessful, the contact order is as follows: Water Department Foreman, Water Quality Specialist, and lastly the Water Department M&O Specialists. If all of the above contact attempts fail, the Standby Staff member then calls the Utilities Maintenance 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.

8.3 Certification, Education and Training

The City is in full compliance with current laws and regulations regarding staff certification and training. Seven City Public Works employees possess Washington State Department of Health (DOH) certifications. Table 8.1 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 8.1 Water Utility Personnel Certifications

Position	Name	Certification
Operations Manager	Bryan Still	WDM4, CCS, WDS, WTPO-IT
Water Department Superintendent	Jason Bates	WDM3, CCS
Water Department Foreman	Rodney Langford	WDM3, WDS, CCS
Water Quality Specialist	Joe McCain	WDM4, CCS, WDS
Water Department M&O Specialist	Gordon Hanscom	WDM-IT2
Water Department M&O Specialist	Tyler Centen	
Water Department M&O Specialist	Alex Burlakov	

Note:
Abbreviations: WDM – Water Distribution Manager; CCS – Cross-Connection Control Specialist; WDS – Water Distribution Specialist; WTPO-IT – Water Treatment Plant Operator.

8.4 System Operation, Maintenance and Control

The following sections summarize the routine maintenance of the water system. Appendix Q includes the routine maintenance schedule for the City's water system.

8.4.1 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 inquiries. 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.

8.4.2 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.

8.4.3 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.

Pressure reducing valves (PRVs) are located where the City connects to Seattle Public Utilities pipelines and reduce the pressure of the City of Seattle's (Seattle's) major supply lines to the working pressures of the City's 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.

8.4.4 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 City's 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.

8.4.5 Main Flushing

The City 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.

8.4.6 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.

8.4.7 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.

8.4.8 Meter Maintenance/Replacement

The City has one full-time Water Department M&O 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 Utilities Maintenance Manager. 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.

8.4.9 Utility Locating Service

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

8.4.10 Sanitary Survey

A sanitary survey of the City's water system was completed by DOH in October 2019. The City completed the recommendations that DOH provided to the City in the Routine Sanitary Survey letter dates November 5, 2019.

8.5 Water Quality Operations

The City takes an aggressive approach to protecting the quality of distributed water. The City contracts with Seattle, which conducts monitoring and testing of the distribution system to protect water quality from source to tap. Trained water quality employees from 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 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 7 - Water Quality.

If a water quality violation occurs, requiring customer notification, the City notifies the DOH in accordance with Washington State Administrative Code (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.

8.6 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) which are located in the City's Municipal Code 14.06:

- **Establishment of Local Authority.** The City's legal authority to implement and enforce a cross-connection control program is established by the City's 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 CCSs. As of December 2020, the City has four 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 2021, the City's database contained information on 1,723 backflow prevention assemblies at 476 different sites throughout the service area.

8.7 Emergency Response Operations

The City's objective is to provide and support effective planning, disaster management, and education services to enable citizens and employees of the City to prepare for, respond to, and recover from an emergency. The Cascade Water Alliance (Cascade) has a Water Shortage Contingency Plan to outline the Cascade's response to water shortage that affects the regional supply. The City also has a Water Shortage Contingency Plan to manage water supply and demand in the event of a supply problem. Both Water Shortage Contingency Plans are located in Appendix P.

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 Standard Operating Procedures (SOPs).
- Floods.
- Terrorism.
- Volcanic Eruption.

8.8 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 negations, 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.

8.9 Records Documents

The City 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 supervisory control and data acquisition (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.
- Maximum contamination level violations.
- Water quality complaints.
- Backflow prevention.
- Maintenance and construction.
- O&M manuals.
- Personal records.
- Flushing and distribution system.

8.9.1 Telemetry

The water system's SCADA system consists of remote telemetry units (RTUs) located at individual supply stations (SSs), 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 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.

8.9.2 Asset Management

The Public Works Department uses Lucity as their asset management platform. Lucity was procured in 2017 and was implemented in 2018 to roll out Work and Asset management for Water, Sewer, Surface Water, Streets, and Parks Maintenance. The crews utilize Lucity daily to track work and manage assets. There is a direct integration with geographic information system (GIS). Crews are able to look up assets using a mobile device while in the field and create work orders from an asset on the map. Some divisions are taking advantage of using Preventative Maintenance work orders to automate work, and pump reads are automatically brought forward onto new work orders. In 2020, Lucity was implemented for Facilities and Maintenance crews. In 2021, the Public Works Department will be implementing Lucity for Fleet.

Pump station records are kept in log books at each pump station, but they are currently being transferred to Lucity.

8.10 Standard Plans and Specifications

In accordance with WAC 246-290-120, the City maintains standard plans and specifications on file with the DOH 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 City 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 DOH. A copy of the City's current standards is available at 6300 Southcenter Blvd., Suite 100. The City's Infrastructure Design and Construction Standards are in Appendix Q.

8.11 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.

8.12 Remaining Useful Life Summary

Carollo completed a remaining useful life (RUL) analysis as a pipeline asset management study to review the useful life of existing water pipes in the City and establish a pipeline replacement strategy. The work was summarized in a final memorandum dated November 2014. This section will summarize the results and recommend a future water main repair and replacement program based on the findings of this study. The results from the 2014 analysis were updated based on revised pipe diameters as part of this CWSP.

Pipe material was provided by the City for the 2014 study. Pipe age was not available for water pipelines. Pipe age was initially estimated based on sewer pipe age and parcel improvement dates. The data underwent thorough City review and substantial updates were made to reflect institutional knowledge. Pipe age was assigned based on best available information.

Table 8.2 presents the estimated useful lives developed for the RUL analysis. It is important to note that the actual useful life of an individual pipe can vary widely due to soil, groundwater, and installation conditions. It is recommended that the condition of pipes being replaced be noted for consideration in future analyses, which will increase the accuracy of the useful life estimates.

Table 8.2 Useful Life of Pipes

Pipe Material	Useful Life (years)
Cast Iron (CI)	50
Ductile Iron (DI)	80
Asbestos Cement (AC)	50
Steel	50

RUL is defined as the length of time left before a pipe maintenance costs will likely exceed its cost of replacement (useful life). Pipe age, material type, and chosen useful life were used to determine the RUL of the City's pipes.

Figure 8.1 presents the total length of pipe reaching the end of its assumed useful life by decade. Analysis showed that 88,473 feet of pipes already reached its useful life; this corresponds to 40 percent of the total system. Approximately 41,421 feet of pipes will be reaching its useful life in the next 10 years, which corresponds to the short-term of this Plan. No pipe is expected to reach its useful in the second half of the planning period (planning years 2030-2040).

In summary, approximately 58 percent of the City's pipes will be reaching it useful life in the next 20 years. Note, pipes that exceed their useful life will continue to provide service, however, are at a greater risk for pipe breaks and may increase leakage.

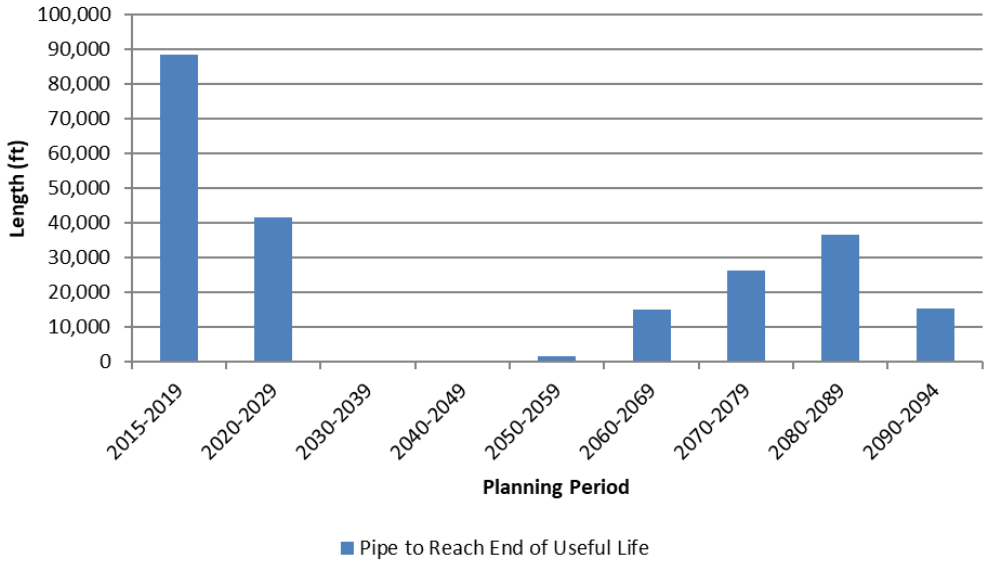


Figure 8.2 Length of Pipe Replacement By Decade

Prioritization of the pipeline replacement is needed to manage costs and reduce risk of failure. Pipe replacement should be prioritized based on criticality to the system to best manage the aging distribution infrastructure within the City's available budget. The prioritization will allow the City flexibility to implement and adapt the order of projects based on current opportunities and challenges. Pipelines identified as reaching their useful life in the next 20 years were prioritized as high, medium, and low. The length of each priority category is presented in Table 8.3 and shown graphically in Figure 8.3.

Increasing the pipeline replacement program budget in the near-term will allow more pipes to be replace before the end of their useable life and may result in more cost-effectively managing this infrastructure. To minimize costs, it is recommended that the City prioritize the replacement of pipes where redevelopment and transportation projects can reduce the cost of replacement.

The prioritization presented in this section will be combined with other recommendations from the system analysis and merged into a comprehensive CIP (see Chapter 9).

Table 8.3 Prioritization of Pipe Replacement

Priority	Pipe Replacement Linear Feet
High	26,600
Medium	93,100
Low	22,600

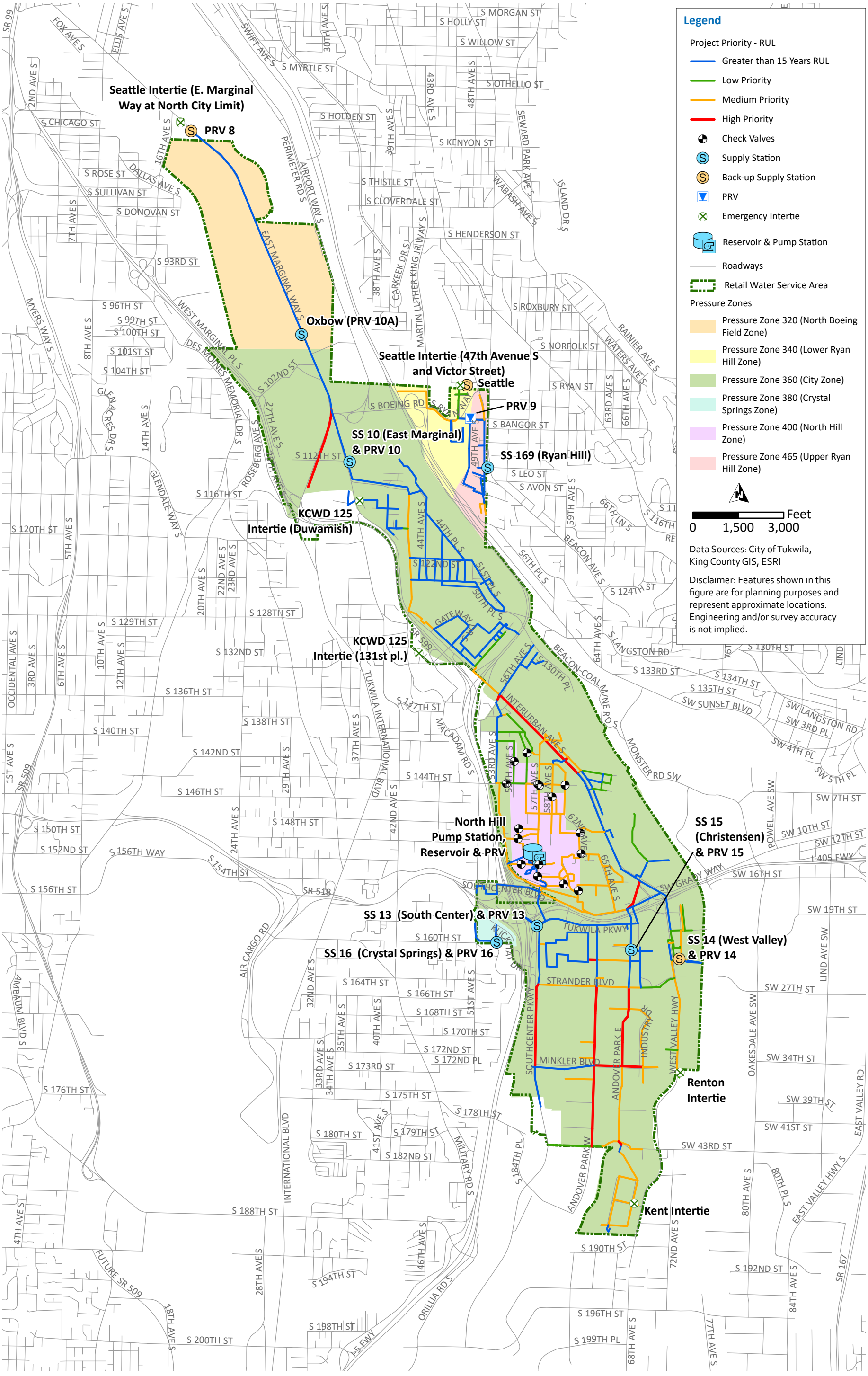


Figure 8.3 Project Priority – RUL Analysis

Chapter 9

CAPITAL IMPROVEMENTS PROGRAM

9.1 Introduction

This chapter presents a summary of all capital projects outlined in the previous chapters and creates a cohesive Capital Improvements Program (CIP) for the City of Tukwila (City) to continue consistent, efficient water supply to its retail water service area. Programs listed in this chapter consider storage, pumping, and supply requirements, improvements to the hydraulic system, and general recommendations. System improvements were analyzed according to the policies and criteria described in Chapter 3. The recommended projects are presented for the short-term (2021-2025), medium-term (2026-2030) and long-term (2031-2040).

9.1.1 CIP Project Categories

The capital projects identified in this Comprehensive Water System Plan (CWSP) were categorized by infrastructure as follows:

- Distribution Pipeline (P): projects to install new pipe or upsize existing pipe.
- Pump Station (PS): Improvement project related to the existing pump station.
- Storage (ST): New storage projects and improvements related to storage.
- Supply (S): Improvement projected related to existing sources of supply.
- General (G): General water system projects and annual projects that occur system wide.

The CIP projects have been assigned a project number based on the project category.

9.1.2 CIP Project Types

The CIP projects are also categorized into three types of projects:

- Repair and Replacement: projects identified with remaining useful life (RUL), and extensive maintenance.
- Improvement: capacity-related projects necessary to meet evaluation criteria.
- Capacity: new pipes and infrastructure needed to serve future customers.

Individual projects may include elements of multiple capital project types, meaning that each project was defined as one or more of the three types and assigned a percentage of the total project cost to each type. The allocations between multiple types were made using professional judgment.

9.1.3 CIP Prioritization

The capital improvement implementation was separated into three phases:

- Short-term: 0 to 5 years.
- Medium-term: 5 to 10 years.
- Long-term: 10-20 years.

The City prioritized recommended capital projects based on City need and type of deficiency addressed.

9.2 Cost Estimating Assumptions

9.2.1 Cost Estimate Level

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 June 2021 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 June 2021 CCI is 12,112.

Cost estimates were developed using Unclassified/Class 10 Planning Cost estimate, as established by the American Association of Cost Estimators (AACE). This level of estimate is used for long-rage planning, evaluation of alternatives, or concept screening. The expected accuracy range is -50 percent to +300 percent, meaning the actual cost should fall in the range of 50 percent below the estimate to 300 percent above the estimate.

9.2.2 Baseline Unit Cost

Baseline construction costs were estimated using unit costs with the assumptions presented below.

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.

9.2.2.1 Pipeline Unit Costs

The estimated costs for all pipeline projects were based on a cost per linear foot (LF), summarized in Table 9.1. 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. These costs were escalated from the unit costs presented in the 2015 Plan (where the ENR 20-City CCI value used was 9,173 from December 2011). The pipeline unit costs were increased by an additional 10 percent due to construction cost uncertainties in 2021 due to coronavirus disease 2019 (COVID-19).

Table 9.1 Unit Pipeline Upgrade Costs

Diameter	Estimated Cost per LF[(1)]
6-inch	$176
8-inch	$198
10-inch	$209
12-inch	$220
16-inch	$264
18-inch	$275

Note:
(1) Direct costs, not including contingencies.

9.2.2.2 Storage Facility Unit Costs

Costs for new storage were developed based on typical costs from past projects. Estimated costs for all storage tanks include site work, a structure, mechanical and electrical equipment, and piping to connect the storage tank to the system. The unit cost for a ground storage tank is $3 per gallon.

9.2.2.3 Trenchless Pipeline Unit Costs

Costs for pipeline installation under highways and railroads were developed based on typical costs from past projects. Table 9.2 presents the estimated costs for pipeline installation based on the trenchless installation methods (i.e microtunneling, pipe ramming, or auger boring), as well as the launch shafts and exit shafts. The trenchless pipeline installation methods considered include the following:

- Microtunneling is a trenchless method for applications beneath highways, railroads, rivers, and environmentally sensitive areas using pipe jacking. This method is highly precise over a longer distance.
- Auger boring is a traditional shaft-launched trenchless method involving brute force and rotation through an auger to push pipe through the soil and is less precise and has higher risk factors than microtunneling.
- Pipe ramming is a trenchless method of pipeline installation that drives a casing or pipe through the ground using a percussive hammer.

Table 9.2 Storage Project Pipeline Installation Unit Costs

Component	Unit Cost
54-inch microtunnel(3)	$3,000/LF(2)
Launch shaft for microtunnel	$750,000/Each(1)
Exit shaft for microtunnel	$400,000/Each(1)
36-inch auger bore / pipe ramming(3)	$1,700/LF(2)
Launch shaft for auger bore / pipe ramming	$375,000/Each(1)
Exit shaft for auger bore / pipe ramming	$250,000/Each(1)

Notes:
(1) Cost includes shaft installation, excavation, and backfilling.
(2) Cost does not consider inflated 2021 steel pipe market.
(3) Cost includes carrier pipes as well as steel casing.

9.2.2.4 Pump Station Costs

Pump station unit costs were also developed based on typical costs from past projects. Cost estimates are based on pump horsepower (HP), as presented in Table 9.3.

Table 9.3 Pump Station Unit Costs

Component	Unit Cost(1)
Less than 200 HP	$14,800/HP
Greater than or equal to 200 HP	$10,700/HP
Pump Station Generator	$200,000/100 HP

Note:
(1) Direct costs, not including contingencies.

9.2.2.5 Miscellaneous Costs

Other costs for the CIP include pressure reducing valve (PRV) station, new interties, and large water meters. Table 9.4 outlines the unit costs, which are estimated based on past projects or provided by the City.

Table 9.4 Miscellaneous Costs

Component	Unit Cost[1]
Pressure Reducing Valve station	$200,000
New Intertie	$200,000
8-inch water meter	$16,000/meter
10-inch water meter	$23,000/meter

Note:
(1) Direct costs, not including contingencies.

9.2.3 Construction Contingency

Contingency costs must be reviewed on a case-by-case basis because they will vary considerably with each project. Consequently, the preliminary layout of a project will contain uncertainties such as unexpected construction conditions, the need for unforeseen mechanical items, and variations in final quantities; because all these items increase project costs, allowances should be made for them in preliminary cost estimates. To assist the City in making financial decisions for these future construction projects, a construction contingency cost of 30 percent is added to the baseline construction cost.

9.2.4 Additional Costs

Other cost factors were applied to the total construction cost to account for additional project costs, including:

- 10 percent for general project conditions.
- 15 percent for contractor overhead and profit.
- 20 percent for engineering, legal, and administrative (ELA) 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.

9.2.5 Total Capital Improvement Costs

The costs presented in this CIP are high-level planning costs that will help the City make financial decisions.

The sample capital improvement project cost calculation shown below demonstrates how the construction contingency as well as the general conditions, contractor overhead and profit, and ELA costs were added to the baseline construction cost to determine the total project cost.

Example:

Baseline Construction Cost	**$1,000,000**
Construction Contingency (30%)	$300,000
Total Construction Cost	*$1,300,000*
General Conditions (10%)	$130,000
Contractor Overhead and Profit (15%)	$195,000
ELA (20%)	$260,000
Total Capital Improvement Cost	**$1,885,000**

9.3 Recommended CIP Projects

This section summarizes the recommended CIP projects and includes a brief project description, the project priority, and estimated total CIP cost.

Detailed project sheets for each of the recommended CIP projects can be found in Appendix S.

9.3.1 Recommended Storage Projects

This section summarizes the recommended storage projects that were identified through the storage analysis detailed in Chapter 5 – System Analysis.

9.3.1.1 ST-1 New Storage Tank

Recommended storage improvements were provided in Chapter 5 –System Analysis. A high-level feasibility analysis was conducted for four potential storage locations to site the new recommended storage tank. Figure 9.1 shows the four potential storage locations considered as part of this CWSP. The storage alternatives and their associated costs are summarized below.

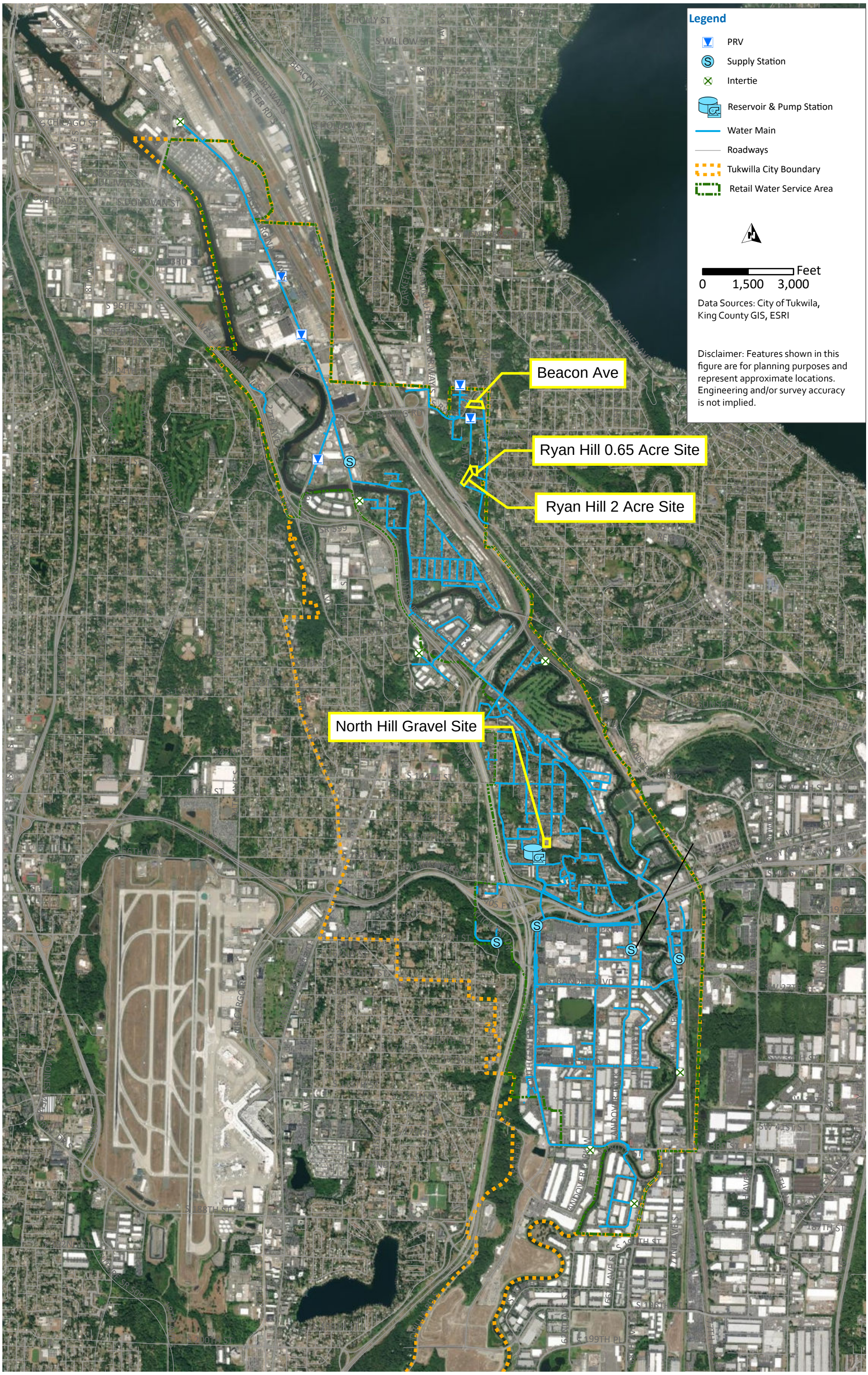


Figure 9.1 Potential Storage Locations

Alternative 1A: North Hill Gravel Site with BPS to 456 Zone

This alternative constructs a new 2.5 million gallon (MG) storage tank located at the North Hill Gravel Site. The tank will fill using existing supply stations in the 360 service level. A booster pump station (BPS) will also be constructed to serve the 360 service level, namely customers in the 360 Pressure Zone (PZ) and 400 PZ. In addition, a separate BPS will be constructed to serve customers in the 465 service level. Note that a new transmission pipe crossing Interstate 5 (I-5) and the railroad will be required for the 465 service level to utilize this new tank. This crossing can potentially occur at multiple locations, each with different constraints and risks. Table 9.5 illustrates the CIP cost for this project.

Alternative 1B: North Hill Gravel Site with Separate 465 Reservoir

This alternative constructs two new tanks: one that will serve as a storage tank at the North Hill Gravel Site that is filled using existing supply stations in the 360 service level, 2.4-MG capacity storage tank, and one that will serve as a storage tank at the Beacon Ave Site that is filled using existing supply stations in the 465 service level, a 1.1-MG capacity storage tank. Two BPSs will also be constructed to serve customers in the respective service levels. Table 9.5 illustrates the CIP cost for this project.

Alternative 2: Beacon Ave. Reservoir

This alternative constructs a new 2.5-MG capacity tank that will serve as a storage tank at the Beacon Ave Site in the 465 service level and fills it using existing supply stations in the 360 and 465 service levels. In addition, a BPS will be constructed to serve the 465 service level. A PRV will be required to reduce pressure from the BPS down to the 360 service level. Check valves will be required at SS-169 in the 465 service level and the fill line to the tank from the 360 service level. Note that a pipe crossing of I-5 and the railroad will be required so the 360 and 465 service levels can share the new storage and so that the supply stations in the 360 service level can fill the tank. This cross can occur at multiple locations, each with different constraints and concerns. Table 9.5 illustrates the CIP cost for this project.

Alternatives 3/4: Ryan Hill Sites Reservoir

This alternative constructs a new tank that will serve as a storage tank at either the Ryan Hill 2 Acre Site or Ryan Hill 0.65 Acre Site in the 465 service level and fills it using existing supply stations in the 360 and 465 service levels. In addition, a new BPS will be constructed to serve the 465 service level. Note that a pipe crossing of I-5 and the railroad will be required so the 360 and 465 service levels can share the new storage and so that the supply stations in the 360 service level can fill the tank. A new PRV will be required to reduce pressure from the BPS down to the 360 service level. New check valves will be required at SS 169 in the 465 service level and the fill line to the tank from the 360 service level. Table 9.5 illustrates the CIP cost for this project.

ST-1 Cost Summary

Table 9.5 summarizes the total CIP costs for the alternatives identified above. Per City direction, the costs for Alternative 1B: North Hill Gravel Site with Separate 465 Reservoir were carried forward to the total CIP cost summary.

Table 9.5 ST-1 Alternatives Cost Summary

ST-1 Alternative	Storage and Pumping Related Baseline Construction Costs(1)	Pipeline/Crossing Related Baseline Construction Costs(1)	Total CIP Costs
Alternative 1A	$15.1 M	$7.7 M	$43.0 M
Alternative 1B(2)	$18.4 M	n/a	$34.6 M
Alternative 2	$11.8 M	$7.7 M	$36.7 M
Alternatives 3/4	$12.0 M	$6.5 M	$34.8 M

Note:
(1) Costs do not include construction contingency, general conditions, contractor overhead and profit, and ELA.
(2) Per City direction, the cost for Alternative 1B were carried forward to the total CIP cost summary.

ST-1 Alternatives Evaluation

The four storage alternatives were qualitatively evaluated based on a stream-lined, focused approach centered around both initial capital cost, key differences in long-term operation and maintenance (O&M) cost impact, and other technical criteria. The evaluation criteria include the following:

- Initial Capital Cost. This evaluation criterion can be readily quantified, and it is based on cost from Table 9.5.
- Annual O&M Costs. This evaluation criterion is qualitative in nature and enables an understanding of the other long-term, annual costs associated with each alternative including the pumping power costs. Results with respect to this evaluation criterion are mainly based on the number of facilities and whether a pump station is a simple, single-speed pump station that pumps to a reservoir, or a pump station that pumps to a closed PZ.
- Water Age Issues. This evaluation criterion addresses the potential for water age issues (loss of chlorine residual) based on estimate residence time within the new storage tank and distribution system.
- Fire Flow Availability. This evaluation criterion addresses whether or not fire flow availability is different or deficient between any of the alternatives.
- Maximize Gravity Storage. This evaluation criterion enables assessing differences between the three alternatives with respect to gravity storage. It is simpler from an operations standpoint and more reliable from a service standpoint to serve customers directly from gravity storage than from continuously-operating pump stations within a closed PZ.
- System Complexity. This evaluation criterion enables comparison between the alternatives with respect to the overall complexity of the new system and the complexity of the new facility systems themselves. For example, pump stations are more complex than reservoirs and continuously-operating pump stations are more complex than pump-to-storage pump stations.
- System Resiliency. This criterion enables comparison between alternatives with respect to redundancy and resiliency of the distribution system.

Evaluation results are presented in Table 9.6. These results are quantitative, except for the initial capital costs which were quantified and summarized in Table 9.5.

Table 9.6 ST-1 Evaluations of Alternatives

Evaluation Criteria	Alternative 1A	Alternative 1B	Alternative 2	Alternatives 3/4
Initial Capital Cost	▲	●	■	■
Annual O&M Costs	▲	●	■	■
Water Age Issues	■	▲	●	●
Fire Flow Availability	●	■	●	●
Maximize Gravity Storage	●	▲	■	■
Construction Complexity	■	●	■	▲
System Resiliency	●	■	●	●

Notes: ● Good ■ Fair ▲ Poor

Further evaluation and a detailed alternatives analysis are recommended to determine a recommended alternative. This study may include field investigation to narrow down appropriate trenchless technology, site availability, and infrastructure routing.

The City is planning to move forward by adding storage in two phases, likely with separate storage facilities for the 360 service area and the 465 service area. The City may pursue partnering with an adjacent utility for shared storage space in one, or both, of the new storage reservoirs.

9.3.1.2 ST-2 Transfer Customers in 380 PZ to Highline Water District (HWD)

The recommended storage improvements presented in ST-1 do not provide storage for the 380 PZ. It is recommended that the City work with HWD to transfer customers from the 380 PZ to HWD service. If ST-3 is completed, ST-2 may not be required. This project is prioritized for the short-term and does not include any capital costs.

9.3.1.3 ST-3 Study for Replacing Pipe Connection to 380 PZ

The City has a pipe that connects the 380 PZ to the 360 PZ, but it is not currently used because the pipe is not deep enough per Washington State Department of Transportation's (WSDOT's) requirements for depth below roadway. This project is a study to review increasing the depth of the one section of pipe that does not meet WSDOT requirements to see if the 380 PZ can be connected to the 360 PZ. If ST-2 is completed, ST-2 is not required. The project is prioritized for the short-term with an estimated cost of $75,000.

9.3.2 Recommended Pump Station Project

The recommended pump station improvement was provided in Chapter 5 – System Analysis and is summarized below. Figure 9.2 shows the location of project PS-1.

9.3.2.1 PS-1 North Hill Pump Station Backup Power

To improve reliability, it is recommended that the North Hill Pump Station be equipped with a back-up generator. The project assumes that back-up power will be installed for the High Pumps and the Fire Flow Pump at the North Hill Pump Station. The project is prioritized for the long-term with an estimated cost of $1,131,000.

9.3.3 Recommended Supply Projects

The recommended supply improvements were provided in Chapter 5 – System Analysis and are summarized below .

9.3.3.1 S-1 Cascade Contract Update

It is recommended that the City work with Cascade to update the management agreement so that contractual flows are sufficient to meet the City's projected maximum day demand while concurrently refilling fire suppression storage. This project is prioritized for the long-term and does not include any capital costs.

9.3.3.2 S-2 SS 15 Operational Changes

It is recommended that supply operational changes are implemented to use a different lead supply or limit the amount of flow supplied by SS 15 when velocity reaches eight feet per second in the future. No infrastructure improvements are recommended to address this deficiency. This project is prioritized for the long-term and does not include any capital costs because it is an operational change only.

9.3.4 Recommended Distribution Pipeline Projects

Several projects were identified in Chapter 5 – System Analysis to address fire flow deficiencies in the distribution system. These projects are repeated in Table 9.7, including their location, length, proposed diameter, and estimated cost. Table 9.7 also includes project P-7, which is a City-driven project with construction estimated to be completed in 2022. Figure 9.2 shows the location and prioritization for the distribution pipeline projects.

Table 9.7 also presents the priority of projects for the pipelines. All projects are recommended for completion within the short-term or medium-term CIP in order to resolve all fire flow deficiencies identified to likely occur by the end of the short-term and medium-term planning period as follows:

- Short-term: Projects recommended for the short-term are those that resolve fire flow deficiencies and where the pipeline is past its RUL. Short-term projects also include City-driven projects planned for the short-term. These projects total 9,130 LF in length, and cost $4,322,000.
- Medium-term: Projects recommended for the medium-term are those that resolve fire flow deficiencies. These projects total 3,530 LF in length, and $1,256,000 in cost.

Table 9.7 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.

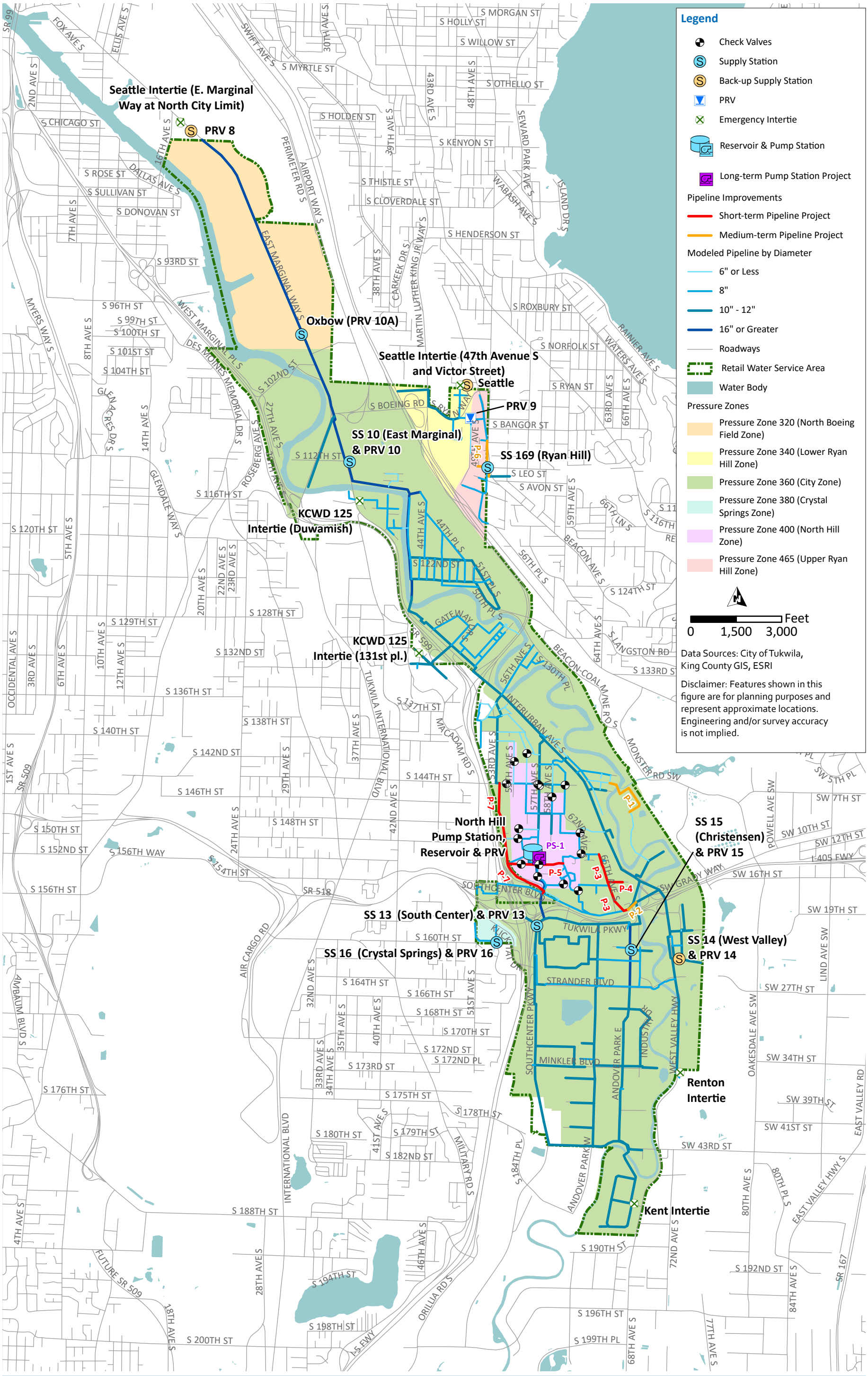


Figure 9.2 Specific CIP Project Priority

Table 9.7 Pipe Capacity Projects

Proj. No.	Project Name	Location	Length, LF	Existing Pipe Size, in.	New Pipe Size, in.	Estimated Cost	Priority(1)	Notes
P-2	Southcenter Blvd Pipe Connection	Southcenter Blvd from 66th Ave S north to existing pipe.	360	n/a	12	$136,000	ST	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2040 conditions.
P-3	Southcenter Blvd & 65th Ave S Pipe Upsize	Southcenter Blvd from 66th Ave S to 65th Ave S, 65th Ave S from Southcenter Blvd to S 151st Street	2,220	8	12	$837,000	ST	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2040 conditions.
P-4	S 153rd St Pipe Upsize	S 153rd Street from 65th Ave S east to end of street	500	8	12	$189,000	ST	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2040 conditions.
P-5	S 152nd St Pipe Project	S 152nd St from Macadam Rd S east to Sunwood Blvd	1,750	n/a, 6	8	$660,000	ST	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2040 conditions.
P-7	Macadam Road Water Upgrade	Macadam Rd S from S 114th St to Southcenter Blvd.	4,300	n/a	10	$2,500,000	ST	City-driven project.
Total Short-Term Priority			**9,130**			**$4,322,000**		
P-1	Starfire Pipe Project	From Starfire Way north (across pedestrian bridge) to S 143rd Place	2,000	n/a	8	$679,000	MT	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2040 conditions.
P-6	51st Ave S Pipe Upsize	Connection from SS169 to 51st Ave S, 51st Ave S from S 112th to S 109th St, S 112th St from 51st Ave S west to end of street.	1,530	8	12	$577,000	MT	Minimum fire flow is currently unmet. Project will meet maximum fire flow required under 2030 conditions.
Total Medium-Term Priority			**3,530**			**$1,256,000**		

Note:
(1) in – inch(es); MT – medium-term; ST – short-term.

9.3.5 General 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.

9.3.5.1 G-1 Annual Pipeline Replacement Program (High Priority)

It is recommended that the City continue its annual pipeline replacement program. This program would replace pipes based on pipe condition determined to be high priority for replacement by the RUL analysis outlined in Chapter 8 – Operations & Maintenance. Figure 9.3 shows the pipelines included in this project in orange. This project is prioritized for the short-term and medium-term with an annual cost of $1,010,000 for ten years for a total cost of $10,101,000.

9.3.5.2 G-2 Annual Pipeline Replacement Program (Medium Priority)

It is recommended that the City continue its annual pipeline replacement program. This program would replace pipes based on pipe condition determined to be medium priority for replacement by the RUL analysis outlined in Chapter 8 – Operations & Maintenance. Figure 9.3 shows the pipelines included in this project in purple. This project is prioritized for the long-term with an annual cost of $3,183,000 for ten years for a total cost of $31,834,000.

9.3.5.3 G-3 Comprehensive Water Plan Updates

The DOH requires that the Comprehensive Water Master Plan be updated every ten years. Chapter 5 – 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 the years 2030 and 2040.

9.3.5.4 G-4 Large Meter Replacement

The City has large water meters that have reached their useful life and need to be replacement. The project includes replacing three 10-inch water meters and seven 8-inch meters. This project is prioritized for the short-term with an estimated cost of $100,000 per year for 5 years.

9.3.5.5 G-5 Highline Intertie Rebuild

The City plans to rebuild its existing intertie with Highline Water District. Rebuilding the intertie with HWD will help increase the resiliency of the system by providing an additional source of supply to the City's system, which can be used during emergencies. This project is prioritized for the long-term with an estimated cost of $377,000.

9.3.5.6 G-6 Interties with WD 125

The City's existing connections with WD 125 are closed valves. The City and WD 125 have had discussions about putting in official two-way interties at the existing valve locations. Creating official interties with WD 125 will help increase the resiliency of the system by providing additional sources of supply, which can be used during emergencies. This project is prioritized for the long-term with an estimated cost of $754,000 for two interties.

9.3.5.7 G-7 Planning Pre-Design Alternatives Analysis for Project ST-1

This project is a study to refine the storage alternatives for project ST-1 based on available sites for the future storage tank and BPS(s), as needed. It is recommended that the study also include a field investigation to narrow down appropriate trenchless technology, site availability, and infrastructure routing. The project is prioritized for the short-term, to begin before design of project ST-1, with an estimated cost of $150,000 for the analysis.

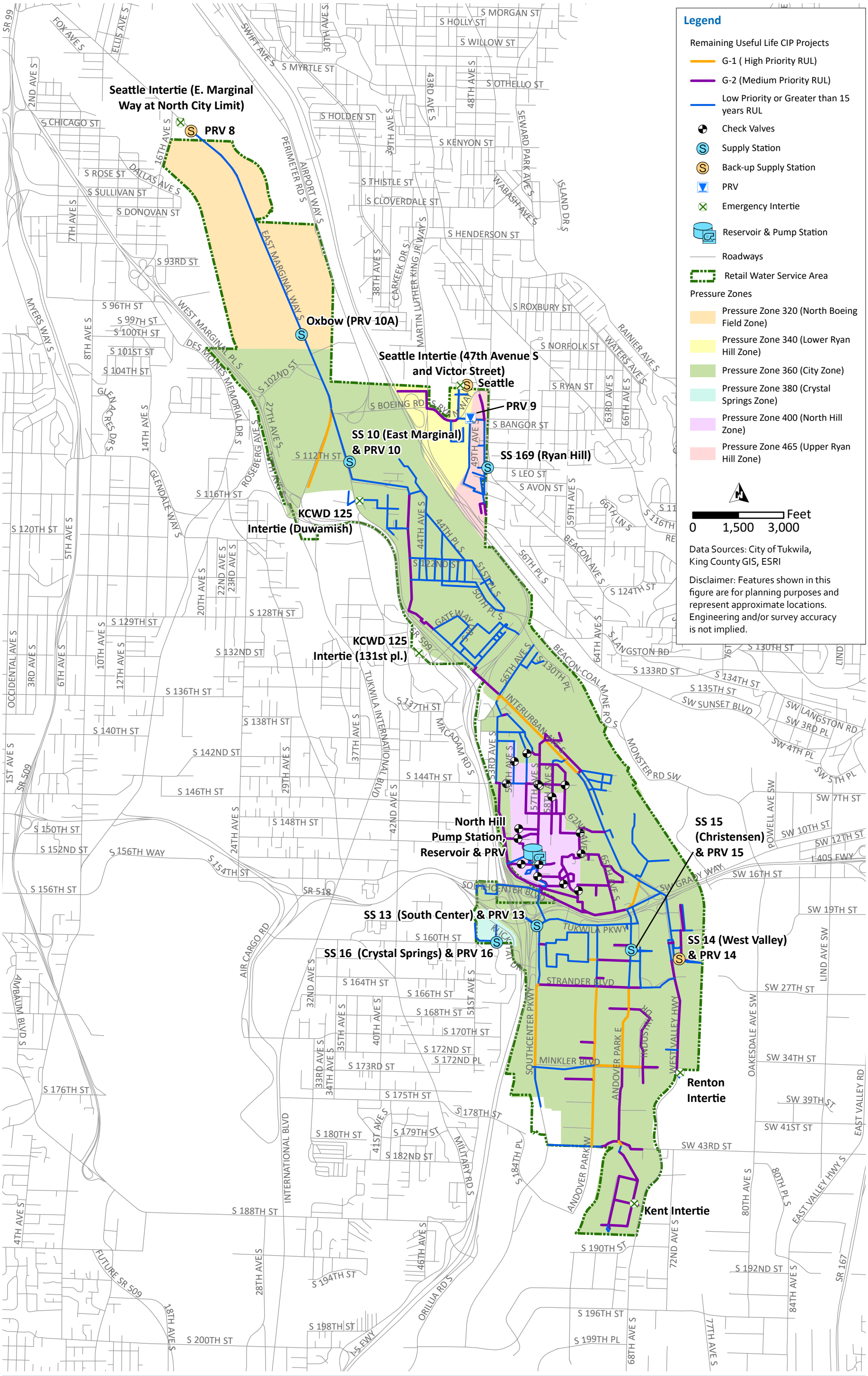


Figure 9.3 Remaining Useful Life CIP Projects

9.4 CIP Summary

This section summarizes the CIP program. Tables 9.8 and 9.9 summarize the CIP projects by project type and category, respectively. Figures 9.4 and 9.5 summarize the percent of each project identified by project category and project type, respectively. Specific project details can be found in the Detailed CIP Table in Appendix R.

The total Water CIP cost over the next 20 years is approximately $85.1 million, which equates to approximately $4.3 million annually in current dollars. Of the total cost, $24.6 million is budgeted for the short-term, $26.7 million is budgeted for the medium-term, and $33.9 million is budgeted for the long-term.

When considering CIP cost by project type, as shown in Table 9.8 and Figure 9.4, approximately 51 percent of the CIP costs are repair and replacement projects. Improvement projects make up approximately 29 percent of the CIP costs, and capacity projects make up about 20 percent of the CIP costs.

When considering CIP costs by project category, as shown in Table 9.9 and Figure 9.5, 51 percent of the CIP costs are general projects, mostly from the pipeline repair and replacement programs, and approximately 41 percent of the CIP costs are storage projects. Distribution pipeline projects make up approximately seven percent of the CIP costs, and the pump station project makes up the remaining one percent of the CIP costs.

Table 9.8 CIP Summary by Project Type

Project Type	Total CIP Cost Estimate	CIP Prioritization		
		Short-term (2021-2025)	Medium-term (2026-2030)	Long-term (2031-2040)
Repair & Replacement	$43,227,000	$6,393,500	$5,050,500	$31,783,000
Improvement	$24,485,000	$10,859,000	$11,541,000	$2,085,000
Capacity	$17,390,000	$7,305,000	$10,085,000	$0
Total Cost	**$85,102,000**	**$24,557,500**	**$26,676,500**	**$33,868,000**
Average Annual Cost	*$4,255,100*	*$2,455,750*	*$2,667,650*	*$3,386,800*

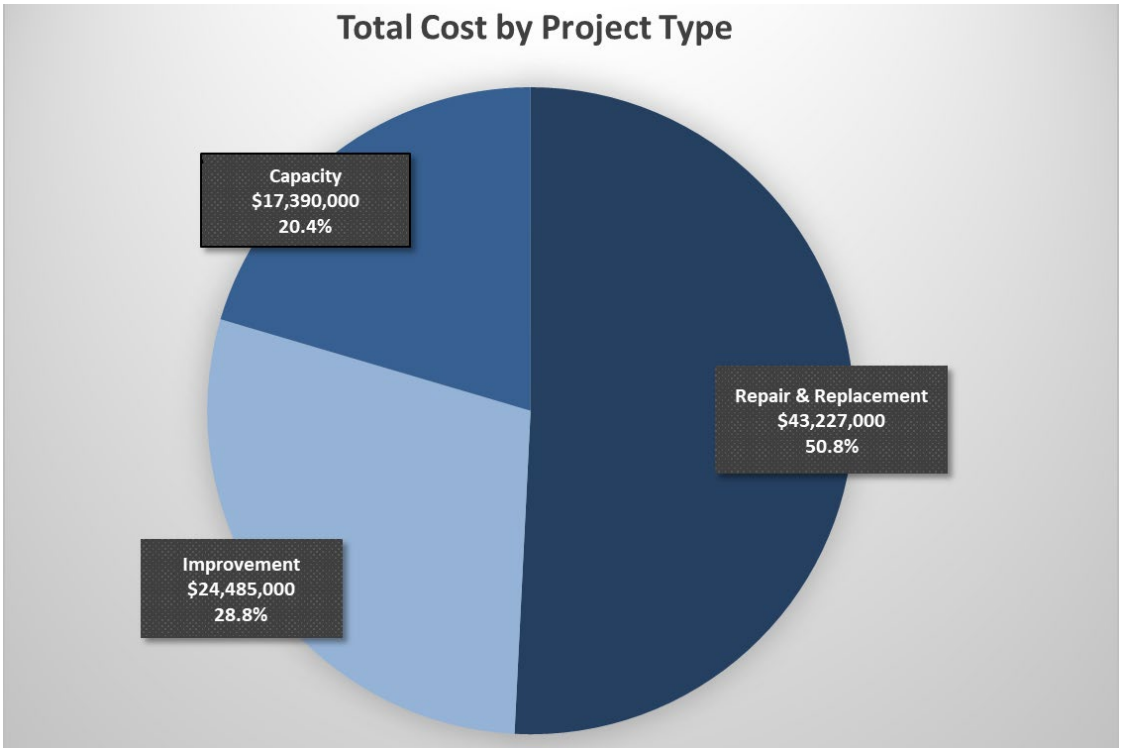


Figure 9.4 CIP Summary by Project Type

Table 9.9 CIP Summary by Project Category

Project Type	Total CIP Cost Estimate	CIP Prioritization		
		Short-term (2021-2025)	Medium-term (2026-2030)	Long-term (2031-2040)
Distribution Pipeline (P)	$5,578,000	$4,322,000	$1,256,000	$0
Pump Station (PS)	$1,131,000	$0	$0	$1,131,000
Storage (ST)	$34,705,000	$14,535,000	$20,170,000	$0
Supply (S)	$0	$0	$0	$0
General (G)	$43,688,000	$5,700,500	$5,250,500	$32,737,000
Total Cost	**$85,102,000**	**$24,557,500**	**$26,676,500**	**$33,868,000**
Annual Cost	*$4,255,100*	*$4,911,500*	*$5,335,300*	*$3,386,800*

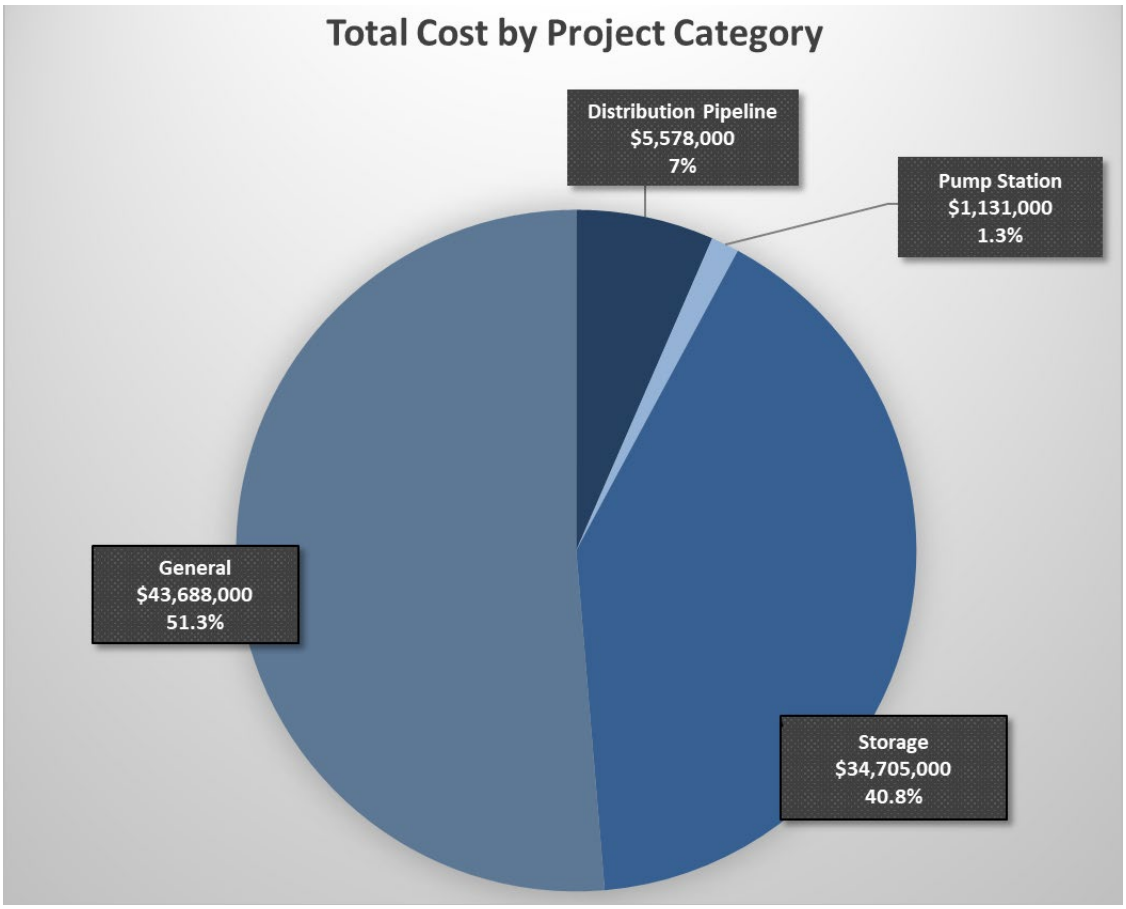


Figure 9.5 CIP Summary by Project Category

9.5 Other Recommendations

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

9.5.1 Water Use Efficiency (Chapter 6) and Water Quality (Chapter 7)

- 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.

9.5.2 Operations & Maintenance (Chapter 8)

- 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.

Chapter 10

FINANCIAL ANALYSIS

10.1 Introduction

This chapter presents the financial program, including financial history, outstanding debt, fees and charges, and capital improvement funding. A ten-year plan is presented to fund the capital improvements recommended in Chapter 9 - Capital Improvements Program (CIP). This chapter has been prepared by the City of Tukwila (City) for inclusion in the Comprehensive Water Plan.

10.2 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 10.1 summarizes the financial history of the water utility in the recent years, 2017 through 2020.

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 [HWD]), rates and reserves.

The key line of Table 10.1 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 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 of Washington (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 2.2 percent for 2021 and 2.2 percent for 2022. 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 increase in years to come.

A new utility tax was established in 2009 at 15 percent on the City's gross utility revenues for water, sewer and stormwater. Gross revenues are currently taxed at 10 percent through December 31, 2021.

Table 10.1 Summary Water Operating Fund History

Water Fund	2017	2018	2019	2020
Water Revenue				
Monthly Service Charges	$6,746,000	$6,941,000	$6,737,000	$6,149,000
Miscellaneous Revenue	$96,000	$125,000	$352,000	$108,000
Interlocal Agreement (HWD)/Grant	$0	$0	$0	$0
Water Connection Fees	$216,000	$108,000	$37,000	$79,000
Total Water Revenues	**$7,058,000**	**$7,174,000**	**$7,126,000**	**$6,336,000**
Water Expenditures				
Cascade Purchased Water	$2,905,000	$2,372,000	$2,707,000	$2,753,000
Operations & Maintenance	$2,172,000	$3,141,000	$2,345,000	$2,307,000
Engineering Labor	$53,000	$88,000	$63,000	$35,000
Interfund Utility Tax	$677,000	$698,000	$677,000	$617,000
Debt Service	$146,000	$147,000	$486,000	$342,000
CIP	$2,041,000	$1,811,000	$265,000	$25,000
Total Water Expenditures	**$7,994,000**	**$8,257,000**	**$6,543,000**	**$6,079,000**
Annual Increase/(Use) of Reserves	$(936,000)	$(1,083,000)	$583,000	$257,000
Ending Water Fund Balance				**$6,079,000**

The 2020 ending water fund balance was estimated to be $6,079,000. Of this, approximately $1,215,800 is set aside for the Working Capital Reserve (20 percent of the prior year's operating revenues) and $4,863,200 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 Operations & Maintenance (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.

Figures 10.1and 10.2 illustrate the four-year history from 2017 to 2020 (budget) of the water program funding and expenses, respectively. The increases in purchased water costs have driven the increases in water service charges. This is expected to continue.

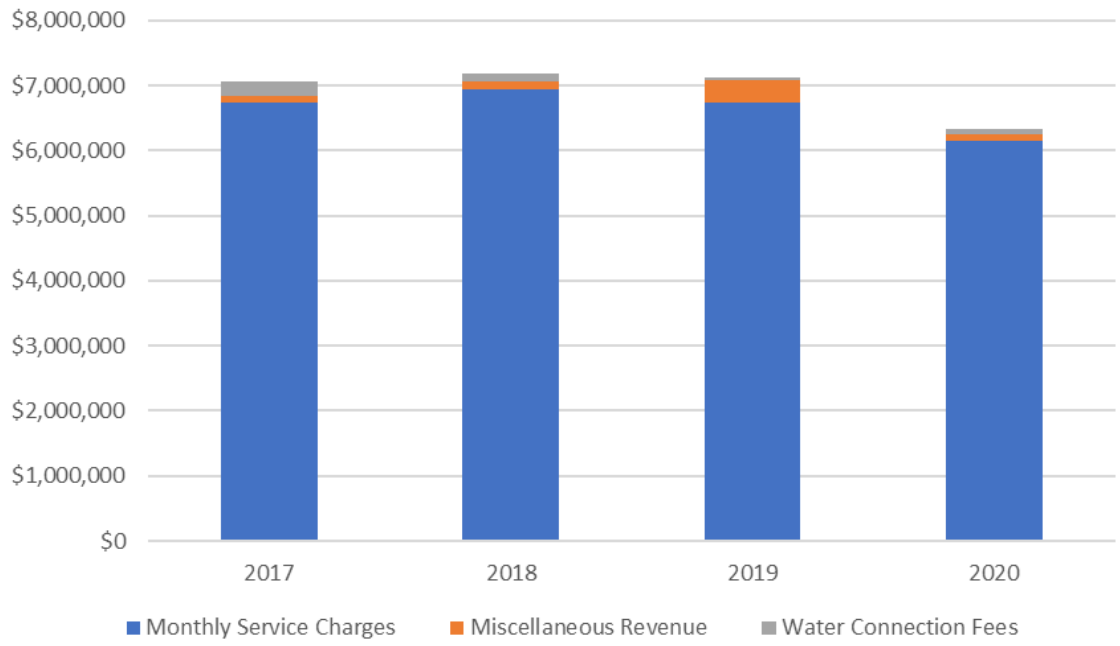


Figure 10.1 Water Program Revenue

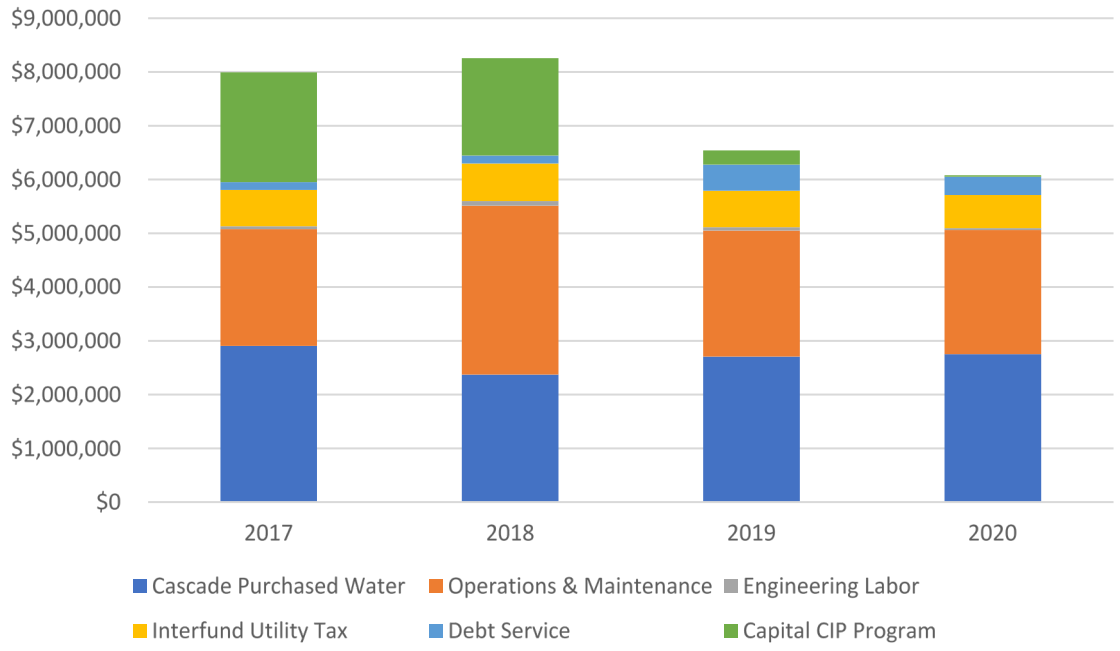


Figure 10.2 Water Program Expenditures

10.3 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 five outstanding debt issues that water is paying a share of the debt service: revenue bonds from 2018 and 2019, and PWTF loans from 2003, 2004, and 2016. The 2018 and 2019

Public Works Bonds are to provide new facilities for the Public Works Department, including water utilities staff. The water utility is paying 34 percent of the annual debt payments for this project. The 2003 and 2004 issues, and the 2006 bond were joint projects related to extending water and sewer services to the Duwamish, Allentown and Foster Point neighborhoods. The water utility is paying 26 percent of the annual debt payments for those issues.

Overall, the water utility will pay debt service (principal and interest) of $354,303 in 2021. The interest rates range from 0.5 percent to 5 percent interest over 20 years. The largest debt payment is for the 2018 Public Work Shops Revenue Bond that will end in 2038. 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 10.2 shows the outstanding water debt principal at the end of 2020, the interest rate, the year the debt will retire and the 2021 principal and interest payments. The principal for the 2018 and 2019 Public Works Shops Bond begins to accrue in 2022. 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, 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.

Table 10.2 Existing Water Debt

Debt Service Issue	Principal as of 12/31/2020	Interest Rate	Year Debt Ends	2021 P+I Payment
2003 PWTF: Duwamish (20%)	$14,454	0.5%	2021	$14,526
2004 PWTF: Allentown/FP (26%)	$80,625	0.5%	2024	$82,238
2006 Rev Bond: Allentown/FP (26%)	$40,719	4-4.5%	2026	$46,934
2018 Public Work Shops (17%)*	$0	4-5%	2038	$136,714
2019 Public Work Shops (17%)*	$0	3-5%	2039	$47,118
Total Existing Debt Service	**$135,798**			**$327,531**

Note:
Abbreviations: P+I – principal plus interest; FP – Foster Point.

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 Allentown PWTF in 2024 and the Allentown Revenue Bond in 2026 will leave an additional $81,028 and $47,829 respectively, a total savings of $128,857 annually after 2026. The end of these PWFT and bond payments provide 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.

10.3.1 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 2021 water rate schedule is shown in Table 10.3.

A typical single-family residence using 1,000 cubic feet of water (equal to 10 ccf [one hundred cubic feet] or 7,480 gallons) pays $47.60 per month during the winter, $58.80 per month during the summer, for an average of $53.20 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.

Table 10.3 Water Rate Schedule (Effective January 2021)

Monthly Rates by Customer Class = Minimum Charge + Consumption Charge	Minimum Charge Per Month	Consumption Charge per ccf
Single Family Residential per Unit	**$19.00**	
Consumption: October - May		$2.86
Consumption: June - September		$3.98
Low Income Senior & Low Income Disabled per Unit	**$9.50**	
Consumption: October - May		$1.44
Consumption: June - September		$1.99
Multi-family Residential per Unit	**$19.00**	
Consumption: October - May		$3.46
Consumption: June - September		$4.78
Commercial/Industrial per Meter		
3/4" Service	$50.00	
1" Service	$62.00	
1 1/2" Service	$90.00	
2" Service	$117.00	
3" Service	$168.00	
4" Service	$224.00	
6" Service	$338.00	
8" Service	$450.00	
10" Service	$562.00	
12" Service	$674.00	
Consumption: October - May		$5.20
Consumption: June - September		$7.04
Fire Line Charges per Service		
2" Service	$10.00	
3" Service	$22.00	
4" Service	$39.00	
6″ Service	$88.00	
8" Service	$132.00	
10" Service	$222.00	
12" Service	$287.00	

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 (KCWD) 125 and the HWD provide water supply to a portion of City residents. Each water district sets its own rates and charges independent of the City.

10.3.2 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 determines this fee and is passed through to new growth by all Cascade member communities.

10.3.3 Affordability

The affordability measure for water systems in the State is generally based on the ratio of monthly water charges compared to the median household income (MHI) for area served. The Washington State Department of Health (DOH) defines their affordability index at 1.5 percent of MHI and the PWTF 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 to be $58,097. To qualify for hardship with PWTF, 2.0 percent of the MHI would be $1,162, or $96.83 per month. With DOH's affordability index of 1.5 percent, the MHI would be $871, or $72.62 per month. By this measure, the current average monthly residential rate of $53.20 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 10.4 compares current 2021 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 10.3 charts the comparison in a graphic.

Table 10.4 Single-Family Monthly Water Rates

Water Provider	Using 10 ccf of Water
Skyway Water & Sewer District	95.13
KCWD125	84.56
HWD-Summer	72.93
Kent	71.35
HWD-Winter	65.83
Renton	62.70
Tukwila-Summer	**58.80**
Tukwila-Average	**53.20**
KCWD20	49.90
Auburn	48.44
Tukwila-Winter	**47.60**

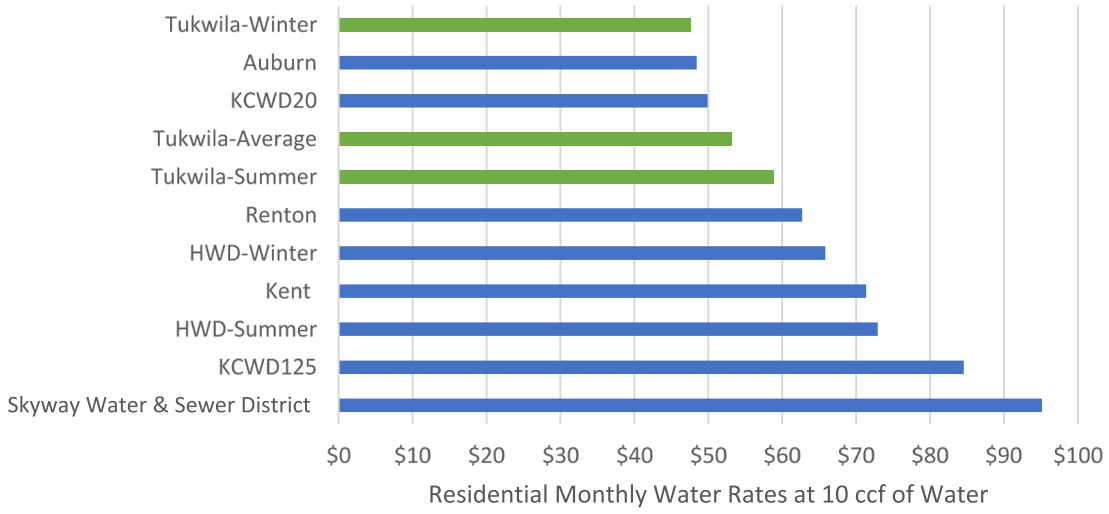


Figure 10.3 Comparing Residential Monthly Water Rates

10.4 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 or 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.

10.4.1 State Of Washington Department of Commerce

The State 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. The 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 Board (PWB): The PWB has had several programs, including construction, pre-construction, emergency and planning. This is a competitive program with an annual application cycle and funds being available the following year. The PWB 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.

This is a competitive program with an annual application cycle and funds being available the following year.

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.

10.4.2 Washington State 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 DOH and the PWTF. Existing water quality issues rank highest and the program is not geared toward growth. Federal requirements apply to the projects funded by this program.

The DOH has an annual cycle and offers low-interest loans at 1.25 to 1.75 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 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.

10.4.3 US Economic Development Administration

Another source of potential capital funding is through the economic development path. The United States Department of Commerce Economic Development Administration (USEDA) 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.

10.4.4 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 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.infrafunding.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.

10.5 Water Capital Improvements

The recommended water capital improvements were presented in Chapter 9. The projects were identified as either short-term, 2021 through 2025; medium-term, 2026 through 2030; or long-term, 2031 through 2040. The cost estimates were prepared using the March 2021 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 10.5 summarizes the short-term project cost of $22,174,000 and shows that this may be $24,060,495 when escalated to the year of construction at 3 percent escalation per year.

Table 10.5 Water Capital Improvement Summary

Period	Estimated Cost (2021)	Escalated to Year of Construction
Short-Term (2021-2025)	$22,174,000	$24,060,495
Medium-Term (2026-2031)	$20,729,000	$26,196,219
Long-Term (2021-2040)	$33,868,000	$59,837,743
Totals	**$76,771,000**	**$110,094,457**

The medium-term projects are estimated to cost $20,729,000 and the long-term projects are estimated to cost $33,868,000, which is equivalent to $26,196,219 and $59,387,743 respectively, when escalated to the year of construction. The total estimated cost for short-, medium-, and long-term projects is $76,771,000, and may reach over $100 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.

10.5.1 Ten-Year Water Capital Improvements

Table 10.6 summarizes the recommended ten-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 ten-year costs are estimated to be $24,557,500, and would be $26,614,815 if escalated to the year of planned construction at 3 percent per year.

Table 10.6 Ten-Year Capital Improvements (2021-2030)

Project ID	Project Name	Short-Term					Medium-Term					Long-Term
		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031-2040
Distribution Pipeline												
P-1	Starfire Pipe Project							$679,000				
P-2	Southcenter Blvd Pipe Connection							$136,000				
P-3	Southcenter Blvd & 65th Avenue S Pipe Upsize						$837,000					
P-4	S 153rd Street Pipe Upsize			$189,000								
P-5	S 152nd Street Pipe Project		$500,000	$1,250,000								
P-6	51st Avenue S Pipe Upsize										$577,000	
P-7	Macadam Road Water Upgrade	$250,000	$2,000,000									
Pump Station												
PS-1	North Hill BPS Back-up Power											$1,131,000
Storage												
ST-1 Alt 1B[(1)]	New Storage Alt 1B: North Hill Gravel Site w/ Separate 465 Tank	$650,000	$600,000	$1,000,000	$6,000,000	$6,000,000			$1,000,000.00	$7,000,000	$7,000,000	
ST-2	Transfer Customers in 380 PZ to HWD											
ST-3	Study for Replacing Pipe Connection to 380 PZ											
General												
G-1	Pipeline Repair and Replacement Program (High Priority)			$1,000,000	$1,000,000	$1,000,000	$1,000,000	$500,000	$500,000	$500,000	$500,000	
G-2	Pipeline Repair and Replacement Program (Medium Priority)											$31,406,000
G-3*	GIS Inventory of Water System	$10,000	$100,000	$50,000	$100,000	$105,000	$100,000					
G-3	Water System Plan	$70,000									$200,000	$200,000
G-4	Large Meter Replacement			$100,000	$100,000	$100,000	$100,000	$100,000				
G-5	Highline Intertie Rebuild											$377,000
G-6	Interties with KCWD125											$754,000
G-7	Planning Pre-Design Alternatives Analysis for Project ST-1											
CIP Total		**$980,000.00**	**$3,200,000.00**	**$3,589,000.00**	**$7,200,000.00**	**$7,205,000.00**	**$2,037,000.00**	**$1,415,000.00**	**$1,500,000.00**	**$7,500,000.00**	**$8,277,000.00**	**$33,868,000.00**
Carollo Total		**$2,360,100.00**	**$3,197,100.00**	**$2,320,100.00**	**$8,340,100.00**	**$8,340,100.00**	**$2,037,000.00**	**$1,415,000.00**	**$1,500,000.00**	**$7,500,000.00**	**$8,277,000.00**	
Total Escalated Costs		$980,000.00	$3,296,000.00	$3,807,570.10	$7,867,634.40	$8,109,290.98	$2,361,441.29	$1,689,584.00	$1,844,810.80	$9,500,775.61	$10,799,607.64	$59,387,743.01
Term Totals		**$24,060,495.48**					**$26,196,219.34**					**$59,837,743.01**

Note:
Abbreviations: BPS – booster pump station; PZ – pressure zone; GIS – geographic information system.

The recommended ten-year CIP averages $5.1 million per year compared to the City's 2021 plan that averages $2.2 million per year for Water projects. The timing for the new reservoir ($10 million) and associated pump station ($5 million) are now recommended within the ten-year planning horizon. An annual average for the proposed pipeline replacement program ($750,000) assumes the pipes will be replaced over a 50-year period.

The City has prioritized two large main replacement and looping projects (Macadam Road, $2.5 million and S 152nd St, $1.5 million) for 2022 and 2023, and has applied for a sidewalk grant of $400,000 to fund the sidewalk portion.

10.5.2 Ten-Year Capital Improvement Funding Plan

The funding plan for the ten-year improvements is summarized in Table 10.7.

10.5.3 Alternative Ten-Year Capital Improvement Funding Plan

Table 10.8 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 2021 list currently awaiting approval by the state legislature.

The annual debt payment for 20-year revenue bonds at 4.0 percent 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 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 9.5 are assumed to be funded within the operations and maintenance program.

Table 10.7 Funding Plan for Ten-Year CIP

Funding Source	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Rates/ Reserves	725,000	555,000	1,089,000	450,000	455,000	537,000	415,000	500,000	700,000	777,000
Future Revenue Bonds	255,000	2,645,000	2,500,000	6,750,000	6,750,000	1,500,000	1,000,000	1,000,000	6,800,000	7,500,000
Annual Total	**$980,000**	**$3,200,000**	**$3,589,000**	**$7,200,000**	**$7,205,000**	**$2,037,000**	**$1,415,000**	**$1,500,000**	**$7,500,000**	**$8,277,000**

Table 10.8 Alternative Funding Plan for Ten-Year CIP

Funding Source	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Rates/ Reserves	725,000	555,000	1,089,000	450,000	455,000	537,000	415,000	500,000	70,000	777,000
Future PWTF Loan	255,000	2,645,000	2,500,000	6,750,000	6,750,000	1,500,000	1,000,000	1,000,000	6,800,000	7,500,000
Annual Total	**$980,000**	**$3,200,000**	**$3,589,000**	**$7,200,000**	**$7,205,000**	**$2,037,000**	**$1,415,000**	**$1,500,000**	**$7,500,000**	**$8,277,000**

10.6 Ten-Year Water Financial Plan

The City has a ten-year financial planning model and capital improvement program that is updated annually. The City updates the CIP every other year, with the next update in 2023, and continues to update 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 2021 to 2026 plan was reviewed and is compared in developing this financial chapter.

Figure 10.4 presents the 2021 Water Program Expenditures. The purchased water costs are the largest category of on-going expense for the water utility and account for 38 percent of the 2021 water program expenditures. The City purchases all of its water from Cascade for sale and distribution to the utility customers. Cascade rate increases are 2.2 percent for 2021 and 2.2 percent for 2022 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 2-6 percent from 2021 through 2030.

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 2026 at over $820,000 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 ten-year water financial plan shown in Table 10.9 includes an additional rate increase of 2 percent in 2021, 5 percent in 2022 and 2023, and 6 percent per year 2024 through 2030 for CIP, positive cash flow and to rebuild the reserves.

Table 10.9 Ten-Year Water Financial Plan

Ten-Year Financial Outlook	Budget 2021	Projected 2022	Projected 2023	Projected 2024	Projected 2025	Projected 2026	Projected 2027	Projected 2028	Projected 2029	Projected 2030
WATER REVENUE										
Operating Revenue										
Water Charges: Cascade	3,289,000	3,356,000	3,524,000	3,629,000	3,701,000	3,776,000	3,852,000	3,929,000	4,008,000	4,088,000
Water Charges: City Water	3,353,000	3,488,000	3,723,000	3,946,000	4,183,000	4,434,000	4,700,000	4,982,000	5,282,000	5,598,000
Rate Increase for CIP		*2%	*5%	*6%	*6%	*6%	*6%	*6%	*6%	*6%
Subtotal Operating Revenue	6,642,000	6,844,000	7,247,000	7,575,000	7,884,000	8,210,000	8,552,000	8,911,000	9,290,000	9,686,000
Miscellaneous Revenue	60,000	83,000	130,000	135,000	140,000	145,000	150,000	155,000	160,000	175,000
Grants/Bonds/PWTF	255,000	2,645,000	2,500,000	6,750,000	6,750,000	1,500,000	1,000,000	1,000,000	6,800,000	7,500,000
Water Connection Fees	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Subtotal Capital Revenue	335,000	2,748,000	2,650,000	6,905,000	6,910,000	1,665,000	1,170,000	1,175,000	6,980,000	7,695,000
Total Water Revenue	**6,977,000**	**9,592,000**	**9,897,000**	**14,480,000**	**14,794,000**	**9,875,000**	**9,722,000**	**10,086,000**	**16,270,000**	**17,381,000**
WATER EXPENDITURES										
Operating Expense										
Purchased Water: Cascade	3,289,000	3,356,000	3,524,000	3,629,000	3,701,000	3,776,000	3,852,000	3,929,000	4,008,000	4,088,000
Operations & Maintenance	2,459,000	2,520,000	2,423,000	2,471,000	2,520,000	2,621,000	2,700,000	2,781,000	2,864,000	2,950,000
Engineering Labor	117,000	119,000	121,000	124,000	126,000	129,000	131,000	134,000	137,000	139,000
Interfund Utility Tax	664,200	684,400	724,700	757,500	788,400	821,000	855,200	891,100	929,000	968,600
Subtotal Operating	6,529,200	6,679,400	6,792,700	6,981,500	7,135,400	7,347,000	7,538,200	7,735,100	7,938,000	8,145,600
Debt Service										
Revenue Bonds	303,357	617,755	617,301	617,783	753,792	752,934	803,573	816,663	832,472	849,218
PWTF Loans	96,765	81,835	81,432	81,028	0	0	0	0	0	0
Subtotal Debt Service	400,122	699,590	698,733	698,811	753,792	752,934	803,573	816,663	832,472	849,218
Capital - CIP	$980,000	$3,200,000	$3,589,000	$7,200,000	$7,205,000	$2,037,000	$1,415,000	$1,500,000	$7,500,000	$8,277,000
Total Water Expenditures	**7,909,322**	**10,578,990**	**11,080,433**	**14,880,311**	**15,094,192**	**10,136,934**	**9,756,773**	**10,051,763**	**16,270,472**	**17,271,818**
Annual Increase/ (Use) of Reserves	-932,322	-986,990	-1,183,433	-400,311	-300,192	-261,934	-34,773	34,237	-472	109,182

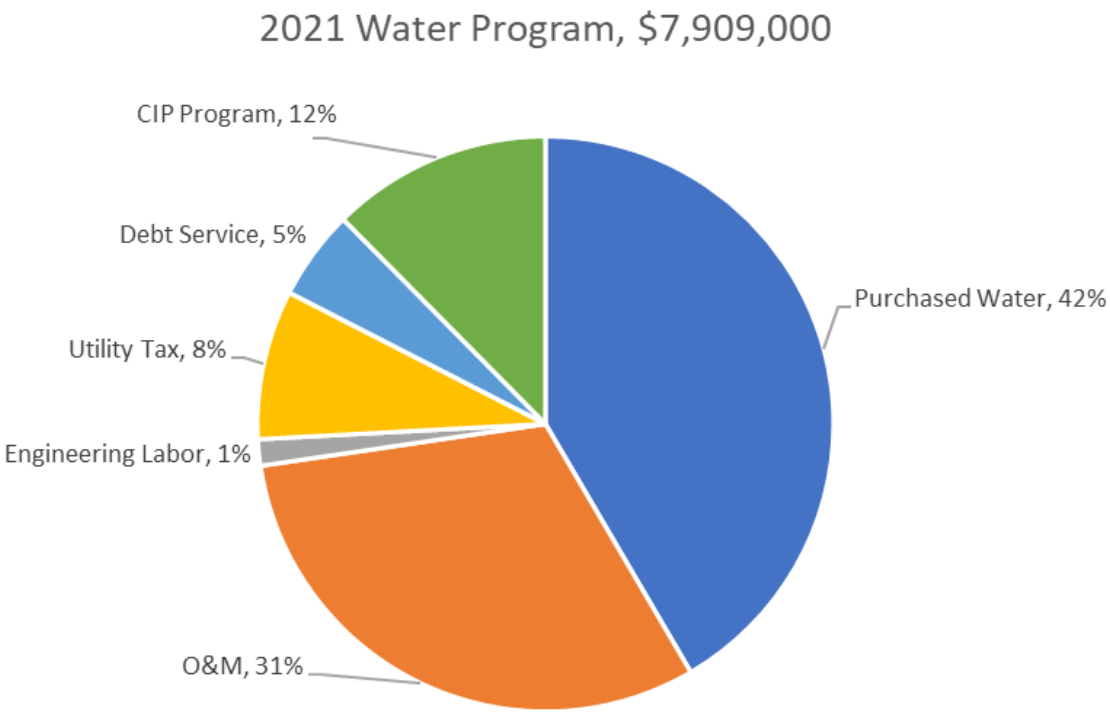


Figure 10.4 2021 Water Program Expenditures

The scenario shown in Table 10.9 includes an additional average 6 percent per year rate increase from 2024 through 2030 to pay for the CIP. 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 10.10 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. 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.

Table 10.10 Ten-Year Water Fund Balance

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Beginning Balance	$5,604,000	$5,443,878	$4,456,888	$3,273,455	$2,873,144	$2,572,952	$2,311,018	$2,276,245	$2,310,482	$2,310,010
Annual Increase/(Use) of Reserves	$(932,322)	$ (986,990)	$ (1,183,433)	$ (400,311)	$ (300,192)	$ (261,934)	$(34,773)	$34,237	$(472)	$109,182
Ending Balance Water	$4,671,678	$4,456,888	$3,273,455	$2,873,144	$2,572,952	$2,311,018	$2,276,245	$2,310,482	$2,310,010	$2,419,192
Working Capital Components										
Target Minimum Reserve (20%)	$934,336	$ 891,378	$654,691	$574,629	$514,590	$462,204	$455,249	$462,096	$462,002	$483,838
Unreserved Balance	$3,737,342	$3,565,510	$2,618,764	$2,298,515	$2,058,362	$1,848,814	$1,820,996	$1,848,386	$1,848,008	$1,935,354
Ending Balance Water	$4,671,678	$4,456,888	$3,273,455	$2,873,144	$2,572,952	$2,311,018	$2,276,245	$2,310,482	$2,310,010	$2,419,192
Meets Target Minimum?	*OK*	*OK*	*OK*	*OK*	*OK*	*OK*	*OK*	*OK*	*OK*	*OK*

Appendix A

STATE ENVIRONMENTAL POLICY ACT CHECKLIST AND DETERMINATION OF NON-SIGNIFICANCE

Appendix B

AGENCY/ADJACENT PURVEYOR COMMENTS AND APPROVAL

Appendix C

LOCAL GOVERNMENT CONSISTENCY DETERMINATION FORM

Appendix D

ADOPTING RESOLUTION AND ORDINANCE

Appendix E

WATER FACILITIES INVENTORY FORM

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

WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 1
Updated: 01/16/2020

Printed: 6/30/2021
WFI Printed For: On-Demand
Submission Reason: Pop/Connect Update

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

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
89500 F	TUKWILA WATER DEPARTMENT	KING	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS	7. OWNER NAME & MAILING ADDRESS
BRYAN STILL [OPERATIONS MANAGER] 600 MINKLER BLVD TUKWILA, WA 98188	TUKWILA, CITY OF HENRY HASH 6200 SOUTHCENTER BLVD TUKWILA, WA 98188 PW DIRECTOR
STREET ADDRESS IF DIFFERENT FROM ABOVE	**STREET ADDRESS IF DIFFERENT FROM ABOVE**
ATTN ADDRESS CITY STATE ZIP	ATTN ADDRESS CITY STATE ZIP

9. 24 HOUR PRIMARY CONTACT INFORMATION		10. OWNER CONTACT INFORMATION	
Primary Contact Daytime Phone: (206) 433-1861		Owner Daytime Phone: (206) 431-2457	
Primary Contact Mobile/Cell Phone: (206) 571-6308		Owner Mobile/Cell Phone:	
Primary Contact Evening Phone:		Owner Evening Phone: (xxx)-xxx-xxxx	
Fax:	E-mail: xxxxxxxxxxxxxxxxxxx	Fax: (206) 431-3665	E-mail: xxxxxxxxxxxxxxxxxxx

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

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

SMA NAME: _____ SMA Number:

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)

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

13. WATER SYSTEM OWNERSHIP (mark only one)

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

14. STORAGE CAPACITY (gallons)

2,000,000

15	16	17	18 SOURCE CATEGORY										19 USE			20	21 TREATMENT						22	23	24 SOURCE LOCATION			
Source Number	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	INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL IN A WELL FIELD	SPRING	SPRING FIELD	SPRING IN SPRINGFIELD	SEA WATER	SURFACE WATER	RANNEY / INF. GALLERY	OTHER	PERMANENT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	DEPTH TO FIRST OPEN TERVAL IN FEET	CAPACITY (GALLONS PER MINUTE)	1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S01	77050Y/SEATTLE	77050 Y											X				X							2500			00N	00E
S02	71850L/RENTON	71850 L													X		X							0	S W	25	23N	04E
S03	381501/KENT	38150 1													X		X							0	S W	36	23N	04E
S04	406506/HIGHLINE	40650 6													X		X							0	N E	35	23N	04E
S05	41998T/KCWD # 125	41998 T													X		X							0	N W	10	23N	04E

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
89500 F	TUKWILA WATER DEPARTMENT	KING	A	Comm

	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)		3785	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	1344		
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	182		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	2441		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	791	791	
28. TOTAL SERVICE CONNECTIONS		4576	

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per year? 9460

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 that are NOT alrealy included in the residential population?	35178	35178	35178	35178	35178	35178	35178	35178	35178	35178	35178	35178
B. How many days per month are they present?	22	20	22	22	21	22	22	21	23	22	21	22

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	50	50	50	50	50	50	50	50	50	50	50	50

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

35. Reason for Submitting WFI:

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

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

SIGNATURE: _____ **DATE:** _____

PRINT NAME: _____ **TITLE:** _____

WS ID	WS Name
89500	TUKWILA WATER DEPARTMENT

Total WFI Printed: 1

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

Water Facilities Inventory (WFI)

Report Create Date:	6/30/2021		
Water System Id(s):	89500F		
Print Data on Distribution Page:	ALL		
Print Copies For:	DOH Copy		
Water System Name:	ALL		
County:	-- Any --		
Region:	ALL		
Group:	ALL		
Type:	ALL		
Permit Renewal Quarter:	ALL		
Water System Is New:	ALL		
Water System Status:	ALL		
Water Status Date From:	ALL	**To**	ALL
Water System Update Date	ALL	**To**	ALL
Owner Number:	ALL		
SMA Number:	ALL		
SMA Name:	ALL		
Active Connection Count From:	ALL	**To:**	ALL
Approved Connection Count	ALL	**To:**	ALL
Full-Time Population From:	ALL	**To:**	ALL
Water System Expanding	ALL		
Source Type:	ALL		
Source Use:	ALL		
WFI Printed For:	On-Demand		

Appendix F

INTERLOCAL AGREEMENTS

08-063
Council Approval 7-21-08

MEMBERSHIP AUDIT ACCEPTANCE AGREEMENT

Between

CASCADE WATER ALLIANCE

And

CITY OF TUKWILA

MEMBER

May 23, 2008

2ND of 2 ORIGINALS

Cascade Water Alliance ("Cascade") and the City of Tukwila ("Tukwila") enter into this Membership Audit Acceptance Agreement (the "Audit Agreement") with respect to Tukwila's public water system.

Article I: Authority – Audit Predicate – Audit – Definitions

Section 1.1 Authority. Article V, Section 5.2.2 of the Cascade Water Alliance Amended and Restated Interlocal Contract, dated December 15, 2004, (the "Interlocal") requires an audit of each Member's water system and Independent Supply, if any, for the purposes of (1) determining Cascade's supply obligation to that Member, (2) recognizing when the Member has lost Independent Supply, and (3) allocating credits against the Member's Regional Capital Facility Charge for its Independent Supply.

Section 1.2 Audit Predicate. Cascade's supply obligations (water quantity and quality) and related supply obligations and the Member's obligations concerning planning, conservation, shortage management, Independent Supply, and payment of Rates and Charges are established by the Interlocal. This Audit Agreement is intended to implement, not modify the Interlocal, and nothing herein shall change the benefits or obligations of a party to the Interlocal.

Section 1.3 Audit. This Audit Agreement incorporates and adopts the audit of Tukwila's public water system, dated May 23, 2008, performed by Cascade Water Alliance (the "Audit"). *The Audit was performed according to a methodology adopted by the Board of Directors of Cascade (the "Board") in Resolution No. 2008-04.* The original Audit is on file with Cascade. A true and accurate copy is attached hereto as Exhibit A.

Section 1.4 Definitions. Capitalized terms not otherwise defined in this Agreement shall have the meaning assigned to them in the Interlocal. The following words have the following meanings when used in this Agreement:

a) Production Requirement – The quantity (seasonal and annual) of water a Member is required to supply from its Independent Supply as established by the Audit and set forth in Section V of Exhibit A.

b) Failure to meet Production Requirement – A Member's voluntary or involuntary failure to meet Production Requirements and so declared by a resolution of the Board.

c) Loss of Supply – A Member's permanent Failure to Meet Production Requirements, or a portion thereof, and so declared by a resolution of the Board.

Article II: Independent Supply

The Audit accurately identifies and quantifies Tukwila's Independent Supply for the purpose of establishing Cascade's supply commitment to Tukwila.

Article III: Supply Commitment

Cascade's supply commitment, as provided in the Interlocal and further defined by the Audit, shall be implemented through the Points of Delivery that are identified in Exhibit A.

Article IV: Wheeling

All existing wheeling arrangements between Members or between Members and non-members as described in Exhibit A shall remain in effect. For future wheeling arrangements, Cascade shall pay wheeling charges when, in the judgment of the Board, a wheeling arrangement represents a cost-effective way to provide water to a Member or non-member.

Article V: Points of Delivery

Section 5.1 Cascade shall either own, or by contract with Seattle, have wholesale master meters at all points of delivery of the regional transmission system as set forth in Exhibit A.

Section 5.2 Costs related to installation of future wholesale master meters initiated by Cascade shall be borne by Cascade. The cost of installing any future wholesale master meters not initiated by Cascade and not listed in Exhibit A shall be charged pursuant to Cascade's fiscal policies to the entity (Member or non-member) receiving the water.

Section 5.3 The hydraulic gradients for the points of delivery are established in Exhibit A. A Member may request changes to such hydraulic gradient(s) to avoid adverse impacts to their distribution system. Cascade shall assume the initial cost of any adjustments required at the Member supply connection to match the defined range. Cascade shall also assume the initial cost of any adjustments (within the Member's distribution system) resulting from changes to the defined hydraulic gradient range caused by Cascade. Thereafter, the cost of any subsequent adjustments shall be borne by each individual Member. Under emergency conditions or other unusual short-term operating situations, Cascade shall not be obligated to meet minimum hydraulic gradients.

Article VI: RCFC Credits – Independent Supply – Production Requirements – Loss

Section 6.1 Award of Credits. According to the Audit, Tukwila is entitled to and shall have 0 credits against the Regional Capital Facilities Charge.

Section 6.2 Production Requirements – Waiver

6.2.1 Tukwila accepts the Audit and the Production Requirement established by the Audit and set forth in Exhibit A, and agrees to produce water from its Independent Supply in an amount at least sufficient to meet its Production Requirements.

6.2.2 The Board may temporarily modify or waive Production Requirements when:

a. the modification or waiver will not result in any increased demand upon Cascade or any increased cost to Cascade;

b. the modification or waiver is based upon unforeseen events such as equipment failure, natural disaster, or other situation that could not have been reasonably foreseen by Member(s);

c. the modification or waiver is based upon a planned temporary interruption of production as might be needed to perform routine maintenance or modification to a Member's system, the impacts of which have been coordinated in advance with Cascade;

d. the modification or waiver is warranted by considerations of equity and fairness as determined in the sole discretion of the Board;

e. the modification or waiver is based upon an agreed demand mitigation plan submitted by a Member and accepted by the Board; or

f. The modification or waiver is in effect only for a specified and limited (not to exceed one year) period of time.

Section 6.3 Production Requirements – Administration and Enforcement. Production Requirements shall be administered and enforced as follows:

6.3.1 Cascade will monitor Members' Independent Supply and Cascade's supply to Members through the collection of necessary reports and data. Cascade will evaluate Independent Supply production relative to Production Requirements and periodically report to Members on status. The frequency of such reports will be determined by practical timeframes for receipt and compilation of necessary data from regional and local sources. If a Member fails to meet Production Requirements, Cascade will notify the Member and the Board as soon as practical.

6.3.2 Each year, Cascade will periodically assess the supply and demand situation to determine whether Production Requirements may be waived or reduced based on a finding of surplus in water supply capacity or capability relative to demands. In the event of shortage conditions invoking shortage response, Cascade will work with Members to maximize those Members' reliance on Independent Supply while recognizing that concurrent demand reductions may cause de facto reductions in the ability to put Independent Supply to full productive use.

6.3.3 The Production Requirement shall be reduced pro rata to reflect a reduction in demand levels in any year. For this purpose, Cascade shall determine the actual Cascade usage per CERU for its collective Members, divide this usage by the standard usage per CERU established and used by Cascade, and multiply this ratio times the Production Requirement. This shall be done separately for annual and peak season demands and Production Requirements.

6.3.4 Shortfalls in production that are not waived by the Board or otherwise satisfied by any of the foregoing shall be documented by a resolution of the Board that shall impose penalties according to a graduated series of financial surcharges and operational sanctions, as follows:

Cascade Actions for Member Shortfall in Independent Supply Production			
Frequency	**Financial Response** *(applies to volume of shortfall)*		**Operational Response**
	Peak Season Shortfall	**Annual Shortfall**	
1st occurrence in 20-year rolling period	None	None	Cascade notifies Member and Board adopts resolution declaring production failure
2nd occurrence in 20-year rolling period	Surcharge equal to 25% of Cascade's *average cost* per ccf delivered*	Surcharge equal to 5% of Cascade's *average cost* per ccf delivered*	Cascade notifies Member and Board adopts resolution declaring 2nd production failure, imposing penalties, and detailing consequences of further failures
3rd and subsequent occurrences in 20-year rolling period	Surcharge equal to 200% of Cascade's *average cost* per ccf delivered*	Surcharge equal to 80% of Cascade's *average cost* per ccf delivered*	Cascade notifies Member and Board adopts resolution declaring 3rd production failure, imposing penalties, and warning that a fourth failure will be deemed a Member declaration of "loss of supply"
* *"average cost per ccf delivered" is defined as total annual Cascade Demand Share revenue divided by total annual Cascade volume delivered.*			

Provided that only one occurrence of a shortfall in Independent Supply Production may be declared per year, and provided further that in the event of multiple shortfalls in the same year (e.g. both peak season and annual shortfalls), the financial penalty shall be the greater of the calculated penalties.

6.3.5 A resolution declaring a permanent Loss of Supply shall be adopted by the Board upon the 4th occurrence of a Failure to Meet Production Requirements in a 20 year rolling period.

6.3.6 Whenever a resolution declaring a Loss of Supply has been adopted by the Board, (a) the Member shall concur in the declaration of Loss of Supply and formally request an additional Full Supply Commitment from Cascade in accordance with Section 5.2.2 of the Interlocal; (b) Cascade shall, at the Member's expense, perform an audit according to the approved audit methodology to quantify Cascade's additional Full Supply Commitment to the Member; and (c) Cascade shall impose, by resolution of the Board, the applicable annual financial penalties provided for in Section 6.3.4 of this agreement for that Loss of Supply, until the Member submits to Cascade a formal request for an additional Full Supply Commitment according to the Interlocal.

6.3.7 Whenever a Member experiences a Loss of Supply, that Loss of Supply shall be documented in a resolution of the Board and copy provided to the Member. The resolution shall

state the basis for the Board's declaration. A resolution declaring a Loss of Supply may be rescinded upon a showing satisfactory to the Board of replacement of lost supply consistent with the requirements of the Interlocal.

ARTICLE VII: General

Section 7.1 Integrated Agreement. This Agreement implements provisions of the Interlocal and shall be construed and interpreted to that effect; otherwise, this document and all attachments integrates all prior oral and written representations between the parties and is the complete agreement between Cascade and Tukwila concerning the Audit of Tukwila's public water system.

Section 7.2 Amendment. Except as otherwise provided, this Audit Agreement may be amended only in writing and only if such writing is signed by the Member and by Cascade; provided, however, an approved water system plan that modifies the Member's service area shall amend the service area described in Section 2.1 pending a further Audit of the Member's public water system in accordance with the Interlocal.

Section 7.3 Interpretation and Venue. This Audit Agreement shall be interpreted and construed according to the laws of the State of Washington; provided that the Interlocal, the Audit, and applicable Cascade resolutions may be consulted as aids to interpretation and construction. Any action to enforce this Agreement shall be brought in King County, Washington.

Section 7.4 Effective Date. This Audit Agreement shall be effective on the date that it is approved by resolution of the Board.

CASCADE WATER ALLIANCE
By:

EROberg 9/3/08

Ed Oberg, Chief Executive Officer — Date

Date _____

Pursuant to Cascade Water Alliance Resolution No. 2008-12, Section 4, adopted 8/27/08, the Chief Executive Officer is authorized to execute the Audit Acceptance Agreements for the seven Cascade Members listed in Section 2.

Date _____

MEMBER
By:

PB Joni Haggerton
Mayor or City Manager or President of Commissioners

Date 7-25-08

Attest:

Christy OF Lafayette

Date 7-25-08

EXHIBIT A

MEMBER WATER AUDIT

CITY OF TUKWILA

PREPARED FOR CASCADE WATER ALLIANCE

May 23, 2008

Section I: Purpose & Background

This water audit outlines the supply relationship between Cascade Water Alliance (Cascade) and its Members, documenting each Member's official service area and independent supply sources. As a condition for membership in Cascade, Members with independent supply sources participated in a water system audit in 1999. The audit included a review of Member-owned independent supplies, which resulted in an award of independent supply credits for use against future Regional Capital Facilities Charge (RCFC) payments. The prior audits were conducted on the premise that Cascade would commence operation and supply delivery in 2000 – however, Cascade did not begin delivering water until 2004.

Cascade has recognized the need to update the prior audits for Members with independent supply sources to establish Member obligations to produce water from independent supplies, and to define RCFC credits (redeemable beginning in 2008). This document has been prepared in accordance with Article V, Section 5.2.2 of the Amended and Restated Cascade Interlocal Contract (dated December 15, 2004), which authorizes Cascade to conduct audits of the independent supplies of its Members at any time. Given that the City of Tukwila does not have any independent supply sources of its own, the primary purpose of this audit is to document the supply relationship between the City and Cascade.

Section II: Utility Description

The City of Tukwila is a municipal corporation that owns and operates a public water system serving customers inside its water service area. Table 1 summarizes information pertinent to the City's water system:

Table 1: General Water System Information – City of Tukwila

Water System Name:	City of Tukwila
Water System ID No:	89500F
Water System Classification:	Group A – Community Type
Type of Ownership:	Local Government
Owner No:	
Address:	600 Minkler Boulevard
System Contact Person:	Operations Manager
CERU Count as of 12/31/04:	8,732
Sources of Information:	**Cascade / City Records**

Section 2.1 Service Area

The City of Tukwila is bounded by the City of Seatac on the west, the City of Seattle on the north, the City of Renton on the east, and the City of Kent on the south. Tukwila's current and future service area, city boundary, and other adjacent purveyor service areas are shown on Figure 1.

The City purchases wholesale water from Cascade (currently Seattle water through the Cascade Block) to serve its customers. In addition to this, the City holds agreements with several non-Members that allow it to acquire additional supply in the event of an emergency.

Section 2.2 Pre-Existing Service Commitments to Non-Members

The City does not have any pre-existing service commitments to non-members.

Section 2.3 Distinguishing Characteristics & Considerations

The following considerations are unique to the City of Tukwila's water system:

- The City holds a surface water right, but that water right is used exclusively for golf course irrigation and is not part of Tukwila's drinking water distribution system. In addition, the City has a reclaimed water program for irrigation and industrial uses. This program has value to Cascade, as it mitigates potable water demand during peak periods.

Section III: Supply Commitment

Section 3.1 Delivery Points

The specific Points of Delivery are identified in Figure 1 (see page 2). The location of each Point of Delivery is listed in Table 2 and is the Points of Delivery as defined by the Member agency at the time the water audit was finalized.

TABLE 2

TABLE OF DELIVERY POINTS

LOCATION	JURISDICTION	STA_NO	HYDRAULIC GRADIENT (Ft)		TYPE
			Minimum	Maximum	
South Center Parkway & Tukwila Parkway	Tukwila	13	460	490	SUPPLY
Christensen Road & Baker Rd.	Tukwila	15	460	490	SUPPLY
53rd Avenue S & S 160th Street	Tukwila	16	460	490	SUPPLY
E Marginal Way & S 112th Street	Tukwila	168	445	490	SUPPLY
51st Avenue S & S Leo Street	Tukwila	169	455	490	SUPPLY
W Marginal Place & S 102nd Street	Tukwila	170	300	490	SUPPLY

WATER SYSTEM AUDIT

CITY OF TUKWILA

PREPARED FOR INTERIM WATER GROUP

INTRODUCTION

PURPOSE

As authorized by the City Council on November 2, 1998, the City of Tukwila has submitted formal application for membership in the Cascade Water Alliance (CWA). This document has been prepared to augment information presented as part of the City's membership application process. It has been prepared to comply with Article V, Section 5.1 of the June 16, 1998 draft Cascade Water Alliance Interlocal Contract, which requires that a Water Supply Audit be prepared for each agency applying to become a member of the CWA.

UTILITY DESCRIPTION

The City of Tukwila is a municipal corporation that owns and operates a public water system. Table 1 summarizes information pertinent to the Tukwila water system, as presented in materials included with Tukwila's application for membership in CWA, the City's December 1998 Draft Water System Comprehensive Plan, and/or obtained from the Washington State Department of Health.

Table 1

City of Tukwila
General Water System Information

Water System Name:	City of Tukwila
Water System ID No.:	89500 F
Water System Classification:	Group A - Community Type
Type of Ownership:	Municipal (City Government)
Owner No.:	002989
Address:	6200 Southcenter Boulevard, Tukwila, WA 98188
System Contact Person:	Ted Freemire, Public Works Operations Manager
Service Area Population :	5,626
Equivalent Residential Units:	7,214

Sources of Information: City of Tukwila CWA Membership Application, Tukwila Water System December 1998 Draft Water System Comprehensive Plan, and Washington DOH

Figure 1, from Tukwila's December 1998 Draft Comprehensive Water System Plan, shows the current Tukwila City limits and the water service area, which is consistent with the Skyway Coordinated Water System adopted by King County and subsequently approved by the Tukwila City Council.

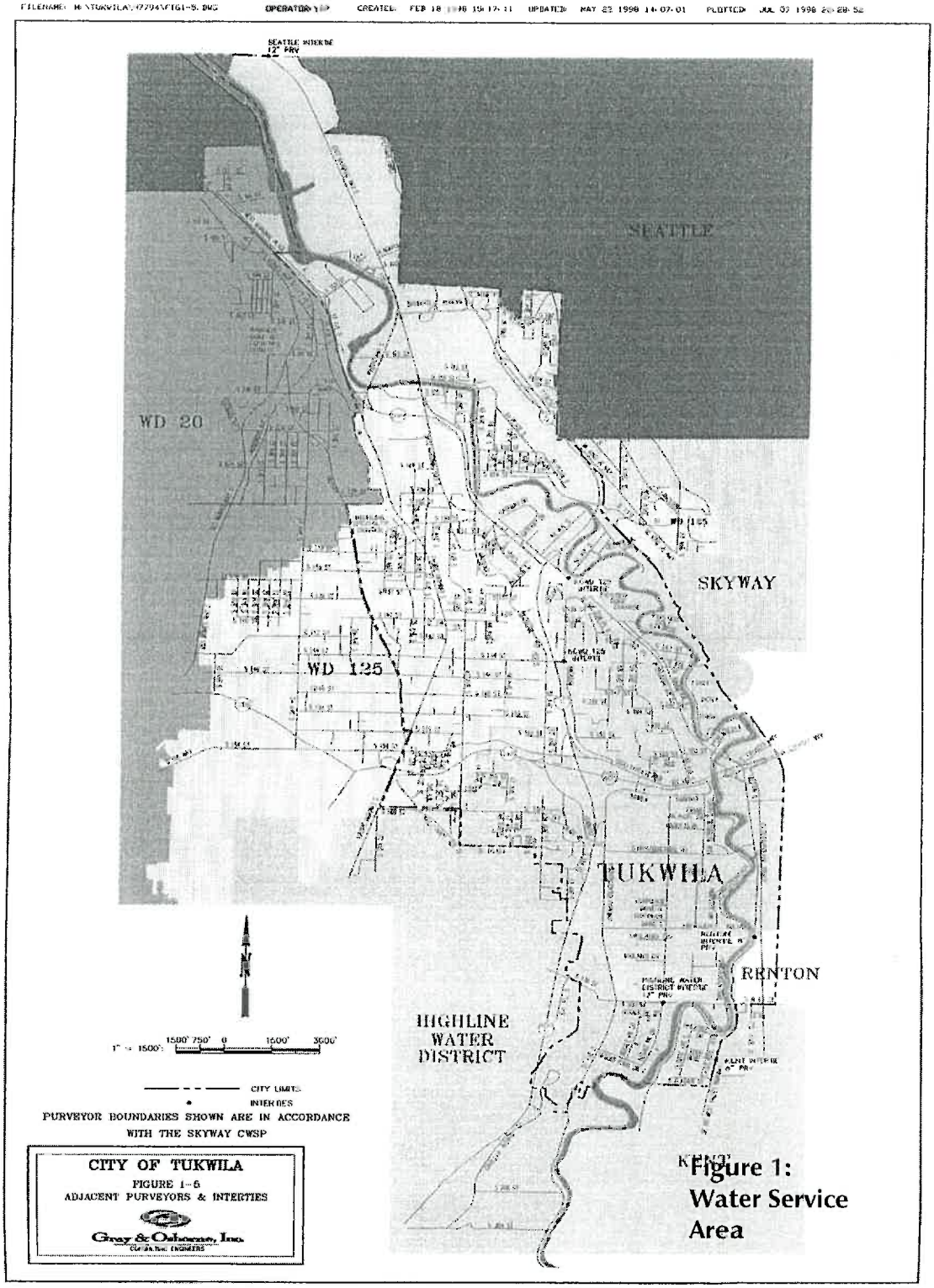


Figure 1: Water Service Area

Source: Tukwila Water System December 1998 Draft Water System Comprehensive Plan

SUPPLY AND DEMAND

SUPPLY SOURCES

Tukwila purchases all of its supply from the City of Seattle. Water is supplied through four metered connections to Seattle's Cedar River Pipe Line 4 (CRPL 4), two metered connections to Seattle's West Seattle Pipe Line (WSPL), and one metered connection to Seattle's SPU Cedar River Pipe Line 3 (CRPL 3).

DEMANDS

Tables 2 and 3 summarize supply and demand information provided by the City of Tukwila as part of its CWA membership application packet. Table 2 converts meter distribution information into Cascade Equivalent Residential Units (CERUs), in accordance with methodology detailed in the June 16, 1998 draft Cascade Water Alliance Interlocal Contract.

WATER QUALITY

As part of Tukwila's current purveyor agreement with the City of Seattle, Seattle is responsible for the quality of all water delivered. Water quality complies with current state and federal rules and regulations. Regular water quality samples are taken at various locations throughout the Tukwila service area to verify compliance with state and federal regulations, including chemical and bacteriological parameters.

Table 2

City of Tukwila
CERU Information

Customer Class	No. of Living Units	No. of Meters	CERUs per Unit	CERUs
Residential:				
Single Family	984		1	984
Duplex*			2	0
3+ AptMulti-family*	2,020		0.64	1,293
			Subtotal Residential	2,277
Commercial: *				
58‘ x ‘ Meter		70	1	70
1‘ Meter		153	2.5	383
1.5‘ Meter		205	5	1,025
2‘ Meter		116	8	928
3‘ Meter		32	16	512
4‘ Meter		20	25	500
6‘ Meter		16	50	800
8‘ Meter		9	80	720
10‘ Meter			115	0
12‘ Meter			160	0
			Subtotal Commercial	4,938
Irrigation: *				
58‘ x ‘ Meter			1	0
1‘ Meter			2.5	0
1.5‘ Meter			5	0
2‘ Meter			8	0
3‘ Meter			16	0
4‘ Meter			25	0
6‘ Meter			50	0
8‘ Meter			80	0
10‘ Meter			115	0
12‘ Meter			160	0
			Subtotal Irrigation	0
			Total CERUs	**7,214**

* City of Tukwila records do not differentiate between duplex and multi-family, or between commercial and irrigation.

Table 3
CWA Audit Process
City of Tukwila
Historical Supply and Demand Summary, mg

Supply Sources	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
						<—— Peak Season ——>							
Wholesale Sources:													
Seattle													
1995	33	46	43	48	54	81	74	61	69	53	53	45	65
1996	42	51	51	65	65	99	104	125	91	63	70	58	88
1997	59	74	63	67	75	86	94	127	84	66	78	57	92
Average	45	57	52	60	65	89	91	104	81	61	67	53	82
Independent Supplies:													
(None)													
Other:													
(None)													

Table 3
CWA Audit Process
City of Tukwila
Historical Supply and Demand Summary, mg

Water Demand:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
						<—— Peak Season ——>							
Retail Sales:													
1995	38	27	32	34	39	57	64	65	59	41	32	31	521
1996	33	33	31	50	51	66	86	92	81	57	52	44	676
1997	48	45	48	47	54	70	69	100	75	53	48	51	707
Average	40	35	37	44	48	64	73	86	72	51	44	42	634
Wholesale Sales:													
(None)													
Unaccounted for Water:													
1995	-5	19	10	14	15	23	10	-5	10	12	20	15	138
1996	9	19	21	15	14	33	19	33	10	6	18	14	210
1997	12	30	15	20	21	17	26	27	9	13	29	6	222
Average	5	23	15	16	17	24	18	18	9	10	23	12	190
Total Average Demand:	45	57	52	60	65	89	91	104	81	61	67	53	824

Table 3
CWA Audit Process
City of Tukwila
Historical Supply and Demand Summary, mgd

Supply Sources	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
						<—— Peak Season ——>							
Wholesale Sources:													
Seattle													
1995	1.1	1.7	1.4	1.6	1.7	2.7	2.4	2.0	2.3	1.7	1.8	1.5	1.8
1996	1.4	1.8	1.6	2.2	2.1	3.3	3.4	4.0	3.0	2.0	2.3	1.9	2.4
1997	1.9	2.7	2.0	2.2	2.4	2.9	3.0	4.1	2.8	2.1	2.6	1.8	2.5
Average	1.4	2.0	1.7	2.0	2.1	3.0	2.9	3.4	2.7	2.0	2.2	1.7	2.3
Independent Supplies:													
(None)													
Other:													
(None)													

Table 3
CWA Audit Process
City of Tukwila
Historical Supply and Demand Summary, mgd

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Water Demand:						<—— Peak Season ——>							
Retail Sales:													
1995	1.2	1.0	1.0	1.1	1.2	1.9	2.1	2.1	2.0	1.3	1.1	1.0	1.4
1996	1.1	1.1	1.0	1.7	1.6	2.2	2.8	3.0	2.7	1.9	1.7	1.4	1.8
1997	1.5	1.6	1.6	1.6	1.7	2.3	2.2	3.2	2.5	1.7	1.6	1.6	1.9
Average	1.3	1.2	1.2	1.5	1.5	2.1	2.3	2.8	2.4	1.6	1.5	1.3	1.7
Wholesale Sales:													
(None)													
Unaccounted for Water:													
1995	-0.2	0.7	0.3	0.5	0.5	0.8	0.3	-0.2	0.3	0.4	0.7	0.5	0.4
1996	0.3	0.6	0.7	0.5	0.5	1.1	0.6	1.1	0.3	0.2	0.6	0.5	0.6
1997	0.4	1.1	0.5	0.7	0.7	0.6	0.8	0.9	0.3	0.4	1.0	0.2	0.6
Average	0.2	0.8	0.5	0.5	0.5	0.8	0.6	0.6	0.3	0.3	0.8	0.4	0.5
Total Average Demand:	1.4	2.0	1.7	2.0	2.1	3.0	2.9	3.4	2.7	2.0	2.2	1.7	2.3

INDEPENDENT SOURCES

As noted previously, Tukwila is supplied through purveyor agreement with the City of Seattle. It currently does not own or operate independent sources.

WATER CONSERVATION

The City of Tukwila has established policies and programs that strive to make efficient use of water, and the City is a participant in development and implementation of future regional and local water conservation programs. Tukwila's conservation measures meet the requirements of SPU, Skyway Coordinated Water System Plan and the Department of Health.

MINIMUM SERVICE STANDARDS

Tukwila currently meets all minimum service standards set forth by the Department of Health.

Minimum hydraulic gradients to be maintained by the City of Seattle are identified in the November, 1981 Water Purveyor contract between The City of Seattle and City of Tukwila. A copy of this information is included as an appendix to Tukwila's 1998 Draft Water System Comprehensive Plan.

WATER AUDIT FINDINGS

Table 4 summarizes findings of the water audit of the Tukwila system.

Table 4

City of Tukwila
Water Supply Audit Summary Information

	Ind. Supply	Avg. 1995 - 1997	Year 2000	Year 2010	Year 2020
Determine Supply Capacity					
Annual	N/A	2.3 mgd	2.60 mgd	3.28 mgd	4.30 mgd
Peak Season	N/A	3.0 mgd	3.6 mgd	4.9 mgd	6.5 mgd
Peak Day	N/A	4.4 mgd	4.7 mgd	6.2 mgd	8.4 mgd
Costs to Reliably Meet Supply Capacity					
Water Quality					
Water Quantity					
Reliability					
TOTAL	N/A	N/A	N/A	N/A	N/A

APPENDICES

APPENDIX A
BACKGROUND INFORMATION FOR CWA APPLICATION AUDIT

AFTER RECORDING, PLEASE RETURN TO:

Inslee, Best, Doezie & Ryder, P.S.
Rainier Plaza, Suite 1900
777 108th Avenue NE
P.O. Box C-90016
Bellevue, WA 98009-9016

CASCADE WATER ALLIANCE

INTERLOCAL CONTRACT

COPY

Date: April 1, 1999

2000 050 5002464

October 5, 1999
REFLECTS AMENDMENTS THROUGH SEPTEMBER 22, 1999

AG 99-073

7/6/98

CASCADE WATER ALLIANCE

INTERLOCAL CONTRACT

Date: 6-1-99, ~~1998~~

2nd of 2
ORIGINALS

TABLE OF CONTENTS

CASCADE WATER ALLIANCE

(NEW REGIONAL WATER SUPPLY ENTITY)

INTERLOCAL CONTRACT

ARTICLE I. Recitals.

WHEREAS, since 1993, elected officials from The City of Seattle, the Suburban Cities Association, and water districts constituting the King County Water Alliance have engaged in a facilitated negotiation to identify a new governance arrangement that would promote the wise cooperative use of water and enable the development of new regional water supplies; and

WHEREAS, an arrangement encouraging discussion among three major partners in the region's water supply, the King County Water Alliance, the Seattle Caucus, and the Suburban Cities Caucus ("Tri-Caucus") was established; and

WHEREAS, on August 30, 1995, the participants in that process executed a "Tri-Caucus Agreement of Principles Regarding the Relationship Between Seattle and the New Entity," which provided for cooperative planning, development, and management of regional water supplies;

WHEREAS, the undersigned agencies are now proceeding to create, by interlocal contract, the Cascade Water Alliance, an intergovernmental body that will further the interests of its members while working cooperatively with other water supply entities in the region; and

WHEREAS, the entities forming the Interim Water Group have completed negotiations with Seattle for a draft Agreement for the Supply of Water, which draft Agreement is expected to be executed in the future.

NOW, THEREFORE, it is agreed as follows:

ARTICLE II. Definitions

"**Board**" means the Board of Directors of Cascade.

"**Bylaws**" means the Bylaws of Cascade, the initial version of which is set forth at Exhibit A.

"**Cascade**" means the Cascade Water Alliance formed by this Contract.

"**Cascade ERUs" or "CERUs**" means equivalent residential units, calculated in accordance with the Regional Capital Facilities Charge Methodology, the original version of which is attached at Exhibit B adopted in accordance with Section 7.5.

"**Contract**" means this Cascade Water Alliance Interlocal Contract.

"**Demand Share**" means a Member's current share of water provided through the Supply System, whether Full Supply or Interruptible Supply, expressed in millions of gallons per day, calculated, as set forth in the Rate Calculation Methodology, on the Member's three-year average annual usage or three-year average annual peak season usage, whichever is greater. "Demand Share" may be adjusted by the Board to take into account water supply, the development for which a Member has become obligated to pay, although that water supply is not yet available.

"**Dual Majority Vote**" means Board approval of a proposal on the basis of a simple majority of all Members (not simply Members present and voting), allowing one vote per Member, together with a simple majority of all Members on the basis of each Member's Demand Share.

"**65% Dual Majority Vote**" means Board approval of a proposal on the basis of a 65% supermajority of all Members (not simply Members present and voting), allowing one vote per

Member, together with 65% supermajority of all Members on the basis of each Member's Demand Share.

"**Executive Committee**" means the Executive Committee of the Board authorized by Section 4.5.

"**Full Supply**" means a guaranteed supply of all or a specific portion of a Member's water needs from the Supply System.

"**Formation Costs**" means the costs incurred during the Formation Period for developing, organizing, and initially implementing Cascade, together with other costs incurred by Members during the Tri-Caucus and IWG processes.

"**Formation Period**" means the period from July 1, 1998, through November 14, 1999.

"**Independent Supply**" or "**Independent Supplies**" means a Member's water supply resources that are not part of the Supply System.

"**Interruptible Supply**" means a supply of all or part of a Member's water needs from the Supply System on a nonguaranteed, interruptible basis.

"**Interim Water Group**" or "**IWG**" means the Interim Water Group formed by and among water utilities under an Interlocal Agreement dated November 22, 1995, as amended.

"**Member**" or "**Members**" means one or more member agencies of Cascade.

"**Minimum Service Standards**" means the minimum service standards adopted by the Board under Section 7.1, the initial version of which is attached at Exhibit C.

"**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.

"**Old Water Buyout Schedule**" means the schedule of rate surcharges and credits for water supply to take into account rights of certain Seattle Contract Purveyors, the initial version of which is attached at Exhibit D.

"**Rate Calculation Methodology**" means the method of setting rates and charges established under Section 7.5.

"**Regional Capital Facilities Charges**" or "**RCFCs**" means the charges to each Member for new CERUs connected to that Member's water distribution system in accordance with Section 5.5 and the Regional Capital Facilities Change Methodology, the initial version of which is set forth at Exhibit B.

"**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 an agency or agencies listed on Exhibit F that is a party to The City of Seattle Water Purveyor Contracts.

"**Shortage Management Plan**" means Cascade's water supply Shortage Management Plan adopted under Section 7.3.

"**State**" means the State of Washington.

"**Supply System**" means the Water Supply Assets owned or controlled by Cascade.

"**System Management Plan**" means the system management plan adopted by the Board under Section 7.1.

"**System Reliability Methodology**" means the system reliability methodology adopted by the Board under Section 8.1, the original version of which is attached at Exhibit E.

"**Water Supply Assets**" means tangible and intangible assets usable in connection with the provision of water supply, including, without limitation, physical facilities (e.g., dams, wells, treatment plants, pump stations, reservoirs, and transmission lines), water rights, capacity rights in facilities or resources owned by other entities, and investments in conservation programs and facilities.

"**Water Supply Plan**" means Cascade's water supply plan adopted under Sections 5.4 and 8.1.

ARTICLE III. Formation of Entity; Purpose and Powers

Section 3.1 Formation. In accordance with the Interlocal Cooperation Act (RCW 39.34), the parties to this Contract create the Cascade Water Alliance, effective January 1, 1999. Cascade is a public body, an instrumentality of its Members and is exercising essential governmental functions on their behalf. The agencies initially eligible for membership in Cascade are listed on Exhibit F. Cascade may, under RCW 39.34.040(3), be incorporated as a public nonprofit corporation in the manner set forth in RCW 24.03 or 24.06 or 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. 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.

The IWG board of directors shall make this Contract available to the qualifying agencies listed on Exhibit F, during the period July 1 through December 31, 1998, during which time neither

this Contract nor its exhibits may be amended. During that period, the IWG board shall establish an audit methodology and cause the audits under Section 5.1 to occur and shall assign initial Demand Shares to each initial Member applicant based on those audits. The IWG board may also accept, for evaluation, applications for membership from agencies not listed on Exhibit F and may commence audits with respect to those applicants. But the IWG board is not authorized to admit to membership any agencies other than those listed on Exhibit F. Before January 1, 1999, the IWG board may hire or contract for an interim chief executive officer and may commence a process for the hiring of a chief executive officer, who may be permanently hired only by the Board after December 31, 1998. The IWG board may, on behalf of Cascade, retain other employees and retain attorneys, accountants, and other consultants, all under contracts not exceeding one year in duration. Before January 1, 1999, IWG officers may perform all necessary functions of Cascade officers. The IWG board may take actions reasonably necessary to organize Cascade in an orderly fashion, but neither the IWG board nor Cascade (before January 1, 1999) may exercise any of Cascade powers set forth in Section 3.5.

Section 3.2 Membership. Each agency listed on Exhibit F is entitled to become a Cascade Member during the period July 1, 1998 through December 31, 1998. After December 31, 1998, Cascade may admit any other municipal water utility subject to applicable provisions of this Contract. However, any Seattle Contract Purveyor shall be entitled to become a Member (subject to the applicable requirements of this Contract) at any time during the Formation Period, and after the end of the Formation Period if that Purveyor applies for membership within 30 days after the current Seattle Water Purveyor Contract is terminated with respect to that Purveyor.

Other municipal water utilities serving the region's urban growth area are eligible to become Members and may be admitted to Cascade upon terms and conditions imposed by the Board and subject to the conditions of this Contract. Each membership application (and each new Member's request for water supply that replaces Independent Supply) 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 request for new supply.

The initial estimated application fee to be paid by each applicant shall be $5,000. The Board shall revise the fee for each applicant based on the actual cost of processing the application, including the cost of the audit. After the completion of processing and audit activities, Cascade shall promptly refund amounts to the extent costs were less than $5,000, and the applicant shall promptly pay amounts to the extent costs exceeded $5,000. Applications for membership must be made in the manner and subject to the conditions set forth in the Bylaws.

As a condition of membership, each applicant is subject to a charge for Formation Costs based on the allocable share of costs (determined by the number of CERUs served when the Member applies). However, each applicant that has contributed its allocable share to the Tri-Caucus process and/or the IWG process shall receive a credit or credits for those prior contributions. Members pay interest at the rate of 6% from January 1, 1999, on Formation Costs owing, unless interest is waived as authorized by Section 3.6. The Board may adjust the Formation Charge as it deems appropriate.

Cascade may decline to admit any applicant to membership if and so long as the State of Washington or the applicable county has determined that the applicant's planning process or plans are materially not in compliance with the requirements of the Growth Management Act. The

Board may deem an applicant's planning process or plan to be in compliance if the applicant's comprehensive plan has been approved.

Section 3.3 Conversion to Municipal Corporation Status. In accordance with Section 10.3, 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 are to:

a. provide water supply to meet the current and projected demands of Cascade Members serving the region's urban growth area, and for certain other non-Member agencies as determined by Cascade, and to carry out this task in a coordinated, cost-effective, and environmentally sensitive manner;

b. develop, 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 to 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 water providers and local non-Member water utilities to maximize supply availability and to minimize system costs;

i. develop the Water Supply Plan for 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;

j. share costs and risks among Members commensurate with benefits received;

k. carry out or to further other water supply purposes that the Members determine, consistent with the provisions of this Contract; and

l. Cascade's purposes include only those related to water resources, as set forth above, and do not include the provision of other general services to the public.

Section 3.5 Powers. To further its purposes, Cascade has the full power and 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, unless and until Cascade has that power under applicable law);

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 and to participate in pooled insurance and self-insurance programs, and to 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; and

o. exercise all other corporate powers that Cascade may exercise under the law relating to its formation and that are not inconsistent with this Contract or with Chapter 39.34 RCW or other applicable law.

In addition, Cascade shall have the power and authority to engage in all activities incidental or conducive to the attainment of the purposes set forth in Section 3.4 of this Contract and 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.

Section 3.6 Special Arrangements for Members That Join During the Formation Period. To induce agencies to join Cascade during the Formation Period (plus an additional period of up to six months as the Board may designate), the following special arrangements or benefits are provided to Members that join during the Formation Period:

a. A Member that is admitted to Cascade within six months after the beginning of the Formation Period is not required to pay interest on its allocable share of Formation Costs.

b. A Member that is admitted to Cascade during the Formation Period may transfer to Cascade, and Cascade must accept, ownership or control over its then-existing Water Supply Assets, subject to the value placed on those Assets by the audit.

c. A Seattle Contract Purveyor that is admitted to Cascade during the Formation Period 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, effective January 1, 2000. Cascade accepts those rights and the corresponding obligation to provide Full Supply (net of Independent Supply), effective January 1, 2000. That Member pays no RCFCs with respect to the amount of water supply represented by the transfer of rights from Seattle (i.e., the Member's transferred rights under its Seattle Water Purveyor Contract are deemed a transfer of Water Supply Assets sufficient to supply all of its needs at the then-current level of usage of water supplied by Seattle, based on CERUs as of January 1, 2000, rather than the Member's being credited for transferred Seattle Water Purveyor Contract rights based on Seattle's original cost, as described in Section 5.5).

d. A Member that is not a Seattle Contract Purveyor, that joins Cascade during the Formation Period with all water supply resources currently serving its retail customers remaining available (either as Independent Supply or with ownership or control transferred to Cascade) shall, effective January 1, 2000, have the right to receive Full Supply from Cascade (net of the Member's Independent Supply).

e. A Seattle Contract Purveyor that joins during the Formation Period shall make and/or receive "old water buyout" payments as set forth in Section 7.6.

Section 3.7 Special Withdrawal at End of Formation Period. Except as provided in this Section 3.7, Members may not withdraw from Cascade during the Formation Period. A Member may withdraw from Cascade between October 1, 1999, and November 14, 1999, without regard to the provisions of Section 10.2, if prior to October 1, 1999, either (a) or (b), below has not occurred:

(a) this Contract has been executed by 75% of the Seattle Contract Purveyors (measured by volume water supply usage as shown on Exhibit F); or

(b) (i) Cascade or The City of Seattle has executed a contract with the City of Tacoma or another provider that provides Cascade or Seattle (or both) with rights to at least one-third of the capacity of Tacoma's Second Supply Project or another source; or (ii) an authorized representative of The City of Seattle has certified that Seattle has sufficient reasonably projected capacity to provide for the Full Supply needs of all the Members through the year 2014 (in no event less than 82 MGD).

If (a) or (b) has not occurred, any Member may, by written notice delivered to Cascade before November 15, 1999, withdraw from Cascade without regard to the provisions of Section 10.2. The notice of withdrawal must be accompanied by a copy of the Member's resolution or ordinance authorizing the withdrawal. Upon a withdrawal under this Section 3.7, any Seattle Purveyor Contract rights that the withdrawing Member had relinquished or transferred to Cascade shall be returned to that Member. Cascade shall have no obligation to repay dues or other amounts contributed to Cascade by the withdrawing Member.

ARTICLE IV. Organization Structure; Board

Section 4.1 Composition and Meetings. Cascade is governed by a Board of Directors consisting of one individual representative appointed by resolution or written motion of the Member's legislative authority. Members may similarly appoint alternate representatives to the Board. Each Boardmember and each alternate must be an elected official of the Member.

The Board may meet as necessary, but at a minimum on a quarterly basis.

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, except where this Contract requires a 65% Dual Majority Vote of all Members or also requires ratification by the Members' legislative authority. Each Member's voting power is based on that Member's risk and financial obligation with regard to Cascade, i.e., on the basis of each Member's Demand Share. The Board may act by voice votes, as set forth in the Bylaws, but 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 Demand Shares, the Members expressly agree that there is only one class of Membership, and voting occurs within that single class.

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 set forth in the Bylaws. The Secretary shall be responsible for Cascade records and performs other duties set forth in the Bylaws. The Treasurer shall be responsible for Cascade accounts and financial records and performs other duties 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 standing committees and special committees as it deems appropriate and appoints members to those committees. Committee members need not be Boardmembers or elected officials or employees of Members, but standing committee chairs must be Boardmembers or alternate Boardmembers.

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, but 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 are 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.

Section 4.6 Staff. 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 also hires or retains legal counsel and independent accountants and auditors to 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 at least 180 days before the beginning of the fiscal year in which that budget will be in effect. The budget must identify the levels of rates and 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 equivalent retail units 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. Before January 1, 2000, total dues collected from all Members may not exceed $500,000. From and after January 1, 2000, no more than 5% of Cascade's annual budget shall be provided from dues. The Board may establish minimum dues per Member and may provide that less than all of a Member's retail equivalent residential units be taken into account in establishing dues.

All Cascade books and records shall be open to inspection by the Washington State Auditor.

Section 4.8 Bylaws. The Board shall adopt Bylaws consistent with this Contract that specify, among other matters, the date of Cascade's annual meeting, Board powers and duties

and those of the Executive Committee, standing committees, officers, and employees. The initial Bylaws are attached to this Contract as Exhibit A.

ARTICLE V. Asset Development and Supply Commitment

Section 5.1 Property Acquisition, Ownership, and Disposition. Cascade may construct, purchase, rent, lease, 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 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.

A Member may transfer to Cascade its title to, or operational control of, water supply and regional transmission assets. Cascade and a Member may mutually determine that Water Supply Assets shall be retained by the Member as Independent Supply subject to Article VI, or that title to specified assets should be transferred to Cascade or retained by the Member with full operational control of those assets transferred to Cascade, in order to (a) observe the requirements of a Member's existing bond covenants, (b) protect and preserve water rights, or (c) provide for other purposes determined by the Board. Water Supply Assets may also be fully retained by Members as Independent Supply, subject to the provisions of Article VI. Transfers of Water Supply Assets must be made in substantially the form of documents approved by the Board, with Board-approved adjustments to meet the needs of the specific transfers. Notwithstanding the foregoing, Members that are Seattle Contract Purveyors shall execute such documents as may be necessary to relinquish their rights under The City of Seattle Water Purveyor Contracts and to transfer their water supply rights thereunder to Cascade.

When an agency applies to become a Member, Cascade shall conduct a water supply audit according to the methodology and within the period determined by the Board. Based on that audit the Board shall assign an initial Demand Share to the applicant. The audit shall assess all Water Supply Assets of the applicant, including those the applicant intends to retain as Independent Supply. The audit shall be performed by qualified professionals using existing available information. It shall address the following factors: existing customer base and demand; projected growth; existing supply; quantity and quality of existing supply; quantity, quality, and cost of resources being developed; the cost of upgrading or integrating existing supplies; and any other factors determined by the Board. Audit results shall be provided to the Board and to the agency being audited. The nature of the Water Supply Assets being transferred or retained, and the "value" of those assets in terms of the calculation of a Member's Demand Share, RCFCs, and other matters relating to the rights and obligations of the Member and Cascade, must be recorded in the form that the Board determines.

Cascade may at any time and at its cost and expense may carry out additional audits of a Member's Independent Supply Water Supply Assets.

Except as provided in Section 3.6, Cascade may (but is not obligated to) accept supply assets offered by Members. Cascade may also (but is not obligated to) accept supply assets that constitute all or part of Satellite Systems. 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.

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. The fact that a Water Supply Asset shall have been transferred to Cascade by a Member shall create no special rights of that Member with respect to that Water Supply Asset.

Section 5.2 Supply Commitment

Section 5.2.1 Commitment to Members. Cascade shall provide Full Supply to meet all current and future water supply needs to a Member that joins with Water Supply Assets sufficient to provide for its needs during the following fifteen years (whether or not those Water Supply Assets are transferred to Cascade or retained as Independent Supply). This commitment to provide Full Supply 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 its Independent Supply. If the needed supply is not available, the shortage shall be shared by all the Members in accordance with the Shortage Management Plan. Cascade is not obligated to provide water supply to service area expansions outside the urban growth boundary. However, Cascade shall be obligated to provide water supply to the entire service area of each Seattle Contract Purveyor (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 the Board determines that the Member's planning process or plans are materially not in compliance with the requirements of the Growth Management Act.

A new Member that joins with Water Supply Assets insufficient to provide for its needs for 15 years receives the Full Supply it desires only if, when and to the extent it is available within reliability standards determined by the System Reliability Methodology. Cascade shall then

undertake to include in the Water Supply Plan, and to acquire, the facilities or other assets necessary in the Board's determination to provide for that deficit. If sufficient Full Supply is not available within reliability standards determined by the System Reliability Methodology, the Member receives full or partial Interruptible Supply, and Full Supply must be provided within 15 years. If Cascade fails to develop sufficient assets to timely provide the increased Full Supply, the commitment nevertheless becomes a Full Supply commitment at the end of that 15-year period, and any shortage shall be shared by all Members in accordance with the Shortage Management Plan.

A Member that joins with Water Supply Assets insufficient to provide for its needs for 15 years, shall immediately pay RCFCs for the number of CERUs representing the deficit unless the Board agrees to an alternative arrangement.

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, those requests must be "vested" 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. Cascade shall provide to a Member that retains Independent Supply, 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. A Member whose Full Supply from Cascade plus its Independent Supply exceeds its own needs shall satisfy any increase in water supply demand from that Independent Supply before Cascade is responsible for meeting the new demands. 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.

A Member requesting additional Full Supply due to loss of Independent Supply shall make that request made by resolution or written motion of the requesting Member's legislative authority. The Member shall pay a lump sum equal to the applicable Formation Costs allocable to the requested supply (if any) plus the RCFCs allocable to the number of CERUs being connected. Cascade shall then include the supply in its Water Supply Plan, and provide the supply when it becomes available, but in any event within 15 years. If within 15 years the supply is not available, Cascade's commitment becomes a commitment for Full Supply and any shortage with respect to that supply must be shared by all the Members in accordance with the Shortage Management Plan.

Section 5.3 Financing of Assets. The acquisition of new capital facilities and other Water Supply Assets must be provided by RCFCs, transfers of Water Supply Assets, use of rate revenues, the issuance of bonds to be repaid by rate revenues and RCFCs, and other fund sources determined by the Board.

Until Cascade is authorized by law directly to finance the acquisition of facilities and other Water Supply Assets, or a successor entity replaces Cascade under Section 10.3, Cascade financing must be carried out on Cascade's behalf by one or more Members on a voluntary basis or by other entities. Members serving as 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 their reasonable costs associated with the financing. Documents of other issuers related to the borrowings must expressly allow transfer of liability on the obligations to Cascade or to a successor entity, including without limitation a joint operating

agency or similar entity that may be permitted by law. All rights and obligations related to those obligations must survive the transfer.

Because obligations issued by Cascade or on its behalf will be payable from Cascade's water supply rate revenue and from RCFCs, any Member's failure to timely pay rates or charges may result in curtailment of water supply and legal action for recovery of charges due. The Members recognize that their promises to pay rates and charges will be relied on by holders of those obligations. To the extent permitted by law, the Board may provide that a Member's failure to timely pay rates and charges may result in a "step-up" requirement under which the other Members may be required to provide for timely payment of the obligations proportionately, based on Demand Shares. In that case, as the Board may determine and subject to the provisions of documents related to a borrowing, Cascade and its Members may seek recovery against the Member that defaults on its duty to timely pay those rates and charges. As the Board determines, and subject to the provisions of documents related to a borrowing, repayment amounts may be passed through to Members that contributed, either in cash or in credits against future rates, dues or RCFCs.

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, the 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 the Water Supply Plan. The Board shall have

the authority to undertake new projects identified in the Water Supply Plan for the expansion of Water Supply Assets and regional transmission system extensions to meet the Members' projected needs. To reduce costs, Cascade may, to the extent that the Board deems advisable, enter into agreements with Members that agree to wheel water through their existing systems before building new transmission facilities. 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 or retains as Independent Supply water supply in excess of its needs, it receives a corresponding credit against future RCFCs.

Seattle Contract Purveyors that do not join during the Formation Period shall pay the greater of (a) an RCFC for their entire customer base, minus the original cost of the Seattle facilities represented by the Seattle Purveyor Contract rights transferred to Cascade, or (b) any applicable payment from the agency under the Old Water Buyout Schedule, plus reasonable interest determined by the Board. The imposition of the net RCFC under (a) shall be phased in over five years for Members that join after the Formation Period, increasing by 20% each year so

that it is charged at the full amount starting in the fifth year after the end of the Formation Period. (For example, if the net RCFC were $100,000, the payment amount would be $20,000 during the period 11/15/99 – 11/14/00, $40,000 during the period 11/15/00 – 11/14/01, and so on.)

RCFCs shall be calculated according to the methodology attached as Exhibit B to this Contract, as it may be amended from time to time. The RCFC Methodology shall include a methodology for determining CERUs. Amendments to that methodology require a 65% Dual Majority Vote of the Board. The Members recognize that capital facilities expansion costs in some instances will be paid immediately and recouped in the future as new customers are added to local systems, while in other cases new customers will be served by existing facilities and will thus need to pay their share of the cost of those existing assets. Accordingly, and as set forth in Exhibit B, the RCFC is calculated as 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. If a Member 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 retain Independent Supply shall receive a credit against their RCFCs to the extent that (as determined by the Board) they increase their use of, or the average yield of, those Independent Supply facilities. Members that develop new Independent Supply that is approved by the Board similarly receive a credit effective when the Independent Supply is placed in service and audited by Cascade.

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 an 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 new 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 immediately begin the construction of facilities.

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.

Cascade is not required to admit a proposed new Member (other than a Seattle Contract Purveyor) while the agency seeking to join is involved in an unresolved assumption, merger, or consolidation, as determined by the Board.

ARTICLE VI. 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 as a whole, new supplies under 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 1 MGD must be described in and be consistent with the Water Supply Plan. A Member developing or acquiring new Independent Supply that replaces supply from Cascade continues to be responsible for the full Demand Share that it would have had if Independent Supply had not been brought on line, unless and until the Board approves a method by which that Member must compensate Cascade with regard to any of its existing commitments to Cascade, e.g., by paying Cascade for the Member's share of fixed costs allocable to any Cascade-provided Full Supply supplanted by the Independent Supply and not readily transferable (in the Board's determination) to another Member. When it is determined by the Board to be in the best interest of the Members as a whole, the Board may reduce a Member's Demand Share and provide an RCFC credit to the extent that a Member develops or acquires Independent Supply.

The Board shall develop a methodology governing the approval and acquisition of Independent Supply.

ARTICLE VII. Asset Management

Section 7.1 Supply System Management. Cascade is responsible for managing, on behalf of all Members, the Water Supply Assets Cascade controls, whether those resources are owned by Cascade, by Members, or by other water supply providers. Cascade is not responsible for managing Independent Supply unless it has expressly agreed to do so. Supply System management responsibilities are governed by a System Management Plan adopted by the Board. The 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 Water Supply Asset responsibilities.

Cascade must manage the water supplies, facilities, and other assets constituting the Supply System in compliance with applicable laws, regulations, and the Minimum Service Standards attached as Exhibit C. Future amendments to the Minimum Service Standards shall require a 65% Dual Majority Vote of the Board.

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 Conservation Management Plan that provides a mandatory base conservation program that functions to reduce both average and peak demands, although 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 either locally funded or funded by

Cascade. Members that fail to comply with base programs set forth in the 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. Members must respond to water shortages in a collective, shared fashion under a Board-adopted Shortage Management Plan. Resources must be shared in a manner that reduces the risk of severe shortages to each Member. The 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 the Shortage Management Plan in areas not served by Supply System.

In the event of shortages, Cascade shall normally reduce or halt Interruptible Supply. 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 the 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 simple Dual Majority Vote of the Board.

Section 7.4 Water Quality. Cascade shall be responsible for water quality 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 initial Rate Calculation Methodology for Members' Full Supply and Interruptible Supply shall provide for the calculation of Demand Shares and for a uniform pricing structure with a

commodity charge for variable costs and fixed-capacity charges allocated by Demand Share for system capital costs, certain fixed O&M costs, and other fixed costs. The Rate Calculation Methodology must include a methodology for determining Demand Shares. Cascade may sell water to non-Members and may impose rates and charges for that water in any fashion it deems appropriate.

Initially, a Member shall be assigned a Demand Share based on the Board's best estimate of capacity to be used by that Member. The Board may base its estimate on a Seattle Contract Purveyor's use of water from Seattle. The Demand Share for a new 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, shall be established based on a Board audit of that Member's past three years of water use. After three years as a Member, the baseline demand and capacity obligation for that Member is 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.

Each Member must include, in bond definitions or covenants made with respect to bonds that establish new lien positions (or both) and in springing definitions or covenants with respect to parity bonds based on old lien positions (or both), language to the effect that rates and charges paid

by that Member to Cascade must be treated as part of their internal operation and maintenance costs. RCFCs need not be treated as operation and maintenance costs.

The Board must set Cascade's rates and charges at levels it determines sufficient to adequately provide for Operation and Maintenance expenses, Cascade debt service and coverage, replacement and renewal of facilities, reserves, and other costs that the Board deems appropriate. The Board may provide that a Member's failure to timely pay rates and charges or 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 and penalty charges).

Section 7.6 Old Water Buyout. Members that are Seattle Contract Purveyors joining during the Formation Period shall make and/or receive payments representing "old water buyout" in accordance with Exhibit D. In addition to the Old Water Buyout Schedule, Cascade shall provide a mechanism to reconcile Seattle Contract Purveyor balance accounts. The Members recognize that an imbalance in "new water" and "old water" Members may result in the payment of some amounts to "old water" Members from water supply rates and charges.

The Old Water Buyout Schedule shall include a mechanism to provide for payments to and from Members and to and from Seattle in order to settle the Seattle balance accounts. At the

Members option, net amounts owed to Cascade may be paid as a lump sum or over five years (beginning not earlier than January 1, 2000) with 6% interest, payable in approximately equal annual installments of principal and interest. At Cascade's option, amounts owed to Members may be paid in a lump sum or over five years (beginning not earlier than January 1, 2000) with 5% interest, payable in approximately equal annual installments of principal and interest. Notwithstanding the previous sentence, at the Member's option amounts owed to a Member may be paid through 2011 (beginning not earlier than January 1, 2000) with 5% interest, in approximately equal annual installments of principal and interest or in different annual payment amounts that may be agreed upon by that Member and Cascade.

Amendments to the Old Water Buyout Schedule shall require a 65% Dual Majority Vote of the Board, and such amendments shall not affect previously established surcharges and credits.

Section 7.7 Franchises and Easements. Except to the extent otherwise required by 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. Each Member shall use its best effort carrying out the cooperative implementation of this Section 7.7.

Section 7.8 Sales of Water to Non-Members. Unless approved by the Board, a member shall not sell water supplied by Cascade, nor shall a Member sell Independent Supply offset by water supplied by Cascade, to an entity that is not a 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 effective date of this Contract.

ARTICLE VIII. Planning

Section 8.1 Water Supply Plan. Cascade must plan for its Members' water supply needs. That planning must endeavor 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, the Water Supply Plan by a Dual Majority Vote. The Water Supply Plan must be based on no less than a 20-year planning horizon. Cascade shall coordinate its planning effort with The City of Seattle and other appropriate agencies and work to encourage cooperative region-wide planning and coordination in the region.

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. Each Member's water comprehensive or system plans 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 System Reliability Methodology. Cascade shall use the System Reliability Methodology attached at Exhibit E for planning, operation, and management purposes. Future amendments to that Methodology shall require a 65% Dual Majority Vote of the Board.

ARTICLE IX. Filings

This Contract must be filed with the King County Office of Records and Elections, 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 X. Duration and Dissolution; Withdrawal

Section 10.1 Duration. Except as provided in Section 3.7 and 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 issued by it or on its behalf are outstanding, or (c) the period it continues to include Members.

Section 10.2 Withdrawals. A Member may withdraw from Cascade if that Member first pays or provides for the payment of an allocable share of the cost of the then-existing Supply System and obligations of Cascade. Such allocable share of cost or obligations shall be determined by the Board and may include, but are not limited to, a share of debt service, fixed operating costs and other expenses, and shall be based on the withdrawing Member's Demand Share plus the Board's estimate of any increase in Demand Share to be allocated to that Member for new Water Supply Assets under construction or for which Cascade will otherwise be obligated to pay.

Upon withdrawal, the withdrawing Member shall have no right to or interest in any Water Supply Assets of 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). All such Water Supply Assets shall remain with Cascade.

The Board may establish additional generally applicable conditions and requirements for withdrawal from the entity.

Section 10.3 Dissolution. Cascade may be dissolved by a 65% Dual Majority Vote of the Board. Upon dissolution, 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. Assets 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. Asset 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.

Notwithstanding the foregoing paragraph, upon a 65% Dual Majority Vote of the Board (confirmed within one year by 65%, as measured by Dual Majority Vote, of the Members' legislative authorities), all assets, liabilities, and obligations of the entity 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 XI. Amendments

Amendments to this Contract and the transfer of Cascade assets, rights, and obligations to a successor entity require (and shall be effective upon) approval by 65% Dual Majority Vote of the

Board (confirmed within one year by 65%, as measured by Dual Majority Vote, of the Members' legislative authorities).

ARTICLE XII. 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 XIII. No Third Party Beneficiaries.

There are no third-party beneficiaries to this Contract. 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 XIV. 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 XV. 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 XI. 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.

ARTICLE XVI. Execution

This Contract may be executed in one or more counterparts.

Signatory Agency: City of Tukwila

Signed by: John W. Rants

Title: mayor

Authorized by: Reso. #1417
(Resolution or Ordinance)

Signature Date: June 1, 1999

ARTICLE XV. 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 XI. 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.

ARTICLE XVI. Execution

This Contract may be executed in one or more counterparts.

Signatory Agency: City of Tukwila

Signed by: John W. Rants

Title: Mayor

Authorized by: Reso. #1417
(Resolution or Ordinance)

Signature Date: June 1, 1999

ARTICLE XVI. Execution

This Contract may be executed in one or more counterparts.

Signatory Agency: _____

By: _____

Title: _____ Date: _____

Attest: _____

Title: _____ Date: _____

Authorized by: _____
(Resolution or Ordinance)

Date: _____

2000 050 5002464

COPY

Cascade Water Alliance

By: Albert Blanchard

Title: Chair Date: 3/8/00

Attest: Michael A Gagliardo

Title: General Manager Date: 3/8/00

EXHIBITS

(References Vote Requirements for Amendments)

EXHIBIT A	-	Bylaws - Section 4.8 (Dual Majority Vote)
EXHIBIT B	-	Regional Capital Facilities Charge Methodology - Section 5.5 (65% Dual Majority Vote)
EXHIBIT C	-	Minimum Service Standards - Section 7.2 (65% Dual Majority Vote)
EXHIBIT D	-	Old Water Buyout Schedule - Section 7.5 (65% Dual Majority Vote)
EXHIBIT E	-	System Reliability Methodology - Section 8.1 (65% Dual Majority Vote)
EXHIBIT F	-	List of Agencies Initially Qualified To Join (Including List of Seattle Contract Purveyors) - Section 3.1
EXHIBIT G	-	List of Other Documents or Actions Referenced in Contract

EXHIBIT A

BYLAWS

OF

CASCADE WATER ALLIANCE

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BYLAWS

OF

CASCADE WATER ALLIANCE

ARTICLE I. PURPOSES

As set forth in the Cascade Water Alliance Interlocal Contract (the "Contract"), Cascade is organized in accordance with the Interlocal Cooperation Act (Chapter 39.34 RCW) and the Nonprofit Miscellaneous and Mutual Corporations Act (Chapter 24.06 RCW), as a public body and an instrumentality of its members, exercising essential governmental functions of its members by: providing water supply to meet the growing demands of the members of Cascade serving the region's urban growth area, and for certain other non-member agencies as determined by Cascade, and to carry out this task in a coordinated, cost-effective and environmentally sensitive manner; developing, owning, maintaining and operating water quality facilities; contracting with Seattle to transfer to Cascade and modify Seattle's rights and duties with respect to individual purveyors; assuming the contractual rights and duties related to the Tacoma supply project; purchasing and providing water supply, transmission services and other related services; providing conservation programs to ensure the wise and efficient use of resources; carrying out emergency water supply management programs for its members when demands exceed available supply; coordinating and planning cooperatively with other regional water providers and local non-member water utilities to maximize supply availability and minimize system costs; developing a regional water supply plan with other water providers in the region to meet regional, state and federal planning requirements, and taking a leadership role in developing and coordinating that supply plan; sharing costs and risks among Members commensurate with benefits received; and carrying out or furthering other water supply purposes that the Members determine, consistent with the Contract.

ARTICLE II. DEFINITIONS

All capitalized terms used and not otherwise defined herein shall have the meaning set forth in the Contract.

ARTICLE III. OFFICES

The principal office and place of business of Cascade in the state of Washington shall be located at _____ [ADDRESS OF ASSOCIATION].

ARTICLE IV. BOARD

Section 4.1 General Powers. The business and affairs of Cascade shall be managed by its Board, which shall be deemed a "Board of Directors" as that term is used in RCW 24.06.125. In addition to its other powers and authority, the Board shall have the full power,

except as prohibited by the terms of any gift, devise, bequest or other transfer, in its sole discretion, to change the form of any investment and, for that or other purposes of Cascade, to dispose of any property held by Cascade. The Board shall have the right to employ or retain agents to carry out the purposes of Cascade, including but not limited to attorneys, consultants, engineers, contractors, and accountants.

Section 4.2 **Composition of Board.** The Board of Cascade shall consist of one individual representative Boardmember from each Member entity. Each representative shall be deemed a "director" as that term is used in RCW 24.06.130. Boardmembers shall not have terms, but each Boardmember shall serve at the pleasure of the Member agency whom the Boardmember represents. In order to serve as a Boardmember, an individual must be an elected official and must be appointed to serve on the Board by resolution or written motion of the legislative body of the appointing Member. Members may designate alternative representatives to the Board. Alternates also must be elected officials and must be appointed as an alternate to serve on the Board by resolution or written motion of the legislative body of the appointing Member. Boardmembers may be removed as set forth in Section 4.11.

Section 4.3 **Tenure.** Unless the Boardmember resigns or is removed in accordance with these Bylaws, each Boardmember shall hold office until replaced by resolution or written motion of the legislative body of the appointing Member. Notwithstanding the foregoing, no Boardmember shall continue in that capacity if he or she is no longer an elected official of the Member whom he or she represents.

Section 4.4 **Annual and Other Regular Meetings.** The annual meeting shall be held in February of each year, at such time and place as may be determined by the Board, for the transaction of such business as may come before the meeting. The Board may specify by resolution the time and place for holding any other regular Board meetings, which shall be held at least quarterly.

Section 4.5 **Special Meetings.** Special meetings of the Board may be called by the Chair, the Vice-Chair, the Secretary or by the written request of Boardmembers representing at least 25% of the Members (by number of Members). Notice of special meetings of the Board stating the date, time and place thereof shall be delivered to Boardmembers in accordance with RCW 24.06.105, as it may be amended. The notice must be written or by electronic means. Notice shall also be given to any other persons as may be required by the Open Public Meetings Act (Chap. 42.30 RCW) or other applicable law.

Section 4.6 **Waiver of Notice of Special Meeting.** Whenever any notice is required to be given to any Boardmember pursuant to applicable law, a waiver thereof in writing signed by the Boardmember, entitled to notice, shall be deemed equivalent to the giving of notice. Any Boardmember may waive notice of any meeting at any time. The attendance of a Boardmember at a meeting shall constitute a waiver of notice of the meeting except where a Boardmember attends a meeting for the express purpose of objecting to the transaction of any business because the meeting is not lawfully convened. Unless otherwise required by law, neither the business to be transacted at, nor the purpose of, any regular or special meeting of the Board need be specified in the notice or waiver of notice of such meeting.

Section 4.7 **Quorum.** A majority (representing Members both by number and by Demand Shares) of Boardmembers (or alternates) shall constitute a quorum for the transaction of any business at any meeting of the Board.

Section 4.8 **Manner of Acting; Rules of Order.** If a quorum is present when a vote is taken, the affirmative Dual Majority Vote of all Members is the act of the Board, unless the question is one upon which a different vote is required by express provision of law, the Contract or these Bylaws. Meetings shall be conducted in accordance with such generally accepted rules of order as the Chair shall determine. However, the Chair or any Boardmember may at any time require that a meeting be conducted in accordance with the latest available edition or revision of Robert's Rules of Order on Parliamentary Procedure, so far as applicable and when not inconsistent with these Bylaws, the Contract, the Articles of Incorporation or any resolution of the Board. The Board may act by voice votes called for by the Chair, but any Member may require a recorded tabulation of votes (i.e., a recorded Dual Majority Vote or 65% Dual Majority Vote, as applicable) by making a request either immediately before the vote is taken or immediately after a voice vote has been taken.

Section 4.9 **Board Committees.** The Board may create standing committees and special committees as it deems appropriate, and members of such committees shall be appointed by the Board. Persons who serve as members of a committee shall not be required to be Boardmembers or to be elected officials. Chairpersons of standing committees shall be Boardmembers or alternate Boardmembers and shall be designated by the Board, except that the Treasurer shall chair the Finance Committee. The Board shall attempt to appoint committee members in a manner that encourages diversity of representation on committees that reflects the diversity among Members. Committees shall be governed by the same rules regarding meetings, action without meetings, notice, waiver of notice, and quorum (but not voting requirements) as applied to the Board. Recommendations of committees may be by simple majority of committee members. The designation of any such committee and the delegation thereto of authority shall not relieve the Board, or any members thereof, of any responsibility imposed by law. The initial standing committees shall be: (1) the Membership Committee, (responsible for making recommendations on membership to the Board); (2) the Finance Committee (responsible for budget, dues, rate and other financial matters); and (3) the Resource Planning Committee (responsible for the development of water supply resources). No committee shall have the authority to take any action inconsistent with this Contract or inconsistent with RCW 24.06.145.

Section 4.10 Open Public Meetings. All meetings of the Board shall be open to the public as and to the extent required by the Open Public Meetings Act (Chap. 42.30 RCW) and other applicable law.

Section 4.11 Resignation; Removal. A Boardmember may be removed by the Member agency whom he or she represents, or a Boardmember may personally resign at any time. Resignation shall be effective upon the Boardmember or the Member agency delivering written notice to the Chair, the Secretary or the Board of Cascade. In addition, after 30 days' written notice to the Member appointing a Boardmember, any Boardmember may be removed with cause by 65% Dual Majority Vote of the remaining Boardmembers, and the individual removed may not be reappointed by the Member agency for one year after the date of removal.

Section 4.12 Vacancies. Any vacancy occurring in the Board shall be filled by the appropriate Member agency.

Section 4.13 Compensation. By resolution of the Board, the Boardmembers may be paid actual out-of-pocket expenses, if any, for attendance at meetings of the Board or committee thereof or conducting other business of Cascade, provided that the expenses are reasonable.

ARTICLE V. OFFICERS

Section 5.1 Number. Cascade shall have a Chair, a Vice-Chair, a Treasurer and a Secretary, each of whom shall be appointed by the Board. The Chair shall serve as and shall be designated the Chair of the Board. Such other officers and assistant officers, as may be deemed necessary or appropriate may be appointed by the Board. Any two or more offices with the exception of the Chair and Treasurer or Chair and General Manager may be held by the same person.

Section 5.2 Appointment and Term of Office. The officers of Cascade shall be appointed by the Board at the Annual Meeting in even-numbered years, to serve for two years until the next Annual Meeting in an even-numbered year or until removed by the Board. Each officer shall hold office until a successor shall have been appointed, except in the event of the termination of an officer's term in the manner herein provided.

Section 5.3 Resignation. Any officer may resign at any time by delivering written notice to the Chair, the Secretary or the Board, or by giving oral notice at any meeting of the Board. Any such resignation shall take effect at any subsequent time specified therein, or if the time is not specified, upon delivery thereof and, unless otherwise specified therein, the acceptance of such resignation shall not be necessary to make it effective.

Section 5.4 Removal. Any officer appointed by the Board may be removed by the Board upon 30 days' written notice, with or without cause. Appointment of an officer or agent shall not of itself create contract rights in the individual or in the Member or other entity concerned.

Section 5.5 Chair (President). The Chair of the Board (who shall be "President" under RCW 24.06.155 and for any required purposes) shall preside at all meetings of the Board, shall serve on and shall chair the Executive Committee, and shall exercise and perform such other powers and duties as may be determined from time to time by resolution of the Board. In the absence of the Chair, or if there be none, the Vice-Chair shall preside at all meetings of the Board. The Chair may sign deeds, leases, bonds, contracts, or other instruments which the Board has authorized to be executed, except in cases where the signing and execution thereof shall be expressly delegated by the Board or by these Bylaws to some other officer or agent of Cascade or shall be required by law to be otherwise signed or executed. In general, the Chair shall perform all duties incident to office of Chair and such other duties as may be prescribed by resolution of the Board.

Section 5.6 Vice-Chair. The Vice-Chair shall serve on the Executive Committee and shall perform the duties of the Chair in the absence of the Chair. When so acting, the Vice-Chair shall have all the powers of and be subject to all the restrictions upon such officers and shall perform such other duties as from time to time may be assigned to the Chair by resolution of the Board.

Section 5.7 Secretary. The Secretary shall serve on the Executive Committee and shall keep, or cause to be kept, the minutes of the proceedings of the Board and the Executive Committee, shall give notices in accordance with the provisions of these Bylaws and as required by law, shall be custodian of the corporate records of Cascade, shall have charge and custody of and be responsible for maintaining or overseeing maintenance of correct and complete nonfinancial books and records of Cascade. The Secretary shall perform such other duties as from time to time may be assigned by resolution of the Board.

Section 5.8 Treasurer. The Treasurer shall serve on the Executive Committee and shall serve as Chair of the Finance Committee. The Treasurer shall be responsible for maintaining, or overseeing maintenance of, all financial records of Cascade, the development of the annual budget, assuring the appropriate handling of all revenues and expenditures, and shall assist the Board in preparation of the annual budget. The Treasurer shall maintain or oversee maintenance of complete books and records of account, for all funds and securities of Cascade, the transfer of receipts for money due and payable to Cascade from any source whatsoever, and the deposit of all such money in the name of Cascade in the banks, trust companies or other depositories as shall be selected in accordance with law. The Treasurer may sign with the Chair, deeds, leases, bonds, contracts, or other instruments that shall have been authorized by resolution of the Board, and in general shall perform all duties incident to the office of Treasurer and such other duties as from time to time may be assigned to the Treasurer by resolution of the Board. If required by the Board, the Treasurer shall give a bond for the faithful discharge of his duties, in such sum and with such surety or sureties as the Board shall determine.

Section 5.9 Assistant Officers. The assistant officers in general shall perform such duties as are customary or as shall be assigned to them by resolution of the Board. If required by the Board, the assistant Treasurers shall respectively give bonds for the faithful discharge of their duties in such sums and with such sureties as the Board shall determine.

Section 5.10 Delegation. In the case of absence or inability to act of any officer and of any person herein authorized to act in his/her place, the Board may, from time to time, delegate the powers or duties of such officer to any other officer or any Boardmember or other person whom it may select. The Chair may delegate duties or powers in addition to those listed herein to offices of Cascade as necessary or appropriate to the conduct of the affairs of Cascade.

Section 5.11 Vacancies. Vacancies in any office arising from any cause may be filled by the Board at any regular or special meeting of the Board, subject to the notice provisions set forth in Sections 4.4 through 4.6.

Section 5.12 Indemnification. Cascade shall indemnify officers and Boardmembers as set forth in the Articles of Incorporation.

ARTICLE VI. EXECUTIVE COMMITTEE

The Chair, Vice-Chair, Secretary, Treasurer and chairs of each standing committee shall constitute the Executive Committee of Cascade. The Chair (or acting Chair) shall vote on matters before the Executive Committee only if necessary to break a tie. The Executive Committee shall be governed by such rules regarding meetings, action without meetings, notice, waiver of notice, and quorum as it may deem necessary and appropriate. The Executive Committee shall be responsible for ongoing oversight of the administrative, financial and other affairs of Cascade, and take any actions on behalf of Cascade except those expressly reserved to the Board by the Board or under Section 4.5 of the Contract. The Executive Committee shall have the authority to approve agreements or transactions involving $25,000 or less. In addition, in emergencies involving public health or safety or the protection of the assets and responsibilities of Cascade, the Executive Committee may take such actions as it deems necessary with prompt notice thereof given to the Board. The Executive Committee shall not have the authority to take any action inconsistent with this Contract or inconsistent with RCW 24.06.145.

ARTICLE VII. STAFF AND CONSULTANTS

The staff of Cascade shall consist of a chief executive officer (known as the General Manager) and such other positions established by the Board. The Board shall appoint the General Manager. The General Manager shall appoint persons to fill other staff positions, subject to such confirmation by the Board or by the Executive Committee as the Board may require. Only the Board shall be authorized to hire or retain legal counsel and independent accountants and auditors. Other consultants may be designated in such manner as the Board may determine, subject to Section 4.5 of the Contract.

ARTICLE VIII. EXECUTION OF CONTRACTS AND OTHER INSTRUMENTS

Section 8.1 Execution of Contracts and Deeds. Except as otherwise provided by resolution of the Board authorizing the execution thereof, all contracts, deeds, leases, notes, mortgages, pledges, transfers, and other written instruments binding upon Cascade for amounts involving the expenditure of or revenue to Cascade of greater than $25,000, shall be executed on

behalf of Cascade by the Chair and one other officer. The execution of documents involving lesser amount may be signed by the General Manager alone.

ARTICLE IX. FINANCES

Section 9.1 Loans. No loans to or from Cascade involving amounts greater than $25,000 shall be contracted on behalf of Cascade, and no evidences of indebtedness totalling more than $25,000 shall be issued in its name unless authorized by the Board. Nothing in this section shall prohibit the General Manager from obligating Cascade under a conditional sales agreement or similar instrument so long as the value of the purchase does not exceed $25,000. No loans shall be made by Cascade to any officer, Boardmember or private entity.

Section 9.2 Checks, Drafts, Warrants, Orders and Evidences of Indebtedness. All checks, drafts, warrants or other orders for the payment of money, notes or other evidences of indebtedness issued in the name of Cascade shall be signed by officers or agents of Cascade and in the manner as shall from time to time be prescribed by resolution of the Board. In the absence of such provision by the Board such instrument shall be signed by any two officers of Cascade, one of whom shall be the Treasurer.

Section 9.3 Contributions and Disbursements. All contributions and other funds received by Cascade shall be deposited in a special account or accounts in such banks, trust companies or other depositories as the Board may select. All disbursements shall be made under proper authority of the Board. All contributions, income to and disbursements of Cascade shall be recorded by the Treasurer or Treasurer's designee in appropriate books and records and such records shall be subject to examination at any reasonable time, upon request by any director.

Section 9.4 Budget/Financial Management. An annual budget of proposed receipts, operating income and expenditures shall be prepared by the Treasurer and submitted to the Board for its approval at least 180 days prior to the beginning of the fiscal year in which that budget will be in effect. The budget shall identify the level of rates and charges upon which revenue projects are based. When approved by the Board, such budget shall be the authorization for expenditures and operating expenses of Cascade, subject to subsequent changes in such budget made by the Board.

Section 9.5 Expenditures for Qualifying Purposes Only. Subject to applicable law, the funds of the corporation may be expended or distributed only for the purposes of Cascade as described in the Contract and in the Articles of Incorporation.

ARTICLE X. SEAL

Cascade need not have a corporate seal. If the Board adopts a corporate seal, the seal of Cascade shall be circular in form and consist of the name of Cascade, the state and year of incorporation, and the words "Corporate Seal".

ARTICLE XI. BOOKS AND RECORDS

Cascade shall keep correct and complete books and records of account, minutes of the proceedings of the Board and any committees designated by the Board, and such other records as may be necessary or advisable. All books and records shall be subject to disclosure under the public disclosure law, Chapter 42.17 RCW.

ARTICLE XII. FISCAL YEAR

The fiscal year of Cascade shall be determined by resolution adopted by the Board. In the absence of such a resolution, the fiscal year shall be the calendar year.

ARTICLE XIII. COPIES OF RESOLUTIONS

Any person dealing with Cascade may rely upon a copy of any of the records of the proceedings, resolutions or votes of the Board when such records are certified by the Chair or Secretary.

ARTICLE XIV. LIMITATION ON DISTRIBUTION OF FUNDS

Subject to the applicable law, the funds of Cascade may be distributed only for the purposes of Cascade as described in the Contract.

ARTICLE XV. AMENDMENTS TO BYLAWS

These Bylaws may be altered, amended or repealed, and new bylaws may be adopted, by the Dual Majority Vote of the Board.

The undersigned, being the Secretary of Cascade, hereby certifies that these Bylaws are the Bylaws of the Cascade Water Alliance, adopted by resolution of the Board on _____, 1998.

DATED this ____ day of _____, 1998.

_____

Secretary

EXHIBIT B

Cascade Water Alliance

Regional Capital Facilities Charge Methodology

The Regional Capital Facilities Charge (RCFC) Methodology for the Cascade Water Alliance (CWA) provides a mechanism for the recovery of growth-related costs from member agencies experiencing growth. The general objectives of the RCFC methodology include:

- Recovery of capital costs in excess of average system capital costs.
- Recovery of a minimum share of capital costs commensurate with a pro rata share of system investment.
- Equitable allocation of capital costs to new customers.

The RCFC methodology is premised on several essential observations:

- System expansion and extension is inherently more expensive, on a unit cost basis, than existing system capacity.
- Members experiencing the greatest growth should bear a proportionate share of the increase in capital costs.
- Changes in actual volumes and demands provide a poor short-term indicator of growth impacts, due to the effect of other factors on demand.
- Changes in customer base can be readily documented and provide an adequate measure of relative changes in demand.
- The use of an RCFC allows for uniform and more stable long-term rates through its equitable allocation of costs and generation of funds for capital use.

The RCFC methodology involves several basic steps:

1) Define Existing Cost Basis - The existing capital cost basis initially consists of two components: capital costs incurred by the CWA and capital costs supported by the CWA through wholesale payments to Seattle.
2) Define Cost of Future System Expansion - Based on the planned capital improvement program, identify projects and portions of projects allocable to growth in customer base during the analysis period. Initially, the Seattle Water Capital Facilities Plan will be used to define regional capital needs based on the costs allocated to Purveyors and the growth-related share through its assignment of those projects to "old" or "new" water.
3) Define Customer Base - Define a methodology for determining system capacity in terms of equivalent residential units (Cascade ERUs, or CERUs). Based on the CERU definition, develop an estimate of current customer base and anticipated growth during the analysis period.
4) Calculate Alternate RCFC Bases - Consistent with the objectives above, the RCFC shall be the greater of two measures: the average unit cost of expansion projects less the average unit cost of existing facilities; or the average unit cost of the combined total of existing and expansion projects.

Prior to developing the RCFC, the definition of customer base in terms of measurable units must be established.

CERU Methodology

The purpose of the Cascade Equivalent Residential Unit (CERU) methodology is to establish an equitable estimate of system demand which can be used for the allocation of capital costs to new development. It has been structured to allow ready provision of information by members without undue burden.

Central to this approach is the establishment of a common basis for measurement against which all other development can be compared. This has been defined as the equivalent demand of a typical single-family home, or CERU.

It will be expected that the CWA will improve the CERU definition and structure as the quality and quantity of available data increase. Such improvements might include: meter equivalent factors based on actual usage levels or patterns, rather than meter flow capacity; changes in multi-family equivalency based on updated information on usage patterns; changes in emphasis, for example between peak instantaneous and some other measure, such as peak season or annual volume; a greater level of sophistication in estimating demands; or differences in demand levels between comparable existing and new developments.

Initially, the CERU methodology relies on available measures which reflect relative demand levels. The CERU methodology uses the following basis for estimation:

- Single family homes and duplexes = 1 CERU per unit (a duplex = 2 CERUs. A duplex includes single family homes with accessory dwelling units.)
- Multi-family homes (3+ units) = 0.64 CERU per living unit.
- Commercial = 1 CERU per meter equivalent, based on AWWA safe operating maximum flows, currently as follows:

Meter Size	Flow Rate	Meter Equivalents
5/8x3/4 and 3/4 inch	20 gpm	1.0
1 inch	50 gpm	2.5
1.5 inch	100 gpm	5.0
2 inch	160 gpm	8.0
3 inch	320 gpm	16.0
4 inch	500 gpm	25.0
6 inch	1000 gpm	50.0
8 inch	1600 gpm	80.0
Note: Capacity of large meter sizes may require case-by-case determination.		

  For commercial meters sized 4 inches or larger, the CWA reserves the right to determine CERUs based on specific water demands and requirements.
- Industrial = 1 CERU per meter equivalent, or on case by case basis, especially for large meters.
- Irrigation = 1 CERU per meter equivalent.
- Fire sprinkler and deduct meters = 0 CERUs, with no RCFC imposed since these meters do not increase system demand. This assumes that the customer and

agency can demonstrate that the meters will not be used for domestic use or do not represent additional system demands.

Each member agency will report total CERUs to the CWA on a quarterly basis. The net increase in CERUs from the prior report would be subject to the applicable RCFC. When a change in the CERU basis is made, the prior quarter CERU basis will be restated under the new definition, so that a consistent quarter to quarter comparison is applied to determine the applicable RCFC charge.

Existing Cost Basis

The existing cost basis is determined by the original cost of system assets used to serve the CWA. For assets owned or controlled by the CWA, the original cost basis is undepreciated, reflecting the level of investment made by existing customers. The cost basis could include up to ten years of interest on those costs, without fundamentally changing the methodology, but the initial RCFC excludes such interest, except for interest paid during construction which is integrated into the recorded capital cost for a given project.

The determination of the cost basis for specific assets owned, controlled or used by the CWA includes:

- The recorded capital cost, undepreciated, recorded in the CWA financial records for assets owned by the CWA.
- The recorded capital cost, undepreciated, recorded in member financial records, for assets owned by members but for which control has been transferred to the CWA.
- The capital cost basis used to determine wholesale rates paid by the CWA to Seattle or another wholesale service provider. The current Seattle wholesale rate structure identifies these costs through determination of rate base for old water rates and the Purveyor Facilities Account for new water rates.

Cost of Future System Expansion

The cost of system expansion and extension is determined based on the capital improvement plan of the CWA and the cost of improvements to the system(s) of wholesale providers which would be allocated to the CWA. The costs would be based on current cost estimates, not inflated to year of construction. For each identified project, the cost or portion of cost allocable to expansion and extension, as opposed to upgrade, replacement, or other purpose, would be determined.

The time period used to define system expansion costs would normally be a long-term planning horizon, such as 20 years or more. Currently, the formation of the CWA through interlocal together with statutory limitation applicable to water districts limits the time period used to 10 years. Due to this, supply projects providing supply capacity in excess of ten years of needs will be allocated between the portion serving 10 years of planned growth and the portion serving planned growth beyond the 10 year horizon. For transmission projects, the costs attributable to growth will be fully included in the cost basis, due to the more integrated nature of such improvements, the relatively low incremental cost of oversizing transmission mains, and the immediate benefits provided from a higher level of transmission capacity.

The initial source document used for defining the future system expansion cost is the Seattle Water Capital Facilities Plan, which identifies:

- Planned improvements to the Seattle regional supply and transmission systems, including their estimated costs and schedule.
- Portions of those projects currently allocable to Seattle Purveyors, and thus expected to be allocated to the CWA in assuming the supply role.
- Projects which expand or extend the system, through the identification of projects qualifying as "new water" projects under the existing Purveyor contracts.

The initial cost basis has been adjusted to reflect CWA assumption of responsibility for the Seattle interest in the Tacoma supply project, and reduced to exclude certain conservation projects which the CWA would be unlikely to undertake.

Due to current statutory limits on water districts, a 10 year planning horizon has been applied for establishing the cost basis. Consistent with the above guidance, the cost of the Tacoma project was pro-rated between capacity used during the 10 year period and capacity for use after the 10 year period.

Calculation of RCFC

The two approaches used to calculate the RCFC are:

1) The total capital cost basis for future system expansion is divided by the projected growth in customer base in CERUs to determine a marginal cost per CERU. The total capital cost basis for existing facilities is divided by the current customer base in CERUs to determine an embedded cost per CERU. The difference between these is the incremental cost per CERU which forms one basis for the RCFC.
2) The total capital cost basis for existing facilities plus future system expansion is divided by the total CERU basis for existing customer base plus estimated future growth. This determines an average cost per CERU based on total system needs.

The RCFC is the greater of these two results.

Initial RCFC Determination

The initial RCFC, to be applicable to all growth occurring on or after January 1, 2000 for members joining during the formation period, or all growth occurring after application for membership for subsequent members, is $904 per CERU. The initial determination of this charge, according to the above methodology, is shown in the worksheet attached as Exhibit B-1. This charge is the result of the incremental capital cost approach, which is the greater of the two approaches at this time.

EXHIBIT C

Cascade Water Alliance

Minimum Service Standards

[Minimum service standards will be established consistent with the terms of the Seattle wholesale agreement. It is anticipated that service standards for existing service locations will be comparable to those currently provided through the Seattle Purveyor agreement.]

EXHIBIT D

Cascade Water Alliance

Purveyor Contract (Old Water) Buyout

The old water buy-out has been determined by comparing forecasts of costs incurred from wholesale water purchases directly from Seattle Public Utilities (SPU) and costs incurred through rates, annual dues and Regional Capital Facilities Charges (RCFCs, a type of growth charge) paid to Cascade Water Alliance. Through this comparison, the old water buy-out is defined as a fixed amount either payable by the member to CWA or payable from CWA to the member. The buy-out amounts to be offered for each agency are shown in Exhibit D-1, attached.

Exhibit D-1

Summary of Old Water Buyouts

CWA Participants

		Minimum Buyout = 110% w/ RCFCs 2000-2011, net of available cash	
		Payments to each agency	Payments (from) each agency
1	W.D. 20	$2,372,077	$0
2	W.D. 45	$14,938	$0
3	W.D. 49	$49,496	$0
4	W.D. 85	$0	($44,935)
5	W.D. 90	$0	($718,904)
6	W.D. 119	$0	($514,289)
7	W.D. 125	$0	($2,246,441)
8	Bellevue	$1,019,397	$0
9	Bothell	$0	($2,131,783)
10	Bryn Mawr	$235,260	$0
11	Cedar River	$0	($1,760,000)
12	Coal Creek	$0	($1,710,253)
13	Duvall	$0	($1,303,494)
14	Edmonds	$892,614	$0
15	Highline	$6,136,270	$0
16	Kirkland	$473,959	$0
17	Mercer Island	$5,027,114	$0
18	Northshore	$0	($2,398,803)
19	Olympic View	$1,153,131	$0
20	Redmond	$0	($3,802,487)
21	Renton	$1,891	$0
22	Shoreline	$2,196,003	$0
23	Skyway	$270,658	$0
24	Soos Creek	$0	($3,763,037)
25	Tukwila	$4,372,546	$0
26	Woodinville	$0	($3,820,928)
27		$0	$0
28	New Member A	$0	$0
29	New Member B	$0	$0
30		$0	$0
CWA Total		$24,215,354	($24,215,354)

EXHIBIT E

Cascade Water Alliance

System Reliability Methodology

CWA will define a reliability standard for planning purposes. It is likely that this standard will be consistent with reliability requirements defined in the supply agreement between CWA and Seattle Public Utilities (SPU). The System Reliability Methodology refers to the means of establishing available reliable supply for use by then current and prospective members. In particular, the means by which applications for new service or new supply commitments become full service commitments is identified.

Definition of Supply Commitments

The Agreement defines Full and Interruptible Supply commitments. In summary, these are:

- A Full Supply commitment entitles a member to an equal priority of service with all other full supply commitments. This commitment is superior to any interruptible supply commitments or contract commitments, unless otherwise determined by the Board. This means that, barring such Board action, full supplies are not subject to curtailment until all interruptible and contract commitments and supplies have been suspended or terminated.
- An Interruptible Supply commitment entitles a member to make use of available water capacity and supply, subject to superior commitments. In the event of shortage, Interruptible Supplies would be subject to full curtailment before any curtailment of Full Supply commitments would occur.
- A given member may have both Full and Interruptible Supply commitments. In such case, each commitment is subject to its corresponding level of priority. A member with both Full and Interruptible Supply commitments would be required to terminate its use of Interruptible Supply before any curtailment of any member's Full Supply commitments would be required.

The CWA will undertake, as a planning objective, to provide Full Supply commitments which meet the reliability standard for its members at all times. Nonetheless, it is possible that, from time to time, available supplies do not satisfy the reliability standard for all Full Supply commitments despite the efforts of the CWA. All Full Supply commitments remain equal in priority at all times, including such circumstances.

Determination of Available Full Supply Commitments

The CWA will, through its supply planning, establish the level of Full Supply commitment which it can meet through the following series of steps:

1) Define reliability standard - Define a reliability standard under which each CWA supply resource and the combined supply and transmission system resources can be evaluated to determine a reliable firm yield.
2) Determine available firm supply - By applying the reliability standard, determine the current and projected reliable firm yield for the CWA system. The projection period should be at least 20 years. [The 20 year period should normally assure

that a 15 year horizon is always projected, even immediately before a 5 year plan update.]

3) Determine current and projected demand - Determine the current demand level and projected demands for the projection period, again at least 20 years into the future)
4) Determine CWA ability to meet Full Supply commitments at established reliability standard - Based on the available firm supply and the projected member demand, determine the current and projected excess or deficit in supply capacity.

Evaluation of New Supply Commitments

For evaluating new supply commitments (new members, annexations or loss of independent supply), the standard defined in the Agreement is that a Full Supply commitment can only be made if sufficient excess supply capacity exists 15 years in the future. This is intended to protect the CWA's ability to meet existing Full Supply commitments as a priority over extending new commitments to new or existing members. It should be noted that for existing members with Full Supply commitments, all member growth in demand is automatically provided a Full Supply commitment, except for: annexations or mergers outside the member service area identified in the CWA plan; reduction in or loss of existing independent supplies; or demand growth planned to be met by existing or new independent supplies.

The CWA will determine new Full and Interruptible Supply commitments through the following steps:

1) Determine current and projected 15 year demand for CWA supply.
2) Determine sufficiency of projected 15 year excess firm supply (without new resources) and transmission.
3) A Full Supply commitment is limited to the projected excess in capacity 15 years in the future; the remainder of the service commitment is Interruptible Supply.
4) Determine additional supplies needed to meet all Interruptible Supply commitments as Full Supply commitments.
5) Establish Full and Interruptible Supply commitments. Interruptible Supply commitments become Full Supply commitments after addition of supply in the quantity determined in 4), but in no case longer than 15 years after CWA commitment.

EXHIBIT F

Agencies Initially Eligible for Membership

The purpose of this list is to establish a CWA decision-making body capable of offering membership terms to prospective members. The initial solicitation would be restricted to Purveyors and full IWG participants. CWA will accept application from other eligible water agencies once a CWA decision-making body is established to evaluate supply commitments and establish terms for membership.

Exhibit F-1 lists agencies initially eligible for membership, and shows their proportionate share of 1995-1997 average wholesale purchases from Seattle Public Utilities. These percentages constitute the basis for determining compliance with the 75% membership threshold specified in the CWA interlocal and the CWA-SPU wholesale supply agreement.

Exhibit F-1 Agencies Initially Eligible for CWA Membership	
Agency	% of Total Purveyor Demand (1995-97 Average)
SEATTLE PURVEYORS	
City of Bellevue	22.6%
City of Bothell	2.0%
Bryn Mawr/Lakeridge Water & Sewer District	0.2%
Cedar River Water & Sewer District	2.5%
Coal Creek Water District	3.1%
City of Duvall	0.5%
City of Edmonds	1.5%
Highline Water District	10.2%
City of Kirkland	5.5%
City of Mercer Island	3.5%
Northshore Utility District	8.6%
Olympic View Water & Sewer District	1.6%
City of Redmond	5.8%
City of Renton	0.0%
Shoreline Water District	3.3%
Skyway Water & Sewer District	0.5%
Soos Creek Water & Sewer District	6.6%
City of Tukwila	3.5%
King County Water District #119	0.3%
King County Water District #125	2.6%
King County Water District #20	4.2%
King County Water District #45	0.4%
King County Water District #49	2.3%
King County Water District #83	0.0%
King County Water District #85	0.3%
King County Water District #90	2.3%
Woodinville Water District	5.9%
NON-PURVEYORS	
Covington Water District	0.0%
City of Issaquah	0.0%

EXHIBIT G

LIST OF OTHER DOCUMENTS OR ACTIONS REFERENCED IN CONTRACT

- Allocation of Demand Shares (Dual Majority Vote)
- Audit Methodology - Section 5.1 (Dual Majority Vote)
- Water Supply Asset Transfer Documents - Section 5.1 (Dual Majority Vote)
- Water Supply Plan (Dual Majority Vote)
- Independent Supply Acceptance Methodology - Section 6.1 (Dual Majority Vote)
- Rate Calculation Methodology (including CERU Methodology) - Section 7.5 (Dual Majority Vote)
- Dissolution of Cascade - Section 10.1 (65% Dual Majority Vote)
- Resolution Transferring Cascade Assets and Liabilities to a Successor Agency – Section 10.3 (65% Dual Majority Vote)
- Conservation Management Plan - Section 7.2 (Dual Majority Vote)
- Shortage Management Plan - Section 7.3 (Dual Majority Vote)
- Moratoria on New Connections - Section 7.3 (65% Dual Majority Vote)
- System Management Plan - Section 7.1 (Dual Majority Vote)

Interlocal Agreement for the Interim Water Group

2 of 2

WHEREAS, three caucuses representing the King County Water Alliance, the City of Seattle and the Suburban Cities Association (the "Tri-Caucus") have met since 1993 to discuss and to propose action with regard to the future of water supply and planning for the region; and

WHEREAS, the Tri-Caucus has reached agreement on several key issues as memorialized in the Regional Water Supply Governance Accord dated March 24, 1993; the Resolution of Intent Regarding Regional Water Supply Governance dated December 8, 1993; the Water Governance General Agreement of Principles dated December 14, 1994; and most recently, the Principles Regarding the Relationship Between Seattle and the New Entity and Guiding Vision statement dated August 30, 1995 which defines the relationship between the City of Seattle and a proposed new water supply governance organization ("New Entity"); and

WHEREAS, the undersigned parties desire to create an interim group by interlocal agreement composed of water purveyors and other interested municipalities to focus on the organizational and financial structure of the New Entity; and

WHEREAS, the purpose of this interlocal agreement is to provide a mechanism for the accumulation of financial resources; to retain professional assistance for the purpose of developing a framework for the New Entity and to develop financial data to assess impacts of various proposals; to negotiate a final agreement between Seattle and the New Entity; to provide a focus for negotiations with Tacoma on the Second Supply; and to assist in implementing and carrying out the principles agreed to by the Tri-Caucus; and

WHEREAS, this Agreement is entered into by the undersigned parties, municipal corporations organized under the laws of the State of Washington, pursuant to the Interlocal Cooperation Act, chapter 39.34 RCW, and has been authorized by the legislative bodies of each jurisdiction; Now Therefore,

It is hereby agreed by the parties as follows:

1. Purpose. The purpose of this agreement is to bring together interested municipalities which are potentially impacted by proposed changes in regional water supply governance and to provide a mechanism for the accumulation of financial resources in order to retain professional assistance for the purpose of developing a framework for the New Entity, to negotiate a final agreement between Seattle and the New Entity, to develop financial data to assess impacts of various proposals, to provide a focus for negotiations with the City of Tacoma on the Second Supply and to assist in implementing and carrying out the principles agreed to by the Tri-Caucus.

2. Organization. This agreement does not establish a separate legal entity but rather creates an administrative entity to be known as the Interim Water Group ("Group") which shall act at the direction of a board comprised of representatives from each of the parties to this agreement. The Interim Water Group shall perform purely administrative functions and except as otherwise noted herein, no power or authority to act on behalf of or in the stead of the undersigned parties is delegated to the Interim Water Group.

3. Governance. Governance shall be through the Joint Board ("Board") as provided in the By-Laws of the Group. The By-Laws shall include , but not be limited to, provisions governing representation, meetings, voting requirements/quorum, notice, officers and terms and provisions concerning the membership, responsibilities,

organization and procedures of the Board. The initial By-Laws shall be adopted by the Board and may thereafter be amended by a vote of the Board. The By-Laws may provide for a weighted vote method related to assessments and/or financial contributions.

4. Duration. This Agreement shall remain in effect until December 31, 1997 unless earlier terminated or amended pursuant to Section 8.

5. Finances.

a. Budget. The Board shall adopt a budget. The budget shall include projected expenditures reasonably necessary to achieve the Group's purposes and may include staff compensation and staff support, as well as compensation for professionals hired by the Group. Because the monetary needs of the Group may not be foreseeable for any annual period and because contributions/assessments of the parties may occur at various times, the budget may be amended as needed by the Board.

b. Dues, Assessments and Membership Fee. To fund the budget, the parties may agree to commit to paying dues and assessments as recommended by the Board or make voluntary contributions. In addition, a one time new member fee shall be paid by parties to this agreement as a requirement of membership. This fee shall be non-refundable. The new member fee shall be an amount equal to the product of $1000 times the member's average annual retail water sales for the previous calendar year measured in million gallons per day (mgd) to the nearest tenth of an mgd, not to exceed $2500.

c. Special fund. The Group shall establish a special fund with one of the parties to this Agreement for the purpose of administering all funds of the Group, which fund shall be designated the "Operating fund of Interim Water Group Joint Board."

d. Credits. When developing agreements forming the New Entity the Board shall consider and implement ways to provide parties to this agreement a credit for all fees, dues, assessments, and voluntary contributions paid to the Group if at a later date the member joins the New Entity.

6. Staffing and Contracting. The Board shall have the authority to enter into contracts in order to carry out the purposes of this Agreement including, but not limited to, contracts to provide desired administrative, consulting, and professional services. The parties may lend or otherwise provide staff support to the Group. Reimbursements may be made to members providing services to the Group based upon a defined work product and cost approved by the Board.

7. Limitations.

a. The Board may not take any actions or make any decisions until at least ten cities and/or districts have become a party to this agreement.

b. By becoming a party to this Agreement, no member has committed itself to participate financially beyond the dues, assessment, or membership fee provisions set forth herein or any voluntary contributions such member may make to the Group.

c. By becoming a party to this Agreement no member thereby

obligates itself to join or otherwise become a member of the New Entity or to forego or otherwise alter its current water purveyor contract with Seattle.

d. This Agreement shall not constitute a delegation of any of the powers of the individual parties to the Group.

e. The Group and its Board shall not enter into agreements or take actions which are inconsistent with the purpose and authorizations set forth in this Agreement.

f. The Board shall not incur debt or obligations beyond the financial resources that have been committed to and received from members.

8. Amendment and Termination.

a. Amendment. This Agreement may be amended by written approval of the parties.

b. Termination. This Agreement may be terminated at any time by a vote of the Board. Upon termination, all obligations of the Group shall be paid and any assets of the Group shall be distributed to the parties pursuant to a distribution formula established in the By-Laws based on fees, dues, assessments and voluntary contributions of the parties.

9. Limitation of Liability. Neither the members of the Group nor its Board or officers shall be individually liable for any debts or obligations of the Group. Each member shall be obligated to contribute to the Group only those amounts determined pursuant to the procedures set forth in the By-Laws.

10. Withdrawal. Any member may withdraw from this Agreement by giving at least 60 days written notice to the Board of its intention to terminate membership. In addition, any member may withdraw by giving written notice within 60 days after receiving notice of any proposed dues or assessments without obligation to pay the proposed dues or assessments. Upon withdrawal from this Agreement, a previous member shall not be entitled to a refund of any dues, assessments, fees or any other contributions, nor shall it be relieved from paying dues or assessments which have been committed to by the member.

11. Filing. This Agreement shall be effective upon filing with the King County Records and Elections Division, the Secretary of State, and the clerk of each member hereto.

12. Counterparts. This Agreement may be signed in counterparts and, if so signed, shall be deemed one integrated Agreement.

IN WITNESS WHEREOF, this Agreement has been executed by the undersigned party on the date set forth below:

By: John W. Ranta

Dated: 2-20-96

Attest: Jane E. Canter
City Clerk

AG

Second Amendment to
Interlocal Agreement for the Interim Water Group

The Interlocal Agreement for the Interim Water Group (the "Agreement") is hereby amended as follows, pursuant to Section 8 of the Agreement.

> Section 4. Duration. This agreement shall remain in effect until March 31, 1999, unless earlier terminated or amended pursuant to Section 8.

IN WITNESS WHERE OF, this Amendment has been executed by the undersigned party on the date set forth below:

City of Tukwila
Member Agency

By John W. Rants
Signature

Mayor
Title

Dated: January 13, 1999

Attest: Robert H. Baker, Acting City Clerk for Jane E. Cantu

2nd of 2
ORIGINALS

Background Information
CWA Application Audit

Please Note: A limited portion of this information also appears on the application form. However, this document may be transferred to other parties, such as a consultant conducting the audit, without the accompanying form. Therefore, please complete all information to the extent possible.

I. Agency and Contact Person

Name of Water Utility City of Tukwila

Name of Contact Person Ted Freemire

Phone Number of Contact Person (206) 433-1861

Please note: This request applies only to *water* utilities. Do not provide information on sewer or other utilities.

II. Existing Customer Base

For CWA, the definition of ERUs is as follows:

- Single Family Residences = 1 ERU. Single family is limited to detached housing units with separate meters. Attached units are multi-family, regardless of metering.
- Duplex = 1 ERU per unit (2 for Duplex). Include residences with accessory dwelling units as duplexes.
- Multi-family (3+ units) = 0.64 ERUs per unit
- Commercial = 1 ERU per meter equivalent (5/8x3/4 inch = 1 meter equivalent, larger meters proportional to AWWA standard flow capacity)
- Mixed Use = Commercial unless separately metered.
- Irrigation = same as commercial
- Fire Lines/Meters = 0 ERU (***do not include***)

In the following table, please indicate the number of living units for each residential category and the number of meters, by size, for non-residential customers, including irrigation meters but not fire lines.

Recognize that this reporting would become a regular, probably quarterly, activity as a member of CWA. Therefore, develop this information with the intent to generate this report in the future as a routine administrative function.

Please provide the total number of living units or meters for the following customer classes:

(enter)			Water Utility
Water Customer Class	**# of Living Units**	**# of Meters**	**Notes/Comments**
Residential			
Single Family Residential	984		
Duplex			
3+ Apartment/Multifamily	2020		
Commercial			
5/8" x 3/4" Meter		101	
1" Meter		210	
1.5" Meter		254	
2" Meter		139	
3" Meter		34	
4" Meter		22	
6" Meter		17	
8" Meter		9	
10" Meter		0	
12" Meter		0	
Irrigation			
5/8" x 3/4" Meter			
1" Meter			
1.5" Meter			
2" Meter			
3" Meter			
4" Meter			
6" Meter			
8" Meter			
10" Meter			
12" Meter			
FIRE LINES -DO NOT INCLUDE			

INCLUDED IN Commercial

If you do not have the information available in the form requested, please indicate whether you will attempt to compile this information, or wish CWA to do so as a part of the audit process. Please note that CWA involvement in this role will increase the audit cost billed to you.

If data is incomplete, some valuable initial information which you could provide might include:

- If multi-family units are not available, then the number of meters by meter size ***for multi-family only*** should be separately provided.
- If customer classes are not distinguished, please provide number of meters by size for all classes.
- If meter sizes are not known, then please provide annual water sales, by customer class if possible.
- If all residential classes are grouped together, please provide meter counts by size if available.

III. Projected Customer Growth

For Purveyors, please review the demand forecast and ERU growth estimated for your agency in the IWG financial analyses. Please comment below on any significant differences with your own forecasts or experience.

For non-Purveyors, please complete the following table identifying projected demands and customer base. If you submit a water comprehensive plan which represents "best available" information , you may indicate so below and do not need to complete this table. Also, if available, please provide monthly consumption or production records for the period 1995-1997. These can be reported at the total system level.

For all applicants, please indicate below if there are any prospective or potential changes in your service area that could affect your demand and are not in the above numbers? (e.g., annexations, major development projects, new industries, departing major water users, significant conservation or reuse efforts, etc.)

Demand	1996	2000	2005	2010	2015	2020
Annual	1183867	1270000	1450000	1600000	1800000	2100000
Average Day						
Peak Season	559834	589163	682927	791784	917896	1064093
Peak Day	3877	6270	7260	8250	9570	11220

Please specify the units for the demand figures, e.g., (ccf, gallons, mgd).

IV. Historical Water Consumption/Purchases

What was your agency's total water production for 1995-1997 including purchases from the Seattle Water Department, other wholesale purchases, and production?

	Purchases from SWD	Other Purchases	Own Production
1995	880582	0	0
1996	1183864	3	0
1997	1241880	0	0
Total	3306326	3	0

Are there any unique circumstances surrounding purchases during this period? (e.g., sales/wheeling to other agencies, additions/losses of service area, changes in old water allowance, etc.) Please describe fully.

Assumed customers on E. Marginal Way and Cambell Hill from City of Seattle. This increased our annual old water allowance from 1203864 CCF to 1375836 CCF.

Applicant: City of Tukwila

CWA Membership Proposal: ☐ Draft ☑ Final

The Interim Water Group, acting on behalf of the Cascade Water Alliance (CWA), extends to the City of Tukwila an offer to join the Cascade Water Alliance on the following terms and conditions:

- Ratification of the final membership proposal by the IWG Board of Directors
- Authorization of the CWA Interlocal Contract by the Applicant
- Authorized signature of the CWA Interlocal Contract by the Applicant
- Authorized signature of "Assignment & Assumptions of Water Purveyor Contract with Seattle" (Assignment), subject to CWA holding the Assignment until the Seattle contract is signed.
- Approval of the final membership proposal by the Applicant.
- Payment of Formation Costs of $0.00, as defined in this membership offer.
- Payment of first year Annual Dues of $18,036, as defined in this membership offer. Prior to CWA formation, these funds will be held by IWG in a restricted account on CWA's behalf, and transferred to CWA upon its official formation.
- Approval and acceptance of the Old Water Buy-out terms by Tukwila.
- Designated CWA Representative: Steve Mullet (must be an elected official of Applicant).

CWA shall determine the adequacy of Applicant compliance with these terms.

Prior to CWA formation, the IWG Board of Directors shall act as the CWA Board for the above actions, subject to the limitations established in Section 3.1 of the CWA Interlocal Contract.

Basis for Membership Offer

This offer is based upon the Cascade Water Alliance Interlocal Agreement and the series of tables compiled based on data provided by the Applicant. These tables provide the numerical basis for the determination of initial costs, voting rights, and rates and charges as summarized in this membership offer. In the event of numerical error in these data or their use, CWA and the Applicant will work to resolve those errors. CWA will be responsible for determining necessary and appropriate corrective action.

1. Voting Rights

Voting rights in CWA are determined by the dual voting system as defined in the CWA Interlocal Contract. Tukwila's voting rights would be:

- **1** vote as a member agency, for tabulation of votes by agency.
- **3.3** votes based on adjusted demand shares for 1999. The demand shares are based on total Tukwila wholesale purchases. Due to expansion of service area in 1996, 1995 purchases were not considered in this total.
- The relative weight of these voting rights will be dependent on the number of members in CWA and the total demand shares of those members, and will change over time.

2. Formation Costs

Formation costs are based on financial participation in the Tri-Caucus and Interim Water Group processes. Due to limited records for the Tri-Caucus process, we will primarily rely on documentation of payments provided by applicants and revise this calculation of Formation Costs based upon this information.

Tukwila has fully participated in the Tri-Caucus and IWG processes. Formation costs due upon acceptance are: **$0.00**

3. Annual Dues

Annual dues are determined by CWA as a part of its revenue structure. They are based on the number of Cascade Equivalent Residential Units (CERUs) served by the member, regardless of supply source. This number will change annually.

For 1999, the annual dues have been established at $2.50 per CERU.

Based on data provided by Tukwila, a 1998 CERU basis of 7,214 has been determined. This is based solely on retail CERUs reported as of 12/31/97.

Tukwila's 1999 Annual Dues are: **$18,036**

4. RCFCs

Tukwila does not currently have a supply deficiency. Further, RCFCs are not payable during 1999. The basis for RCFCs will be the quarterly change in Tukwila's CERUs. For informational purposes, Tukwila's current retail CERUs are 7,214, and the estimated RCFC is currently $904 per CERU. If the level of CERUs is changed due to corrections or revisions to calculation methods, then the CERU total will be revised accordingly, without additional RCFC's due, as provided in Exhibit B of the CWA Interlocal Agreement.

5. Rates

The annual dues are the only rates applicable in 1999. During 1999, the rates for 2000 will be established, consistent with the CWA Interlocal Contract. A rate study will be conducted to determine rates as they would apply to Tukwila and other members. These

will be predominantly based on demand shares. For informational purposes, Tukwila's demand shares for 1999 are 3.3.

6. Old Water Buy-out

Tukwila will receive an old water buyout consistent with the terms of the Contract.

Tukwila's old water buy-out from CWA is: **$4,372,546**

According to the CWA Interlocal Contract, Tukwila will receive this amount lump sum or over up to 5 years with interest. The following schedule identifies a minimum repayment schedule, with interest, from CWA:

August 1, 2000	$985,902
August 1, 2001	$985,902
August 1, 2002	$985,902
August 1, 2003	$985,902
August 1, 2004	$985,902

Unless otherwise specified by Tukwila, these amounts will be applied as credits against rate payments due. Also, in the event that agencies which owe an old water buy-out pay earlier than the required schedule, CWA may be able to accelerate payments to Tukwila. In such case, payments would include interest calculated on date of payment and actual principal balance outstanding. On the lines below, please indicate your preference regarding each of these two independent issues:

☐ Tukwila would prefer payment of old water buy-out, rather than credits

☐ Tukwila would prefer acceleration of old water buy-out payments, if possible

7. Independent Supply

Tukwila has no independent supplies, and no credits or transfers are involved.

8. Supply Commitment

Tukwila receives a full supply commitment from CWA consistent with the CWA Interlocal Agreement.

9. Service Area

As provided in Section 5.2.1 of the CWA Interlocal Agreement, CWA's service commitment automatically extends to the member agency's existing service area, as defined at the time of membership. For purposes of that definition, Tukwila's service area is defined as: the planned service area as contained in Tukwila's most recently adopted and

approved water system plan, including amendments, at the date of CWA membership. **[Agency may attach excerpt from plan as further description.]**

10. Assumptions & Mergers

In the event that Tukwila would assume water service to areas currently served by other utilities, the new service area would ordinarily be subject to appropriate RCFCs and old water buy-out payments. However, special terms would apply to such an assumption provided that Tukwila has initiated assumption through submittal of a petition to the King County Boundary Review Board prior to November 15, 1999. Those terms are:

- For take-overs of non-Purveyors, the relevant CWA conditions are neutral in effect, and no special consideration is warranted.
- For take-overs involving non-member Purveyors otherwise owing an old water buy-out, the buy-out should remain due to CWA, with interest. However, for processes initiated (see definition below) before the end of the Formation Period (11/14/99), the progressive RCFC charge as defined in Section 5.5 of the CWA Interlocal would be waived provided that the member continues to diligently pursue the take-over and completes the take-over, an agreement for an orderly take-over, or receives a public vote approving such a take-over prior to the end of 2004.
- For take-overs involving non-member Purveyors due an old water buy-out, the buy-out would be reduced in increments equal to 20% of the full buy-out amount for a five year period after the Formation Period. Again, for processes initiated (see definition below) before the end of the Formation Period (11/14/99), the progressive RCFC charge as defined in Section 5.5 of the CWA Interlocal would be waived provided that the member continues to diligently pursue the take-over and completes the take-over, an agreement for an orderly take-over, or receives a public vote approving such a take-over prior to the end of 2004.

The definition of initiation for a take-over process would include:

- For an assumption of a District by a City, a resolution by the City Council stating its intent to execute the assumption, and a submittal of a petition for the assumption to the Boundary Review Board.
- For a merger or consolidation of two agencies (e.g. two Districts or Cities), a resolution approved by each legislative body approving the merger, and a submittal of a petition for merger or consolidation to the Boundary Review Board.

In situations involving partial take-overs of service areas, or take-overs by multiple jurisdictions, the terms would be pro-rated on a fractional basis of the non-member agency, as measured by CERUs. In situations involving a take-over of service area from Seattle, no buy-out provisions apply, and the RCFC would be waived, since the service area had no prior opportunity to elect to join or not join CWA.

11. Assured Equal Treatment

Specific terms of membership offers may be revised from time to time during the Formation Period as determined by the CWA Board. Should material changes in terms of membership occur during this period which, if offered to Tukwila, would have benefited Tukwila, such changes shall be offered retroactively to Tukwila.

Cascade Water Alliance

Application for Membership

This application for membership initiates a review process by CWA which may culminate in an offer of membership from CWA to the applicant.

I. Confirmation of Receipt of Application and Payment: [*to be completed by CWA*]

Date: 11/20, 1998

Amount Received: **$ 5,000.00** [Application will not be accepted without payment]

Form of Payment: check # 208502 warrant #_____ other _____

Received By: _____ (initials) *Receipt Issued:* Yes

II. Authorization – Copy of the resolution or ordinance authorizing application to CWA. [*Required by CWA **before** acceptance of application and deposit*]

Authorization Received? Yes

III. Name of Applicant: [*Must be a Municipality*]

City of Tukwila

IV. Address of Applicant:

6300 Southcenter Blvd., Suite 100
Tukwila, WA 98188

V. Contact Person & Phone Number:

Ted Freemire (206) 433-1860

VI. Payment: Applicant pays an application fee deposit of $5,000.00. CWA will bill the applicant for its costs to process the application, including but not limited to the conduct of appropriate investigation by CWA or its designees (system audit), presentation and review of the CWA membership offer, and any related administrative costs. If total allocable costs are less than $5,000, the difference will be refunded by CWA to the applicant within 30 days of acceptance of a membership offer by the applicant or expiration of the offer. If total allocable costs exceed $5,000, the difference will be paid

by the applicant to CWA within 30 days of acceptance of a membership offer by the applicant or expiration of the offer.

> ***By making application, applicant agrees to payment of all CWA costs to process application, regardless of applicant decision on membership. Applicant understands that total cost may exceed the initial deposit of $5,000. Applicant shall be responsible for any CWA costs related to collection of amounts due.***

VII. Initial Information Submittal: Much of the accompanying information survey was used by the Interim Water Group during the formation of CWA. Submittal of current survey information and a copy of your water system plan with your application will help to reduce your cost for the system audit conducted by CWA.

Survey Completed and Submitted? Yes (No)

Water System Plan Submitted? Yes (No)

VIII. Limitations

> **Submittal of this application and payment does not obligate the applicant to accept the conditions of membership offered by CWA, nor does it obligate the applicant to join CWA regardless of conditions. By accepting this application and accompanying payment, CWA agrees to process the application and offer membership to the applicant on terms acceptable to CWA, except that CWA reserves the right to reject and return any application (and payment) from an agency determined by CWA to be ineligible. Applicant recognizes that eligibility for membership will be determined by CWA (or the Interim Water Group acting on CWA's behalf) in accordance with the Interlocal Agreement creating CWA and that upon joining CWA, applicant will be responsible for paying Formation Costs in accordance with that contract.**

Applicant:

By Authorized Officer: Ross Earnst

Name: Ross EARNST

Title: Public Works Director

City of Tukwila

Washington

Resolution No. 1406

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, TO AUTHORIZE THE PUBLIC WORKS DIRECTOR TO MAKE APPLICATION TO CASCADE WATER ALLIANCE.

WHEREAS, the City of Tukwila is a municipality that supplies water to residents and customers within (and without) its municipal boundaries; and

WHEREAS, the Cascade Water Alliance is an organization of municipalities formed for the purpose of obtaining and developing supplies of water for its members; and

WHEREAS, the City Council of the City of Tukwila has voted to make application to join the Cascade Water Alliance in order to assure its residents and customers of a continued supply of water; and

WHEREAS, an application for membership in the Cascade Water Alliance must be accompanied by a Resolution of Authorization and a deposit of $5,000.00 to pay for the cost of a water system audit and the cost of the application procedure;

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, HEREBY RESOLVES AS FOLLOWS:

Section 1. Application to Cascade Water Alliance.

A. The Director of Public Works is authorized on behalf of the City to make application to the Cascade Water Alliance for membership in that organization in accordance with the terms and conditions of the application process adopted by the Cascade Water Alliance, and the City agrees to pay all costs

Cascade Water Alliance
CWA Member Audits
City of Tukwila
Edit: **15-Mar-99**

Table 1
CWA Audit Process
Calculation of CERU's

Information Current as of: 12/31/97

Water Customer Class	# of Living Units	# of Meters	Notes/ Comments	CERU Factor	CERU's
Residential					
Single Family Residential	984			1	984
Duplex	0			1	0
3+Apartment/Multifamily	2,020			0.64	1,293
Commercial					
5/8" x 3/4" Meter		70	includes irr. meters	1	70
1" Meter		153		2.5	383
1.5" Meter		205		5	1,025
2" Meter		116		8	928
3" Meter		32		16	512
4" Meter		20		25	500
6" Meter		16		50	800
8" Meter		9		80	720
10" Meter		0		115	0
12" Meter		0		160	0
Irrigation					
5/8" x 3/4" Meter		0		1	0
1" Meter		0		2.5	0
1.5" Meter		0		5	0
2" Meter		0		8	0
3" Meter		0		16	0
4" Meter		0		25	0
6" Meter		0		50	0
8" Meter		0		80	0
10" Meter		0		115	0
12" Meter		0		160	0
			Total w/o Wholesale		7,214
Wholesale Supplies to Other Agencies		(see attached)	(see attached worksheet)		
- - - - -					0
- - - - -					0
Wholesale Purchases from Other Agencies		(see attached)	(see attached worksheet)		
- - - - -					0
- - - - -					0

Cascade Water Alliance
CWA Member Audits
City of Tukwila
Edit: 15-Mar-99

Table 2
CWA Audit Process
Wholesale Sales to Other Agencies

NOT APPLICABLE

----- Is Agency a CWA Member? No			----- Is Agency a CWA Member? No		
Annual Water Sales	0	ccf	Annual Water Sales	0	ccf
Peak Season Water Sales	0	ccf	Peak Season Water Sales	0	ccf
Annual Sales/CERU (1)	118	ccf	Annual Sales/CERU (1)	118	ccf
Peak Season Sales/CERU (2)	56	ccf	Peak Season Sales/CERU (2)	56	ccf
Estimated CERU's (max. of annual or peak)	0		Estimated CERU's (max. of annual or peak)	0	
Estimated Demand Shares	0.00		Estimated Demand Shares	0.00	

Notes:
This computation applies only if wholesale customer is not a CWA Member.

Per CWA ERU Statistics

(1) Retail Demand/ERU	242	gpd - Annual
(2)Retail Demand/ERU	342	gpd - Peak
	365.25	Days per year
	122	Days per Peak Season
	748	gal/ccf
	1,000,000	gal/mil gal

Cascade Water Alliance
CWA Member Audits
City of Tukwila
Edit: 15-Mar-99

Table 3
CWA Audit Process
Wholesale Purchases from Other Agencies

NOT APPLICABLE

Annual Water Purchases	0	ccf	Annual Water Purchases	0	ccf
Peak Season Water Purchases	0	ccf	Peak Season Water Purchases	0	ccf
Annual Sales/CERU (1)	118	ccf	Annual Sales/CERU (1)	118	ccf
Peak Season Sales/CERU (2)	56	ccf	Peak Season Sales/CERU (2)	56	ccf
Estimated CERU's (max. of annual or peak)	0		Estimated CERU's (max. of annual or peak)	0	
Estimated Demand Shares	0.00		Estimated Demand Shares	0	

Notes:
This computation applies only if wholesale customer is not a CWA Member.

Per CWA ERU Statistics

(1) Retail Demand/ERU	242	gpd - Annual
(2)Retail Demand/ERU	342	gpd - Peak
	365.25	Days per year
	122	Days per Peak Season
	748	gal/ccf
	1,000,000	gal/mil gal

Annual Wholesale Water

1995	0	gal
1996	0	gal
1997	0	gal

Cascade Water Alliance
CWA Member Audits
City of Tukwila
Edit: 15-Mar-99

Table 4
CWA Audit Process
Sample Quarterly CERU Update

Starting Date: 12/31/97

Ending Date: 01/01/99

Water Customer Class	# of Living Units	# of Meters	A Beginning CERU's	B Additions	C Removed from Service*	D Net Change	E CERU Factor	F Net Change in CERU's	G Ending CERU's
Residential									
Single Family Residential	984		984				1		
Duplex	0		0				1		
3+Apartment/Multifamily	2,020		1,293				0.64		
Commercial									
5/8" x 3/4" Meter		70	70				1		
1" Meter		153	382.5				2.5		
1.5" Meter		205	1025				5		
2" Meter		116	928				8		
3" Meter		32	512				16		
4" Meter		20	500				25		
6" Meter		16	800				50		
8" Meter		9	720				80		
10" Meter		0	0				115		
12" Meter		0	0				160		
Irrigation									
5/8" x 3/4" Meter		0	0				1		
1" Meter		0	0				2.5		
1.5" Meter		0	0				5		
2" Meter		0	0				8		
3" Meter		0	0				16		
4" Meter		0	0				25		
6" Meter		0	0				50		
8" Meter		0	0				80		
10" Meter		0	0				115		
12" Meter		0	0				160		
	Total w/o Wholesale		7,214						
Wholesale Supplies to Other Agencies		(see attached)			(see attached worksheet)				
-----			0						
-----			0						

D = B - C
F = D * E
G = A + F

Notes: * Please explain circumstances of removals

Cascade Water Alliance
CWA Member Audits
City of Tukwila
Edit: **15-Mar-99**

Table 5
CWA Audit Process
Sample Worksheet for Wholesale Sales to Other Agencies

Annual Water Sales	A	ccf	Annual Water Sales	A	ccf
Peak Season Water Sales	B	ccf	Peak Season Water Sales	B	ccf
Annual Sales/CERU (1)	C	118 ccf	Annual Sales/CERU (1)	C	118 ccf
Peak Season Sales/CERU (2)	D	56 ccf	Peak Season Sales/CERU (2)	D	56 ccf
Estimated CERU's (max. of annual or peak)	E		Estimated CERU's (max. of annual or peak)	E	
Estimated Demand Shares	F		Estimated Demand Shares	F	

E = Maximum (A/C, B/D)
F = Maximum (A/365.25, B/122) * 0.000748
[0.000748 = 748/1,000,000]

Notes:
This computation applies only if wholesale customer is not a CWA Member.

Per CWA ERU Statistics

(1) Retail Demand/ERU	242	gpd - Annual
(2)Retail Demand/ERU	342	gpd - Peak
	365.25	Days per year
	122	Days per Peak Season
	748	gal/ccf
	1,000,000	gal/mil gal

Cascade Water Alliance
CWA Member Audits
City of Tukwila
Edit: 15-Mar-99

Table 6
CWA Audit Process
Demand Share Calculations

Historical Supply and Demand Summary, mgd

Supply Sources	Jan	Feb	Mar	Apr	May	Jun*	Jul*	Aug*	Sep*	Oct	Nov	Dec	Average	Peak Avg
Wholesale Sources:														
1 Seatttle/CWA														
1995	1.1	1.7	1.4	1.6	1.7	2.7	2.4	2.0	2.3	1.7	1.8	1.5	1.8	2.3
1996	1.4	1.8	1.6	2.2	2.1	3.3	3.4	4.0	3.0	2.0	2.3	1.9	2.4	3.4
1997	1.9	2.7	2.0	2.2	2.4	2.9	3.0	4.1	2.8	2.1	2.6	1.8	2.5	3.2
Average	1.6	2.2	1.8	2.2	2.3	3.1	3.2	4.1	2.9	2.1	2.5	1.9	2.5	3.3

Initial 1999 Demand Share Basis: 3.3

	Applicable Demand Shares	Amount Transferred
Minus: Demand Shares transferred to Members receiving wholesale supply from Agency	0.00 (3)	0 (deducted from Agency's demand shares)
Plus: Demand Shares transferred from Members selling wholesale water to Agency	0.00 (3)	0 (added to Agency's demand shares)

Total Demand Shares for Agency: 3.3

Growth Adjustment (1): 1.0000

1999 Demand Shares (2): *3.3* (4)

28 days/month
29 days/month
30 days/month
31 days/month

Notes:
*Denotes Peak Season
(1) Estimate based on demand forecast. Growth adjustment for 1999 would be
[1998 CERU's] / [Average CERU's 1996-1998].
(2) For informational purposes only. 1999 water purchases continue to be made under Seattle Purveyor contract.
(3) Demand shares are only transferred upon request by an affected party an concurrence of both parties involed.
(4) Excluded 1995 sales due to a service area expansion in 1996. Average based on years 1996 and 1997.
Input Area

Historical Supply and Demand Summary, ccf

Supply Sources	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Wholesale Sources:													
1 Seattle													
1995	43,619	62,018	56,862	63,948	71,866	107,742	98,863	81,075	92,574	70,822	70,568	60,625	880,582
1996	56,712	68,660	68,340	87,170	87,498	132,062	139,542	166,724	121,506	84,587	93,023	78,043	1,183,867
1997	79,352	99,439	83,938	89,017	99,698	115,475	125,864	169,822	111,730	88,083	103,740	75,716	1,241,874

748 gal/ccf
1000000 gal/1 mil gal

Cascade Water Alliance
CWA Member Audits
City of Tukwila
Edit: 15-Mar-99

Table 7
CWA Audit Process
Identifying Old Water Buyout

Old Water Buyout

$4,372,546 owed to Agency from CWA
$0 owed to CWA from Agency

Payment Preference

$4,372,546 lump sum (if available)
$4,929,508 5 year payment

Schedule of 5 Year Payment

July 1, 2000 payment to CWA		August 1, 2000 payment from CWA	
Year 1	$0	**Year 1**	$985,902
Year 2	0	**Year 2**	985,902
Year 3	0	**Year 3**	985,902
Year 4	0	**Year 4**	985,902
Year 5	0	**Year 5**	985,902

Work Area
Option 1 - Owed from Agency

Term 4 years
Interest Rate 6.00%
Principal $0

Principal Remaining	$0	$0	$0	$0	$0

	Year 1	Year 2	Year 3	Year 4	Year 5
Interest	$0	$0	$0	$0	$0
Principal	0	0	0	0	0
Total	$0	$0	$0	$0	$0

Option 2 - Owed from CWA

Term 4
Interest Rate 5.00%
Principal $4,372,546

Principal Remaining	$4,372,546	$3,495,958	$2,684,854	$1,833,196	$938,954

	Year 1	Year 2	Year 3	Year 4	Year 5
Interest	$109,314	$174,798	$134,243	$91,660	$46,948
Principal	876,588	811,104	851,659	894,242	938,954
Total	$985,902	$985,902	$985,902	$985,902	$985,902

Cascade Water Alliance
CWA Member Audits
City of Tukwila
Edit: 15-Mar-99

Table 8
CWA Audit Process
Unpaid Formation Costs

I. Tri-Caucus Costs

Amount Allocated	$1,097
Amount paid by Agency*	$1,097
Net Amount Due	$0

II. IWG Costs

Total Assessment Shares	$17,453
Total Amount Paid	$17,453
Net Amount Owed	$0

Note:
* Based on available records, payments will be adjusted upon documentation provided by applicant.

Cascade Water Alliance
CWA Member Audits
City of Tukwila
Edit: **15-Mar-99**

Table 9
CWA Audit Process
First Year Annual Dues

Cost per CERU	$2.50	
Current CERU	7,214	As of: 12/31/97
First Year Dues	$18,036	

Contingency for Wholesale Sales

If Redmond does not join, then additional CERU's and First Year Dues

Est. CERUs	0
Cost per CERU	$2.50
First Year Dues	$0

If Issaquah does not join, then additional CERU's and First Year Dues

Est. CERUs	0
Cost per CERU	$2.50
First Year Dues	$0

Cascade Water Alliance
CWA Member Audits
City of Tukwila
Edit: 15-Mar-99

Table 10
CWA Audit Process
Membership Dues/Credits

IV. Total Due from Agency to CWA to join upon Membership

Tri-Caucus Costs	$0
IWG Costs	0
First Year Dues	18,036
Initial RCFC Deficit	

Net Amount Due
from Agency to CWA $18,036

Cascade Water Alliance
CWA Member Audits
City of Tukwila
Edit: 15-Mar-99

Table 11
CWA Audit Process
Credits for Independent Supply

(None for Tukwila)

Cascade Water Alliance
Water System Audit Authorization
12/17/98

Applicant: **City of Tukwila**

BREAKDOWN OF COSTS

The total cost to perform your water system audit has been estimated at ***$4,018***. A breakdown of this amount and proposed scopes of work and budgets are provided for your review and approval.

- ☐ A scope of work from FCS Group, Inc. related to characterizing the customer base, defining ERUs, identifying the old water buy-out and payment provisions, and reviewing ongoing reporting requirements. *Estimated cost: $1,900.*

- ☐ A scope of work from R.W. Beck addressing independent supplies, system supply and demand, service standards (e.g. minimum heads at supply points), and other engineering/planning components. Even for agencies without independent supply considerations, there are basic elements for this scope which are required. *Estimated cost: $1,085.*

- ☐ The cost of legal assistance in preparing an addendum to the Interlocal detailing the terms of the membership offer. *Estimated cost: $600.*

- ☐ An allocation of costs for general audit development. These costs were incurred by the CWA and are to be allocated over an estimated number of applicants. In the event the CWA receives more initial applicants than anticipated, a rebate or credit will be issued to agencies that paid a higher proportionate share. *Estimated cost: $433.*

APPLICATION DEPOSIT

The applicant has paid an application fee deposit of $5,000. CWA will bill the applicant for its costs to process the application, including but not limited to the conduct of appropriate investigations by CWA or its designees (system audit), presentation and review of the CWA membership offer, and any related administrative costs. If total allocable costs are less than $5,000, the difference will be refunded by CWA to the applicant within 30 days of acceptance of a membership offer by the applicant or expiration of the offer. If total allocable costs exceed $5,000, the applicant will pay the difference to CWA within 30 days of acceptance of a membership offer by the applicant or expiration of the offer.

TERMS

By making application, applicant agrees to payment of all CWA costs to process application, regardless of applicant decision on membership. Applicant understands that total cost may exceed the initial deposit of $5,000. Applicant shall be responsible for any CWA costs related to collection of amounts due.

Applicant agrees to the terms set forth above and authorizes commencement of the water system audit.

APPROVED:
CITY OF TUKWILA
WSHINGTON

By Ross Earnst
Name Ross Earnst
Title Public Works Director
Date Jan 6, 1999

APPROVED:
INTERIM WATER GROUP

By Gwenn Maxfield
Name Gwenn Maxfield
Title Interim Executive Director

City of Tukwila
John W. Rants, Mayor
Department of Public Works
James F. Morrow, P.E., Director

June 10, 1999

Gwen Maxfield
Cascade Water Alliance
PO Box 1923
Bothell, WA 98041

RE: Cascade Water Alliance Contract Number 99-073
Water Purveyor Contract with Seattle Number 99-072

Dear Ms. Maxfield:

Enclosed are originals 2 of 2 on the Cascade Water Alliance contract no. 99-073 and the Water Purvey Contract no. 99-72 for your records.

Should you have any questions regarding these, please contact Ted Freemire, Maintenance Operations Manager at (206) 433-1860.

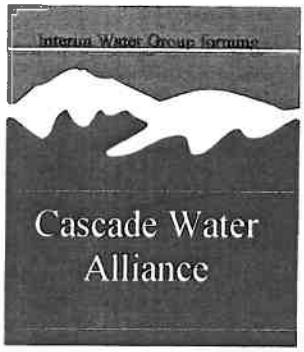
Sincerely,

James Morrow
Public Works Director
City of Tukwila

Enclosures

cf: Ted Freemire
Cascade Water Alliance File

NOTE: Gwen picked up the originals in person on June 10, 1999.



P.O. Box 1923
Bothell, WA 98041-1923
Ph: (425) 820-4544

December 17, 1998

Mr. Ted Freemire
City of Tukwila
600 Minkler Blvd.
Tukwila WA 98188

Dear Mr. Freemire,

Attached please find the detailed cost breakdown to complete the water supply / demand audit necessary prior to joining Cascade Water Alliance. As noted in the attachments, the engineering aspect of the audit will be completed by R.W. Beck; FCSGroup will accomplish the financial components of the audit.

While your audit cost estimate is within the estimated amount of $5000, we ask that you approve the submitted budget before our consultants begin the audit process. After reviewing the authorization sheet and appended cost estimates, please sign the *Water System Audit Authorization* sheet and return to Cascade at the address on this letterhead.

Questions may be addressed to myself at 425-881-7832, Dave Jochim at 206-695-4408, or Ed Cebron at 425-867-1802.

Thank you for your continued interest and support in Cascade Water Alliance. I am looking forward to an exciting 1999 as we launch our new organization.

Sincerely,

Gwenn Maxfield
Interim Director

Cascade Water Alliance
Water System Audit Authorization
12/17/98

Applicant: **City of Tukwila**

BREAKDOWN OF COSTS

The total cost to perform your water system audit has been estimated at ***$4,018***. A breakdown of this amount and proposed scopes of work and budgets are provided for your review and approval.

- ☐ A scope of work from FCS Group, Inc. related to characterizing the customer base, defining ERUs, identifying the old water buy-out and payment provisions, and reviewing ongoing reporting requirements. *Estimated cost:* *$1,900.*

- ☐ A scope of work from R.W. Beck addressing independent supplies, system supply and demand, service standards (e.g. minimum heads at supply points), and other engineering/planning components. Even for agencies without independent supply considerations, there are basic elements for this scope which are required. *Estimated cost:* *$1,085.*

- ☐ The cost of legal assistance in preparing an addendum to the Interlocal detailing the terms of the membership offer. *Estimated cost:* *$600.*

- ☐ An allocation of costs for general audit development. These costs were incurred by the CWA and are to be allocated over an estimated number of applicants. In the event the CWA receives more initial applicants than anticipated, a rebate or credit will be issued to agencies that paid a higher proportionate share. *Estimated cost:* *$433.*

APPLICATION DEPOSIT

The applicant has paid an application fee deposit of $5,000. CWA will bill the applicant for its costs to process the application, including but not limited to the conduct of appropriate investigations by CWA or its designees (system audit), presentation and review of the CWA membership offer, and any related administrative costs. If total allocable costs are less than $5,000, the difference will be refunded by CWA to the applicant within 30 days of acceptance of a membership offer by the applicant or expiration of the offer. If total allocable costs exceed $5,000, the applicant will pay the difference to CWA within 30 days of acceptance of a membership offer by the applicant or expiration of the offer.

TERMS

By making application, applicant agrees to payment of all CWA costs to process application, regardless of applicant decision on membership. Applicant understands that total cost may exceed the initial deposit of $5,000. Applicant shall be responsible for any CWA costs related to collection of amounts due.

Applicant agrees to the terms set forth above and authorizes commencement of the water system audit.

APPROVED:
CITY OF TUKWILA
WSHINGTON

By_____

Name _____

Title _____

Date _____

APPROVED:
INTERIM WATER GROUP

By _____

Name **Gwenn Maxfield**

Title **Interim Executive Director**

FCS Group Proposed Scope of Work
CWA Water System Audit

December 17, 1998

Applicant: City of Tukwila

Type of Applicant: Seattle Purveyor

Independent Supplies: None

Data Provided: Complete

APPROVED: _____ Date: _____, 1998

SCOPE OF WORK

The proposed scope of work is based on the specific requirements for each agencies audit. The scope of work and budget is provided to the applicant for review and approval prior to commencing the audit.

The applicant should expect several elements of cost in the audit:

- This scope of work from FCS Group related to characterizing the customer base, defining ERUs, identifying the old water buy-out and payment provisions, and reviewing ongoing reporting requirements.
- A scope of work from R.W. Beck addressing independent supplies, system supply and demand, service standards (e.g. minimum heads at supply points), and other engineering/planning components. Even for agencies without independent supply considerations, there are basic elements of this scope which are required.
- The cost of legal assistance in preparing an addendum to the interlocal detailing the terms of the membership offer.
- An allocation of costs incurred to develop the audit process and templates for the audits. These costs were incurred by the CWA and are to be allocated over an estimated number of applicants. In the event the CWA receives more initial applicants than anticipated, a rebate or credit will be issued to agencies that paid a higher proportionate share.

FCS Group Scope of Work and Budget

The system audit will include any or all of the following elements, with estimated level of effort shown by task:

1) Meet with Applicant - Meet with CWA and Applicant representatives to review the process and content of the audit. Identify data needs, contacts, responsibilities, and schedule. (4 hours)
2) Develop Estimated CERUs and Demand Shares - Complete an analysis and summary table documenting the applicant's current CERU basis and estimated current demand shares. Review ongoing

reporting requirements with applicant to determine ability to provide data on a routine basis (e.g. quarterly). (10 hours)

3) Develop Draft Membership Proposal - Integrate audit findings into a draft membership proposal. Present to IWG Board for approval and transmittal to Applicant. (5 hours)
4) Review Draft Membership Proposal - Meet with Applicant and CWA representatives to review the draft membership proposal. Identify additional analytical needs, if any, and related costs. (4 hours)

Activities subsequent to the review of the draft membership proposal will not generally be charged to the Applicant, unless separately scoped and budgeted based on a request for further analysis or review by the Applicant. the outcome of that initial review. Activities related to support of CWA in the negotiation of terms with the Applicant will be charged to the CWA, and not the Applicant.

The total estimated level of effort is 23 hours, at an estimated cost, including labor and expenses, of $1,900. Applicant will be billed by IWG based on actual invoiced amounts from FCS Group, not to exceed the budget estimate.

Schedule

Assuming approval of this scope and budget no later than January 1, 1999, the proposed completion date for the draft membership offer will be February 26, 1999.

BASIS OF BUDGET
WATER SYSTEM AUDIT
CITY OF TUKWILA

Scope of Work and Budget:

The scope of work and budget is based on the following:

- Data review is limited to information provided with the membership application.
- Evaluation of independent supplies is not applicable.
- Because all water is supplied by the City of Seattle, no evaluation of water quality information has been budgeted.
- Although the City of Tukwila may have had involvement in various activities associated with development of potential future regional water supplies, no consideration of these supplies will be given in the water supply audit.
- The Water System Audit Table of Contents is attached.

Activity	Hours	Budget (Labor & Exp)
Review Submittal Materials/ Data Review	2	$275
Coordination with FCSG	1	$150
Document Minimum Service Standards	2	$275
Prepare Audit Report	4	$385
Total	**9**	**$1085**

RW BECK

TABLE OF CONTENTS
WATER SYSTEM AUDIT
CITY OF TUKWILA

A SURVEY WATER DEMAND AND SOURC OF SUPPLY

Name of Water Utility: City of Tukwila

Prepared by: Ted FREEMIRE / Pat Bladen Phone Number (206) 433-1861

DEMAND

Please fill in the table below with data you have available.

ACTUAL AND FORECAST WATER DEMAND IN HUNDREDS OF CUBIC FEET (CCF)

	Water Produced		Water Sold		Non-Revenue Water
	Own Source	Purchased	Retail	Wholesale	
ACTUAL					
1994 Annual		862309	688944		173365
1994 Peak Month		102174	90951		11223
1994 Peak Week		29322			
1994 Peak Day		3770			
1995 Annual		880582	701873		178709
1995 Peak Month		107742	76753		30989
1995 Peak Week		30045			
1995 Peak Day		3863			
1996 Annual		1183867	917134		266733
1996 Peak Month		166724	123157		43567
1996 Peak Week		30154			
1996 Peak Day		3877			
1997 Annual		1241880	953471		288409
1997 Peak Month		169822	134329		35493
1997 Peak Week		43671			
1997 Peak Day		5615			
FORECAST					
2000 Annual		1270000	106000		210,000
2000 Peak Month		190000	148000		42000
2000 Peak Week					
2000 Peak Day		6270			
2005 Annual		1450000	1200000		250000
2005 Peak Month		220000	170000		50000
2005 Peak Week					
2005 Peak Day		7260			
2010 Annual		1600000	1400000		200000
2010 Peak Month		250000	190000		60000
2010 Peak Week					
2010 Peak Day		8250			
2015 Annual		1800000	1600000		200000
2015 Peak Month		290000	230000		60000
2015 Peak Week					
2015 Peak Day		9570			
2020 Annual		2100000	1900000		200000
2020 Peak Month		340000	270000		70000
2020 Peak Week					
2020 Peak Day		11220			

SUPPLY

1. Does your system have its own ☐ Ground water? ☐ Surface water? ☒ Neither. (We purchase all our water from others)

2. Do you purchase (or have the option of purchasing) water from other purveyors? ☒ Yes ☐ No

If yes,

Who? Kent, Renton, Highline, WD 125,

Are there any limitations on the amount of water you can purchase? ☒ Yes ☐ No

If yes, please specify the maximum amount of water you can purchase:

Annual _____ (af/yr or mgd)

Instantaneous _____ (gpm, cfs or mgd)

Other limitation (Specify period: Emergency use only) (gpm, cfs or mgd)

Do you expect the maximum amount of water you can purchase to change in the next 30 years?

☐ Yes - Increase ☐ Yes - Decrease ☒ No

If increase or decrease,

When? _____

By how much? _____

The following questions apply only to your *own* source(s) of supply. If you do not currently have independent supply, please continue to Question 8.

3. Please describe your existing water rights: Annual Water Right (Qa) _____ (af/yr or mgd)

Instantaneous Water Right (Qi) _____ (gpm or cfs)

4. Please provide a general description of your own source(s) of supply. _____

5. Is the use of your water right constrained by other restrictions or regulations (such as instream flow requirements, place of use or point of withdrawal requirements, sustainability issues, etc.)?

☐ Yes ☐ No

If yes, please describe:_____

6. Considering the above constraints, what is the maximum sustainable supply available from your source(s)?

_____

Please specify period (year, peak month, peak week, peak day) and units (af, mg, or mgd)

7. Do you have infrastructure-related constraints in meeting your existing or future demand?

☐ Yes ☐ No

If yes, please describe:_____

8. Are you planning to take any action that would change the amount of water that can be delivered from your currently developed source(s)?

☐Yes - Increase ☐Yes - Decrease ☐No

If increase or decrease, when?_____

and by how much? Annual:_____

Peak Day:_____

Please describe the action(s)_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

9. Are you planning to develop *additional* sources in the future? ☐ Yes ☒ No

If yes, does this require a new water right? ☐ Yes ☐ No

Does this require a transfer from an existing right? ☐ Yes ☐ No

Will the source(s) be ☐ Ground water? ☐ Surface water? ☐ Both?

When do you anticipate the new source(s) will be brought on line?_____

How much will this increase water available for use? Annual:_____

Peak Day:_____

Please describe the new source(s)_____

_____

_____

_____

_____

_____

_____

_____

_____

SUPPLY AND DEMAND

12. In what year do you think water *available* from your *current* supply sources (including water you can purchase from others) would no longer be sufficient to meet forecast demand?

2014

13. In that year, would the difficulty be in meeting
- [x] Peak day demand
- [x] Peak week demand
- [x] Peak month
- [ ] Annual demand

14. Is there anything else you think we should know about your supply system but about which we haven't asked? If so, please tell us in the space below.

City of Tukwila

Washington

Resolution No. 1339

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, AUTHORIZING THE MAYOR TO EXECUTE AN INTERLOCAL AGREEMENT TO JOIN THE INTERIM WATER GROUP.

WHEREAS, three caucuses representing the King County Water Alliance, the City of Seattle and the Suburban Cities Association (the "Tri-Caucus") have met since 1993 to discuss and to propose action with regard to the future of water supply and planning for the region; and

WHEREAS, the Tri-Caucus has reached agreement on several key issues as memorialized in the Regional Water Supply Governance Accord dated March 24, 1993; the Resolution of Intent Regarding Regional Water Supply Governance dated December 8, 1993; the Water Governance General Agreement of Principles dated December 14, 1994; and most recently, the Principles Regarding the Relationship Between Seattle and the New Entity and Guiding Vision statement dated August 30, 1995 which defines the relationship between the City of Seattle and a proposed new water supply governance organization ("New Entity"); and

WHEREAS, certain parties desire to create an interim group by interlocal agreement composed of water purveyors and other interested municipalities to focus on the organizational and financial structure of the New Entity; and

WHEREAS, the purpose of such interlocal agreement is to provide a mechanism for the accumulation of financial resources to retain professional assistance for the purpose of developing a framework for the New Entity, negotiating a final agreement between Seattle and the New Entity, developing financial date to assess impacts of various proposals, provide a focus for negotiations with Tacoma on the Second Supply and to assist in implementing and carrying out the principals agreed to by the Tri-Caucus; and

WHEREAS, the City of Tukwila desires to participate as a member of the Interim Water Group pursuant to said interlocal agreement;

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, HEREBY RESOLVES AS FOLLOWS:

Section 1. The Mayor is authorized to execute that certain Interlocal Agreement for the Interim Water Group.

PASSED BY THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, at a regular meeting thereof this 18th day of December, 1995.

Allan Ekberg, Council President

ATTEST/AUTHENTICATED:

Jane E. Cantu

City of Tukwila

6200 Southcenter Boulevard • Tukwila, Washington 98188 Steven M. Mullet, Mayor

June 9, 2000

Ms. Diane Gale, Director
Seattle Public Utilities
Dexter Horton Bldg., 10th Floor
710 Second Avenue
Seattle, WA 98104

Re: Authorization to Negotiate

Dear Ms. Gale:

The City of Tukwila is a member of the Cascade Water Alliance, a public non-profit corporation organized under chapter 24.03 RCW, and the Interlocal Cooperation Act, chapter 39.34 RCW, to develop water supply, engage in water supply planning and negotiate a wholesale supply agreement with the City of Seattle.

The Board of Directors of the Cascade Water Alliance has on behalf of its members, begun negotiations with the City of Seattle for a wholesale water supply contract to replace the existing "Purveyor Contracts". Such negotiations are within the mandate of Cascade, as expressed in its Interlocal Contract, and the City of Tukwila supports Cascade in its efforts to negotiate a new contract. In these negotiations, Cascade is acting upon and with the authorization of the City of Tukwila.

Very truly yours,

Steven M Mullet

Steve M. Mullet
Mayor

cf: Michael A. Gagliardo
Cascade Water Alliance

RECEIVED
JUN 14 2000
BY:_____

April 10, 2000

Pat Brodin
City of Tukwila
600 Minkler Boulevard
Tukwila, WA 98188

Dear Mr. Brodin:

When the City of Tukwila accepted membership in the Cascade Water Alliance, the delivery of an executed Assignment and Assumption of Water Purveyor Contract With Seattle document was required, along with execution and approval of the Interlocal Contract and other membership conditions. It was the intention of Cascade to hold the Assignment and Assumption documents until the proposed water supply agreement with the City of Seattle was executed.

The proposed water supply agreement, which provided the basis for the Assignment and Assumption document delivered to Cascade, is no longer being perused. A review of the Assignment and Assumption document indicates that this document is specific to implementing that proposed agreement. The Membership Committee, in developing proposed amendments to the Interlocal Contract and the Resource Planning Committee, in developing concepts and principles for a water supply and transmission agreement with Seattle, note that the timing and nature of the Seattle agreement now under development will determine required actions related to Cascade Member Seattle Purveyor Contracts.

Therefore, I am returning to you the original Assignment and Assumption documents delivered to Cascade by the City of Tukwila. The documents are have not been fully executed and Cascade has not retained any originals. As the contract negotiation process with Seattle progresses, we will discuss the need for, substance and timing of a similar agreement to transfer or assign rights under Seattle Purveyor Contracts to Cascade.

If you have any questions, please contact me.

Sincerely,

Michael A. Gagliardo,
General Manager

CC: Michael Ruark

1309 114th Avenue S.E. — Suite 300 — Bellevue, WA 98004
Ph: (425) 453-0930 — Fax: (425) 453-0953

The Interim Water Group Forming

Cascade Water Alliance

P.O. Box 1923
Bothell, WA 98041-1923
Ph: (425) 820-4544

March 10, 1999

Ted Freemire
City of Tukwila
600 Minkler Blvd.
Tukwila WA 98188

Dear Mr. Freemire:

Your Cascade Water Alliance membership offer is ready for acceptance. The nine steps necessary to finalize membership in Cascade Water Alliance are outlined on the front page of the membership proposal. A fresh copy of the CWA Interlocal Contract (including 2nd Amendment) is also provided for the City of Tukwila to sign as part of the membership approval process, as well as the "Assignment and Assumption" of your purveyor contract.

Congratulations! The City of Tukwila will become one of the first official Cascade Water Alliance members. You and your board have worked hard to bring the region to this point, and it is a significant step for all. We especially appreciate your contribution to the formation process.

Please call me if you have further questions or suggestions. I am looking forward to this major step for regional governance.

Sincerely,

Gwenn Maxfield
Interim Director

Enclosures

IWG
Interim Water Group

Dated: March 3, 1997

To: City of Tukwila
600 Minkler Blvd.
Tukwila, WA 98188

Attention: Ted Freemire, Public Works Operations Mgr.

Subject: NOTICE OF ASSESSMENT NO. 4

This Notice of Assessment serves as written notice of a proposed assessment. Acknowledgment of this notice, in writing, will establish your amount of commitment and date for payment of the assessment.

Pursuant to the Interim Water Group By-Laws (the "By-Laws"), Section 4.2., within 60 days of this written notice, members shall notify the Board in writing of their commitment to such assessment. Commitments may be for all or any portion of the proposed assessment.

Upon a commitment to pay the assessment, members shall have 60 days from the date of commitment to pay the assessment.

In accordance with the By-Laws, if no written commitment is received by the Board within 60 days of this written notice, the Board shall assume that the Member has made no commitment for any portion of the proposed assessment. At that time, the Board may solicit voluntary contributions from members for those portions of assessments that members choose not to pay.

Assessments are based upon members' average annual retail water sales for the previous calendar year measured in million gallons per day (mgd) to the nearest tenth of an mgd. Your assessment for this period is: $2,695, based upon 1.8 mgd.

Please indicate, in writing, within 60 days of the date of this notice, your commitment to this assessment. At that time, but not to exceed 60 days from this letter, an invoice for payment will be issued.

P.O. Box 1923
Bothell, WA 98041-1923
Ph: (206) 820-4544
Fax: (206) 821-7192

City of Tukwila

6200 Southcenter Boulevard • Tukwila, Washington 98188

John W. Rants, Mayor

RECEIVED 3-4-97

February 28, 1997

Gwenn Maxfield, IWG Chair
Interim Water Group
P.O. Box 1923
Bothell, WA 98041-7192

Dear Ms. Maxfield;

I have appointed Council Member Jim Haggerton as the City of Tukwila representative of the Interim Water Group. Ted Freemire, Public Works Operations Manager will be the alternate member.

You can reach these individuals at:

Jim Haggerton
Council Person
6200 Southcenter Blvd.
Tukwila, WA 98188

Ted Freemire
PW Operations Manager
600 Minkler Blvd.
Tukwila, WA 98188
(206) 433-1861

Please forward all correspondence to these members. Thank you.

Sincerely,

John W. Rants

John "Wally" Rants
Mayor

cc: Jim Haggerton
Ted Freemire

City of Tukwila
John W. Rants, Mayor
Department of Public Works
Ross A. Earnst, P. E., Director

October 23, 1996

RECEIVED 1616 10-25-96

Mr. Cliff Harshman
Interim Water Group
P.O. Box 1923
Bothell, WA 98041-1923

Re: Assessment No. 3

Dear Mr. Harshman:

In response to the October 1, 1996, memorandum concerning the Notice of Assessment No. 3, the City of Tukwila would like to purchase the remaining shares as referenced. This decision was reached after review by the Mayor and the City Council Utility Committee.

If you have any questions concerning this matter, please contact me or the City Engineer, Ron Cameron at 433-0179. Thank you.

Sincerely,

Ross A. Earnst, PE
Public Works Director

cf: Ron Cameron, City Engineer

IWG
Interim Water Group

Dated: October 1, 1996

To: City of Tukwila
6200 Southcenter Blvd.
Tukwila, WA 98188

Attention: Ron Cameron

Subject: NOTICE OF ASSESSMENT NO. 3

This Notice of Assessment serves as written notice of a proposed assessment. Acknowledgment of this notice, in writing, will establish your amount of commitment and date for payment of the assessment.

Pursuant to the Interim Water Group By-Laws (the "By-Laws"), Section 4.2., within 60 days of this written notice, members shall notify the Board in writing of their commitment to such assessment. Commitments may be for all or any portion of the proposed assessment.

Upon a commitment to pay the assessment, members shall have 60 days from the date of commitment to pay the assessment.

In accordance with the By-Laws, if no written commitment is received by the Board within 60 days of this written notice, the Board shall assume that the Member has made no commitment for any portion of the proposed assessment. At that time, the Board may solicit voluntary contributions from members for those portions of assessments that members choose not to pay.

Assessments are based upon members' average annual retail water sales for the previous calendar year measured in million gallons per day (mgd) to the nearest tenth of an mgd. Your assessment for this period is: $7,784 based upon 1.8 mgd.

Please indicate, in writing, within 60 days of the date of this notice, your commitment to this assessment. At that time, but not to exceed 60 days from this letter, an invoice for payment will be issued.

P.O. Box 1923
Bothell, WA 98041-1923
Ph: (206) 820-4544
Fax: (206) 821-7192

IWG
Interim Water Group

P.O. Box 1923
Bothell, WA 98041-1923
Ph: (206) 820-4544
Fax: (206) 821-7192

Solicitation for Voluntary Contributions

Dated: August 23, 1996

To: City of Tukwila
6200 Southcenter Blvd.
Tukwila, WA 98188

Attention: Ron Cameron

This Solicitation for Voluntary Contributions is a request for interest in portions of dues and assessments that members chose not to pay, and therefore, in accordance with the Interim Water Group By-Laws, Section 4.2., are made available to other members.

The total amount of dues and assessments not paid from Assessment No. 1 and available for voluntary contributions is: **$3,718**.

Please indicate, in writing, within 30 days of the date of this request, the dollar amount of your interest in this voluntary contribution opportunity. At the end of the 30 day period, voluntary contributions shall be accepted by the Board from members in order of size, from the smallest to the largest, based upon average annual retail water sales for the previous calendar year, until the amount available is totally subscribed.

Letters of interest should be mailed to:

Interim Water Group
Attn: Cliff Harshman, Secretary/Treasurer
P.O. Box 1923
Bothell, WA 98041-1923

City of Tukwila

Washington

Resolution No. 1441

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, APPOINTING CITY COUNCIL MEMBERS TO BOARDS AND COMMITTEES FOR THE YEAR 2000.

WHEREAS, through representation at meetings, Tukwila has played a bigger role in regional and national meetings in recent years; and

WHEREAS, various Council members are active in many different local, regional and national groups as the representative or the alternate from Tukwila; and

WHEREAS, many of these groups need special notification of appointments to their committee for their records; and

WHEREAS, by appointing these members by resolution and then notifying those groups of the official appointments, there will be no confusion about who represents Tukwila;

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, HEREBY RESOLVES AS FOLLOWS:

Section 1. Appointments.

A. The following members are appointed as the City's representatives and alternates to the committees for the year 2000 as shown here:

1. South County Transportation Board ..... *Pam Carter*
2. Human Services Roundtable..... *Pam Linder*
3. South King County Human Services Forum..... *Pam Linder*
4. Cascade Water Alliance ..... *Jim Haggerton*
   Pam Carter, alternate
5. Airport Coalition Cities ..... *Jim Haggerton*
   Pam Carter, alternate
6. Regional Effort to Achieve Community Housing ..... *Joan Hernandez*
   Richard Simpson, alternate
7. Lodging Tax Advisory Committee ..... *Joe Duffie, Joan Hernandez*
8. Part 150 Study for Boeing Field..... *Pam Linder*
   Joe Duffie, alternate

B. These appointments will remain in effect until the term is finished, the year ends, or another appointment replaces these original appointments.

PASSED BY THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, at a Regular Meeting thereof this 20th day of March, 2000.

Joe Duffie, Council President

City of Tukwila

Washington

Resolution No. 1418

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, DESIGNATING STEVE MULLET AS REPRESENTATIVE, JIM HAGGERTON AS FIRST ALTERNATE, AND PAM CARTER AS SECOND ALTERNATE, TO SERVE ON THE CASCADE WATER ALLIANCE.

WHEREAS, the City Council of the City of Tukwila has voted to accept membership to the Cascade Water Alliance; and

WHEREAS, the City of Tukwila has officially designated a representative to said committee;

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, HEREBY RESOLVES AS FOLLOWS:

Section 1. Steve Mullet is hereby designated as the representative of the City of Tukwila to the Cascade Water Alliance, Jim Haggerton is hereby designated as first alternate, and Pam Carter is hereby designated as second alternate to said alliance.

Section 2. A copy of this resolution shall be forwarded to the Cascade Water Alliance in care of Gwen Maxfield, Cascade Water Alliance, P.O. Box 1923, Bothell, Washington 98041-1923.

PASSED BY THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, at a Regular Meeting thereof this 3rd day of May, 1999.

Dave Fenton, Council President

ATTEST/AUTHENTICATED:

Jane E. Cantu, CMC, City Clerk

City of Tukwila

Washington

Resolution No. 1417

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, AUTHORIZING THE MAYOR TO SIGN CASCADE WATER ALLIANCE INTERLOCAL CONTRACT, AND ASSIGNMENT AND ASSUMPTION OF WATER PURVEYOR CONTRACT WITH SEATTLE.

WHEREAS, since 1993, elected officials from the City of Seattle, the Suburban Cities Association, and the King County Water Alliance have engaged in a facilitated negotiation to identify a new governance arrangement that would promote the cooperative use of water and enable the development of new regional water supplies; and

WHEREAS, an arrangement encouraging discussion among three major partners in the region's water supply—the King County Water Alliance, Seattle Caucus, and the Suburban Cities Caucus ("Tri-Caucus")—was established; and

WHEREAS, on August 30, 1995, the participants in that process executed a "Tri-Caucus Agreement of principles regarding the relationship between Seattle and the new Entity (Cascade Water Alliance)," which provided for cooperative planning, development, and management of regional water supplies; and

WHEREAS, agencies are now proceeding to create, by interlocal contract, the Cascade Water Alliance, an intergovernmental body that will further the interests of its members while working cooperatively with other water supply entities in the region; and

WHEREAS, the Cascade Water Alliance is an organization of municipalities formed for the purpose of obtaining and developing supplies of water for its members; and

WHEREAS, the City of Tukwila is a municipality that supplies water to residents and customers within (and without) its municipal boundaries; and

WHEREAS, an offer has been extended to the City of Tukwila to join the Cascade Water Alliance; and

WHEREAS, a water audit has been completed for the City of Tukwila; and

WHEREAS, the City Council of the City of Tukwila has voted to join the Cascade Water Alliance in order to assure its residents and customers continued water supply, and allow the City of Tukwila to actively participate in the operational planning and decisions of regional water system issues;

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, HEREBY RESOLVES AS FOLLOWS:

Section 1. Application to Cascade Water Alliance.

A. The Mayor of the City of Tukwila is authorized on behalf of the City to execute the Cascade Water Alliance Interlocal Contract, a copy of which contract has been assigned Number 99-073 in accordance with the terms and conditions of the application process adopted by the Cascade Water Alliance.

B. The Mayor of the City of Tukwila is authorized on behalf of the City to execute that certain Assignment and Assumption of the Water Purveyor Contract with the City of Seattle, a copy of which Contract has been assigned Number 99-072.

PASSED BY THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, at a Regular Meeting thereof this 3rd day of May, 1999.

Dave Fenton, Council President

ATTEST/AUTHENTICATED:

Jane E. Cantu, CMC, City Clerk

APPROVED AS TO FORM:

By: _____
Office of the City Attorney

Filed with the City Clerk: 4-29-99
Passed by the City Council: 5-3-99
Resolution Number 1417

20130715-00

2ND AMENDED AND RESTATED

DECLINING BLOCK

WATER SUPPLY AGREEMENT BETWEEN

THE CITY OF SEATTLE

AND

THE CASCADE WATER ALLIANCE

July 15, 2013

TABLE OF CONTENTS

LIST OF SECTIONS

LIST OF EXHIBITS

2nd AMENDED AND RESTATED
DECLINING BLOCK
WATER SUPPLY AGREEMENT BETWEEN
THE CITY OF SEATTLE
AND
THE CASCADE WATER ALLIANCE

This 2nd amendment to and restatement of the Declining Block Water Supply Agreement between the City of Seattle, a municipal corporation ("Seattle"), and the Cascade Water Alliance, a joint municipal utility services authority formed under authority of Chapter 39.106 RCW ("Cascade"), is dated and effective this 15th day of July, 2013 ("Agreement").

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, in 2004, the Cascade Water Alliance and Seattle entered into a 50-year Declining Block Water Supply Agreement, which was amended and restated in 2008; and

Whereas, in 2012, Cascade converted from a non-profit corporation formed under the Interlocal Cooperation Act to a municipal corporation under the Joint Municipal Utility Services Act, Chapter 39.106 RCW; and

Whereas, regional municipal water supply forecasts show a demand growing more slowly than previously forecast over the next 50 years resulting in an opportunity to reconsider future supply planning by both Parties; and

Whereas, after meeting the demands of its existing retail and wholesale customers, Seattle has water supply available to sell for a defined period with minimal risk of triggering the need for new supply development prior to 2060; and

Whereas, Cascade has determined that it can defer development of its Lake Tapps water right by purchasing additional block water from Seattle for a defined period and using its members' independent supplies; and

Whereas, temporary sales of additional block water from Seattle to Cascade would bring additional revenue into the Seattle system and allow Cascade to defer substantial capital investment to develop its Lake Tapps water right into the future; and

Whereas, Cascade and Seattle desire to amend the 2008 Amended and Restated 50-year Declining Block Supply Water Supply Agreement to restructure the supplemental block of water through 2023, to extend the total block of water from 2024 through 2044 and to restructure the declining block increments, all of which are mutually beneficial to the Parties and their respective customers by maximizing existing resources and stabilizing rate paths; and

Whereas, the Parties intend that this amendment to the Agreement continue the existing structure as a declining block contract based on the expectation that Cascade will develop its own independent supply and that Seattle will have no further obligation to provide additional water to Cascade during or beyond the amended term of this Agreement.

Now therefore, Seattle and Cascade agree to the following terms and conditions for the provision and purchase of a 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 January 1, 2004 through December 31, 2063.

Beginning January 2020, and again each January at 5-year intervals, either Cascade or Seattle may request consideration of further extension of the supply commitment. Neither Party is obligated to agree to such discussion or any related extension or other amendment; and any extension or amendment would be subject only to terms negotiated at the time of such written amendment to this Agreement in accordance with Section 9.4.

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 Seattle 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

8 MGD Wholesale Water Supply. All or any portion of the 8 MGD Wholesale Water Supply as that term is defined in the Amended and Restated Agreement for the Sale of Wholesale Water between Cascade and the City of Tacoma, dated December 31, 2012. The Parties understand and agree that the 4 MGD and 6 MGD Wholesale Water Supplies under that same agreement are not covered by this Agreement as they would be wholesale sales by the City of Tacoma, not Cascade.

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.

Base Block. The amount of water Seattle commits to supply Cascade beginning on January 1, 2004 through the termination date of this Agreement, as specifically scheduled in Section 3.4 A.

Cascade Block. The total amount of water Seattle commits to supply Cascade under this Agreement, composed of the Base Block and the Supplemental Block, as more fully expressed in Article III.

Cascade Member. A Member of Cascade as that term is defined in the Cascade Water Alliance Joint Municipal Utility Services Agreement, dated March 28, 2012, as it may be amended from time to time.

Cascade Points of Delivery. Seattle owned and operated specific metered delivery locations serving Cascade Members as listed in Exhibit II, at which Seattle provides a defined level of service, beginning from the outlet from the supply pipeline to the end of the Seattle meter vault, including the water meter and associated appurtenances.

Cascade Sub-regional System. Seattle owned and operated Transmission System assets serving Cascade Members as listed in Exhibit VII.

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 owned and operated Supply System assets as listed in Exhibit IV.

Existing Transmission System Facilities. Seattle owned and operated 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 Agreement, Seattle's Firm Yield is 171 MGD, unless modified pursuant to Section 3.2.

Full or Partial Requirements Customer Commodity Charge. The rate charged per 100 cubic feet (ccf) to wholesale customers served under Full or Partial Requirements Contracts in accordance with Seattle Municipal Code (SMC) 21.04.440.E.2, as it may be amended from time to time.

Management Agreement. A written agreement, pertaining to subjects authorized by this Agreement, between the Director, Seattle Public Utilities, and the Chief Executive Officer ("CEO"), 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 Month Factor. Average Daily Demand multiplied by 1.69

Peak Season. June 1 through September 30.

Peak Season Factor. Average Daily Demand multiplied by 1.35

Rate of Return on Investment. The average cost of debt of the Seattle water system plus 1.5 percent.

Seattle's Service Area Boundary. Seattle's then-current designated place of use of Seattle's water certificates, permits, claims or service area under Seattle's approved water system plan at the time of the sale in accordance with applicable state law.

Seattle Water System. All Seattle owned and operated water rights and claims and all Seattle owned and operated facilities, including the Seattle Existing Supply System Facilities as listed in Exhibit IV, the Seattle Existing Transmission System Facilities as listed in Exhibit V, Cascade and other Sub-regional Facilities and Points of Delivery, together comprise the Seattle Water System.

Sub-regional Facilities. Any facilities owned and operated by Seattle that are not identified as Existing Supply System Facilities (Exhibit IV), Existing Transmission System Facilities (Exhibit V), or Cascade Sub-regional System (Exhibit VII).

Supplemental Block. The amount of water Seattle commits to supply Cascade beginning on January 1, 2009 through December 31, 2044, as specifically scheduled in Section 3.4 B.

White River – Lake Tapps Reservoir Project. Cascade's project to develop a new municipal drinking water supply in the future from the White River and Lake Tapps under water rights issued in 2010 under Permit Nos. S2-29920(A) and (B), S2-29934, R2-29935, and Claim No. 160822, as more particularly defined in Cascade's approved Transmission and Supply Plan.

ARTICLE III - SUPPLY

3.1 A. Each calendar year from the effective date of this Agreement, Seattle shall make available to Cascade the Base Block, according to the schedule set forth in Section 3.4 A.

B. Each calendar year commencing January 1, 2009 and terminating on December 31, 2044, Seattle shall make available to Cascade the Supplemental Block, according to the schedule set forth in Section 3.4 B.

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, unless the Parties mutually agree by Management Agreement to a different reduction or no reduction to the Cascade Block if it is in each their best interests at the time. In the event of any reduction to the Cascade Block, the Base and Supplemental Blocks will be reduced in the same proportion, as appropriate. 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, Seattle shall make available the Cascade Block multiplied by the Peak Season Factor.

B. During the Peak Month, Seattle shall make available the Cascade Block multiplied by the Peak Month Factor.

3.4

A. The Base Block shall be supplied in accordance with the following schedule:
   1. Beginning January 1, 2004 through December 31, 2023, Seattle shall make available to Cascade 30.3 MGD Average Daily Demand.
   2. Beginning January 1, 2024 through December 31, 2029, Seattle shall make available to Cascade 29.3 MGD Average Daily Demand.
   3. Beginning January 1, 2030 through December 31, 2034, Seattle shall make available to Cascade 26.8 MGD Average Daily Demand.
   4. Beginning January 1, 2035 through December 31, 2045, Seattle shall make available to Cascade 24.3 MGD Average Daily Demand.
   5. Beginning January 1, 2046, Seattle shall make available to Cascade 23.3 MGD Average Daily Demand, and on each January 1 thereafter through December 31, 2063, the amount will decline by 1 MGD Average Daily Demand until it reaches5.3 MGD Average Daily Demand.
   6. Beginning January 1, 2064, Seattle shall make available to Cascade up to 5.3 MGD Average Daily Demand in accordance with Section 3.5.

B. The Supplemental Block shall be supplied in accordance with the following schedule:
   1. Beginning January 1, 2009 through December 31, 2023, Seattle shall make available to Cascade 3.0 MGD Average Daily Demand.
   2. Beginning January 1, 2024 through December 31, 2029, Seattle shall make available to Cascade 4.0 MGD Average Daily Demand.
   3. Beginning January 1, 2030 through December 31, 2034, Seattle shall make available to Cascade 6.5 MGD Average Daily Demand.

4. Beginning January 1, 2035 through December 31, 2039 Seattle shall make available to Cascade 9.0 MGD Average Daily Demand.
5. Beginning January 1, 2040 through December 31, 2040 Seattle shall make available to Cascade 7.0 MGD Average Daily Demand.
6. Beginning January 1, 2041 through December 31, 2041 Seattle shall make available to Cascade 5.0 MGD Average Daily Demand.
7. Beginning January 1, 2042 through December 31, 2042 Seattle shall make available to Cascade 3.0 MGD Average Daily Demand.
8. Beginning January 1, 2043 through December 31, 2043 Seattle shall make available to Cascade 2.0 MGD Average Daily Demand.
9. Beginning January 1, 2044 through December 31, 2044 Seattle shall make available to Cascade 1.0 MGD Average Daily Demand.

3.5 Beginning January 1, 2064, 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 by providing written notice to Seattle by December 31, 2062, specifying the Block of water from zero to 5.3 MGD and the Cascade Members to be served by that Block. If Cascade exercises this right, the parties shall enter into a separate agreement.

3.6

A. All water supplied to Cascade under this Agreement is provided with the intent to serve Cascade Members' retail customers without limitation.

B. Cascade or Cascade Members may sell water supplied under this Agreement, or water from their respective independent supplies offset by water supplied under this Agreement, for wholesale purposes to non-Cascade Members only as follows:

1. For temporary emergency purposes under those specific emergency intertie agreements identified in Exhibit I.

2. To wholesale customers of Cascade or a Cascade Member, as of January 31, 2013. The parties will amend Exhibit I by Management Agreement by August 1, 2013 to reflect all of the non-Cascade Members being served under this provision.

3. Within Seattle's Service Area Boundary, except for then-current Seattle Wholesale Customers, provided that: (a) Cascade obtains Seattle's prior written consent; and (b) an equivalent amount of the Base Block will be converted to Supplemental Block and charged in accordance with Section 8.8 from the effective date of the sale. Seattle's consent may be subject to conditions Seattle deems reasonably necessary to protect the Seattle Regional Water Supply System. This provision

will not apply to any wholesale sales authorized under other provisions of this Section 3.6.

4. Outside of Seattle's Service Area Boundary, provided that: (a) Cascade provides advance written notice to Seattle in a form mutually agreed by the Parties by Management Agreement; and (b) an equivalent amount of the Base Block will be converted to Supplemental Block and charged in accordance with Section 8.8 from the effective date of the sale.

5. From the 8 MGD Wholesale Water Supply from the City of Tacoma or water supplies from Cascade's White River - Lake Tapps Reservoir Project, except not to then-current Seattle Wholesale Customers, provided that: (a) Cascade provides advance written notice to Seattle in a form mutually agreed by the Parties by Management Agreement; and (b) an equivalent amount of the Base Block will be converted to Supplemental Block and charged in accordance with Section 8.8 from the effective date of the sale.

6. To then-current Seattle Wholesale Customers provided that: (a) Cascade obtains Seattle's prior written consent; and (b) the full amount of the Base Block will be converted to Supplemental Block and charged in accordance with Section 8.8 from the effective date of the sale. Seattle's consent may be subject to conditions Seattle deems reasonably necessary to protect the Seattle Regional Water Supply System.

7. Offsets. For the purposes of this Section 3.6 B, the Parties understand and agree that any wholesale sales made by Cascade or a Cascade Member prior to the full implementation and delivery of water supplies from Phase 2 of Cascade's White River – Lake Tapps Reservoir Project, as more particularly defined in Cascade's 2012 Transmission and Supply Plan, are made with water supplied under this Agreement or water from Cascade or Cascade Member's respective independent supplies offset by water supplied under this Agreement and that the applicable provisions of this Section 3.6 B apply to such wholesale sales. After the full implementation and delivery of water supplies from Phase 2 of Cascade's White River – Lake Tapps Reservoir Project, the Parties understand and agree that the applicable provisions of this Section 3.6 B will apply unless Cascade demonstrates and Seattle agrees that a particular wholesale sale by Cascade or a Cascade Member is from surplus independent supplies without offset by water supplied under this Agreement.

3.7 All water supplied under this Agreement must be used within Seattle's Service Area Boundary.

3.8 During the term of this Agreement, if a Seattle Wholesale Customer identified in Exhibit III becomes a Cascade Member, Seattle will release that customer from its obligations

under its existing water supply contract with Seattle in accordance with the provisions of such contract and the Supplemental Block will be increased by the allocated block of water identified in Exhibit III for that customer, with a corresponding proportional increase to any adjustments or limitations to the Cascade Block under Sections 3.3, 3.4 and 3.14. If that entity takes delivery of all or a portion of its water through a Sub-regional Facility, Cascade and Seattle shall enter into a Management Agreement to include the costs of such facility under this Agreement prior to increasing the Supplemental Block.

3.9 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.

3.10 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.

3.11 Average Daily Demand for a calendar year may be calculated by using the monthly meter readings around the 20th of each month from February through December of that calendar year plus a prorated amount for the number of days in January from the January meter read in that calendar year plus a prorated amount for the number of days in December from the January meter read in the following calendar year and dividing the total deliveries during such time by the actual number of days in that calendar year. The year-end prorations used to calculate ADD may be adjusted by Management Agreement based on changed meter reading procedures.

3.12 Seattle shall endeavor to read the meters at all Cascade Points of Delivery on the same day. In the event that meters at any Cascade Point 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.

3.13 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.

3.14 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 Points of Delivery. Adjustments in the Cascade Block shall result in an equivalent adjustment in Seattle's Transmission capacity commitment. The specific Cascade Points of Delivery that are to be adjusted and the adjustment for each Cascade 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. Cascade Points of Delivery are specifically identified in Exhibit II. The Parties may amend the location, hydraulic gradient and instantaneous flows at each Cascade Point of Delivery by Management Agreement.

C. Seattle shall supply water at the inlet side of each Cascade 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 Cascade 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 changes to existing or additional Cascade Points of Delivery from the Existing Transmission System Facilities, which Seattle may approve or reject at its

sole discretion. Seattle shall establish the minimum hydraulic gradient for any new Cascade Point of Delivery at its sole discretion, after consultation with Cascade. The Parties may amend Exhibit II to reflect the changes in or additional Cascade Points of Delivery under this section 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 Cascade 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 Cascade 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. The Parties may amend Exhibit VII by Management Agreement.

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. The Parties may amend Exhibit I by Management Agreement. 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.

4.5 A. Transmission Wheeling. Seattle, at its discretion, may make excess transmission capacity available for a fee and under conditions it deems reasonable, for purposes of wheeling other water supply between points within the Seattle Water System to Cascade or others.

B. Interconnection/Intertie.

1. In the event Cascade requests an interconnection to the Seattle Water System to take delivery of any other water supplied to Cascade under separate water supply contracts or arrangements, Cascade shall, at its expense, be responsible for the design, engineering, permitting and construction of any and all infrastructure necessary to interconnect to the Seattle Water System. Any interconnection to the Seattle Water System or intertie between the Seattle Water System and another water supply system will be subject to Seattle's review, approval and such conditions and requirements as Seattle and the other

water supply system owner may determine to be reasonably necessary in order to provide and maintain the safe and efficient design, function, capacity, water quality, integrity and reliability of their respective water supply systems.

2. Seattle may request that the interconnection allow for joint use for Seattle's purposes subject to mutually agreed upon terms.

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. Cascade understands and agrees that as an existing wholesale customer of Seattle, this commitment includes good faith efforts in meeting the intent of Part 1, Section B.1.5 of the Settlement Agreement between the Muckleshoot Indian Tribe and the National Marine Fisheries Services and the City of Seattle (Civ. No. 03-3775JLR), by implementing, through its own water conservation program(s), conservation measures that provide comparable savings to those implemented by Seattle within the Seattle Retail Distribution System.

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. In that event, the Base and Supplemental Blocks will be reduced or restricted in the same proportion, as appropriate.

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. The parties understand and agree that the cost allocation and recovery provisions were specifically negotiated and based on specific consideration of the circumstances of this extended and restructured declining block contract, including but not limited to the limitations and restrictions applied in this Agreement, recognition of protection against stranded costs in the Seattle Water System, and recognition of the anticipated savings from Cascade's deferred capital project expenditures.

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 Existing Supply System Facilities listed in Exhibit IV shall be included in the Existing Supply Cost Pool. The Parties may amend Exhibit IV by Management Agreement.

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 Regional Conservation Program shall be included in the New Supply Cost Pool. If any portion of a New Supply Resource project enhances reliability of Existing Supply System 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 Existing Transmission System Facilities listed in Exhibit V and may include costs related to Cascade Points of Delivery in accordance with this Agreement or as mutually agreed by Management Agreement to address third party claims arising from a Cascade Point of Delivery. Costs incurred for purposes of transmission reliability may be included in the Existing Transmission Cost Pool by

Management Agreement. The Parties may amend Exhibit V 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 System 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 operating, maintaining, repairing, replacing, relocating, adding or improving Cascade Points of Delivery for any reason other than Section 8.4.A shall be borne by Cascade, except to the extent that such costs are due to the negligence of Seattle. Costs will be invoiced and due in 30 days upon receipt or as otherwise provided for by Management Agreement as provided in Article X. 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. Allocation of costs related to third party claims arising from Cascade Points of Delivery may be handled pursuant to a Management Agreement.

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 System Facilities, all Existing Transmission System 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, as it may be updated from time to time by Management Agreement, 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, as it may be updated from time to time by Management Agreement.

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 For the Base Block, 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 Base Block and the costs in the Existing Supply Cost Pool divided by the Firm Yield. In the event the 171 MGD Firm Yield is modified downward in accordance with Section 3.2 , this allocation formula will use the Base Block, whether reduced or not, and the modified Firm Yield. In the event the 171 MGD Firm Yield is modified upward (with no change in the Base Block), this allocation formula will continue to use the existing 171 MGD Firm Yield. The Parties understand and agree the intent of this provision is that Cascade will pay a consistent percentage of system costs regardless of modifications of Firm Yield unless the parties

subsequently mutually agree to an alternative reduction to the Cascade Block pursuant to Section 3.2.

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 Base Block and the costs in the Existing Transmission Cost Pool divided by the Firm Yield. In the event the 171 MGD Firm Yield is modified downward in accordance with Section 3.2, this allocation formula will use the Base Block, whether reduced or not, and the modified Firm Yield. In the event the 171 MGD Firm Yield is modified upward (with no change in the Base Block), this allocation formula will continue to use the existing 171 MGD Firm Yield. The Parties understand and agree the intent of this provision is that Cascade will pay a consistent percentage of system costs regardless of modifications of Firm Yield unless the parties subsequently mutually agree to an alternative reduction to the Cascade Block pursuant to Section 3.2.

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 For the Supplemental Block, Cascade shall pay the then current Full or Partial Requirements Customer Commodity Charge. The Full or Partial Requirements Customer Commodity Charge shall be applied to the annual volume of the Supplemental Block allocated by month in accordance with the schedule in Section 8.10 C. Seattle will provide Cascade 30 days' advance notice of any proposed changes to the Full or Partial Requirements Customer Commodity Charges. For months that include a rate change, the charge shall be prorated in accordance with the effective date of the rate change.

8.9 Cascade shall pay the costs of penalties for exceeding the Cascade Block, as defined in Section 8.11 and any other costs requiring invoice by Seattle within 30 days of invoice by Seattle. Overdue balances shall bear interest at the rate of 1% per month.

8.10 Cascade shall pay the annual costs allocated to Cascade in accordance with Section 8.7 for the Base Block and 8.8 for the Supplemental Block as follows:

A. Prospective Cost Estimate for the Base Block. Seattle may conduct a cost estimating study to revise estimates of the annual costs allocable to Cascade for the Base Block

upon 120 days notice to Cascade. Cascade shall pay Seattle for the Base Block 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 the Base Block not less than the five following years.

B. Statement of Annual Costs. On or before October 1st of each year, Seattle shall provide Cascade with its best, non-binding estimate of the annual costs for the Base and Supplemental Blocks for the next year. On or before December 1st of each year, Seattle shall notify Cascade of Cascade's annual costs for the Base and Supplemental Blocks for the next year. For the Base Block, such annual cost shall be the sum of the prospective cost estimate determined in accordance with Section 8.10 A and the amount of excess or deficit identified in the most recent cost audit performed in accordance with Section 8.10 D. For the Supplemental Block, such annual cost shall be in accordance with Section 8.8. In the event the Full or Partial Requirements Customer Commodity Charges change during the year, Seattle will provide Cascade with an updated cost estimate for the Supplemental Block for the remainder of that 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 8.10 B for the Base Block and Section 8.8 for the Supplemental Block, 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 for the Base Block. No later than August 1 of each year, Seattle shall provide a statement of actual costs for the Base Block 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 for the Base Block made by Cascade during the prior year were in excess of, or insufficient to meet the actual costs allocable to Cascade for the Base Block 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 8.10 B. 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 Base Block and Supplemental Block charges out of its gross revenues. Except for the Transition Payments in Section 8.10 G below, 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 Cascade Water 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.

G. Transition Payments. In consideration for entering into this 2nd Amended and Restated Declining Block Water Supply Agreement, Cascade will pay to Seattle, three transition payments of the following amounts and on the following schedule:

1. Payment of $5 million due on or before July 31, 2013
2. Payment of $12 million due on or before December 31, 2018
3. Payment of $5 million due on or before December 31, 2024

Seattle will consider these transition payments as revenue to offset costs in the Existing Supply Cost Pool allocated to the Full and Partial Requirements customer class under the provisions of those contracts.

8.11 A. Charges will be imposed for exceeding the Cascade Block for Annual Average Daily Demand, Peak Month Factor and Peak Season Factor limitations, based on daily averages measured according to Sections 3.9-3.11. These charges will be determined by multiplying the appropriate multiplier(s) from the following tables times the then current Full or Partial Requirements Customer Commodity Charge(s) for the period(s) in which the exceedance occurred, the result multiplied by the full amount of the exceedance over the applicable limit (in MGD) and then multiplied by the actual number of days in the calendar year, 30 days for Peak Month or 122 days for Peak Season, whichever is applicable.

For the first instance in any five-year period, the following multipliers will apply:

	Multipliers for Charges for Water in Excess of Annual Average Daily Demand, Peak Season and Peak Month Block Limitations - First Instance in 5-Year Period			
Category	**0 to 1 MGD**	**>1 to 2 MGD**	**>2 to 3 MGD**	**>3 MGD**
ADD	1.0	1.0	1.1	1.2
Month	1.0	1.0	9.1	16.7
Season	1.0	1.0	3.1	4.7

The multipliers for the first 2 MGD in the table above reflect a buffer before penalty charges begin. Cascade agrees not to plan or rely on this buffer as available firm supply.

B. For any additional instances of water in excess of the average annual and peak supply limitations in any five-year period, the following multipliers will apply.

	Multipliers for Charges for Water in Excess of Annual Average Daily Demand, Peak Season and Peak Month Block Limitations - Additional Instances in 5-Year Period			
Category	**0 to 1 MGD**	**>1 to 2 MGD**	**>2 to 3 MGD**	**>3 MGD**
ADD	1.0	1.1	1.1	1.2
Month	1.5	9.1	9.1	16.7
Season	1.5	3.1	3.1	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.

8.12 Except in the case of an emergency, the provisions of Section 8.11 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 Seattle shall keep full and complete books of accounts for the Seattle Water 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.

9.3 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.

9.4 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 to another form of organization authorized by Washington law, shall not be considered an assignment. Seattle may not convey the Seattle Water System in its entirety or any of its component parts used to meet the obligations of this Agreement 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.

9.5 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	Chief Executive Officer
Seattle Public Utilities	Cascade Water Alliance

700 Fifth Avenue, 49th Fl.
Seattle, WA 98104

520 112th Avenue NE, Suite 400
Bellevue, WA 98004

9.6 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.

9.7 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.

9.8 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.

9.9 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 shall be established 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. Cascade shall require those agencies that later join Cascade as a Cascade Member to convey such written acknowledgment and acceptance to Seattle within one month of joining Cascade. Without waiving any other remedies available under this Agreement or applicable law, should any Cascade Member required to do so fail to convey such written acknowledgement and acceptance, 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 by Cascade's most recent annual proportionate use report, until such written acknowledgement and acceptance is provided to Seattle.

ARTICLE X - TECHNICAL COMMITTEE

Technical Committees comprising of 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 CEO 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 and implementation of this Agreement may require direct communication and coordination between Seattle staff and the staff of Cascade or Cascade Members and accommodation of Cascade's insurers with respect to claims. The Parties may establish any desired communication or coordination and claim protocols by Management Agreement.

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 - UNFORESEEN AND UNAVOIDABLE 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, as amended and restated herein, represents the entire agreement between the Parties concerning the subject matter hereof and will supercede Amended and Restated 50-Year Declining Block Water Supply Agreement between the City of Seattle and the Cascade Water Alliance, dated December 17, 2008 upon the effective date noted herein. This Agreement may not be amended except as provided in Section 9.4.

THE CITY OF SEATTLE, a municipal corporation:

By: _____ DATE: 7/15/13
DIRECTOR, SEATTLE PUBLIC UTILITIES

THE CASCADE WATER ALLIANCE, a joint municipal utility services authority:

BY: _____ DATE: 7/12/13
CHIEF EXECUTIVE OFFICER

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 125
   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%)

EXHIBIT II

CASCADE 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)					
132nd Ave. SE & SE 26th Street	59	8	8	425	1,300
128th Ave. SE & Newport Way	56	8	8	435	850
Mercer Is. Pipeline & 108th Ave. SE	66	9	8	420	700
140th Ave. NE & 40th Street	65	2	10	500	3,500
132nd Ave. NE & NE 14th St.	62	2	12	470	4,500
132nd Ave. NE & NE 24th Street	63	2	10	455	4,500
152nd Ave. NE & NE 8th Street	61	2	24	460	3,500
145th Pl. SE & SE 28th 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
128th Ave SE & SE 56th ST [3]	47	8	8	440	Backup to Sta. 55 [5]
128th Ave SE & Newport Way [3]	55	8	6	435	800
120th Ave SE & SE 35th ST [3]	46	9	6	425	Backup to Sta. 124 [5]
I-90 & Lake Washington Boulevard [3]	50	9	6	425	Fire flow backup only

124th Ave SE & SE 38 PL [3]	124	9	8	425	1,500
128th Ave SE & SE 70th 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 132nd Ave. NE & NE 113th Street	74	1	10	555	4,500
132nd Ave. NE & NE 85th Street	75	1	16	535	4,080
140th Ave. NE & NE 70th Street	72	2	12	520	1,240
Redmond 160th Ave NE & NE 104th Street	165	28	10	515	1,000 (combined with following planned new location)
NE 172nd Street & Tolt 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 84th Ave. S & S 134th Street	1	10	6	455	210
Beacon Ave S & S 124th Street	5	10	8	455	720
Cornell Ave S & S 112th Street	172	4	6	375	Backup service
Tukwila 39th 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 162nd Street	14	13	8	460	Backup emergency service
Christensen Rd. & Baker Rd	15	13	8	460	480

METER SERVICE					
LOCATION	**STATION NUMBER (1)**	**PIPELINE SEGMENT NUMBER(1)**	**SIZE OF METER (IN.)**	**MINIMUM HYDRAULIC GRADIENT AT STATION UPSTREAM OF METER (FEET NAVD-88 Datum)**	**FLOW UP TO WHICH THE MINIMUM HYDRAULIC GRADIENT IS GUARANTEED (gpm)**
53rd Ave S & S 160th Street	16	13	6	460	20
E Marginal Way & S 112th Street	168	15	12	445	810
51st Ave S & S Leo Street	169	12	8	455	60
W. Marginal Place & s 102nd St.	170	5	12	300	80
47th 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 of Water by Individual SPU Wholesale Water Customers

Water Utility	Annual Block (110%)	Peak Season Factor	Peak Season Block	Peak Month Factor	Peak Month Block
Bothell	1.77	1.35	2.39	1.69	2.99
Cedar River	3.05	1.35	4.11	1.69	5.15
Coal Creek	1.02	1.35	1.38	1.69	1.73
Duvall	0.73	1.35	0.98	1.69	1.23
Edmonds	0.00	1.35	0.00	1.69	0.00
Highline	6.02	1.35	8.12	1.69	10.17
Mercer Island	2.24	1.35	3.03	1.69	3.79
Northshore	6.36	1.35	8.58	1.69	10.75
Olympic View	0.56	1.35	0.76	1.69	0.95
Shoreline WD	1.96	1.35	2.64	1.69	3.31
Soos Creek	5.03	1.35	6.79	1.69	8.50
Woodinville	5.01	1.35	6.76	1.69	8.46
WD 20	2.60	1.35	3.50	1.69	4.39
WD 45	0.33	1.35	0.45	1.69	0.56
WD 49	1.39	1.35	1.87	1.69	2.34
WD 85	0.00	1.35	0.00	1.69	0.00
WD 90	0.91	1.35	1.23	1.69	1.54
WD 119	0.46	1.35	0.62	1.69	0.78
WD 125	2.15	1.35	2.90	1.69	3.63
Existing Purveyor Totals	**41.57**		**56.12**		**70.25**

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. **Seattle Wellfields**
   - 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

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

4. Certain costs related to Cascade Points of Delivery

Cascade Points of Delivery are generally not considered part of the Existing Transmission System Facilities, however, certain costs may be included in the Existing Transmission Cost Pool as follows:

- The costs of existing meters, vaults and related equipment at all Cascade Points of Delivery installed prior to 2004 to the extent those costs were unamortized as of December 31, 2003.
- Any costs related to Cascade Points of Delivery that are included in the Existing Transmission Cost Pool in accordance with the Agreement.

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.

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 Regional Conservation Program shall be used as the indices for operations cost in the Existing Supply Cost Pool, Existing Transmission Cost Pool and for the Regional Conservation 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

Program	Project	Project Name	Activity
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
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 UP0LAND 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

Program	Project	Project Name	Activity
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 Cholrination 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
Water Quality & Supply	N5508	Lead & Copper Rule Compl.	N550801 Monitoring, Reporting & Admin
Water Quality & Supply	N5508	Lead & Copper Rule Compl.	N550802 Corrosion Trtmnt 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 Standy
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 Cascade Point of Delivery in Bellevue at the intersection of Bel-Red Road and 132nd Ave NE
- The NE 24th Street Feeder, from the Cedar Eastside Supply Line to the Cascade Point of Delivery in Bellevue 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.

SEATTLE PUBLIC UTILITIES & CASCADE WATER ALLIANCE
MANAGEMENT AGREEMENT No. 7

REVISIONS TO EXHIBIT I

This Management Agreement No. 7 is entered into pursuant to Sections 3.6 B and 4.4 of the 2nd Amended and Restated Declining Block Water Supply Agreement between the City of Seattle ("Seattle") and the Cascade Water Alliance ("Cascade"), dated July 15, 2013 ("Agreement").

Management Agreement

1. The revised exhibit attached and incorporated herein as "Revised Exhibit I" replaces the existing Exhibit I in the Agreement in its entirety.
2. The Parties understand and agree that changes to any of the agreements listed in the Revised Exhibit 1 or new agreements involving supply, purchase or resale of water that Cascade or any Cascade Member enters into with a non-Cascade Member during the term of the Agreement should be reviewed by the Parties to determine which provision of 3.6 B applies to the situation and whether an update to the Revised Exhibit 1 by Management Agreement is necessary. The Parties also understand and agree that this will include a review of new agreements, or existing agreements that may remain in effect, between Cascade or a Cascade Member and a withdrawing Cascade Member at the time of the withdrawal in the event a current Cascade Member withdraws its membership from Cascade. Cascade agrees that it will promptly notify and provide copies of such agreements to Seattle as appropriate.
3. The Parties understand and agree that additional updates to the Revised Exhibit I may be required to address the electric contracts for pump stations included in Section 3.a of the Revised Exhibit I, which the parties will endeavor to complete by December 31, 2013.

Agreed to:

Ray Hoffman, Director — Date 7/15/13
Seattle Public Utilities

Chuck Clarke, CEO — Date 7/12/13
Cascade Water Alliance

Attachment: Revised Exhibit I, dated July 11, 2013

REVISED EXHIBIT I
July 11, 2013

Other Agreements

List of commitments or agreements, as approved by Seattle regarding the supply, purchase or resale of water to non-Cascade Members:

1. **Those specific emergency interties for temporary emergency purposes only as referenced in Section 3.6 B.1:**

   a) Bellevue to KC WD 117 (Hilltop)

      @ 51st Ave & 150th Pl SE

   b) Bellevue to KC WD 22 (Beaux Arts)

      @ 108th Ave SE & SE 28th St

   c) Kirkland from Northshore Utility District

      @ NE 118th St & 116th Ave NE

   d) Kirkland to/from Northshore Utility District[1]

      @ 12521 128th Ln NE

   e) Redmond to Union Hill Water Assoc.

      @ NE 95th St near 195th Ave NE

   f) Redmond to/from Union Hill Water Assoc. (Redmond Ridge)

      @ NE 93rd St & NE 221st PL
      @ Redmond Ridge Dr & NE 80th St
      @ Novelty Hill Rd @ 224th Ave NE

   g) Redmond to Woodinville WD

      @ NE 133rd St & 227th Ave NE
      @ 232nd Ave NE & NE 135th St (bilateral)

   h) Redmond to/from Northeast Sammamish W&SD

      @ 187th Ave NE & NE 55th St

   i) Sammamish Plateau W&SD to Ames Lake Water Assoc.

      @ NE 33rd St & NE Union Hill Rd

j) Sammamish Plateau W&SD to/from Northeast Sammamish W&SD[2]

@ 2008 East Lake Sammamish Pkwy NE
@ 20807 NE 19th PL

k) Sammamish Plateau W&SD to Overdale Water Assoc

@ 5215 229th Ave SE near SE 52nd St

l) Skyway to/from Renton

@ 12603 82nd Ave S near S 126th St

m) Skyway to/from KC WD 125[3]

@ S Langston Rd & S 132nd St
@ S 124th St & Beacon Ave S

n) Tukwila to/from KC WD 125

@ S 131st PL & 44th Ave S

o) Tukwila to/from KC WD 125

@ E Marginal Way & S 116th St

p) Tukwila to/from Kent[4]

@ Todd Blvd & West Valley Hwy

q) Tukwila to Renton[5]

@ 17000 West Valley

r) Tukwila to/from KC WD 75 (Highline)

@ S 180th St & Andover Park West

2. **Those agreements providing wholesale water supply to Non-Cascade Member wholesale customers as of January 31, 2013 as referenced in Section 3.6 B.2:**

   a) Bellevue to WD 1 (Yarrow Point)

      @ NE 38th & 92nd Ave NE
      @ NE 42nd & 92nd Ave NE

   b) Bellevue to KC WD 22 (Beaux Arts)[6]

      @ 108th Ave SE & SE 28th St

   c) City of Issaquah to Issaquah Highlands Community Assoc for the Grand Ridge Drive Water Utility

      @ NE Harrison Dr & Grand Ridge Dr

   d) Sammamish Plateau W&SD to Overdale Water Assoc[7]

      @ 5215 229th Ave SE near SE 52nd St

3. **Other relevant Agreements as referenced in Section 4.4:**

   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%)

   b) Sammamish Plateau W&SD to/from Northeast Sammamish W&SD[8]

      @ 216th Ave NE & NE 17th
      @ 1910 226th Ave NE

   c) Redmond/Woodinville Water District Interlocal Agreement and 7 Amendments[9]

      1. East of 184th Ave NE
      2. Blakely Ridge (Trilogy)
      3. 177th Ave NE & 184th Ave NE
      4. 167th Ave NE & 172nd Ave NE
      5. Shadowbrook Phase II
      6. Redmond Assembly Plat
      7. East of 176th Ave NE

d) Skyway from Renton[10]

@ 80th Ave S & S 116th St

e) Interlocal Agreement Implementing the City of Bellevue's Partial Assumption of the Coal Creek Utility District[11]

@ Hazelwood Ln
@ SE 64th & Lake Washington Blvd
@ 114th Ave SE
@ 119th Ave SE
@ 123rd Ave SE
@ Newcastle & 126th Ave SE
@ Newcastle & 128th Ave SE
@ Coal Creek & SE 66th ST

Notes:

[1] No agreement exists for this intertie connection. Cascade reported as emergency intertie.
[2] See Section 5 of the Agreement for Joint Operation of Water Storage Facilities.
[3] See Section 5 of the Agreement for Joint Lease, Construction and Operation of Water Storage and Transmission Facilities, generally for wheeling.
[4] Emergency purposes includes meeting peak demand. Any agreement for use for purposes other than emergency under Section 4 of the Agreement not included here.
[5] Emergency purposes, max quantity 2.7 MGD.
[6] Cascade reported as seasonal supplemental supply.
[7] Cascade reported that by resolution, converted from emergency supply to continuous wholesale supply pending assumption of the Overdale service area expected within a year.
[8] Cascade reported as continuous supply through "zero-net exchange".
[9] Interlocal agreement establishes common service area boundary, provisions for District to supply water to Redmond for certain service areas, and to determine on case by case basis which entity will serve developments that straddle common service boundary line.
[10] See Section 4 and Exhibit B of Contract for Water Supply and Joint Storage and Transmission.
[11] See Section XIV of the Interlocal Agreement.

SEATTLE PUBLIC UTILITIES & CASCADE WATER ALLIANCE
MANAGEMENT AGREEMENT No. 9

REVISIONS TO EXHIBIT II

This Management Agreement No. 9 is entered into pursuant to Section 4.1 of the 2nd Amended and Restated Declining Block Water Supply Agreement between the City of Seattle ("Seattle") and the Cascade Water Alliance ("Cascade"), dated July 15, 2013 ("Agreement").

Management Agreement

1. The revised exhibit attached and incorporated herein as "Revised Exhibit II" replaces the existing Exhibit II in the Agreement in its entirety.

Agreed to:

Ray Hoffman, Director Seattle Public Utilities	5/24/14 Date	Chuck Clarke, CEO Cascade Water Alliance	5/27/14 Date

Attachment: Revised Exhibit II, dated March 27, 2014

Exhibit II

CASCADE POINTS OF DELIVERY[1], MINIMUM HYDRAULIC GRADIENTS, AND MAXIMUM FLOW RATES OF WATER SUPPLIED

POINT OF DELIVERY (POD)							MINIMUM HYDRAULIC GRADIENT UPSTREAM OF SEATTLE METER (FEET NAVD-88 Datum) [3]	MAXIMUM FLOW UP TO WHICH HYDRAULIC GRADIENT IS GUARANTEED UNDER THE AGREEMENT [3] [4] (gpm)
SEATTLE METER LOCATION	CASCADE MEMBER OPERATING DOWNSTREAM OF POD	SEATTLE STATION NUMBER	SEATTLE PIPELINE SEGMENT NUMBER	SEATTLE METER SIZE (IN.)	CASCADE MEMBERS SERVED	SIZE OF CASCADE MEMBER METER(S), (IN.) [2]		
132nd Ave. NE & NE 113th Street	Kirkland	74	1	10"	Kirkland, Redmond	12"	555	3,540
132nd Ave. NE & NE 85th Street	Kirkland	75	1	16"	Kirkland, Redmond	None	535	4,890
140th Ave. NE & NE 70th Street	Kirkland	72	2	12"	Kirkland, Redmond	12"	520	1,430
140th Ave. NE & 40th Street	Bellevue	65	2	10"	Bellevue, Redmond	18"	500	3,800
132nd Ave. NE & Bel-Red Road	Bellevue	62	2	12"	Bellevue	12"	470	4,200
132nd Ave. NE & NE 24th Street	Bellevue	63	2	10"	Bellevue	12"/8" [5]	455	3,900
152nd Ave. NE & NE 8th Street	Bellevue	61	2	24"	Bellevue, Redmond	16"	460	3,000
145th Pl. SE & SE 28th Street	Bellevue	58	3	12"	Bellevue	16"	470	2,700
14509 SE Newport Way	Bellevue	60	3	10"	Bellevue. Issaquah	12"	525	2,300
14509 SE Newport Way	Bellevue	182	3	10"	Bellevue, Issaquah, Sammamish Plateau	12"/8"/8" [6]	525	5,810
132nd Ave SE & SE 26th ST	Bellevue	59	8	8"	Bellevue	8"	425	1,300
128th Ave. SE & Newport Way	Bellevue	56	8	8"	Bellevue	8"	435	800
128th Ave SE & SE 56th ST	Bellevue	47	8	8"	Bellevue	6"	440	Backup service
128th Ave SE & Newport Way	Bellevue	55	8	6"	Bellevue	6"	435	625
128th Ave SE & SE 70th ST	N/A	52	8	12"	Bellevue		445	1700 [7]

POINT OF DELIVERY (POD)							MINIMUM HYDRAULIC GRADIENT UPSTREAM OF SEATTLE METER (FEET NAVD-88 Datum) [3]	MAXIMUM FLOW UP TO WHICH HYDRAULIC GRADIENT IS GUARANTEED UNDER THE AGREEMENT [3] [4] (gpm)
SEATTLE METER LOCATION	CASCADE MEMBER OPERATING DOWNSTREAM OF POD	SEATTLE STATION NUMBER	SEATTLE PIPELINE SEGMENT NUMBER	SEATTLE METER SIZE (IN.)	CASCADE MEMBERS SERVED	SIZE OF CASCADE MEMBER METER(S), (IN.) [2]		
Mercer Is. Pipeline & 108th Ave. SE	Bellevue	66	9	8"	Bellevue	8"	420	800
124th Ave SE & SE 38 PL	Bellevue	124	9	8"	Bellevue	8"	425	1,400
Cornell Ave S & S 112th Street	Skyway	172	4	6"	Skyway	None	375	Backup service [8]
84th Ave. S & S 134th Street	Skyway	1	10	8"	Skyway	None	455	210
Beacon Ave S & S 124th Street	Skyway	5	10	8"	Skyway	8"	455	720
W Marginal Place & S 102nd ST	Tukwila	170	5	12"	Tukwila	12"	300	300
51st Ave S & S Leo Street	Tukwila	169	12	8"	Tukwila	8"	455	70
47th Ave S & S Victor Street	Tukwila	173	12	6"	Tukwila	6"	425	Backup service
South Center Parkway & Tukwila Parkway	Tukwila	13	13	10"	Tukwila	10"	460	800
West Valley Hwy & S 162nd Street	Tukwila	14	13	8"	Tukwila	8"	460	Backup service
Christensen Rd. & Baker Rd	Tukwila	15	13	8"	Tukwila	10"	460	840
53rd Ave S & S 160th Street	Tukwila	16	13	6"	Tukwila	6"	460	20
E Marginal Way & S 112th Street	Tukwila	183	15	12"	Tukwila	12"	445	900
7749 E Marginal Way S	Tukwila	168	20	12"	Tukwila	12"	N/A	Backup service [8]
Trilogy Parkway NE & NE 125 Street (East meter)	Redmond	164	28	10"	Redmond, Sammamish Plateau	16"	610	2900 [9]
Trilogy Parkway NE & NE 125 Street (West Meter)	Redmond	186	28	10"	Redmond, Sammamish Plateau	16"	610	Redundant Supply [9]
160th Ave NE & NE 104th Street	Redmond	165	28	10"	Redmond	16"	515	2420 [10]
NE 172nd Street & Tolt Pipeline No. 2	Redmond	185	28	6"	Redmond	16"	515	Redundant Supply [10]
							TOTAL:	**51,375**

POINT OF DELIVERY (POD)							MINIMUM HYDRAULIC GRADIENT UPSTREAM OF SEATTLE METER (FEET NAVD-88 Datum) [3]	MAXIMUM FLOW UP TO WHICH HYDRAULIC GRADIENT IS GUARANTEED UNDER THE AGREEMENT [3] [4] (gpm)
SEATTLE METER LOCATION	CASCADE MEMBER OPERATING DOWNSTREAM OF POD	SEATTLE STATION NUMBER	SEATTLE PIPELINE SEGMENT NUMBER	SEATTLE METER SIZE (IN.)	CASCADE MEMBERS SERVED	SIZE OF CASCADE MEMBER METER(S), (IN.) [2]		

Notes:

1. All Points of Delivery (PODs) provide a wholesale level of service. Seattle bears no responsibility for retail service level obligations, such as fire flow or emergency backup.
2. This column is for informational purposes only, i.e., there are no related terms or conditions under the Agreement. Cascade will be responsible for providing Seattle with updated Cascade Member information from time to time.
3. These minimum hydraulic gradients and maximum flows relate to contractual conditions under the Agreement, but do not necessarily reflect practical or operational limits at particular PODs.
4. Except as provided in Note 7 below, all or some of the maximum flows allocated to each POD may be reallocated to another POD on the same Pipeline Segment Number, including those PODs designated as Backup Services. In that case, minimum hydraulic gradients are not guaranteed.
5. Flow branches into two metered Bellevue pipelines downstream of Station 63.
6. The 12" Bellevue meter is located at 4112 161st Ave SE. The two 8" meters that each serve Issaquah and the Sammamish Plateau are located at 16104 SE Newport Way in a single meter vault.
7. The maximum flow shown is the portion serving Bellevue via Coal Creek Utility District. All or a portion of this maximum flow may be reallocated from this POD to other PODs on the same Pipeline Segment Number, but additional flows from other PODs may not be reallocated to this POD.
8. When a Backup Service is the only POD on a Pipeline Segment Number, the Cascade Member operating the Backup Service can re-allocate all or portions of the maximum flows from other PODs it operates to that Backup Service, regardless of Pipeline Segment Number. In that case minimum hydraulic gradients are not guaranteed.
9. The maximum flow that can be shared between Stations 164 and 186 is 2,900 gpm.
10. The maximum flow that can be shared between Stations 165 and 185 is 2,420 gpm.

Intertie Agreements – KCWD #125

2.34.41.

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
~~Turnover~~ file 2.34.41
Finance Director
Sr. Accountant
City Clerk
Attachments (11)

Document No. 78.2:

A & C FILE # 86-033

CITY OF TUKWILA & WATER DISTRICT NO. 125
AGREEMENT TO PROVIDE WATER SERVICE

DATE 4/28/86

Water District #125
S. 131st + 44th
1 of 2

THIS AGREEMENT made this 1st day of May, 1986 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 anticipates 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 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

BY: _____

attest:

BY: _____
City Clerk

WATER DISTRICT NO. 125

BY: _____
PRESIDENT OF THE BOARD OF WATER COMMISSIONERS

BY: _____
SECRETARY OF THE BOARD OF WATER COMMISSIONERS

CONTROL # 26-005

PERMIT # M-09-86

CITY OF TUKWILA
6200 SOUTHCENTER BLVD.
TUKWILA, WA 98188

ISSUE DATE 1-21-86

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 inter 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.

THE APPLICANT MUST NOTIFY CITY INSPECTOR Dave Grage (433-1860) OF COMMENCEMENT 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)

INSPECTION FEE $ 15.00 ( )

TOTAL Waived

RECEIVED BY N/A

RECEIPT #

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 TUKWI 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]

PHILLIP FRASER, SENIOR ENGINEER, CITY OF TUKWILA

CC: APPLICANT
INSPECTOR
CITY SHOPS
BUILDING OFFICIAL
FINANCE DEPT. (IF APPLICABLE)
FIRE DEPT. (IF APPLICABLE)

I HEREBY CERTIFY THAT THE PERMIT HOLDER WHOSE NAME AND ADDRESS APPEARS ON THIS RECORD HAS S 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

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 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 refereneced 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 emergency 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 Grage - telephone number 433-1863) and the following 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.

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 Freemire
City Engineer
Dave Grage
Tukwila Adm. Files: Intertie agreements/purveyor's agreements

/cd

Enclosure (1)

CONSULTING ENGINEERS

PHILIP M. BOTCH & ASSOCIATES, INC.

11000 MAIN STREET BELLEVUE, WASHINGTON 98004 TELEPHONE (206) 682-5300

January 7, 1985

RECEI...
CITY OF TU...

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

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

RECE

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.

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

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 sometime 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,

for Phillip R. Fraser
Senior Engineer

/cs
(BOTCH)
M.10

cc: Ted Freemire
File: 85-SW01 - 8

Enclosure: (1)

CONSULTING ENGINEERS

PBA

PHILIP M. BOTCH & ASSOCIATES, INC.

11000 MAIN STREET BELLEVUE, WASHINGTON 98004 TELEPHONE (206) 682-5300

April 15, 1986

RECEIVED
CITY OF TUKWILA
APR 17 1986
PUBLIC WORKS DEPT

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 refereneced 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

85.101

23441

DATE
A & C FILE # 86-024
CO. Document No. 78.24
DATE 4/28/86

CITY OF TUKWILA & WATER DISTRICT NO. 125
AGREEMENT TO PROVIDE WATER SERVICE Water Dist # 125
Interurban Ave S. + 52nd S

192

THIS AGREEMENT made this 1st day of May, 1986 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 anticipates 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: 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 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 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

4-26-84

BY: _____

attest:

BY: _____
City Clerk

WATER DISTRICT NO. 125

BY: _____
PRESIDENT OF THE BOARD OF WATER COMMISSIONERS

BY: _____
SECRETARY OF THE BOARD OF WATER COMMISSIONERS

2.34.41

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

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

CONSULTING ENGINEERS

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

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 APPLICATION

Permit 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: Ron Larnt

Title: City ENGINEER

Date Approved: 7/24/85

CONSULTING ENGINEERS

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
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 guarentee 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 du ration of intertie agreement.

   B. Appropriate authorizations through the Seattle Water Department officials allowing ammendment to Tukwila's/S.W.D./WD #125's purveyor 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 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.

4. A copy of the right of entry onto the Metro Park and Ride Lot properties shall accompany the permits. Nessary 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 reveiw that the use of the intertie is intended to be reciprocal, with the operations of this intetie 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 433-1856.

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

RECEIVED
JAN 21 1986
PHILLIP M. BOTCH & ASSOC.

Phillip M. Botch and Assoc.
11000 Main Street
Bellevue, WA 98004

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

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 follow:

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. Cooper

Title: Chair.

MUNICIPALITY OF METROPOLITAN SEATTLE

By: Kenneth M. Kelley

Title: Right-of-Way & Property Supervisor

Document No. 70.59

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°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°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°45'23" WEST, 15.42 FEET TO THE PROPOSED RIGHT-OF-WAY LINE FOR 52ND AVENUE SOUTH, END OF THIS DESCRIPTION.

Exh No. 5

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°21'30" West 668.61 feet; thence south 69°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°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°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, 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

Intertie Agreement – Renton

Renton Municipal Building
Mill Avenue South
ton, WA 98055

CAG-95-034

AGREEMENT FOR THE EMERGENCY SALE OF WATER BETWEEN THE CITY OF RENTON AND THE CITY OF TUKWILA

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)

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.

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, City Clerk

APPROVED AS TO LEGAL FORM:

Larry Warren, City Attorney

CITY OF TUKWILA

By: John W. Rants
John W. Rants, Mayor

ATTEST/AUTHENTICATED:

Jane E. Cantu, City Clerk

APPROVED AS TO LEGAL FORM:

Linda Cohen, City Attorney

H:DOCS:95-108:JDW:ps

Exhibit No. 3

CAG-079-78

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 D. Bauch
Mayor

By Melanie Anderson
City Clerk

CITY OF RENTON

By C. J. Delaurenti
Mayor

By Marie E. Mattos
City Clerk, Deputy

Approved as to form:

Lawrence J. Warren
Lawrence J. Warren, City Attorney for City of Renton

William 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 Deppty City Clerk and approved by Mr. Warren.

Yours very truly,

CITY OF RENTON

Maxine E. Motor

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/w	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 8" 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 wtih $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·

PUBLIC WORKS DEPARTMENT
6230 Southcenter Boulevard
Tukwila, Washington 98057
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 $8.00 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.

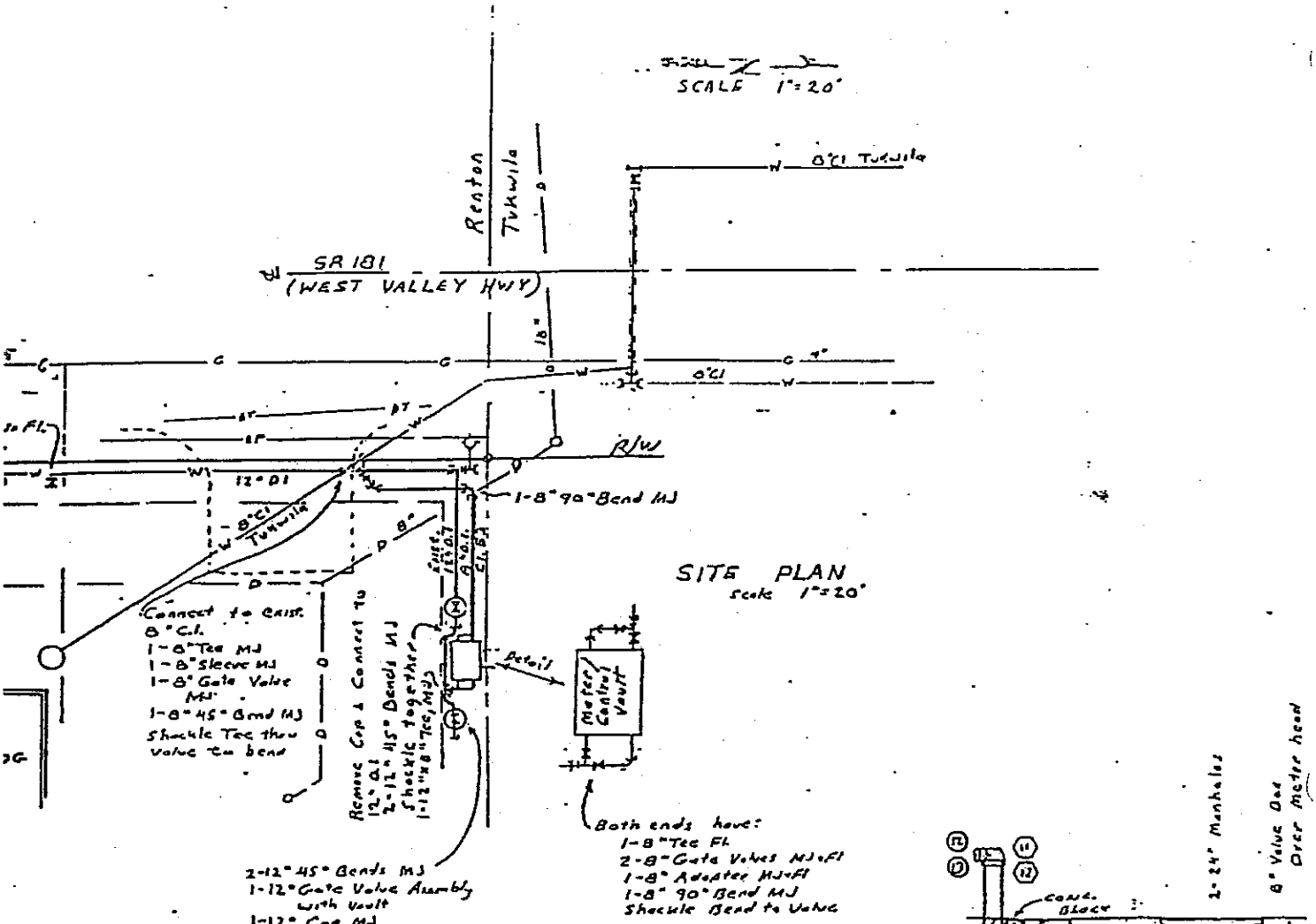
On the more basic issued as to agreement to allow this intertie to become a reality, I will be discussing this with the City Council on Monday, August 21, and hope to have the approval necessary to authorize you to proceed.

Sincerely,

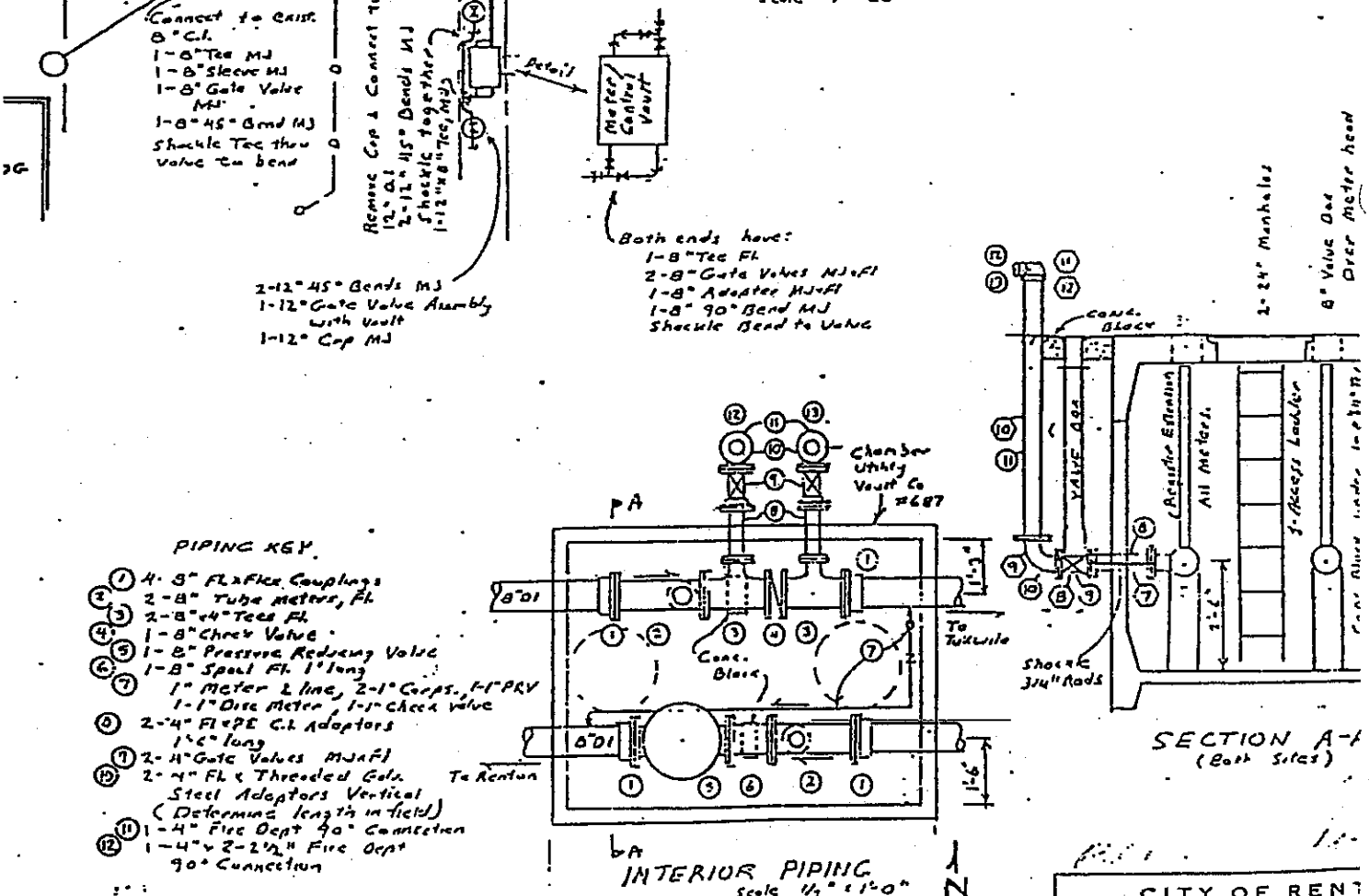
Terence R. Monaghan, P. E.
Public Works Director

TRM/dp

TUKWILA - RENTON INTERTIE PLAN



SITE PLAN
Scale 1"=20'



PIPING KEY

1. 4-8" FL x Flex Couplings
2. 2-8" Tube meters, FL
3. 2-8"x4" 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" Corps., 1-1" PRV, 1-1" Disc Meter, 1-1" Check valve
8. 2-4" FL x PE C.I. Adaptors 1'-6" long
9. 2-4" Gate Valves MJxFL
10. 2-4" FL x Threaded Galv. Steel Adaptors Vertical (Determine length in field)
11. 1-4" Fire Dept 90° Connection
12. 1-4"x 2-2½" Fire Dept 90° Connection

INTERIOR PIPING
Scale ½" = 1'-0"

SECTION A-A
(Both Sides)

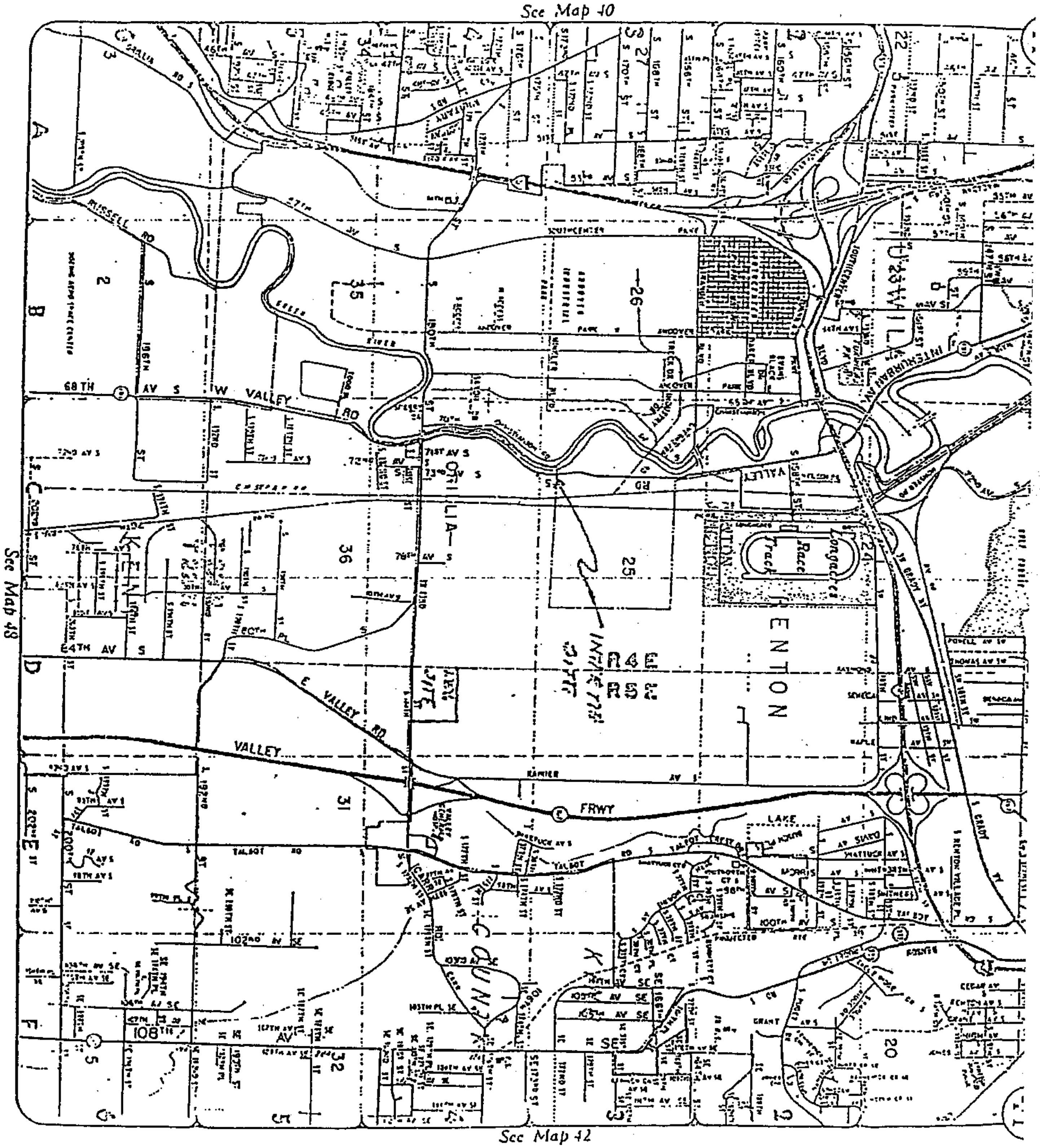
NOTE

Key of Valve Specialties and Tube Meters
Manufacturer: Rockwell
Style #
Cla-Val 210-01

CITY OF RENTON
DEPARTMENT OF ENGINEERING
METER / CONTROL
KENT/TUKWILA INTERTIE

DESIGNED
DRAWN
CHECKED
APPROVED
DATE

See Map 40



See Map 48

See Map 42

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 M. Bauch
Mayor

CITY OF KENT

By Isabel Hoyer
Mayor

Attest:

By Melissa Anderson
City Clerk

Attest:

By Marie Jones
City Clerk

Approved as to Form:

City Attorney for
City of Tukwila

Approved as to Form:

City Attorney for
City of Kent

Cascade Water Alliance Water Supply Commitment

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 Requirements[1] 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 Supply[2] 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

Supply (MGD)		6 Year Planning Period (2010) Forecasted Demand (MGD)	
AAD	MDD	AAD	MDD
66.0	137.0	53.0	124.0

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 Plan[3] 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 Vote[4], 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 Supply[5] 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 interties[6] and interconnections[7]. 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.

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[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.

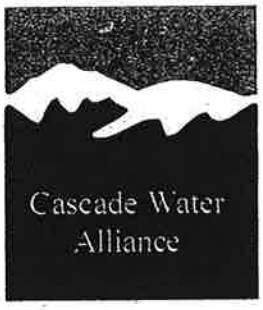
List of documents, commitments, adjustments, reductions, agreements and/or written approvals regarding the supply, purchase and/or resale of water according to the Interlocal:

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
Key Components of Cascade WSP submitted early to Members				
▪ 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.



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 l, 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 that 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: _____

Title: Chair Date: December 15, 2004

Attest: _____

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: E R Berg

Title: Deputy City Manager Date: 04/15/2005

Attest: Myrna L Basich

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: Jim Hornday

Title: Board President Date: 4-6-05

Attest: Judith Nelson, Gen. 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: Ava Frisinger

Title: MAYOR Date: April 4, 2005

Attest: Christine Lamb

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: _____

Title: Assistant City Manager Date: 3/18/05

Attest: LYNN STOKESBARY

Title: ASSISTANT CITY MANAGER Date: 3/18/05

Authorized by: Resolution R-4493

(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 Jane Christenson

By: Jane Christenson

Title: Assistant to the Mayor Date: 2-11-05

Attest: Bonnie Matthews

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: W. R. Stevenson 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

Sammamish Plateau W&S District

ARTICLE 16. Execution.

This Contract may be executed in one or more counterparts.

Signatory Agency

By: _____

Title: President Date: 3/2/05

Attest: Cheryl Scheuerman

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: 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 TUKWILA

WASHINGTON

RESOLUTION NO. 1155

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, ADOPTING ANNEXATION POLICIES FOR THE CITY AND REPEALING RESOLUTION NO. 992.

WHEREAS, recent annexations to Tukwila included all the areas within the City's adopted Comprehensive Planning Area including the entire South Central School District and Fire District #1, and

WHEREAS, the annexations served the desires of the City to increase population and welcome logical extensions of adjacent areas into the City, and

WHEREAS, prudence dictates that the City adjust to serving the larger Tukwila before further annexations take place, and

WHEREAS, financial and service area impacts of serving more areas should be considered carefully before more annexations occur, now, therefore,

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF TUKWILA , WASHINGTON, DO HEREBY RESOLVE AS FOLLOWS:

Section 1. Annexation Policies Declared The policies set forth in this resolution shall be the stated annexation policies of the City.

1.0 GENERAL STATEMENTS ON ANNEXATION

1.1 The City of Tukwila will consider requests of communities or property owners within Tukwila's urban growth area to annex into the City. Each annexation will be reviewed on a case-by-case basis to assess the feasibility of providing services to the community, the fiscal impacts to the City if the annexation occurred, and the benefits received by the City.

COMMENTS: For purposes of planned growth and fiscal responsibilities, Tukwila should carefully consider annexations within the urban growth area and adjacent special use districts.

1.2 The City of Tukwila will freely make available to persons/ areas interested in annexation any information related to its taxes or services. Each annexation process should emphasize public information and clear communication among the Tukwila community, City government and the area under consideration.

COMMENTS: Upon request, City Council members, the Mayor, and other appropriate persons as designated by the Mayor will be available to attend meetings, pro vide information and explain the City's annexation policy.

1.3 Tukwila and King County should work together through interlocal agreements to implement coordinated local policy which will provide municipal services.

COMMENTS: Specific annexation proposals should coordinate with local policy and receive support from other jurisdictions.

1.4 An annexation report shall be presented to the City Council for all annexations. Major annexations should include a thorough study/assessment of the area under consideration, a financial report analysis, and a plan for meeting the area's service needs.

COMMENTS: This policy will ensure that Tukwila has an appropriate assessment of the annexation area. This will include the potential costs and benefits to the community, consideration of any existing Capital Improvement Plans and, when necessary, a plan for providing municipal services to the area. This approach is intended to make the annexation process smoother and more predictable.

2.0 METHOD OF ANNEXATION

The most appropriate means to accomplish annexations may be either an election or a petition, depending upon the size of the area and the number of property owners involved.

3.0 SIZE OF ANNEXATION AREAS

3.1 The City will consider requests for annexations regardless of the size of the area.

COMMENTS: The City will balance the needs of the City and the desires of the annexation area for their mutual benefit in deciding to allow annexations.

3.2 Tukwila prefers annexations of a sufficiently large size for efficient processing and for a logical extension of municipal services.

4.0 ANNEXATION COSTS

4.1 Tukwila will consider paying the basic costs of the annexation process including administration, environmental threshold determination, and filing fees. If an annexation requires an Environmental Impact Statement (EIS), Tukwila will consider assuming the costs on a case-by-case basis.

4.2 Assuming Tukwila's bonded indebtedness shall be considered on a case-by-case basis.

COMMENTS: The general purpose facilities developed for any bond issue provide services for all Tukwila and any area joining Tukwila through annexation. Different tax rates which foster different service expectation among citizen groups should be avoided.

5.0 BOUNDARIES OF THE CITY

5.1 The boundaries of an annexation are a result of petitioners' actions, although they should be within the City's Urban Growth Area.

COMMENTS: The City will need to develop its plans on how to best service an area as a result of a potential annexation.

5.2 The City's urban growth area shall be considered the boundary of the City's annexation areas.

6.0 SERVICE

6.1 The City will strive to maintain service levels for Tukwila's existing citizens when new areas are considered for annexation.

6.2 The City should provide for facilities and services for newly annexed areas according to the following guidelines:

1. First, to maintain existing facilities and services;
2. Second, to upgrade existing facilities and services to Tukwila standards;
3. Third, to provide new facilities and services to support planned growth.

COMMENTS: This policy will provide a consistent basis for identifying needs and setting priorities to furnish facilities and services in a newly annexed area.

6.3 Tukwila should determine whether or not to assume management of fire, sewer, or water districts in annexation areas on a case-by-case basis subject to the requirements of RCW 35.13A.

COMMENTS: Tukwila's urban growth areas will include portions of several special purpose districts providing water, sewer, and fire services. In light of the individual factors pertaining to the operation of each, the decision to assume administration should be made on a case-by-case basis. City Council members, the Mayor, and other appropriate persons as designated by the Mayor should contact the affected special purpose districts.

7.0 SPECIAL PURPOSE DISTRICTS (EMPLOYEES)

The City will retain the employees of special purpose districts when it assumes the ownership and administration of the district.

COMMENTS: There is presently state law requiring this. The State RCW reads as follows:

35.13.A.090 Employment rights of district employees. Whenever a city acquires all of the facilities of a water district or sewer district, pursuant to this chapter, such a City shall offer to employ every full time employee of the district who is engaged in the operation of such a district's facilities on the date on which such city acquires the district facilities. When a city acquires any portion of the facilities of such a district, such a city shall offer to employ full time employees of the district as of the date of the acquisition of the facilities of the district who are no longer needed by the district.

Whenever a city employs a person who was employed immediately prior thereto by the district, arrangements shall be made: (1) For the retention of service credits under the pension plan of the district pursuant to RCW 41.04.110; (2) For the retention of all sick leave standing to the employee's credit in the plan of such district; (3) For a vacation with pay during the first year of employment equivalent to that to which he would have been entitled if he had remained in the employment of the district.(1971 1st ex.s. c95 5 s 9.)

8.0 PLANNING AND ZONING

8.1 The land use proposed for an area to be annexed should be consistent with Tukwila's adopted Comprehensive Plan Policies, adjacent uses and other land use requirements.

COMMENTS: This policy will ensure that zoning for annexation areas shall be determined both according to Tukwila's Comprehensive Plan and in consideration of existing uses in the area.

8.2 Tukwila should consider simultaneous zoning for annexations on a case-by-case basis.

COMMENTS: Simultaneously adopting the zoning designation for the annexation area and the annexation itself will provide predictability for the City of Tukwila, property owners, and residents involved in an annexation action.

8.3 In newly annexed areas, buildings and facilities which do not comply with Tukwila's zoning and other code requirements shall be considered non-conforming uses in Tukwila.

COMMENTS: Designating non-conforming uses in newly annexed areas will ensure that they are treated the same as existing non-conforming uses in Tukwila.

Section 2. A copy of these annexation policies shall be distributed freely to any persons or organizations interested in annexation to Tukwila.

Section 3. Repealer Resolution 992, passed by the City Council of Tukwila, Washington on March 3, 1986, and the annexation policies referenced therein, are hereby repealed.

PASSED BY THE CITY COUNCIL OF THE CITY OF TUKWILA, WASHINGTON, at a regular meeting thereof this 17th day of September, 1990.

Joan Hernandez

Joan Hernandez, Council President

ATTEST/AUTHENTICATED:

Jane Cantu

Jane Cantu, City Clerk

APPROVED AS TO FORM:

OFFICE OF THE CITY ATTORNEY:

Filed with the City Clerk: 9-14-90
Passed by the City Council: 9-17-90
Resolution Number 1155

Appendix G

WATER RIGHTS SELF-ASSESSMENT FORMS

Water Right Self-Assessment Form for Water System Plan

Mouse-over any link for more information. Click on any link for more detailed instructions.

Water Right Permit, Certificate, or Claim # *If water right is interruptible, identify limitation in yellow section below	WFI Source # If a source has multiple water rights, list each water right on separate line	Existing Water Rights Qi= Instantaneous Flow Rate Allowed (GPM or CFS) Qa= Annual Volume Allowed (Acre-Feet/Year) This includes wholesale water sold				Current Source Production – Most Recent Calendar Year Qi = Max Instantaneous Flow Rate Withdrawn (GPM or CFS) Qa = Annual Volume Withdrawn (Acre-Feet/Year) This includes wholesale water sold				10-Year Forecasted Source Production (determined from WSP) This includes wholesale water sold				20-Year Forecasted Source Production (determined from WSP) This includes wholesale water sold			
		Primary Qi Maximum Rate Allowed	Non-Additive Qi Maximum Rate Allowed	Primary Qa Maximum Volume Allowed	Non-Additive Qa Maximum Volume Allowed	Total Qi Maximum Instantaneous Flow Rate Withdrawn	Current Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume Withdrawn	Current Excess or (Deficiency) Qa	Total Qi Maximum Instantaneous Flow Rate in 10 Years	10-Year Forecasted Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume in 10 Years	10-Year Forecasted Excess or (Deficiency) Qa	Total Qi Maximum Instantaneous Flow Rate in 20 Years	20-Year Forecasted Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume in 20 Years	20-Year Forecasted Excess or (Deficiency) Qa
1																	
2																	
3																	
4																	
5																	
6																	
	TOTALS =																
Column Identifiers for Calculations:		A		B		C	=A-C	D	=B-D	E	= A-E	F	=B-F	G	=A-G	H	=B-H

PENDING WATER RIGHT APPLICATIONS: Identify any water right applications that have been submitted to Ecology.

Application Number	New or Change Application?	Date Submitted	Quantities Requested			
			Primary Qi	Non-Additive Qi	Primary Qa	Non-Additive Qa

INTERTIES: Systems receiving wholesale water complete this section. Wholesaling systems must include water sold through intertie in the current and forecasted source production columns above.

Name of Wholesaling System Providing Water	Quantities Allowed In Contract		Expiration Date of Contract	Currently Purchased (2019) Current quantity purchased through intertie				10-Year Forecasted Purchase (2030) Forecasted quantity purchased through intertie				20-Year Forecasted Purchase (2040) Forecasted quantity purchased through intertie			
	Maximum Qi Instantaneous Flow Rate	Maximum Qa Annual Volume		Maximum Qi Instantaneous Flow Rate	Current Excess or (Deficiency) Qi	Maximum Qa Annual Volume	Current Excess or (Deficiency) Qa	Maximum Qi 10-Year Forecast	Future Excess or (Deficiency) Qi	Maximum Qa 10-Year Forecast	Future Excess or (Deficiency) Qa	Maximum Qi 20-Year Forecast	Future Excess or (Deficiency) Qi	Maximum Qa 20-Year Forecast	Future Excess or (Deficiency) Qa
1 City of Seattle (through the Cascade Water Alliance)	**2,930 GPM**	**NA**	**12/21/2053**	**2,160 GPM**	**770 GPM**	**1,974 AF/yr**	**NA**								
2															
3															
TOTALS =	**2,930 GPM**	**NA**		**2,160 GPM**	**770 GPM**	**1,974 AF/yr**	**NA**	**3,192 GPM**	**(262 GPM)**	**2,766 AF/yr**	**NA**	**3,726 GPM**	**(796 GPM)**	**3,405 AF/yr**	**NA**
Column Identifiers for Calculations:	A	B		C	=A-C	D	=B-D	E	=A-E	F	=B-F	G	=A-G	H	=B-H

INTERRUPTIBLE WATER RIGHTS: Identify limitations on any water rights listed above that are interruptible.

Water Right #	Conditions of Interruption	Time Period of Interruption
1		
2		
3		

ADDITIONAL COMMENTS:

The City holds a surface water right to irrigate Foster Municipal Golf Course (Permit Number S2-23433P) during irrigation season.

Appendix H

SYSTEM MAP

Seattle Intertie (E. Marginal Way at North City Limit)

PRV 8

Oxbow (PRV 10A)

Seattle Intertie (47TH Avenue S. and Victor Street)

SS 10 (East Marginal) & PRV 10

SS169 (Ryan Hill

KCWD 125 Intertie (Duwamish)

KCWD 125 Intertie (131ST PL.)

North Hill Pump Station, Reservoir & PRV

SS 15 (Christensen) & PRV 15

SS13 (South Center) & PRV 13

SS 14 (West Valley) & PRV 14

SS 16 (Crystal Springs) & PRV 16

Renton Intertie

Kent Intertie

Legend

- Check Valves
- Supply Station
- Back-up Supply Station
- PRV
- Emergency Intertie
- Reservoir & Pump Station

Modeled Pipeline by Diameter

- 6" or Less
- 8"
- 10" - 12"
- 16" or Greater
- Roadways
- Retail Water Service Area

Pressure Zones

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

N

Feet

0 2,500 5,000

Data Sources: City of Tukwila, King County GIS, ESRI

Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.

Appendix I

DETAILED DEMAND PROJECTION

ADD Projections (gpd)
Water System Plan
City of Tukwila

	Pressure Zone	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
City-Wide		1,756,000	2,064,000	2,111,000	2,158,000	2,206,000	2,253,000	2,301,000	2,334,000	2,367,000	2,400,000	2,433,000	2,467,000	2,516,000	2,566,000	2,616,000	2,667,000	2,717,000	2,779,000	2,842,000	2,905,000	2,968,000	3,032,000
380 Zone		4,100	4,600	4,700	4,800	4,900	4,900	5,000	5,100	5,200	5,300	5,400	5,500	5,500	5,600	5,700	5,700	5,800	5,800	5,800	5,800	5,800	5,800
340 Zone		14,400	16,300	16,900	17,500	18,100	18,700	19,200	20,300	21,300	22,300	23,300	24,300	24,700	25,000	25,400	25,800	26,200	26,300	26,400	26,400	26,500	26,600
465 Zone		33,800	37,700	38,400	39,100	39,800	40,500	41,200	42,300	43,400	44,500	45,600	46,700	47,200	47,700	48,200	48,600	49,100	49,400	49,500	49,600	49,800	49,900
320 Zone		129,200	152,900	152,900	152,900	152,900	152,900	152,900	152,900	152,900	152,900	152,900	152,900	152,900	152,900	152,900	152,900	152,900	152,900	153,000	153,000	153,000	153,000
360/400 Zone		1,574,600	1,852,400	1,898,200	1,944,200	1,990,300	2,036,500	2,082,900	2,113,700	2,144,600	2,175,500	2,206,300	2,237,300	2,286,000	2,335,000	2,384,200	2,433,600	2,483,300	2,545,000	2,607,200	2,669,900	2,733,100	2,796,900
ADD ERU Value		149	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147
380 Zone																							
Single-Family Residential	380 Zone	1,488	1,546	1,618	1,689	1,761	1,833	1,904	1,994	2,085	2,175	2,265	2,356	2,415	2,475	2,535	2,595	2,655	2,655	2,655	2,655	2,655	2,655
Multifamily Residential	380 Zone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial, Industrial & Gover	380 Zone	2,504	2,810	2,810	2,810	2,810	2,810	2,810	2,810	2,810	2,810	2,810	2,810	2,810	2,810	2,810	2,810	2,810	2,812	2,814	2,816	2,818	2,820
Large Consumers	380 Zone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DSL	380 Zone	147	235	239	243	247	251	255	259	264	269	274	279	282	285	289	292	295	295	295	295	296	296
Other Authorized Use	380 Zone	0	33	34	34	35	35	36	37	37	38	39	39	40	40	41	41	42	42	42	42	42	42
340 Zone																							
Single-Family Residential	340 Zone	6,398	6,901	7,461	8,020	8,580	9,139	9,699	10,645	11,591	12,537	13,483	14,429	14,758	15,088	15,417	15,746	16,076	16,076	16,076	16,076	16,076	16,076
Multifamily Residential	340 Zone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial, Industrial & Gover	340 Zone	7,511	8,431	8,431	8,431	8,431	8,431	8,431	8,431	8,431	8,431	8,431	8,431	8,466	8,501	8,536	8,571	8,606	8,677	8,748	8,820	8,892	8,965
Large Consumers	340 Zone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DSL	340 Zone	514	828	858	888	919	949	979	1,030	1,081	1,132	1,183	1,234	1,254	1,274	1,293	1,313	1,333	1,337	1,340	1,344	1,348	1,352
Other Authorized Use	340 Zone	0	117	121	125	129	134	138	145	152	159	167	174	177	179	182	185	188	188	189	189	190	190
465 Zone																							
Single-Family Residential	465 Zone	11,307	11,608	12,007	12,407	12,806	13,206	13,605	14,281	14,957	15,632	16,308	16,984	17,215	17,446	17,678	17,909	18,140	18,140	18,140	18,140	18,140	18,140
Multifamily Residential	465 Zone	13,777	15,448	15,681	15,916	16,156	16,399	16,645	16,998	17,358	17,726	18,102	18,485	18,619	18,755	18,891	19,028	19,166	19,305	19,305	19,305	19,305	19,305
Commercial, Industrial & Gover	465 Zone	7,511	8,447	8,463	8,478	8,494	8,510	8,526	8,534	8,542	8,550	8,559	8,567	8,644	8,722	8,801	8,881	8,961	9,080	9,201	9,323	9,447	9,573
Large Consumers	465 Zone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DSL	465 Zone	1,204	1,917	1,952	1,987	2,023	2,058	2,094	2,150	2,206	2,263	2,320	2,378	2,402	2,426	2,450	2,474	2,498	2,512	2,519	2,526	2,532	2,539
Other Authorized Use	465 Zone	0	270	275	280	285	290	295	303	311	319	327	335	338	341	345	348	352	354	355	355	356	357
320 Zone																							
Single-Family Residential	320 Zone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Multifamily Residential	320 Zone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial, Industrial & Gover	320 Zone	3,756	4,216	4,216	4,216	4,216	4,216	4,216	4,216	4,216	4,216	4,216	4,216	4,224	4,232	4,241	4,249	4,258	4,281	4,305	4,329	4,353	4,377
Large Consumers	320 Zone	120,889	139,770	139,770	139,770	139,770	139,770	139,770	139,770	139,770	139,770	139,770	139,770	139,770	139,770	139,770	139,770	139,770	139,770	139,770	139,770	139,770	139,770
DSL	320 Zone	4,604	7,775	7,775	7,775	7,775	7,775	7,775	7,775	7,775	7,775	7,775	7,775	7,776	7,776	7,777	7,777	7,777	7,779	7,780	7,781	7,783	7,784
Other Authorized Use	320 Zone	0	1,094	1,094	1,094	1,094	1,094	1,094	1,094	1,094	1,094	1,094	1,094	1,094	1,094	1,094	1,095	1,095	1,095	1,095	1,095	1,095	1,096
360/400 Zone																							
Single-Family Residential	360/400 Zone	173,478	174,019	176,074	178,129	180,183	182,238	184,293	186,584	188,875	191,166	193,457	195,748	197,352	198,955	200,559	202,163	203,767	204,784	205,801	206,817	207,834	208,851
Multifamily Residential	360/400 Zone	151,551	182,487	197,557	212,628	227,699	242,769	257,840	274,644	291,448	308,252	325,056	341,861	353,625	365,389	377,154	388,918	400,683	408,140	415,598	423,055	430,513	437,970
Commercial, Industrial & Governmental - Total		867,539	979,178	984,576	990,004	995,462	1,000,950	1,006,468	1,008,532	1,010,600	1,012,672	1,014,749	1,016,830	1,023,586	1,030,388	1,037,235	1,044,127	1,051,065	1,061,364	1,071,764	1,082,266	1,092,870	1,103,579
Commercial, Industrial & Gover	360/400 Zone	867,539	977,568	981,346	985,146	988,966	992,808	996,671	998,115	999,563	1,001,014	1,002,467	1,003,924	1,008,653	1,013,414	1,018,207	1,023,032	1,027,888	1,035,098	1,042,378	1,049,729	1,057,152	1,064,648
Commercial, Industrial & Gover	360/400 Zone	0	22,106	44,333	66,684	89,157	111,754	134,476	142,975	151,490	160,023	168,574	177,142	204,964	232,970	261,163	289,543	318,111	360,519	403,343	446,586	490,253	534,348
Large Consumers	360/400 Zone	325,974	388,768	388,768	388,768	388,768	388,768	388,768	388,768	388,768	388,768	388,768	388,768	388,768	388,768	388,768	388,768	388,768	388,768	388,768	388,768	388,768	388,768
DSL	360/400 Zone	56,087	94,227	96,556	98,893	101,238	103,590	105,951	107,519	109,088	110,658	112,229	113,802	116,282	118,773	121,276	123,791	126,318	129,455	132,618	135,808	139,024	142,268
Other Authorized Use	360/400 Zone	0	13,262	13,589	13,918	14,248	14,579	14,912	15,132	15,353	15,574	15,795	16,017	16,366	16,716	17,068	17,422	17,778	18,220	18,665	19,114	19,566	20,023

MDD Projections (gpd)
Water System Plan
City of Tukwila

	Pressure Zone	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
														1.62%	1.59%	1.57%	1.55%	1.52%	1.95%	1.91%	1.88%	1.84%	1.81%
City-Wide		4,660,000	5,390,000	5,480,000	5,570,000	5,670,000	5,760,000	5,850,000	5,920,000	5,980,000	6,040,000	6,100,000	6,170,000	6,270,000	6,370,000	6,470,000	6,570,000	6,670,000	6,800,000	6,930,000	7,060,000	7,190,000	7,320,000
380 Zone		7,300	8,200	8,300	8,500	8,600	8,700	8,900	9,000	9,200	9,400	9,500	9,700	9,800	9,900	10,000	10,200	10,300	10,300	10,300	10,300	10,300	10,300
340 Zone		25,600	28,800	29,900	30,900	32,000	33,000	34,100	35,800	37,600	39,400	41,200	43,000	43,600	44,300	45,000	45,700	46,400	46,500	46,600	46,800	46,900	47,100
465 Zone		60,000	66,700	67,900	69,200	70,400	71,600	72,900	74,800	76,800	78,700	80,700	82,700	83,600	84,400	85,300	86,100	86,900	87,400	87,600	87,900	88,100	88,300
320 Zone		229,400	270,600	270,600	270,600	270,600	270,600	270,600	270,600	270,600	270,600	270,600	270,600	270,600	270,600	270,600	270,600	270,600	270,700	270,700	270,800	270,800	270,900
360/400 Zone		2,794,400	3,278,800	3,359,900	3,441,200	3,522,800	3,604,600	3,686,800	3,741,300	3,795,900	3,850,600	3,905,200	3,960,000	4,046,200	4,132,900	4,220,000	4,307,500	4,395,500	4,504,600	4,614,700	4,725,700	4,837,600	4,950,500
Peaking Factor		1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77
380 Zone																							
Single-Family Residential	380 Zone	2,640	2,737	2,864	2,990	3,117	3,244	3,370	3,530	3,690	3,850	4,010	4,169	4,275	4,381	4,487	4,593	4,699	4,699	4,699	4,699	4,699	4,699
Multifamily Residential	380 Zone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial, Industrial & Governmental	380 Zone	4,443	4,974	4,974	4,974	4,974	4,974	4,974	4,974	4,974	4,974	4,974	4,974	4,974	4,974	4,974	4,974	4,974	4,978	4,981	4,985	4,988	4,991
Large Consumers	380 Zone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DSL	380 Zone	262	416	423	430	437	444	451	459	468	477	485	494	499	505	511	517	522	523	523	523	523	523
Other Authorized Use	380 Zone	0	59	60	61	61	62	63	65	66	67	68	69	70	71	72	73	74	74	74	74	74	74
340 Zone																							
Single-Family Residential	340 Zone	11,353	12,215	13,206	14,196	15,186	16,177	17,167	18,841	20,516	22,190	23,865	25,539	26,122	26,705	27,288	27,871	28,454	28,454	28,454	28,454	28,454	28,454
Multifamily Residential	340 Zone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial, Industrial & Governmental	340 Zone	13,329	14,923	14,923	14,923	14,923	14,923	14,923	14,923	14,923	14,923	14,923	14,923	14,985	15,046	15,108	15,170	15,232	15,357	15,484	15,611	15,739	15,869
Large Consumers	340 Zone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DSL	340 Zone	912	1,465	1,519	1,572	1,626	1,679	1,733	1,823	1,914	2,004	2,095	2,185	2,220	2,255	2,289	2,324	2,359	2,366	2,373	2,379	2,386	2,393
Other Authorized Use	340 Zone	0	206	214	221	229	236	244	257	269	282	295	308	312	317	322	327	332	333	334	335	336	337
465 Zone																							
Single-Family Residential	465 Zone	20,066	20,546	21,253	21,960	22,667	23,374	24,081	25,277	26,473	27,669	28,865	30,061	30,470	30,880	31,289	31,699	32,108	32,108	32,108	32,108	32,108	32,108
Multifamily Residential	465 Zone	24,450	27,344	27,755	28,172	28,596	29,025	29,462	30,086	30,724	31,375	32,040	32,719	32,956	33,196	33,436	33,679	33,923	34,170	34,170	34,170	34,170	34,170
Commercial, Industrial & Governmental	465 Zone	13,329	14,951	14,979	15,007	15,035	15,063	15,091	15,105	15,120	15,134	15,149	15,163	15,300	15,439	15,578	15,719	15,861	16,072	16,286	16,502	16,722	16,944
Large Consumers	465 Zone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DSL	465 Zone	2,137	3,393	3,455	3,518	3,580	3,643	3,706	3,805	3,905	4,006	4,107	4,209	4,251	4,294	4,336	4,379	4,422	4,447	4,458	4,470	4,482	4,494
Other Authorized Use	465 Zone	0	478	486	495	504	513	522	536	550	564	578	592	598	604	610	616	622	626	627	629	631	632
320 Zone																							
Single-Family Residential	320 Zone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Multifamily Residential	320 Zone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial, Industrial & Governmental	320 Zone	6,665	7,462	7,462	7,462	7,462	7,462	7,462	7,462	7,462	7,462	7,462	7,462	7,476	7,491	7,506	7,521	7,536	7,578	7,620	7,662	7,704	7,747
Large Consumers	320 Zone	214,533	247,393	247,393	247,393	247,393	247,393	247,393	247,393	247,393	247,393	247,393	247,393	247,393	247,393	247,393	247,393	247,393	247,393	247,393	247,393	247,393	247,393
DSL	320 Zone	8,170	13,762	13,762	13,762	13,762	13,762	13,762	13,762	13,762	13,762	13,762	13,762	13,763	13,764	13,765	13,765	13,766	13,768	13,771	13,773	13,775	13,778
Other Authorized Use	320 Zone	0	1,937	1,937	1,937	1,937	1,937	1,937	1,937	1,937	1,937	1,937	1,937	1,937	1,937	1,937	1,937	1,937	1,938	1,938	1,938	1,939	1,939
360/400 Zone																							
Single-Family Residential	360/400 Zone	307,858	308,014	311,651	315,288	318,924	322,561	326,198	330,253	334,308	338,363	342,418	346,473	349,312	352,151	354,990	357,829	360,668	362,468	364,267	366,067	367,866	369,666
Multifamily Residential	360/400 Zone	268,946	323,001	349,676	376,351	403,027	429,702	456,377	486,120	515,863	545,607	575,350	605,093	625,916	646,739	667,562	688,385	709,209	722,408	735,608	748,808	762,008	775,208
Commercial, Industrial & Governmental - Total		1,539,555	1,733,146	1,742,700	1,752,308	1,761,968	1,771,681	1,781,449	1,785,102	1,788,762	1,792,430	1,796,106	1,799,789	1,811,748	1,823,787	1,835,905	1,848,104	1,860,385	1,878,614	1,897,022	1,915,610	1,934,381	1,953,335
Commercial, Industrial & Governmental - Regular	360/400 Zone	1,539,555	1,730,295	1,736,983	1,743,708	1,750,471	1,757,270	1,764,107	1,766,664	1,769,226	1,771,794	1,774,367	1,776,945	1,785,317	1,793,744	1,802,227	1,810,766	1,819,362	1,832,123	1,845,008	1,858,020	1,871,159	1,884,427
Commercial, Industrial & Governmental - High	360/400 Zone	0	39,127	78,470	118,030	157,808	197,805	238,023	253,065	268,138	283,242	298,376	313,542	362,786	412,357	462,258	512,491	563,057	638,119	713,917	790,457	867,748	945,796
Large Consumers	360/400 Zone	578,482	688,120	688,120	688,120	688,120	688,120	688,120	688,120	688,120	688,120	688,120	688,120	688,120	688,120	688,120	688,120	688,120	688,120	688,120	688,120	688,120	688,120
DSL	360/400 Zone	99,534	166,782	170,905	175,041	179,191	183,355	187,533	190,308	193,085	195,865	198,646	201,429	205,818	210,228	214,659	219,110	223,582	229,135	234,734	240,380	246,073	251,814
Other Authorized Use	360/400 Zone	0	23,473	24,053	24,635	25,219	25,805	26,393	26,784	27,175	27,566	27,958	28,349	28,967	29,588	30,211	30,838	31,467	32,249	33,037	33,831	34,632	35,440

Appendix J

HYDRAULIC MODEL DEVELOPMENT AND CALIBRATION

DRAFT PROJECT MEMORANDUM

COMPREHENSIVE WATER SYSTEM PLAN

City of Tukwila

Date: June 22, 2021
Project No.: 1866A.00

Prepared By:	Natalie Reilly, P.E.
Reviewed By:	Aurelie Nabonnand, P.E.
Subject:	Hydraulic Model Update and Calibration

Purpose

The City of Tukwila's (City) hydraulic model is the primary tool used to evaluate its distribution system, namely by examining how the existing water infrastructure will handle future demands and verifying that recommended improvements will mitigate system deficiencies.

As part of the Comprehensive Water System Plan (CWSP), the City's WaterCAD hydraulic model was updated and calibrated. Pipes in the hydraulic model were updated using geographic information system (GIS) data and additional comments and clarifications from the City over the course of the CWSP's development.

The following technical memorandum details the model updated and summarizes the model calibration.

Summary of Model Updates

This section provides reviews updates that were made to the City's WaterCAD model as part of the CWSP.

The City's existing hydraulic model, which was updated and calibrated as part of the Comprehensive Water System Plan 2015 update, was used as a starting point. The following updates were completed to reflect the distribution system's conditions as of 2020:

- **Physical system updates**: The model's 'Base-Physical' alternative was updated to reflect the 2020 physical conditions of the water system including adjusting pipe alignments, adding new pipes, and correcting pipe diameter sizes. Table 1 summarizes all the pipe updates made to the model.
- **Pressure-reducing valve (PRV) station updates**: The PRV's pressure settings were revised so that PRV flows better matched supervisory control and data acquisition (SCADA) data that was provided by the City for model calibration.
- **Fire flow updates**: A new "2021 Fire Flow" fire flow demand alternative was created with updated fire flow requirements for each node with a nearby hydrant, as shown in Figure 5.4 in Chapter 5.
- **Junction updates:** Junction elevations were updated according to 2-feet contours provided by the City.

Additionally, the model was updated to the current version of WaterCAD software, WaterCAD CONNECTION Edition Update 1.

Table 1 Hydraulic Model Pipe Updates

Pipe Updates
Adjusted pipe alignments throughout the system to better match actual pipe configuration per GIS.
Updated pipe in the 465 Pressure Zone (PZ) on 51st Avenue S and surrounding areas to better match actual pipe configuration per GIS.
Added pipe in Duwamish Hill area on 40th Avenue S, S 114th Street, 41st Avenue S, and S 113th Street.
Added pipe on 50th Avenue S and S 124th Street.
Connected pipe on 51st Place S and 50th Place S at southern end.
Added pipe in Foster Area on 51st Avenue S, 52nd Avenue S, S 137th Street, S 136th Street and 54th Avenue S.
Updated pipe on S 150th Street and S 150th Place to better match actual pipe configuration per GIS.
Updated pipe alignment and length on S 152nd Place to better match actual pipe configuration per GIS.
Removed pipe between Southcenter Blvd and Sunwood Blvd.
Removed looped pipe in Canyon estates.
Updated pipe configuration east of Tukwila Park.
Updated diameter of pipe on W Valley Hwy at I-405 crossing.
Updated pipe alignment and intersections on W Valley Hwy near Amtrack-Tukwila station to better reflect actual pipe configuration per GIS.
Removed private pipe and hydrants south of Strander Blvd and east of Andover Park E from model.
Removed private pipe and hydrant east of Andover Park E and south of Minkler Blvd.
Removed pipe loop between Midland Drive and Triland Drive.
Added pipe on Wig Blvd, Bauch Drive, and updated pipe on Minkler Blvd.
Updated pipe alignment at Westfield Southcenter Mall.
Updated pipe diameter and added pipe for 52nd Avenue S/53rd Avenue S pipe improvement project (52nd Avenue S from Interurban Avenue S to 53rd Avenue S, 53rd Avenue S from 52nd Avenue S to S 137th Street, S 137th Street connecting 53rd Avenue S, 53rd Avenue S from S 137th Street to S 144th Street).
Updated pipe diameter to 12-inch along Green River Trail through Tukwila Park from Interurban Avenue S to Southcenter Blvd.

Water Demand Allocation

In addition to the physical system updates, new demand alternatives were created. Existing and future demands were allocated to the closest junctions in the hydraulic model. The City provided historical water consumptions by customer type and the number of water accounts by customer type and pressure zone. This data, along with the acreage by customer type in each pressure zone, was used to develop demand factors in gallons per day per acre (gpd/acre) for existing demands. This process was also used to develop demand factors for future demands based on the 2030 and 2040 demand projections.

To allocate existing demands, the 2020 average day water demands presented in Chapter 4 were assigned to non-vacant parcels by pressure zone and land use, using the demand factors in gpd/acre. Non-vacant parcels were obtained from the City's parcel GIS layer and its accompanying spreadsheet and are identified as having a non-vacant present use. Water demands for each parcel were then allocated to the nearest model junction using GIS. Demands for the 10 large users were allocated separately to specific model junctions, as summarized in Chapter 4.

Meanwhile, the 2020 maximum day demands (MDD) were allocated by multiplying the 2020 average day demands (ADD) by the MDD/ADD peaking factor, which was 1.77.

Diurnal curves, which show the ratio of water demand for each hour of the day compared to the average water demand for the day, were used to model the customer demand variation over an extended period of 24 hours. Diurnal curves were developed using the City's SCADA data to represent fluctuations in water demands under ADD and MDD conditions. Shown in Figure 1, the ADD diurnal curve was developed with SCADA data on supply station and reservoir flows from February 2019 while, shown in Figure 2, the MDD diurnal curve was developed using similar data only from August 2019.

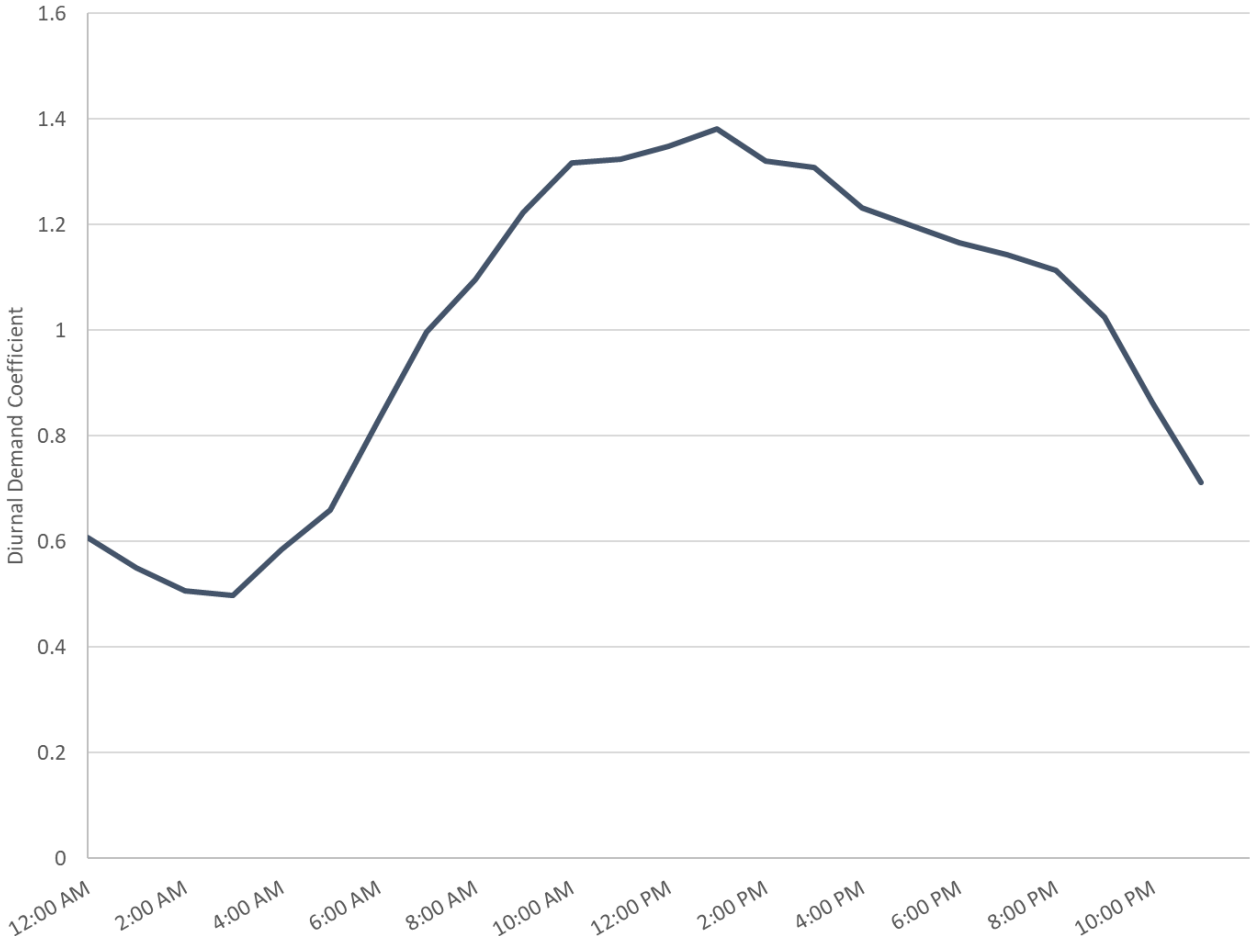


Figure 1 ADD Diurnal Curve

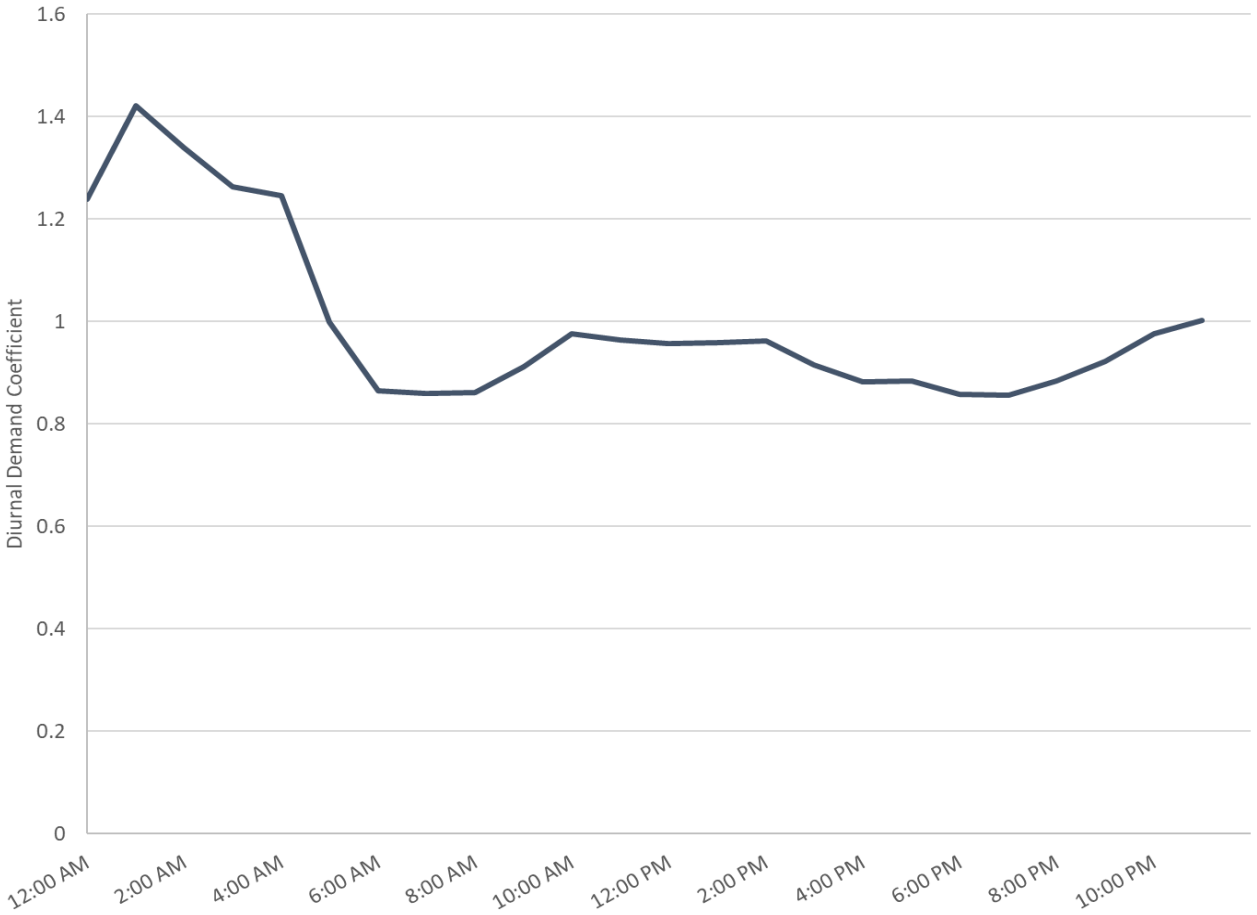


Figure 2 MDD Diurnal Curve

The following demand alternatives were created to represent existing demands:

- 2020 ADD: ADD with the ADD diurnal curve.
- 2020 MDD: MDD with the MDD diurnal curve.
- 2020 MDD steady state: MDD under steady state conditions with no diurnal curve.

To allocate future demands, the 2030 and 2040 additional water demands presented in Chapter 4 were assigned to vacant parcels by pressure zone and land use using demand factors in gpd/acre. Vacant parcels were obtained from the City's parcel GIS layer and its accompanying spreadsheet as parcels identified as vacant in the "PresentUse" column and the "VacantFlag" column. Parcels identified as vacant in the "VacantFlag" column were reviewed and updated as needed. Any parcels flagged as vacant but designated as one of the following existing land uses were not included in the demand allocation: right-of-way, utility, road, railroad, park, streams, and waterbody. The following demand alternatives were created to represent future demands:

- 2030 ADD: ADD with the ADD diurnal curve.
- 2030 MDD: MDD with the MDD diurnal curve.
- 2030 MDD steady state: MDD under steady state conditions with no diurnal curve.
- 2040 ADD: ADD with the ADD diurnal curve.
- 2040 MDD: MDD with the MDD diurnal curve.
- 2040 MDD steady state: MDD under steady state conditions with no diurnal curve.

Hydraulic Model Calibration Overview and Methodology

Calibration is the process of comparing model simulation results to actual field data and making corrections and adjustments to the model to achieve a loose agreement between model prediction and field measured data. This section describes the hydraulic model calibration process and results.

Model Calibration Overview

The purpose of the water system hydraulic model is to estimate, or predict, how the water system will respond under a given set of 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. Data obtained from the field tests can be used to determine appropriate roughness coefficients for each pipeline, as roughness coefficient can vary with age, pipe material, and construction quality.

Hydrant Flow Test Calibration Overview

During ADD conditions, roughness coefficients have a relatively small effect on operation of the distribution system due to low velocities. As flows increase in the system on higher demand days or during fire flows, velocities within pipelines increase, leading to higher system head losses.

The hydrant flow tests stress the distribution system by creating a differential between the hydraulic grade line (HGL) at the point of hydrant flow and the system HGL at neighboring hydrants. This HGL differential increases the effect of the roughness coefficients on system losses. The model is calibrated by simulating the hydrant flow test and adjusting settings and parameters to match the field measured pressures under similar demand and system boundary conditions. For the monitoring hydrants, the results are considered acceptable if model pressures are within 10 feet of pressure (4.3 pounds per square inch [psi]) or have a 10 percent difference to both the static and residual field data. Model pressures within 5 feet of pressure or 5 percent of the field measurements are considered very good.

The headloss factor is a function of pipeline material, diameter, and age, as well as headloss from bends, connections, and fitting that are not specifically modeled. Hydrant test calibration refines the initial estimation of the value of headloss factors that best represent current conditions within the City's distribution system. The headloss factor should be adjusted only within the accepted roughness coefficient range of $80 < C < 130$.

A static pressure scenario and residual pressure scenario were created in the model for each fire hydrant test. Each scenario is comprised of a different demand dataset to produce the model conditions similar to the field conditions during each hydrant flow test.

Hydrant Flow Test Data

The City conducted a hydrant flow test program on July 21, 2020 and July 24, 2020 to gather recent and detailed information for calibration of the updated hydraulic model. The City conducted four flow tests at three locations in two of the system's six pressure zones using the hydrant flushing procedure outlined in Attachment 1. Typically, when conducting hydrant flow tests, there should be a minimum 10 psi pressure drop (static pressure minus residual pressure) to assist in calibration. Values less than this are within the range of error seen in a planning-level model. However, a 10-psi pressure drop was difficult to achieve due to the redundant nature of the City's distribution system.

Figure 3 shows the locations of all hydrant tests performed in the distribution system. Attachment 2 documents the complete hydrant flow test program, test report and system operating data.

Seattle Intertie (E. Marginal Way at North City Limit)

PRV 8

Oxbow (PRV 10A)

Seattle Intertie (47th Avenue S and Victor Street)

Seattle

PRV 9

SS 10 (East Marginal) & PRV 10

SS 169 (Ryan Hill)

KCWD 125 Intertie (Duwamish)

Hydrant Test #2

KCWD 125 Intertie (131st pl.)

North Hill Pump Station, Reservoir & PRV

Hydrant Tests #3A & #3B

SS 15 (Christensen) & PRV 15

SS 13 (South Center) & PRV 13

SS 16 (Crystal Springs) & PRV 16

SS 14 (West Valley) & PRV 14

Hydrant Test #1

Renton Intertie

Highline Water District Intertie

Kent Intertie

Legend

- Hydrant Test Areas
- Test Hydants
- Supply Station
- Emergency Supply Station
- PRV
- Intertie
- Reservoir & Pump Station

Water Main by Diameter

- 6" or Less
- 8"
- 10" - 12"
- 16" or Greater
- Unknown
- Roadways
- Retail Water Service Area
- Water Body

Pressure Zones

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

N

Feet

0 1,500 3,000

Data Sources: City of Tukwila, King County GIS, ESRI

Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.

Figure 3 Hydrant Test Sites

Hydrant Flow Test Calibration Results

Calibration to hydrant flow tests is conducted individually in order to specifically represent the conditions of the system at the time of the test. Therefore, numerous simulations are performed during the calibration phase. Adjustments are made to the model between runs to minimize the difference between the model and the field-measured results. SCADA data on reservoir levels, pump stations, and inlet flows are available in Appendix B.

The results of the calibration as summarized in Table 2, Figure 4, and Figure 5. Figure 4 summarizes the static calibration point results on a 1 to 1 plot. As shown in Figure 4, the static pressures are 84 percent calibrated to the +/- 4.3 psi threshold. All the modeled static pressure results are within 10 percent of the field measured static results. Figure 5 summarizes the residual calibration point results on a 1 to 1 plot. As shown in Figure 5, the residual pressures are 88 percent calibrated to the +/- 4.3 psi threshold. One modeled residual pressure result for Test 3A is outside of 10 percent of the field measured residual result. At Hydrant 64, the field measured pressure drop was 34 psi and the modeled pressure drop was 25 psi. This result was deemed sufficient for calibration purposes given the large pressure drop.

Model Recommendations

The updated and calibrated model provides an excellent tool for evaluating the distribution system. The model should be updated periodically to maintain reasonable prediction of water system conditions. An update would include incorporating main replacements and improvements, adding new service areas, incorporating operating changes to the reservoirs and pumps, adjusting PRV and supply settings, and adjusting demands to match demand projections and land use. As part of this periodic update, hydrant flow tests should be conducted to verify the accuracy of the model and aid in monitoring system changes.

Table 2 Calibration Summary Results

Test No.	Hydrant Number	Model Junction ID	El. (feet)	Flow (gpm)	Field Results		Model Results		Comparison			
					Static Pressure (psi)	Residual Pressure (psi)	Static Pressure (psi)	Residual Pressure (psi)	Static Pressure Diff (psi)	Residual Pressure Diff (psi)	Static Pressure Error (%)	Residual Pressure Error (%)
1	198A	1377	28	1832.5	144	112	137.2	129	6.8		4.7%	
	198B	1383	26		140	132	138.1	132	1.9	-0.3	1.4%	-0.2%
	187A	1380	25		139	132	138.5	132	0.5	-0.4	0.4%	-0.3%
2	301	1386	14	2034	144	124	143.6	131	0.4		0.3%	
	274	1389	14		140	132	143.7	135	-3.7	-2.8	-2.6%	-2.1%
	272B	441	14		140	134	143.7	135	-3.7	-0.6	-2.6%	-0.4%
3A	63A	1392	245	983	70	38	64.0	38	6.0		8.6%	
	64	1395	199		84	50	82.6	57	1.4	-7.3	1.7%	-14.6%
	97A	1401	194		92	66	93.5	68	-1.5	-2.2	-1.6%	-3.3%
3B	63A	1392	252	947	44	32	40.1	35	3.9		8.9%	
	64	1395	209		60	54	58.7	54	1.3	0.3	2.2%	0.6%
	97A	1401	184	1832.5	70	63	69.5	65	0.5	-1.5	0.7%	-2.4%

Abbreviations:
(1) ID – identification; El. – elevation.

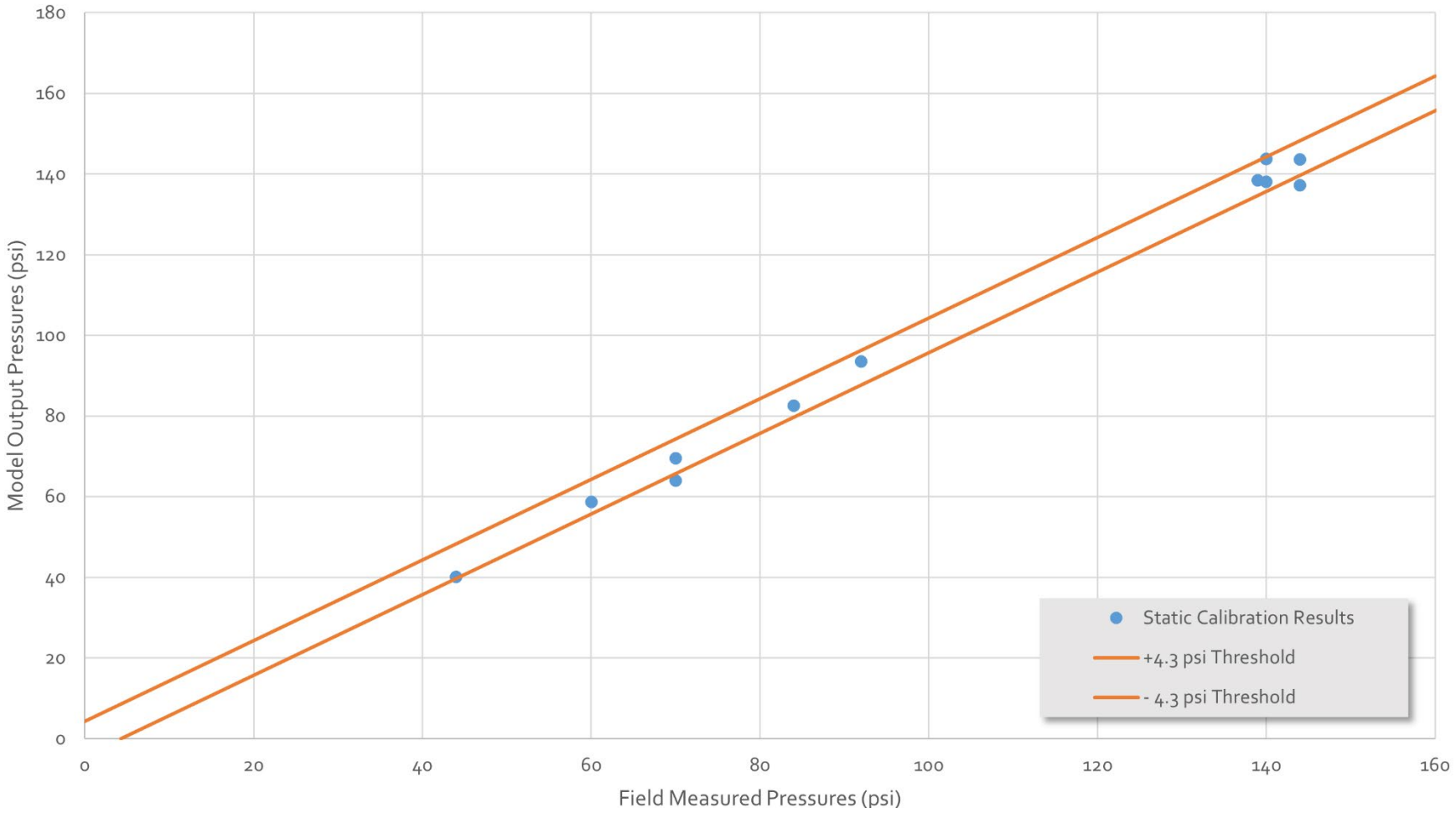


Figure 4 Static Calibration Results

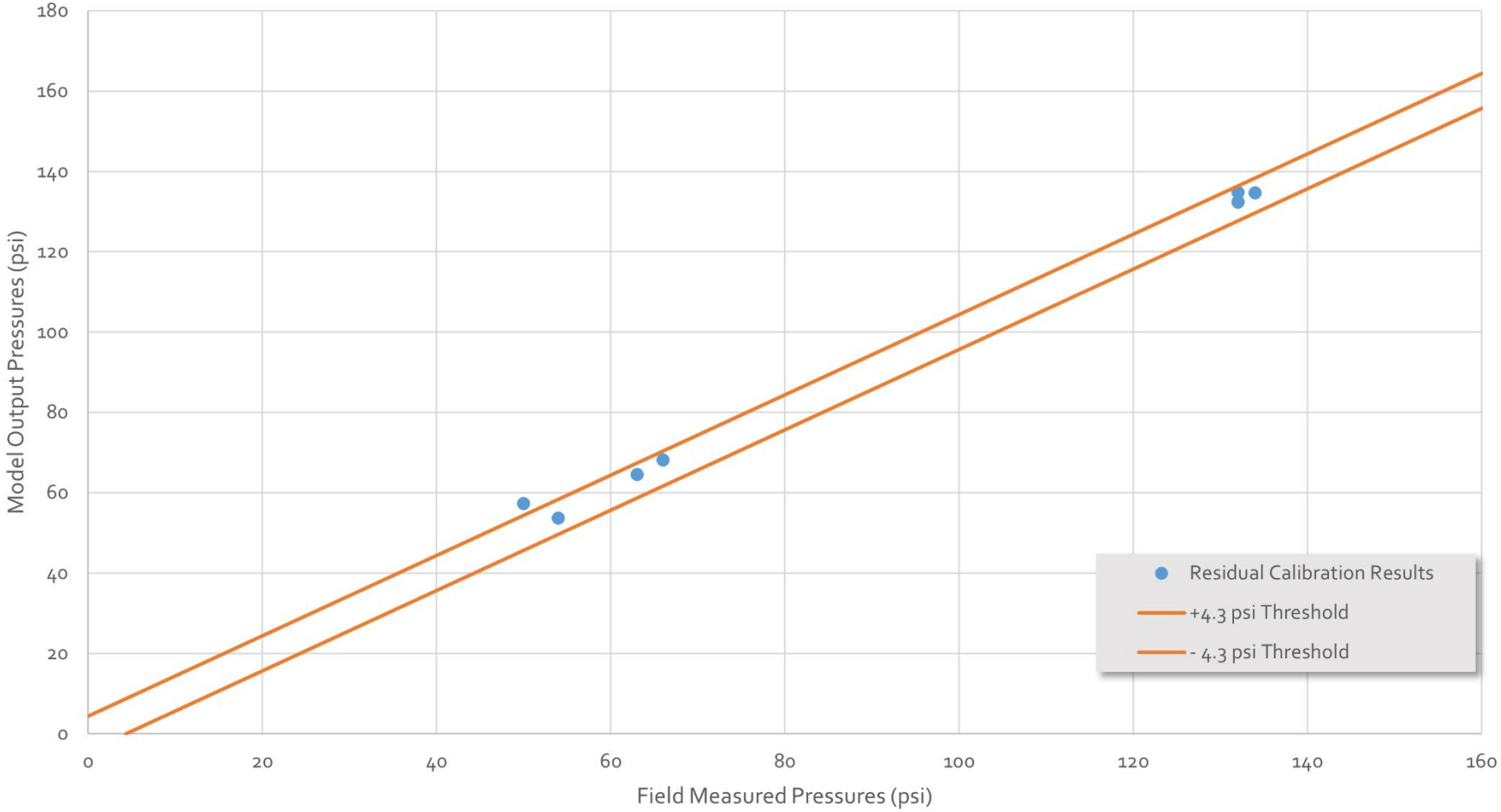


Figure 5 Residual Calibration Results

This document is released for the purpose of information exchange review and planning only under the authority of Aurelie A. Nabonnand, June 2021, Washington, PE No. 56703.

Prepared by:

Natalie Reilly, P.E.

AN:NR:sb

Attachment 1

HYDRANT FLUSHING PROCEDURE HANDOUT FOR MODEL CALIBRATION PROJECT MEMORANDUM

COMPREHENSIVE WATER SYSTEM PLAN

City of Tukwila

Date: June 19, 2020
Project No.: 1866A00

Prepared By:	Aurelie Nabonnand, P.E.
Subject:	Hydrant Flushing Procedure – Handout for Model Calibration

Objective

This handout presents procedures and recommendations for conducting hydrant flow testing. It also outlines the general hydraulic calibration process and how flow hydrant tests are used to calibrate the City's hydraulic model.

Hydrant Flow Test Calibration

Overview of Fire Flow Calibration Process

The calibration of hydrant flow tests is intended to develop a steady state calibrated hydraulic model by closely matching its water model pressures to field pressures under similar demand and system boundary conditions. The primary varied parameter for this calibration will be pipeline roughness coefficients, although other parameters may be adjusted as calibration results are generated.

Hydrant flow test calibration involves refining the initial estimation of the value of roughness coefficients to best match 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. As the flows increase in the system on higher demand days, velocity within pipelines increase and roughness coefficients contribute more to overall system head loss. Hydrant flow tests artificially create high demand events to generate more headloss, allowing a better estimation of the pipeline roughness coefficients to be applied to the hydraulic model.

Hydrant flow tests will consist of one or two flowing hydrants and two pressure hydrants. System data such as total demand, pump flow, and reservoir levels during the time of the test will be recorded. These field tests are simulated in the model to calibrate the model under steady state conditions.

Fire Flow Test Locations

The three (3) locations selected for fire flow testing are shown on Figure 1. These locations are distributed across the system; selected based on location, accessibility, and representation of the various portions of the system. Each of the sites is shown in detail on an individual detail map (Attachment A).

The test sites have been selected such that they create a good geographical coverage of the distribution system. All tests involve 6-inch and 8-inch diameter pipelines (except Hydrant Test #3) and are located away from major transmission lines to increase the chance that a substantial pressure drop (> 10 psi) is observed during the tests.

Emergency SS
(Seattle Intertie)

SS 10A (Oxbow)

(Emergency Intertie)
Seattle Intertie

SS 10 (East Marginal)

KCWD 125
Intertie (Duwamish)

Hydrant Test #2

KCWD 125
Intertie (131st pl.)

North Hill
Pump Station,
Reservoir & PRV

Hydrant
Test #1

SS 15 (Christensen)

SS 13 (South Center)

SS 16 (Crystal Springs)

SS 14
(West Valley)

Alternate
Hydrant Test

Hydrant
Test #3

Renton
Intertie

Highline Water
District Intertie

Kent Intertie

Legend

- Hydrant Test Areas
- Test Hydants
- Supply Station
- Emergency Supply Station
- PRV
- Intertie
- Reservoir & Pump Station

Water Main by Diameter

- 6" or Less
- 8"
- 10" - 12"
- 16" or Greater
- Unknown
- Roadways
- Retail Water Service Area

Pressure Zones

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

0 1,500 3,000 Feet

Data Sources: City of Tukwila, King County GIS, ESRI

Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.

Figure 1 Hydrant Test Sites

The fire test sites were selected using the City's updated GIS water main database, however the City should confirm the pipeline and fire hydrant information in the vicinity of each test site (e.g., alignment, diameter, age, and material of the pipelines and location of fire hydrants).

General Hydrant Flushing Protocol

This section presents the general protocol for performing hydrant flushing. It is intended to provide a general reference for the operations staff performing flushing operations. In addition to the protocol, safety considerations, and sensitive area considerations are also presented.

Flushing Protocol

The following protocol should be used for each hydrant flush. Safety is a key issue when implementing a hydrant-flushing program. While performing a flush, it is important to avoid damage to private property, to allow adequate drainage, and to use traffic control where necessary. In addition, it is important to be aware of sensitive areas such as creeks and other areas that might suffer erosion from the high flow rates. In addition to safety concerns, chlorinated water may be toxic to fish, and water with high sediment content can adversely affect aquatic life. Therefore, it is important to dechlorinate the water, and to ensure that excessive sediment is not discharged into a sensitive creek.

Hydrant flushing should follow this procedure:

- Assess the hydrant to be flushed and the area surrounding the hydrant to determine the safety and sensitivity of the site.
- Locate the hose outlet on the flush hydrant. Remove the outlet cap and install any necessary adaptors.
- Flush the hydrant at a low flow rate (about 10 gpm) by slightly opening the hose outlet. Flush the hydrant until the water runs fairly clear. Accumulated sediment in the hydrant line may damage the pressure testing equipment; the water should run clear before any testing is attempted.
  - ***Note***: Verify the direction of the water flow away from the test area. Ensure that water is not causing any damage to neighboring property. Water should also discharge properly into a drain inlet. Check the path of the water and visually inspect the drain inlet for plugging or other obstructions. If water drainage is problematic, do not conduct any further testing. Shut off the hydrant, remove all equipment, and choose another hydrant.
- Turn the hydrant off and install a pressure gauge on the hose outlet.
- Slowly open the operating nut one to two turns. Bleed the air out of the gauge, read, and record the static pressure.
- Once a static pressure reading is taken, close the operating nut slowly to avoid water hammer.
- Determine which remaining outlet (usually the steamer or pumper outlet) will be used for flushing.
- Remove the steamer outlet cap and install a combination flow tester/discharge diffuser on the hydrant. Also, set up the dechlorination system of choice.
  - ***Note***: The need to dechlorinate discharges to the environment is more critical with chloramines than with chlorine. This is due in part to the higher disinfectant residual concentration throughout the distribution system and, in the case of chloramines, the stability of the disinfectant residual even when introduced to the environment (i.e., light, heat, soil, etc.). Therefore, it is important to dechlorinate the discharge before it reaches a drainage inlet or another water body. If flushing discharge flows to a sewer dechlorination is not required.
- Slowly open the flush hydrant; opening the hydrant too quickly can cause negative pressure in the distribution system. Flush the hydrant until an adequate pressure reading is obtained.

- Once the flush is completed, slowly turn off the hydrant. If the hydrant is closed too quickly, a water hammer (pressure surge) may occur.
  - ***Note***: Pressure regulated areas require an even slower shutdown of the hydrant. In pressure regulated areas, shut the hydrant down halfway while monitoring the pressure gauge and let the water flow for 30 to 45 seconds. This allows the distribution system to recover and permits water pressures to level off. Then, partially close the hydrant and again allow the system to recover. After the short wait, shut down the hydrant slowly until fully closed. Monitor the pressure gauge and avoid pressure spikes.
- After hydrant is closed, remove equipment from hydrant, and close all nozzle caps.

Safety Considerations

Before beginning the hydrant flushing, it is important to inspect the site for safety. The following issues should be addressed:

1. Water flow path to a nearby drain inlet should be unencumbered.
2. Drain inlets should be free of debris.
3. Potential flooding/damage to neighboring property should be strictly avoided.
4. The flow trajectory of the water should not endanger passing vehicles or pedestrian traffic.
5. Water should not cause slick or unsafe conditions in traveled areas.
6. No freestanding water should be left in extremely cold conditions; water could become icy and create slick or unsafe conditions.
7. Do not flush a hydrant if the above or any other conditions create an unsafe situation.

Sensitive Area Considerations

Sensitive areas are those that could be adversely impacted by a large influx of drinking water. Such areas might include creeks, ponds, or other water bodies.

Chloramine residual in the drinking water helps prevent the regrowth of bacteria. Chloramine is a combined form of chorine and ammonia, which is more stable than free chlorine. The concentration is measured as total chlorine residual. Both chlorine and chloramine that are present in flush water are toxic to fish and other small freshwater biota and must be removed before the water reaches any natural water bodies. In addition, extremely silty water can potentially suffocate animals living in natural ponds and streams. The following questions should be addressed before flushing a hydrant in any area suspected as sensitive:

- Are the road surfaces free of significant debris that could flow into the drain inlets?
- Are curbs or ditches sufficient to handle hydrant flow without creating a buildup of silt?
- Are the surfaces over which water will flow free of possible contaminants such as oil, soil, etc.?
- Will water discharged during the flow test erode unpaved areas, etc.?

If any of the above conditions exist, steps should be taken to mitigate the situation and/or re-route the flow away from the sensitive area. If neither mitigation nor re-routing is possible, then the next available (i.e., not in a sensitive area) hydrant should be flushed instead.

Hydrant Flow Testing Procedure

For each of the hydrant flow tests one flow hydrant is opened while residual pressure is measured at two pressure hydrants. If a sufficient pressure drop is not generated with one hydrant flowing, a second hydrant should be opened. Generally, the two flow hydrants should be located adjacent to one another with one pressure hydrant upstream and the other pressure hydrant downstream of the flow hydrants.

Hydrant Flow Testing Equipment

Table 1 lists the equipment needed for hydrant flow testing. After safety equipment, the most important component for hydrant flushing is the flow diffuser/dechlorination equipment. This equipment reduces the energy of the water as the flow from the hydrant is released to the street gutter. Even though the flushing flow rate may be high, the energy diffuser will minimize damage from erosion and allow the water to flow down the gutter instead of spray across the street. The energy diffuser is sometimes used to mix dechlorination chemical. The two methods for dechlorination of potable water are injecting chlorine neutralizer such as Sodium Bisulfite or allowing the water to flow past a solid form of dechlorination chemical such as sodium Bisulfite or ascorbic acid. A metering pump may inject liquid or the dechlorination equipment may have an eductor and a flow control valve that will suck in the required amount of chemical. Dry chemical tablets may be placed in the flow diffuser, or in porous bags in the gutter. The equipment selected for use by the City will have directions for the proper application of chemical. Always sample water before it flows into a storm drain inlet to ensure it is fully dechlorinated.

Table 1 Hydrant Flow Test Equipment

Item	Quantity
Pressure gauge and necessary adaptor to connect gauge to hydrant	3
Dechlorinating hydrant diffuser with hose (as needed for directing flow) and dechlorinating tablets	3
Handheld pitot gage with conversion chart (not needed if diffuser includes built in pitot gage)	2
Adjustable Combination Hydrant and Spanner Wrench	4
Hand-held radios or push-to-talk type cell phones	4
18 inch pipe wrench	1
Adjustable 12 inch crescent wrench	1
12 inch channellock pliers	1
6 inch screwdriver	1
24 foot engineers tape measure	1
Roll of 1/2 inch x 520 inch PTFE tape for thread sealing	1
Clipboard with testing forms	1
Map for locating hydrants	1
Repair forms for identifying valves and hydrants that need repair	As needed
Cloth rags	As needed
Traffic Cones	As needed
Warning Signs	As needed

Hydrant Flow Testing Procedure

The essential guidelines of a hydrant flow test for model calibration are listed below. On the day of hydrant flow testing, all pressure and flow meters should be calibrated by comparing readings when attached to the same hydrant.

1. Identify the flowing hydrant and the pressure hydrants. The proposed hydrant flow test sites are shown on Figure 1. Detail maps for each of the proposed hydrant flow tests are provided in Appendix A.

2. Record the location, date, and time on the testing form of the detail maps in Appendix A.
3. Take a static pressure reading at each of the flowing hydrants and pressure hydrants and record on testing form.
4. Attach flow gauge to Flowing Hydrant 1.
5. Open Flowing Hydrant 1. Make sure to avoid opening the flowing hydrant too fast to avoid water hammer. Dechlorinate the water as it is leaving the system.
6. Record flow and Flowing Hydrant 1 residual pressure.
7. Take a residual pressure reading at Pressure Hydrants 1 & 2 (the pressure should bottom out and then rise slightly before stabilizing). Record the residual pressure. A residual pressure drop (ΔP) of 10 psi is preferable, but 5 psi is acceptable.
    a. If $\Delta P \geq 10$ psi, go to next step.
    b. $\Delta P < 10$ psi, repeat steps above with two flowing hydrants.
    c. If $\Delta P \geq 5$ psi with two flow hydrants, go to next step.
    d. If $\Delta P < 5$ psi, then the test failed and should be repeated. We understand some of these locations may not get a residual pressure drop even with two flowing hydrants, due to the City's distribution system configuration. These tests will be accepted as is.
8. Document all data on the testing forms that have been provided in Appendix A.
9. Slowly close the flowing hydrant. If two hydrants are flowing, close one at a time.

Each detail map provided in Appendix A contains a form that should be filled out in order to document the results of every hydrant test. Every test is assigned the following important parameters:

- **Test Number:** This is the number assigned to each individual hydrant test for identification.
- **Location:** General description of hydrant test location (street names).
- **Pressure Zone:** Pressure Zone within which the hydrant test is conducted. All flow and pressure hydrants should be within the same pressure zone.
- **Date:** Date hydrant test completed.
- **Time:** Actual time of flushing. This information allows the modeler to scale model demands to match demands for the particular time the test occurred using known diurnal curves.
- **Flowing Hydrant 1:** The hydrant that will be flushed during the hydrant testing. It is identified on the detail map for each hydrant flow test.
- **Flowing Hydrant 2:** A back-up hydrant is identified on the detail map for each hydrant flow test. This hydrant should be used if one of the flow or pressure hydrants is inaccessible or if a second flow hydrant is necessary.
- **Pressure Hydrants:** The hydrants that will be used to measure static and residual pressure while the flow hydrant is flushed.
- **Hydrant Number:** Note the hydrant number for both the flow and pressure hydrants.
- **Flow Hydrant Static Pressure:** Pressure reading at Flowing Hydrant 1 under normal conditions before hydrant is opened and flow begins.
- **Flow Hydrant Residual Pressure:** Pressure recorded at Flowing Hydrant 1 if a pitot meter is used.
- **Flow Hydrant Flow:** Flow rate at Flowing Hydrant 1 when residual pressure reading is taken at the two Pressure Hydrants. Record only for the flow hydrant.
- **Pressure Hydrant Static Pressure:** Pressure reading at Pressure Hydrants 1 & 2 under normal conditions (before flowing the flow hydrant).
- **Pressure Hydrant Residual Pressure:** Pressure reading at Pressure Hydrants 1 &2 during flow of the flow hydrant (F1).

- **Notes/Observations:** Directions from the hydraulic modeler for operators of the hydrant tests, and information related to the tests that should be conveyed to the hydraulic modeler.

Contingencies

It is important to be prepared for unplanned events prior to commencing the hydrant flow tests. Some of the following issues may arise during hydrant flushing:

- Loss of system pressure or water supply to a specific area.
- The hydrant may continue to leak after shut down.
- Customer complaints may arise after flushing a particularly sensitive area.

If there is a significant loss of pressure during a hydrant flow test, it could be an indication that there are valves in the system that are closed but should not be. Review the system maps to find valves that may be causing the low-pressure issue. Verify that they are open and repeat the flushing procedure.

Once a flush is complete, the operations staff will close the flow hydrant and pressure hydrants. If any of these facilities are not functioning properly, i.e. the hydrant continues to leak, a report should be made to repair the equipment.

Customer complaints that could arise during the hydrant flow tests include low water pressure, discolored water, odor, damaged laundry, etc. Both the crew working in the field, as well as staff answering the phones at the utility office should be sensitive to these issues and be prepared to answer any questions. Low water pressure will be corrected when the flow tests are complete. Customer water that is discolored or has an odor should be flushed from the plumbing by allowing the water to run until it is clear.

SCADA Data Needs

SCADA data required for the calibration consists of records of the North Hill Reservoir levels, flows from the North Hill Pump Station, supply intertie stations, and pressure reducing valve stations (PRVs) throughout the distribution system. This data will also be recorded for at least one week during the period of hydrant flow testing. A target time interval of 5 to 15 minutes will be used for data gathering.

The SCADA data required is listed in Table 2.

Table 2 SCADA Data Gathering Parameters

Facility Name	Measurements	Unit	Interval	Source
North Hill Reservoir	Level	ft	15 min.	SCADA
North Hill Pump Station	Flow	gpm	15 min.	SCADA
	Discharge HGL	ft	15min.	SCADA
Supply Stations	Flow	gpm	15 min.	SCADA
	Downstream Pressure	psi	15 min.	SCADA
Pressure Reducing Valve Stations	Flow	gpm	15 min.	SCADA
Emergency Interties (if applicable)	Flow	gpm	15 min.	SCADA

Note:
(1) We understand flow at PRVs may not be available. Please provide available information.

Format of Data

SCADA Data

All SCADA data needs to be provided in MS Excel or a MS database format. Table 3 presents a sample format for the SCADA data.

Depending on the interval of data available and record keeping capabilities of the SCADA system, modifications may need to be made to the SCADA system prior to the hydrant testing week. It would be preferable to obtain SCADA data on 5-minute intervals. However, 15-minute or hourly intervals would be sufficient if 5-minute intervals are not possible. If the SCADA data is queried from each facility independently, the time of each data point should be included in the output report.

Table 3 Sample SCADA Data Format

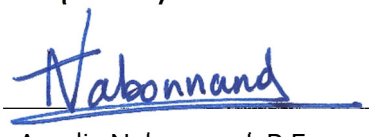
TANK3_LEVEL		TANK2_LEVEL		PS9_PRESSUR_SUCT		PS9_PRESSUR_DISC	
time	ft	time	ft	time	psi	time	psi
2/1/19 1:00	27.61	2/1/19 1:00	25.73	2/1/19 1:00	44.53	2/1/19 1:00	120.59
2/1/19 1:15	27.52	2/1/19 1:15	25.54	2/1/19 1:15	44.65	2/1/19 1:15	117.05
2/1/19 1:30	27.35	2/1/19 1:30	25.39	2/1/19 1:30	44.20	2/1/19 1:30	119.63
2/1/19 1:45	25.12	2/1/19 1:45	25.29	2/1/19 1:45	45.34	2/1/19 1:45	119.42
2/1/19 2:00	25.59	2/1/19 2:00	25.13	2/1/19 2:00	45.13	2/1/19 2:00	115.52
2/1/19 2:15	25.60	2/1/19 2:15	27.56	2/1/19 2:15	45.26	2/1/19 2:15	117.21
2/1/19 2:30	25.55	2/1/19 2:30	27.60	2/1/19 2:30	44.59	2/1/19 2:30	117.29
2/1/19 2:45	27.96	2/1/19 2:45	27.90	2/1/19 2:45	45.01	2/1/19 2:45	117.05
2/1/19 3:00	25.76	2/1/19 3:00	27.67	2/1/19 3:00	45.75	2/1/19 3:00	116.55
2/1/19 3:15	25.41	2/1/19 3:15	26.51	2/1/19 3:15	44.22	2/1/19 3:15	116.91
2/1/19 3:30	25.56	2/1/19 3:30	27.31	2/1/19 3:30	44.42	2/1/19 3:30	115.15
2/1/19 3:45	25.06	2/1/19 3:45	26.96	2/1/19 3:45	45.04	2/1/19 3:45	119.02
2/1/09 4:00	25.11	2/1/09 4:00	27.00	2/1/09 4:00	44.17	2/1/09 4:00	120.00

Notes:
(1) This sample was taken from a different SCADA system and thus may not represent the exact format of the City's SCADA output.

Manual Facilities

For any manually operated facilities operated during the data gathering periods, an operational log should be substituted for the requested facility parameters. It is assumed that flow totalizers are used to take daily readings of the amount of water pumped during each 24-hour period. Photocopies of the log sheets for these pumps would be sufficient. If the City finds it more convenient, a handwritten or electronic log of all sites would also be sufficient.

Prepared by:



Aurelie Nabonnand, P.E.

AN:cjp

Appendix A

FIRE FLOW TEST DETAIL MAPS

Legend

Test Hydrants
- Flowing Hydrant
- Pressure Hydrant 1
- Pressure Hydrant 2
- Other Hydrants

Water Main by Diameter
- 6" or Less
- 8"
- 10" - 12"
- 16" or Greater
- Unknown
- Roadways

N

0 50 100 Feet

Data Sources: City of Tukwila, King County GIS, ESRI

Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.

N

Test Location:_____

_____

Date/Time:_____

Temperature:_____

Notes/Observations:_____

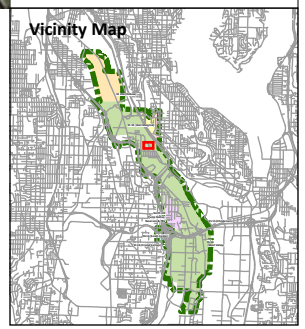
_____

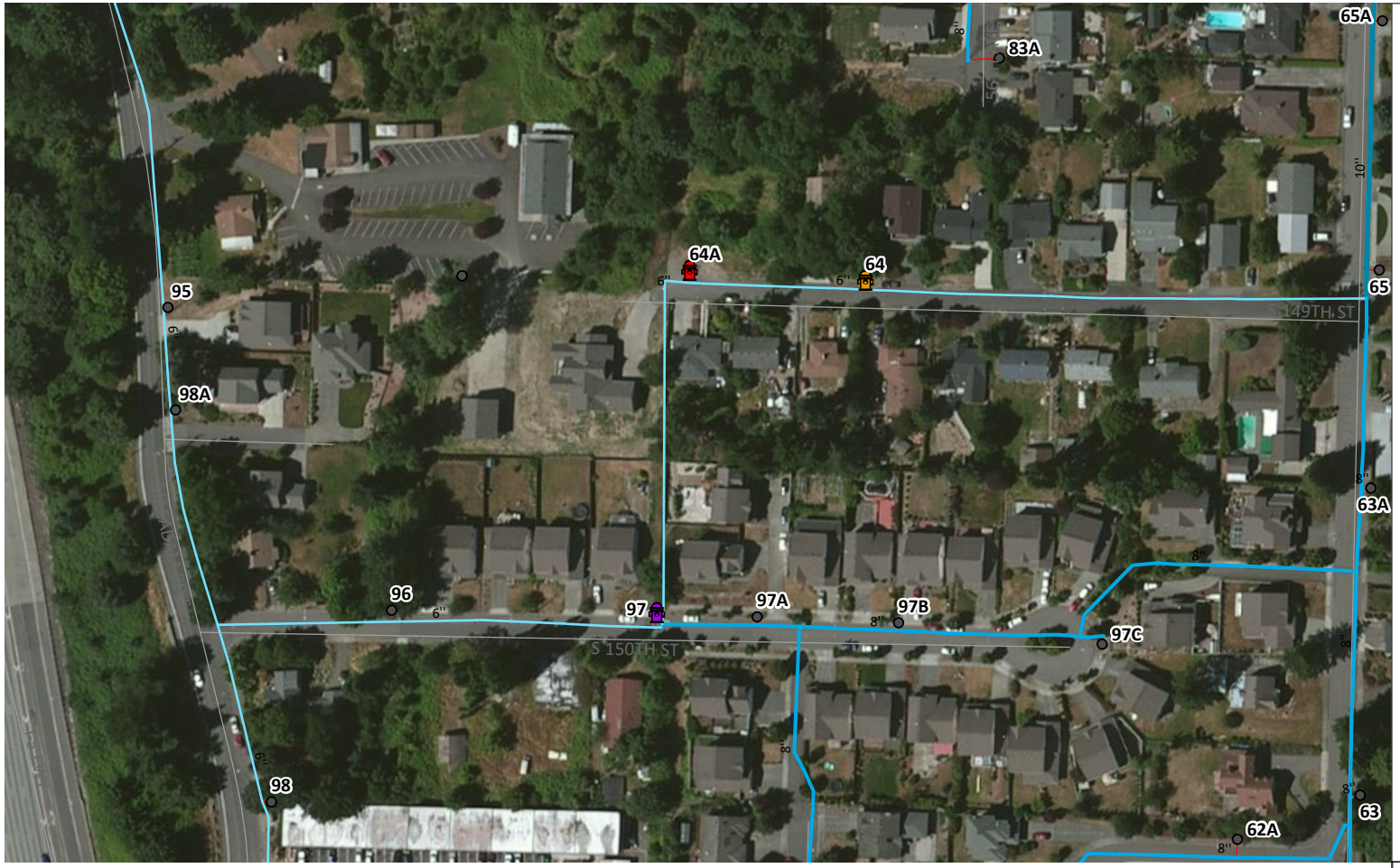
_____

_____

_____

Flowing Hydrant	Pressure Hydrant 1	Pressure Hydrant 2
Hydrant #: _____	Hydrant #: _____	Hydrant #: _____
Make: _____	Make: _____	Make: _____
Main Size:_____	Main Size:_____	Main Size:_____
Static PSI:_____	Static PSI:_____	Static PSI:_____
Residual PSI:_____	Residual PSI:_____	Residual PSI:_____
Pitot PSI:_____		
Flow GPM:_____		
Duration:_____		





Legend

Test Hydrants
- Flowing Hydrant
- Pressure Hydrant 1
- Pressure Hydrant 2
- Other Hydrants

Water Main by Diameter
- 6" or Less
- 8"
- 10" - 12"
- 16" or Greater
- Unknown
- Roadways

Feet
0 50 100

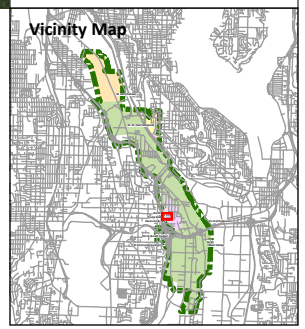
Data Sources: City of Tukwila, King County GIS, ESRI

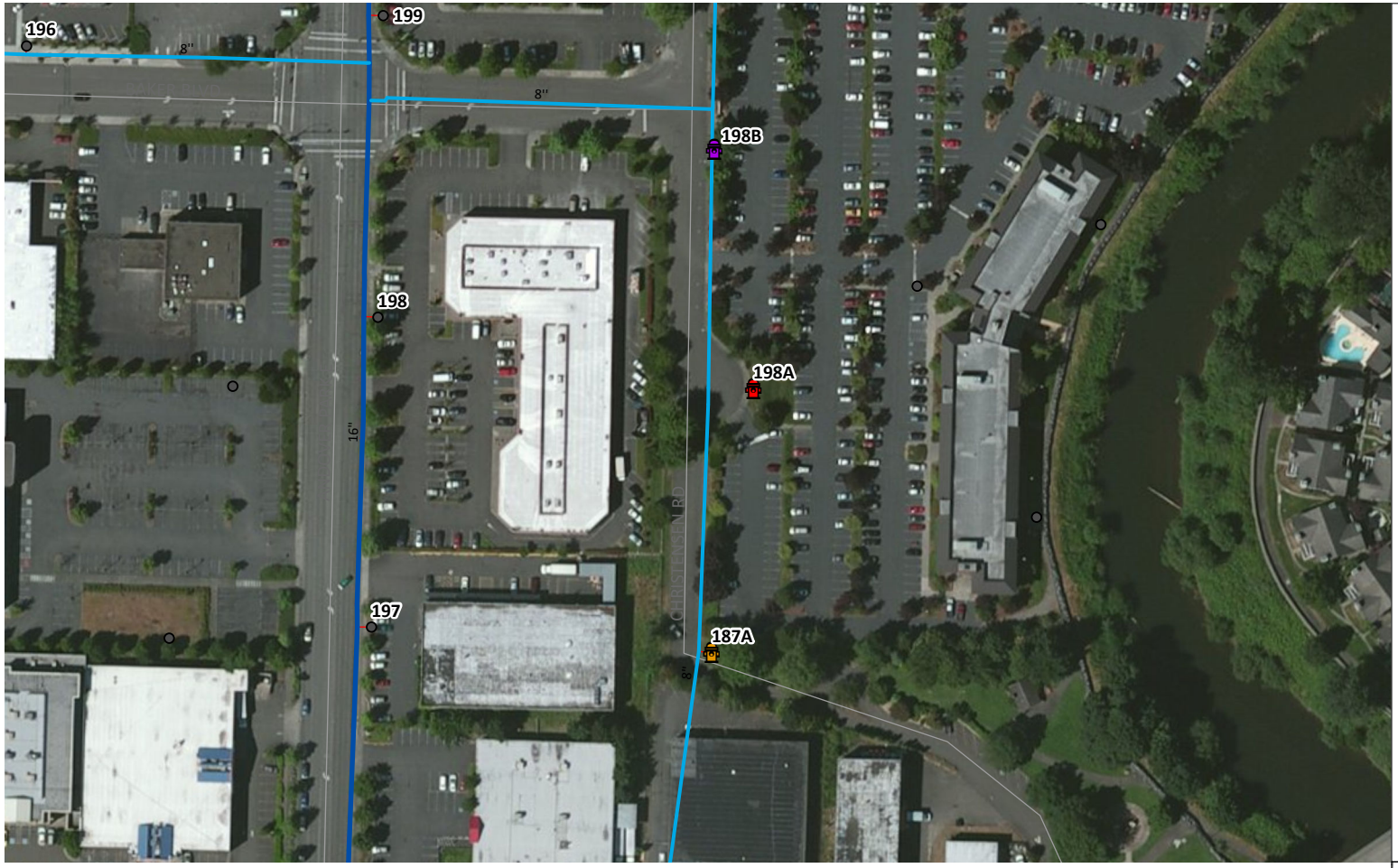
Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.

Test Location:_____
_____
Date/Time:_____
Temperature:_____
Notes/Observations:_____
_____
_____
_____
_____

Flowing Hydrant	Pressure Hydrant 1	Pressure Hydrant 2
Hydrant #: _____	Hydrant #: _____	Hydrant #: _____
Make: _____	Make: _____	Make: _____
Main Size:_____	Main Size:_____	Main Size:_____
Static PSI:_____	Static PSI:_____	Static PSI:_____
Residual PSI:_____	Residual PSI:_____	Residual PSI:_____
Pitot PSI:_____		
Flow GPM:_____		
Duration:_____		

Vicinity Map





Legend

Test Hydrants

- Flowing Hydrant
- Pressure Hydrant 1
- Pressure Hydrant 2
- Other Hydrants

Water Main by Diameter

- 6" or Less
- 8"
- 10" - 12"
- 16" or Greater
- Unknown
- Roadways

Feet
0 50 100

Data Sources: City of Tukwila, King County GIS, ESRI

Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.

Test Location:_____

_____

Date/Time:_____

Temperature:_____

Notes/Observations:_____

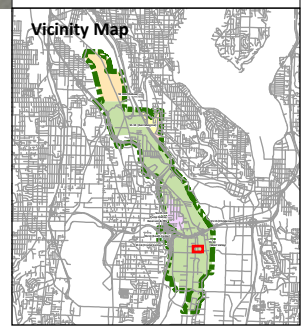
_____

_____

_____

_____

Flowing Hydrant	Pressure Hydrant 1	Pressure Hydrant 2
Hydrant #: _____	Hydrant #: _____	Hydrant #: _____
Make: _____	Make: _____	Make: _____
Main Size:_____	Main Size:_____	Main Size:_____
Static PSI:_____	Static PSI:_____	Static PSI:_____
Residual PSI:_____	Residual PSI:_____	Residual PSI:_____
Pitot PSI:_____		
Flow GPM:_____		
Duration:_____		



Legend

Test Hydrants
- Flowing Hydrant
- Pressure Hydrant 1
- Pressure Hydrant 2
- Other Hydrants

Water Main by Diameter
- 6" or Less
- 8"
- 10" - 12"
- 16" or Greater
- Unknown
- Roadways

N

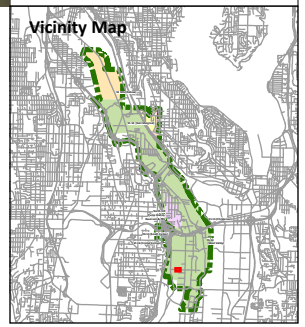
0 25 50 Feet

Data Sources: City of Tukwila, King County GIS, ESRI

Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.

N

Vicinity Map



Test Location:_____

_____

Date/Time:_____

Temperature:_____

Notes/Observations:_____

_____

_____

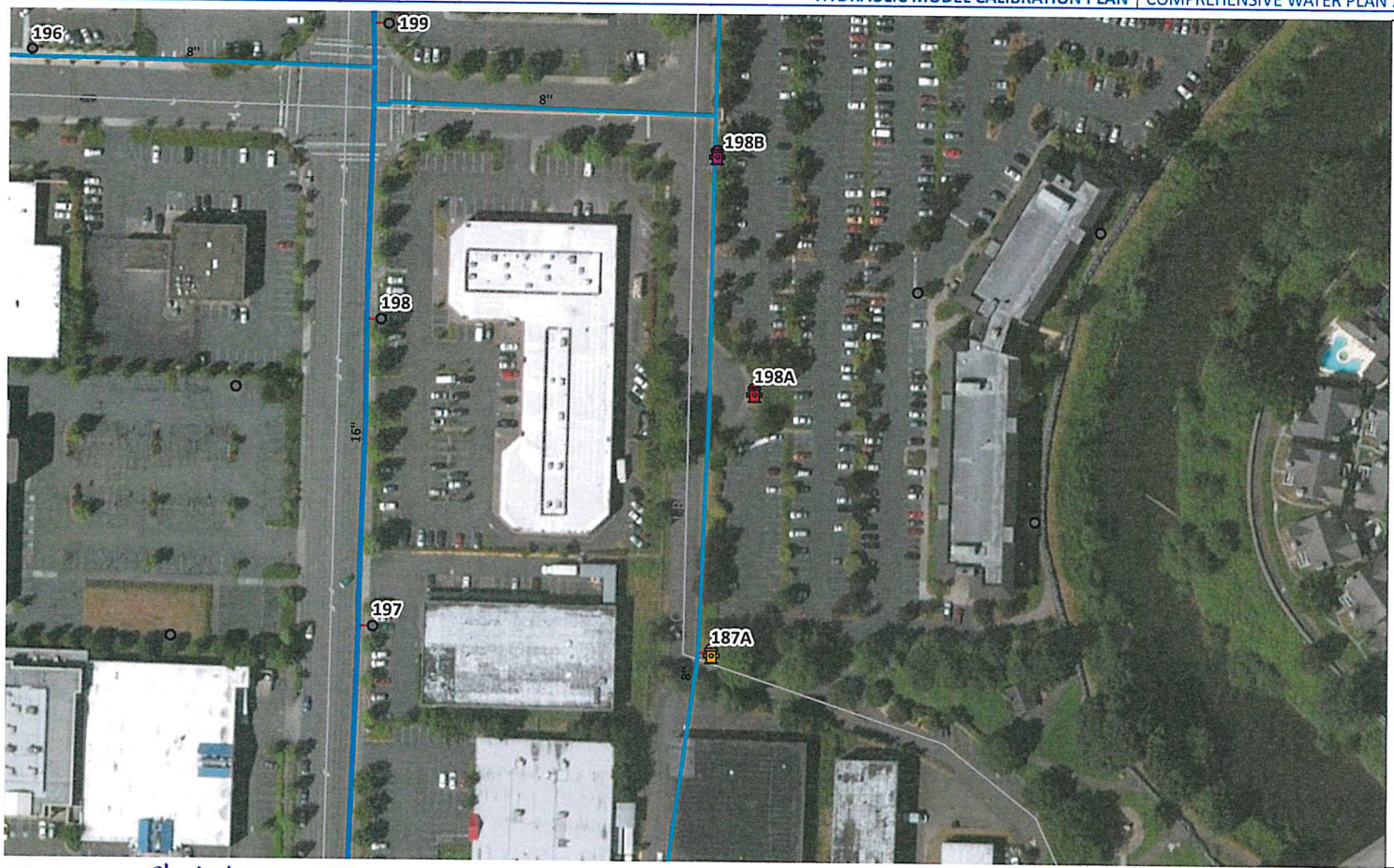
_____

_____

Flowing Hydrant	Pressure Hydrant 1	Pressure Hydrant 2
Hydrant #: _____	Hydrant #: _____	Hydrant #: _____
Make: _____	Make: _____	Make: _____
Main Size:_____	Main Size:_____	Main Size:_____
Static PSI:_____	Static PSI:_____	Static PSI:_____
Residual PSI:_____	Residual PSI:_____	Residual PSI:_____
Pitot PSI:_____		
Flow GPM:_____		
Duration:_____		

Attachment 2

FIRE HYDRANT TEST RESULTS



Legend

Test Hydrants
- Flowing Hydrant
- Pressure Hydrant 1
- Pressure Hydrant 2
- Other Hydrants

Water Main by Diameter
- 6" or Less
- 8"
- 10" - 12"
- 16" or Greater
- Unknown
- Roadways

N

0 50 100 Feet

Data Sources: City of Tukwila, King County GIS, ESRI

Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.

N

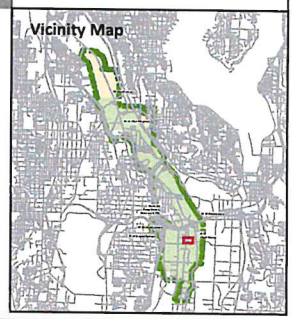
Test Location: Christensen R2

Date/Time: 7/2/20 7:45 AM

Temperature:

Notes/Observations:

	Flowing Hydrant	Pressure Hydrant 1	Pressure Hydrant 2
Hydrant #:	198A	198B	187A
Make:	Waterous	Waterous	Mueller
Main Size:			
Static PSI:	144 PSi	140 PSi	139 PSi
Residual PSI:	112 PSi	132 psi	132 PSi
Pitot PSI:	98 PSi		
Flow GPM:	1809 - 1856 GPM		
Duration:	5 Min		



Legend

Test Hydrants
- Flowing Hydrant
- Pressure Hydrant 1
- Pressure Hydrant 2
- Other Hydrants

Water Main by Diameter
- 6" or Less
- 8"
- 10" - 12"
- 16" or Greater
- Unknown
- Roadways

N

Feet
0 50 100

Data Sources: City of Tukwila, King County GIS, ESRI

Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.

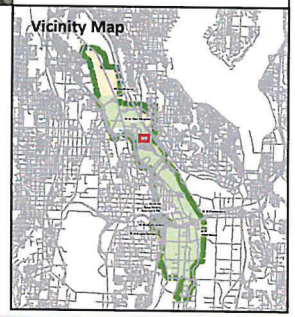
Test Location: 12014 44th pl. S

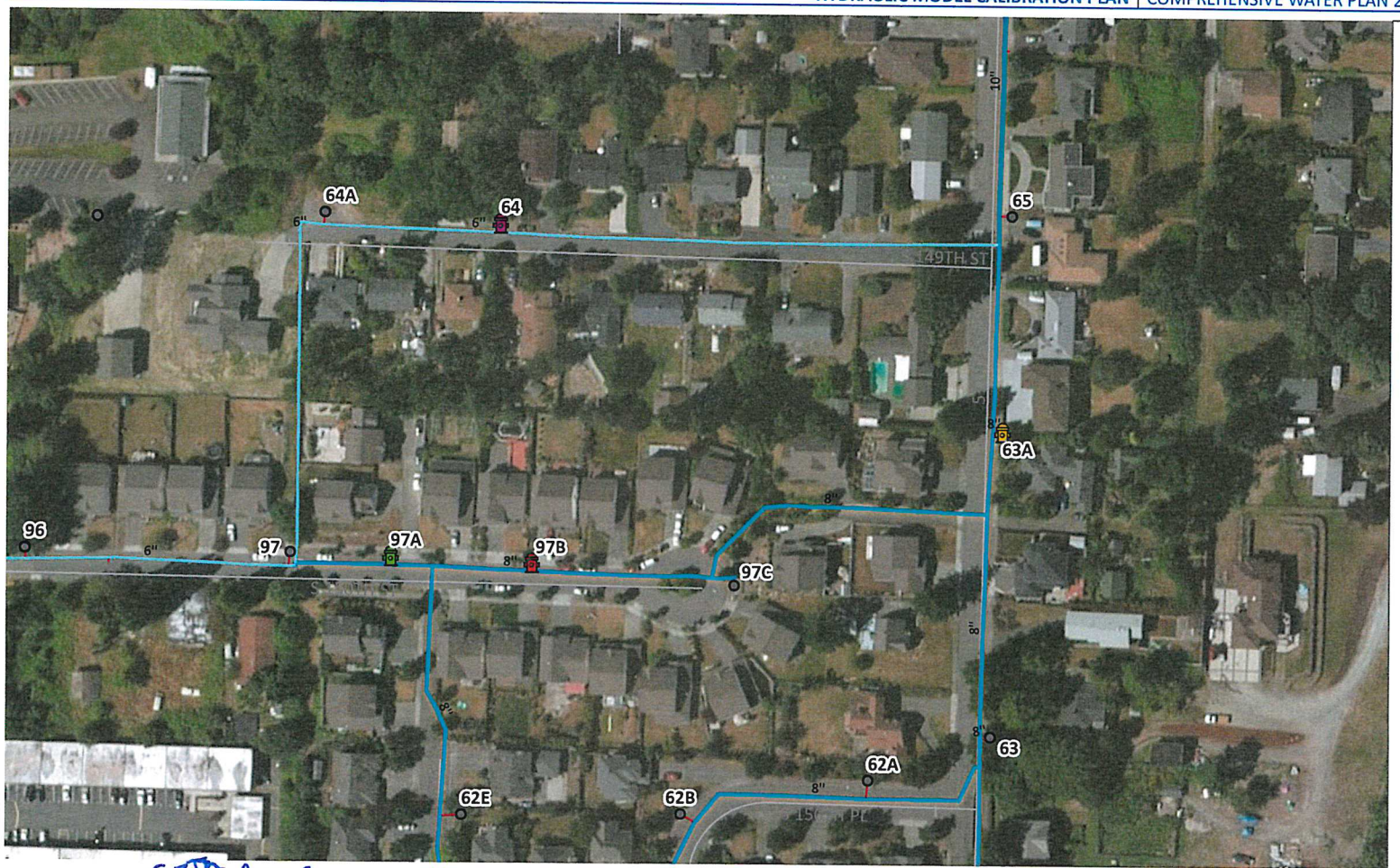
Date/Time: 7-21-20 8:48AM

Temperature:

Notes/Observations:

Flowing Hydrant	Pressure Hydrant 1	Pressure Hydrant 2
Hydrant #: 301	Hydrant #: 274	Hydrant #: 272B
Make: M & H	Make: Mueller	Make: Mueller
Main Size: 8"	Main Size: 8"	Main Size: 8"
Static PSI: 144 PSi	Static PSI: 140 PSi	Static PSI: 140 PSi
Residual PSI: 124 PSi	Residual PSI: 132 PSi	Residual PSI: 134 PSi
Pitot PSI: 124 PSi		
Flow GPM: 2034		
Duration: 3 Min		





Legend

Test Hydrants
- Flowing Hydrant 1
- Flowing Hydrant 2
- Pressure Hydrant 1
- Pressure Hydrant 2
- Other Hydrants

Water Main by Diameter
- 6" or Less
- 8"
- 10" - 12"
- 16" or Greater
- Unknown
- Roadways

Feet
0 50 100

Data Sources: City of Tukwila, King County GIS, ESRI

Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.

Test Location: 57TH Ave S

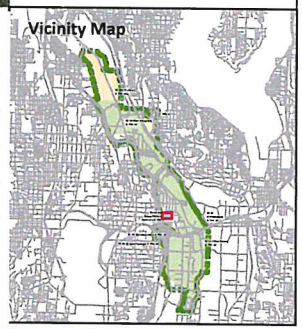
Date/Time: 7-23-20 11:05 AM

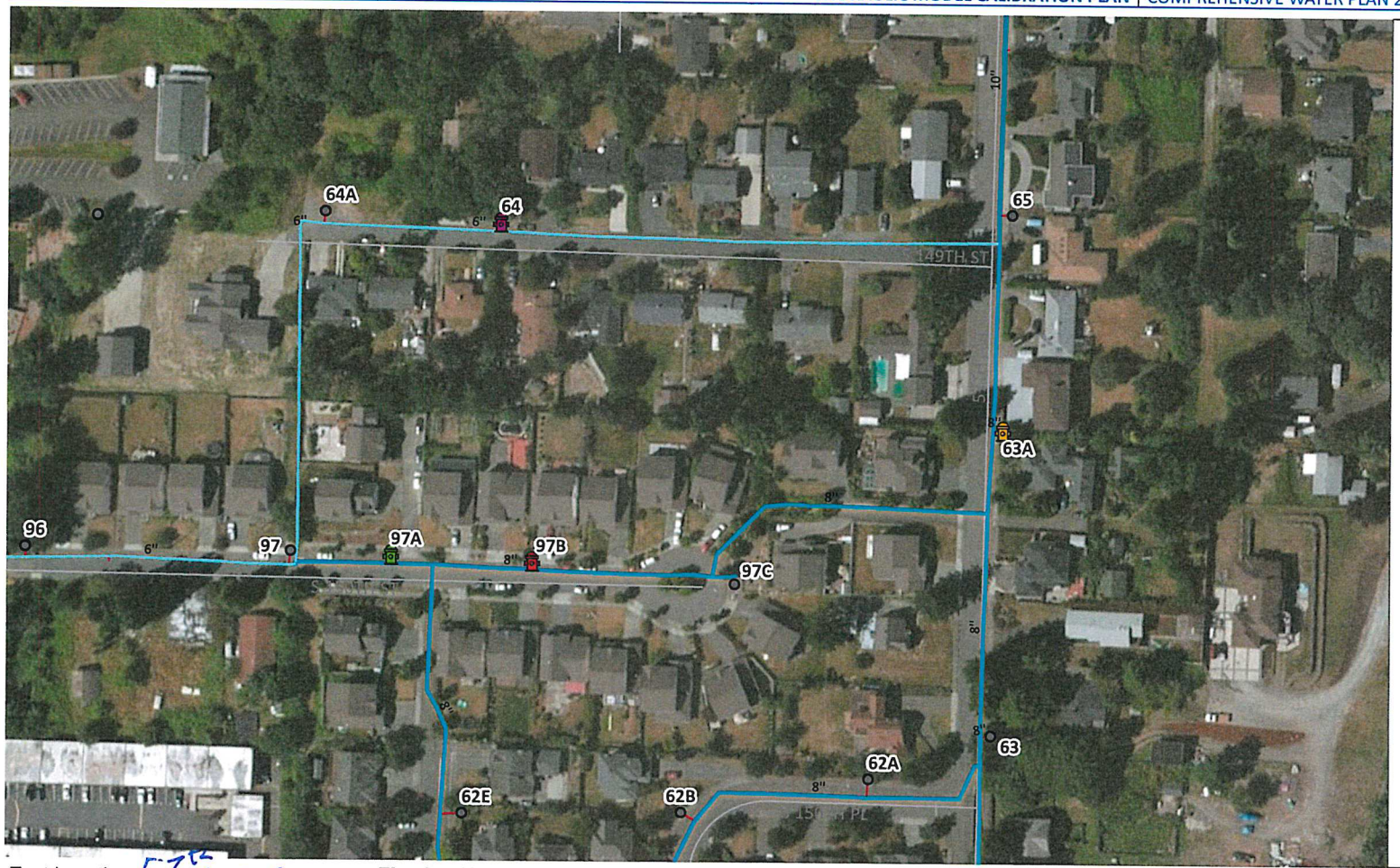
Temperature:

Notes/Observations: N. Hill Reservoir Pumps on

Had to start & stop test to reset Pitot

	Flowing Hydrant	Pressure Hydrant 1	Pressure Hydrant 2	Back-up Hydrant 2
Hydrant #:	63A	64	97A	
Make:	Mueller	Mueller	Clow	
Main Size:	8"	6"	8"	
Static PSI:	70 PSi	84 PSi	92 PSi	
Residual PSI:	38 PSi	50 PSi	66 PSi	
Pitot PSI:	28			
Flow GPM:	983			
Duration:	5 min			





Legend

Test Hydrants
- Flowing Hydrant 1
- Flowing Hydrant 2
- Pressure Hydrant 1
- Pressure Hydrant 2
- Other Hydrants

Water Main by Diameter
- 6" or Less
- 8"
- 10" - 12"
- 16" or Greater
- Unknown
- Roadways

N

Feet
0 50 100

Data Sources: City of Tukwila, King County GIS, ESRI

Disclaimer: Features shown in this figure are for planning purposes and represent approximate locations. Engineering and/or survey accuracy is not implied.

N

Test Location: 57th Ave S.

Date/Time: 7-23-20 10:30AM

Temperature:

Notes/Observations: Pumps at N. Hill Reservoirs off

Flowing Hydrant	Pressure Hydrant 1	Pressure Hydrant 2	Back-up Hydrant 2
Hydrant #: 63A	Hydrant #: 64	Hydrant #: 97A	Hydrant #:
Make: Mueller	Make: Mueller	Make: Clow	Make:
Main Size: 8"	Main Size: 6"	Main Size: 8"	Main Size:
Static PSI: 44 PSi	Static PSI: 60 PSi	Static PSI: 70 PSi	Static PSI:
Residual PSI: 32 PSi	Residual PSI: 54 PSi	Residual PSI: 63 PSi	Residual PSI:
Pitot PSI: 26 PSi			Pitot PSI:
Flow GPM: 947			Flow GPM:
Duration:			Duration:

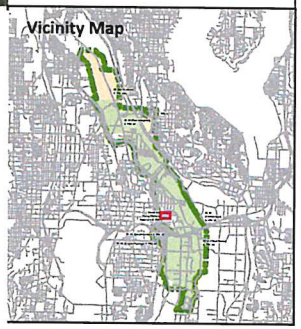


Table 1 - Fire Hydrant Test Results
City of Tukwila
Water System Plan

Hydrant Test #1					
Date:	7/21/2020				
Time:	7:45 AM				
Pressure Zone:	360 Zone				
Flowing Hydrant		**Pressure Hydrant 1**		**Pressure Hydrant 1**	
Hydrant # / location	198A	Hydrant # / location	198B	Hydrant # / location	187A
Static Pressure (psi)	144	Static Pressure (psi)	140	Static Pressure (psi)	139
Residual Pressure (psi)	112	Residual Pressure (psi)	132	Residual Pressure (psi)	132
Flow (gpm)	1833				
Flush Duration (psi)	5 min				

Hydrant Test #1					
Reservoir Levels (ft):		**PRV10**		**PRV15**	
WATER.LEVEL11T	18.3	WATER.FLOW110T	163.8	WATER.FLOW115T	812
WATER.FLOW21T	6.46094	WATER.PRESS110T	204.695625	WATER.PRESS115T	208
WATER.FLOW11T	172.078125	WATER.PRESS210T	146.69906	WATER.PRESS215T	147

Other Comments:

Hydrant Test #2					
Date:	7/21/2020				
Time:	8:48 AM				
Pressure Zone:	360 Zone				
Flowing Hydrant		**Pressure Hydrant 1**		**Pressure Hydrant 1**	
Hydrant # / location	301	Hydrant # / location	274	Hydrant # / location	272B
Static Pressure (psi)	144	Static Pressure (psi)	140	Static Pressure (psi)	140
Residual Pressure (psi)	124	Residual Pressure (psi)	132	Residual Pressure (psi)	134
Flow (gpm)	2034				
Flush Duration (psi)	3 min				

Hydrant Test #2					
Reservoir Levels (ft):		**PRV10**		**PRV15**	
WATER.LEVEL11T	18.2	WATER.FLOW110T	1216.4	WATER.FLOW115T	1,292
WATER.FLOW21T	5.96875	WATER.PRESS110T	203.99625	WATER.PRESS115T	208
WATER.FLOW11T	142.546875	WATER.PRESS210T	144.9975	WATER.PRESS215T	147

Hydrant Test #3	N. Hill reservoir pumps on.				
Date:	7/21/2020				
Time:	11:05				
Pressure Zone:	400 Zone				
Flowing Hydrant		**Pressure Hydrant 1**		**Pressure Hydrant 1**	
Hydrant # / location	63A	Hydrant # / location	64	Hydrant # / location	97A
Static Pressure (psi)	70	Static Pressure (psi)	84	Static Pressure (psi)	92
Residual Pressure (psi)	38	Residual Pressure (psi)	50	Residual Pressure (psi)	66
Flow (gpm)	983				
Flush Duration (psi)	5 min				

Other Comments: N. Hill reservoir pumps on. Had to start and stop test to reset pitot.

Hydrant Test #3					
Reservoir Levels (ft):		**PRV10**		**PRV15**	
WATER.LEVEL11T	17.9	WATER.FLOW110T	963.4	WATER.FLOW115T	1,436
WATER.FLOW21T	5.1875	WATER.PRESS110T	203.795625	WATER.PRESS115T	207
WATER.FLOW11T	154.968755	WATER.PRESS210T	144.99375	WATER.PRESS215T	146

Hydrant Test #4	N. Hill reservoir & pumps off.				
Date:	7/23/2020				
Time:	10:30 AM				
Pressure Zone:	400 Zone				
Flowing Hydrant		**Pressure Hydrant 1**		**Pressure Hydrant 1**	
Hydrant # / location	63A	Hydrant # / location	64	Hydrant # / location	97A
Static Pressure (psi)	44	Static Pressure (psi)	60	Static Pressure (psi)	70
Residual Pressure (psi)	32	Residual Pressure (psi)	54	Residual Pressure (psi)	63
Flow (gpm)	947				
Flush Duration (psi)					

Other Comments: Pumps off. N. Hill Reservoir off.

Hydrant Test #4					
Reservoir Levels (ft):		**PRV10**		**PRV15**	
WATER.LEVEL11T	13.8	WATER.FLOW110T	412.6	WATER.FLOW115T	1,715
WATER.FLOW21T	6.257815	WATER.PRESS110T	204.496875	WATER.PRESS115T	207
WATER.FLOW11T	16.64844	WATER.PRESS210T	145.29656	WATER.PRESS215T	146

Appendix K

CASCADE WATER EFFICIENCY PROGRAM 2019 ANNUAL REPORT

Cascade Water Efficiency Program 2019 Annual Report

Cascade provides safe, clean and reliable water to members in a cost-effective and environmentally responsible manner.

Summary

The 2019 Cascade Water Efficiency Program (program) saves approximately 52 million gallons of water, 6.4 million kilowatt hours of energy, and 4 million pounds of avoided greenhouse gas emissions per year. These savings are equivalent to providing all the indoor water needs for more than 650 families and removing more than 200 cars from the road. The program benefits thousands of residents, businesses, schools, and public agencies through a variety of education and outreach activities, training, and replacement of old fixtures and equipment. The program promotes Cascade as a leader in resource management, and it provides the requisite water efficiency measures and savings goal Cascade members need to meet their state-mandated water use efficiency requirements. Cascade employs one full-time employee to manage the program, and total expenses in 2019 were $577,322 including materials, services, and salaries.

PROGRAM AT A GLANCE...

Community Engagement

506 Classroom Presentations | **11,946** Students Reached

33 Teacher Fellows | **5,170** Student Impacts

16 Community Events | **6,500** Customer Interactions

25 Cascade Gardener Classes | **849** Cascade Gardener Attendees

200 Garden Hotline Calls

18 Soil and Water Steward Training Events | **306** Soil and Water Steward Attendees

6 Workshops of Drip Irrigation, Rainwater Harvesting, and Community Gardening | **175** Workshop Attendees

2 Stream Monitor Workshop Series

58 Stream Monitors Certified

Savings Generating Measures (Direct Installations, Rebates, Distribution)	Completed
Residential Clothes Washers	1,311
Residential Showerheads	7,171
Multifamily Showerheads	784
Multifamily Kitchen Aerators	614
Multifamily Bathroom Aerators	1,775
Conservation Items	
Event Distribution	6,585
Customer Orders From Website	300
Cascade Member Requests	1,180
Teacher Requests	3,445
Condominium Requests	1,390

142,469
TOTAL GALLONS PER DAY SAVED

Relationship to Long-Term Objectives

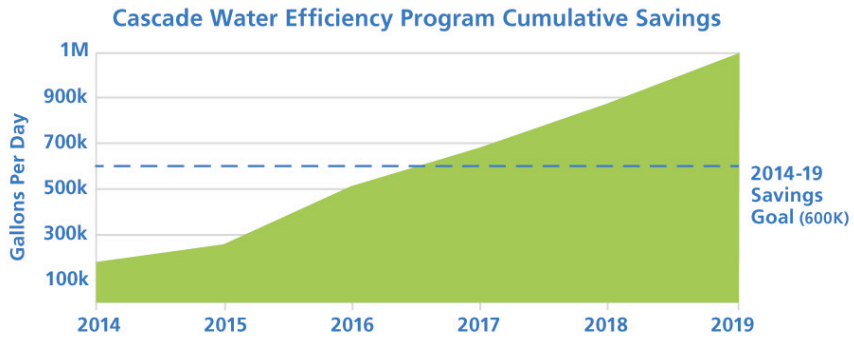
The water efficiency program serves Cascade's mission by lowering regional water demand so that Cascade may delay or defer development of the White River / Lake Tapps Project or other sources of water supply. By utilizing existing water supplies more efficiently, Cascade will save millions of dollars for its members and their ratepayers, leave more water in streams for fish, and reduce the region's carbon footprint through decreased energy usage involved in the treatment, transmission, and heating of drinking water.

Continued Partnerships

Cascade continues to grow and sustain partnerships in the region to leverage resources and promote the importance of reliable, clean, drinking water. In 2019, Cascade collaborated with many entities including Lake Washington Institute of Technology, Sno-King Watershed Council, Bellevue, Issaquah, Lake Washington, and Tukwila School Districts, Puget Sound Energy, Sustainability Ambassadors, Tilth Alliance, and King County Housing Authority.

Savings Goal

Cascade's water efficiency savings goal is a cumulative savings of 0.6 million gallons (mg) per day on an average annual basis and 1.0 mg per day on an average peak season basis for the period 2014 - 19. In 2019, Cascade achieved a savings of 142,469 gallons per day or about 24% of its six-year savings goal. Along with savings from 2014–18, Cascade has achieved approximately 169% of its annual savings goal, slightly more than one million gallons per day.



Classroom Presentations

Cascade provided 506 classroom presentations for 11,946 students at schools within Cascade member service areas. Cascade offers fifteen programs designed to help schools support the Next Gen Science Standards and Washington Science, Technology, Engineering, and Mathematics (STEM) concepts and Next Gen standards. All programs discuss water efficiency and include an explanation of Cascade and its members. Program evaluations provided by teachers are very positive; many schools register for programs months in advance.

"We got to see first hand how pollution affects our local water systems and that felt really powerful."

"Teaching about environmental impacts to young learners helps shape how they will act in the future, so I think what you're doing is invaluable."

"I really appreciate the support from Cascade Water Alliance."

– Local Teachers

Community Science

Cascade is continually developing new material to meet the needs and interests of educators who want to teach the science of water. Kirkland students were introduced to concepts such as watershed dynamics, water quality indicators, and challenges within their watershed. Students learned how to take samples to measure the nitrate, phosphate, and pH levels of a local stream and how to interpret the data to draw conclusions about the stream's water quality. The program has since expanded to schools within Redmond and Tukwila.

Community Gardens

Cascade's partnership with Tilth Alliance includes community workshops on rainwater harvesting, drip irrigation, and other topics to help residents use water wisely. Residents construct community gardens and maintain pea patches with the support of Tilth Alliance and Cascade.

Garden Hotline

Cascade supports the regional Garden Hotline, a service provided by Tilth Alliance, Seattle Public Utilities, and others. Residents can call the Garden Hotline Monday through Saturday and receive expert advice on sustainable gardening techniques and conserving water in their landscapes. In 2019, 200 residents in Cascade member areas utilized this service. The Garden Hotline also promotes Cascade Gardener events.

Partner Spotlight

"Lake Washington Institute of Technology (LWTech) has enjoyed a partnership with Cascade Water Alliance (Cascade) for several years that has incorporated the principles of sustainable water management into our Environmental Horticulture program. Through this partnership, we created a unique irrigation learning lab to teach our students the principles of efficient irrigation. This partnership led Cascade and LWTech to create the Sustainable Landscape Technology Certificate, which includes classes that target some of the most critical aspects of landscaping, such as irrigation system maintenance, proper plant selection, and sustainable hardscaping. Cascade's industry insight and guidance has been invaluable to our students."

– Dr. Amy Morrison, *President,*
Lake Washington Institute of Technology

Problem-Based Learning for Water Systems

Problem-Based Learning for Water Systems provides middle school and high school teachers with a range of academic entry points including science, social studies, math and language arts to incorporate the study of water into their classrooms. Teachers are supported by Cascade through a stipend, materials and resources, and educational opportunities relating to water issues.

Through this innovative program, Cascade targets its resources to have a broader and more lasting impact in classrooms across its service area. In 2019, Cascade supported 33 Teacher Fellows who engaged 34 additional teaching peers. Together these educators impacted 5,170 students in all school districts within Cascade-member areas.

The units created by teachers for their classrooms include our changing water cycle and the importance of conserving water, the global water crisis, wastewater engineering, snowpack data analysis and the Puget Sound ecosystem, water chemistry and water purification engineering, writing science fiction to explore water scarcity issues, and rain water harvesting math.

"My Students have benefitted from the Water Challenge Curriculum as they have engaged in problem-based learning and crafting solutions that could possibly be implemented in their community. **They see themselves as advocates for positive change that directly impacts their families, their schools, and their watershed.** Students learn about local history and local issues, and begin to recognize the delicate balance of economy, society and the environment. The Water Challenge Curriculum increases awareness and engagement in community and world issues demonstrating that students can be advocates for positive change and feel empowered to do so."

– Maile Morgan, *7th grade Social Studies, Bellevue School District*

"The support in finding relevant resources has strengthened connections between my classroom and the real world and has deepened my own content knowledge. Working together with other teachers to make units more authentic and inspiring has been an extremely valuable use of my time. My students are becoming better problem-solvers and can see how science relates to their community as a result. I cannot recommend this program enough!"

– Emma Morris, *11th-12th grade AP Environmental Science, Lake Washington School District*

Water Watchers

Cascade partners with the Sno-King Watershed Council (SKWC), a community-based water monitoring program in King and Snohomish Counties, to deliver workshops and training to residents who are interested in becoming Water Watchers and monitoring local streams.

The goal of SKWC is to foster watershed stewardship through development of volunteer water monitors, which aligns with Cascade's goals. Residents learn how to monitor physical, chemical, and biological indicators of watershed health. The collected data is input into a national database and may be used for protection and restoration of watersheds, streams, and lakes as well as advocacy for the improvement of water quality and public health and to implement environmental education programs.

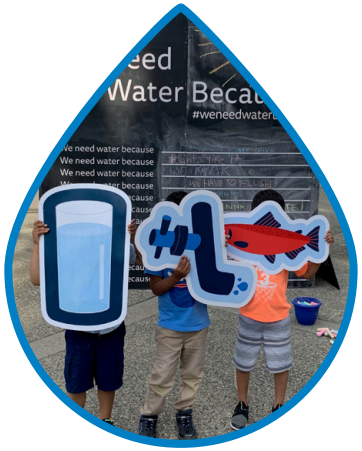
In 2019 Cascade supported SKWC in providing four water monitoring workshops covering bacteriological monitoring, water chemistry monitoring, and stream biomonitoring. The courses resulted in 58 people trained to be water monitors.

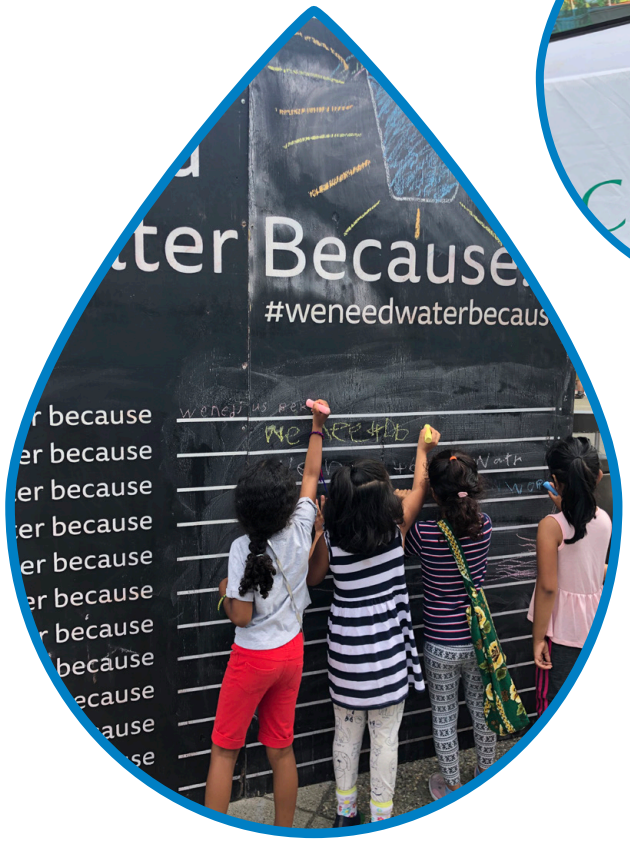
With this partnership, Cascade has trained staff from Nature Vision, Cascade's primary vendor for water education, resulting in water monitoring for classrooms now being offered as part of Cascade's programs.

Community Events

Cascade participated in sixteen community events and festivals in 2019 to promote the value of water and show conservation actions. All members were represented, and Cascade engaged with approximately 6,500 residents. Staff distributed 6,585 conservation items and answered questions about water supply and water efficiency. Cascade participated in the follow events or locations:

- Northwest Flower and Garden Show
- Earth Day at Bellevue Art Museum
- Tukwila Backyard Wildlife Festival
- Crossroads Farmers Market
- Sammamish Parkadilly
- Kirkland Concert Series
- Skyway Health and Safety Fair
- Issaquah Salmon Days
- Kirkland Farmers Market
- Redmond Derby Days
- Sammamish Days
- Redmond Town Center
- Crossroads Mall
- Redmond Lights
- Sammamish Party on the Plateau
- Tukwila See You in the Park





We Need Water Because…

Cascade's public education campaign challenged residents to consider the value of water by completing the sentence, "We need water because…" The program includes a portable, modular chalkboard and handheld blackboard signs in seven languages prominent in Cascade's member service areas (Chinese, Spanish, Russian, Vietnamese, Hindi, Korean and English) for residents to share their responses, as well as a branded photo backdrop and photobooth props.

The campaign provided a unique way to engage with people on the importance of water and demonstrated Cascade's leadership in resource conservation. Residents provided creative and insightful responses during events about water's critical role in our lives and the region.

Cascade Gardener

This program uses expert instructors to teach gardeners how to have beautiful landscapes without excessive water and chemicals inputs. Cascade provided 25 classes for approximately 849 residents at venues in all member areas.

Irrigation Training

Cascade worked with the King County Housing Authority to provide irrigation training for staff, perform irrigation system assessments, and help with landscape planning and development of policies relating to landscape and irrigation management.

Fix-A-Leak Week

In March, Cascade supports US EPA's annual Fix-A-Leak Week, which encourages people to find and fix leaks in their homes, schools, and businesses. During that week, Cascade produced and ran newspaper ads in local newspapers promoting the Fix-A-Leak Week mission of helping people save water.

WaterSense Initiatives

Cascade continues its partnership with Puget Sound Energy to provide point-of-purchase rebates for EnergyStar certified residential clothes washers and WaterSense labeled showerheads.

Puget Sound Energy provides the administration of these programs with Cascade sharing in only the direct rebate costs making these measures very cost-effective. Cascade cost-shared in 1,311 clothes washer rebates and 7,171 showerhead rebates in 2019.

Irrigation Assessments

Cascade provided irrigation assessments to properties like the Eastside Children's Academy to help them save water and money. The assessments provide a detailed audit of the functionality and efficiency of irrigation systems, as well as plant and soil health. Assessments sometimes reveal opportunities for significant water and monetary savings and Cascade remains engaged with property managers to help them affect change to the landscape and irrigation.

Multifamily Retrofits

Cascade partners with Puget Sound Energy to provide direct installation of showerheads and faucet aerators in apartment complexes at no charge to the tenant or property owner. In 2019, Cascade cost-shared in the installation of 784 high-efficiency showerheads and 2,389 aerators in apartments and condominiums in member areas.

Website Ordering

Cascade offers free water efficiency items, such as showerheads, shower timers, and rain gauges, to homeowners in its member service areas through its website. The online ordering process is easy, and the items are shipped to the customer's door. Cascade provided 6,315 items to residents, apartment complexes, and Cascade members for distribution to customers.

Moving Ahead

In 2018 Cascade revised its Transmission and Supply Plan and water savings goal. The new goal continues Cascade's current level of water conservation activities and funding support through 2022. The water efficiency program will continue to offset the impacts to regional water demand through growth so for the foreseeable future, overall annual water demand will likely remain flat or near flat when adjusted for weather. Areas for continued or increased emphasis in 2020 include:

Teacher and student education on water issues and the study of water

- Opportunities for stream sampling to learn analytical techniques for water quality monitoring, data collection and analysis, and reporting
- More resources for teachers, such as videos, water study units, lesson plans, and materials, workshops, field trips, and expert presenters

Targeted outreach to multicultural groups

- Gardening classes in a variety of languages
- Attendance at community events
- Materials printed in various languages

Irrigation efficiency assistance to high-volume water users

- Technical assistance
- Materials to move towards sustainable landscaping

Continued training on irrigation efficiency and sustainable landscape training

- Lake Washington Institute of Technology's Sustainable Landscape Technology program
- Cascade Gardener classes
- Soil and Water Stewardship Program

Appendix L

KING COUNTY WATER RECLAMATION EVALUATION CHECKLIST

For questions, call Kristina Westbrook,
King County Reclaimed Water Program Manager at (206) 296-5279
www.kingcounty.gov/reclaimedwater

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.

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.

Water System Name: City of Tukwila
Date: July 20, 2021
PWS ID# 89500F
Contact: Adib Altallal

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:

   _____

   _____

   ☑ The information requested is unknown, or not available.
   Additional Comments: The City is not required to 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 pursuing 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 of Tukwila		1107 CCF (2019 use)	Sewer and road use	Is a user
Starfire Sports		2,343 CCF (2019 use	Irrigation of turf fields	Is a user
City of Tukwila	13900 Interurban Ave South		Irrigation of golf course	Yes
Foster Golf Course				
Fairway Center	12420-14240 Interurban		Irrigation	Yes
	Ave South			
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

Top Ten Water Users

Account	Name	Address	Projected Average Demand (gpd)
08-0790-0000	SHASTA BEVERAGE	1227 ANDOVER PARK E TUKWILA WA 98188-3956	160,500
07-0001-0000 & 07-0002-0000	WESTFIELD SHOPPINGTOWN #12286	2800 SOUTHCENTER MALL TUKWILA WA 98188-2844	110,300
12-0380-0000 & 12-0385-0000	BOEING COMPANY STRE #DC MAIN	9797 E MARGINAL WAY S TUKWILA WA 98188	88,600
12-0360-0000	BOEING COMPANY STORE #9-51	9407 E MARGINAL WAY S TUKWILA WA 98188	24,900
12-0290-0000	BOEING COMPANY-WIND TUNNEL	8233 E MARGINAL WAY S TUKWILA WA 98188	26,300
15-0585-0000	453300 HILTON HOTELS, MS #7	15920 W VALLEY HWY TUKWILA WA 98188-5547	28,900
08-0214-0000	CHA TUKWILA LLC	16500 SOUTHCENTER PKY TUKWILA WA 98188-3388	26,400
07-0011-0000	SEAFOOD CITY	1368 SOUTHCENTER MALL TUKWILA WA 98188-2833	19,000
05-0320-0000	CANYON ESTATES CONDO ASSN	15200 65TH AVE S TUKWILA WA 98188	23,700
01-0110-0000	TERRACE APARTMENTS	13705 56TH AVE S TUKWILA WA 98168-4760	20,000

Appendix M

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 Jason Bates	**Position** Water Dept. Superintendent	**Daytime Phone #** (206) 433-1863
Number of Monthly Samples Required by Regulation: 50	**Number of Sample Sites Needed:** 10	

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. 65th Avenue South, north of Southcenter Boulevard in Tukwila's North Hill.	1-1. 65th Avenue South at Tukwila Park, Sample Stand 1-2. Repeat Upstream – 6510 Southcenter Blvd. 1-3. Repeat Downstream – 6503 S. 153rd Street 1-4. TBD (Varies in residential urban location)
TU-2. South 122nd Street, west of 46th Avenue South in the Allentown area.	2-1. South 122nd St. & 46th Avenue S., Sample Stand 2-2. Repeat Upstream – 4510 S. 122nd Street 2-3. Repeat Downstream – 4622 S. 122nd Street 2-4. TBD (Varies in residential urban location)
TU-3. 1232 Andover Park West north of South 180th Street.	3-1. 1232 Andover Park West, Sample Stand 3-2. Repeat Upstream – Business 1180 Andover Park West 3-3. Repeat Downstream – Business 6750 S. 180th Street 3-4. TBD (Check with local business in vicinity)
TU-4. 14028 53rd Avenue South, south of S. 140th Street	4-1. 53rd Avenue South & S. 140th Street, Sample Stand 4-2. Repeat Upstream – 14010 53rd Avenue S. 4-3. Repeat Downstream – 14038 53rd Avenue

	South 4-4. TBD (Varies in residential urban location)
TU-5. 14700 59th Ave S	5-1. 14700 59th Ave S., Sample Stand 5-2. Repeat Upstream: 5810 S. 147th Street 5-3. Repeat Downstream: 14475 59th Avenue S. 5-4. TBD (Varies in residential urban location)
TU-9. 4610 S. Ryan Way	9-1. 4610 S. Ryan Way, Sample Stand 9-2. Repeat Upstream: 4610 S. Ryan Way, ¾" residential service. 9-3. Repeat Downstream: 4411 S. Ryan Way 9-4. TBD (Varies in residential urban location)
TU-10. 9050 East Marginal Way S.	10-1. 9050 East Marginal Way S., Sample stand 10-2. Repeat Upstream: 9229 East Marginal Way S. 10-3. Repeat Downstream: 8801 East Marginal Way S. 10-4. TBD (Varies in residential urban location)
TU-11. 13301 57th Ave S.	11-1. 13301 57th Ave S., Sample Stand 11-2. Repeat Upstream: 5612 S. 133rd St. 11-3. Repeat Downstream: 13301 57th Ave S, ¾" residential service 11-4. TBD (Varies in residential urban location)
TU-12. 18375 Cascade Ave S.	12-1. 18375 Cascade Ave S., Sample Stand 12-2. Repeat Upstream: 18200 Cascade Ave S. 12-3. Repeat Downstream: 18375 Cascade Ave S., 1" domestic water service 12-4. TBD (Varies in residential urban location)
TU-13. 17200 Southcenter Parkway	13-1. 17200 Southcenter Parkway, Sample Stand. 13-2. Repeat Upstream: 17200 Southcenter Parkway, 2" domestic water service 13-3. Repeat Downstream 17150 Southcenter

	Parkway, 2" domestic water service 13-4. TBD (Varies in residential urban location)

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	Saturday
Week 1	TU-2, TU-11, TU-13	TU-12	TU-1, TU-4, TU-5, TU-10	TU-3, TU-9, TU-1, TU-2		
Week 2		TU-2, TU-9	TU-10, TU-12, TU-13	TU-1, TU-3	TU-3, TU-4, TU-5	TU-4, TU-11
Week 3	TU-3, TU-11	TU-2, TU-1, TU-10, TU-11	TU-5, TU-12 TU-13	TU-10, TU-4, TU-5, TU-9		
Week 4		TU-9, TU-4, TU-11	TU-3, TU-12, TU-13	TU-5, TU-1	TU-2, TU-10, TU-9	TU-12, TU-13

*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 10 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).

Coliform Monitoring Plan
City of Tukwila Water Utility

G. SYSTEM MAP (Included with Tukwila Comprehensive System Plan; an 8½" by 11" schematic is included showing sampling stand locations.)

Appendix N

INITIAL DISTRIBUTION SYSTEM EVALUATION REPORT AND STANDARD MONITORING PLAN

Form 7: IDSE Report for Standard Monitoring

I. GENERAL INFORMATION

A. PWS Information*

B. Date Submitted* December 16, 2008

PWSID: WA53 89500

PWS Name: City of Tukwila

PWS Address: 6300 Southcenter Blvd.

City: Tukwila State: WA Zip: 98188

Population Served: 21,000

System Type:	Source Water Type:	Buying / Selling Relationships:
X CWS	X Subpart H	X Consecutive System
☐ NTNCWS	☐ Ground	☐ Wholesale System
		☐ Neither

C. PWS Operations

Residual Disinfectant Type: X Chlorine ☐ Chloramines ☐ Other:_____

Number of Disinfected Sources:___ Surface ___GWUDI ___Ground _1_ Purchased

D. Contact Person*

Name: Mike Cusick

Title: Utilities Engineer

Phone #: 206-433-2441 Fax #: 260-431-3665

E-mail: mcusick@ci.tukwila.wa.us

II. STAGE 2 DBPR REQUIREMENTS*

A. Number of Compliance Monitoring Sites	B. Schedule	C. Compliance Monitoring Frequency
Highest TTHM: 3	X Schedule 1	☐ During peak historical month (1 monitoring period)
Highest HAA5: 1	☐ Schedule 2	
Existing Stage 1: NA	☐ Schedule 3	X Every 90 days (4 monitoring periods)
Total: 4	☐ Schedule 4	

Form 7: IDSE Report for Standard Monitoring

III. MONITORING RESULTS*

A. Did you deviate in any way from your approved standard monitoring plan? x 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

X 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
X EPA 524.2	X 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					
	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	X Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	Highest TTHM LRAA
SMP# T-1	☐ Highest TTHM X Highest HAA5 ☐ Stage 1 DBPR	Highest remaining HAA5 LRAA
SMP# H-1	X Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	Highest remaining TTHM LRAA
SMP# T-2	X Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	Highest remaining TTHM LRAA
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	
	☐ Highest TTHM ☐ Highest HAA5 ☐ Stage 1 DBPR	

Attach additional copies of this sheet if you need more room.

Form 7: IDSE Report for Standard Monitoring

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 X 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	2nd Week of June	2nd Week of September	2nd Week of December	2nd Week of March
SMP# T-1	2nd Week of June	2nd Week of September	2nd Week of December	2nd Week of March
SMP# H-1	2nd Week of June	2nd Week of September	2nd Week of December	2nd Week of March
SMP# T-2	2nd Week of June	2nd Week of September	2nd Week of December	2nd 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**.

X 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.**

X 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 staring in 2012:

Period 1	Period 2	Period 3	Period 4
2nd Week of June	2nd Week of September	2nd Week of December	2nd 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:

HAA5	TTHM
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:

$$LRAA_{HAA5} = \left[\frac{(Period1\,\mathrm{Re}\,sult)+(Period2\,\mathrm{Re}\,sult)+(Period3\,\mathrm{Re}\,sult)+(Period4\,\mathrm{Re}\,sult)}{4}\right]$$

$$= \left[\frac{(0.0283)+(0.0294)+(0.0285)+(0.0312)}{4}\right] = 0.02935 mg/L$$

Results for each DBP LRAA shall be rounded to three places (i.e. 1 part per billion) for reporting to the State:

$$LRAA_{HAA5} = 0.02935 mg/L \Rightarrow 0.029 mg/L$$

$$LRAA_{TTHM} = \left[\frac{(Period1\,\mathrm{Re}\,sult)+(Period2\,\mathrm{Re}\,sult)+(Period3\,\mathrm{Re}\,sult)+(Period4\,\mathrm{Re}\,sult)}{4}\right]$$

$$= \left[\frac{(0.0303)+(0.0310)+(0.0296)+(0.0294)}{4}\right] = 0.030075 mg/L$$

Results rounded for reporting:

$$LRAA_{TTJHM} = 0.030075 mg/L \Rightarrow 0.030 mg/L$$

Water Quality Monitoring Schedule

System: TUKWILA WATER DEPARTMENT **PWS ID: 89500 F** **Region: NORTHWEST**
Contact: Bryan Still **Group: A - Comm** **County: KING**

NOTE: To receive credit for compliance samples, you must fill out laboratory and sample paperwork completely, send your samples to a laboratory accredited by Washington State to conduct the analyses, AND ensure the results are submitted to DOH Office of Drinking Water. There is often a lag time between when you collect your sample, when we credit your system with meeting the monitoring requirement, and when we generate the new monitoring requirement.

Coliform Monitoring Requirements

	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	Jun 2021	Jul 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021
Coliform Monitoring Population	45090	45090	45138	45090	45105	45090	45105	45090	45090	45105	45090	45105
Number of Routine Samples Required	50	50	50	50	50	50	50	50	50	50	50	50

- Collect samples from representative points throughout the distribution system.
- Collect required repeat samples following an unsatisfactory sample. In addition, collect a sample from each operating groundwater source.
- For systems that chlorinate, record chlorine residual (measured when the coliform sample is collected) on the coliform lab slip.

Chemical Monitoring Requirements

Distribution Monitoring

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

Water Quality Monitoring Schedule

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*	
Lead and Copper	0	Jan 1999 - Jan 9999	Consecutive System	03/21/1997		
Asbestos	0	Jan 2020 - Dec 2028	waiver - 9 year			
Total Trihalomethane (THM)	4	Jan 2020 - Mar 2020	standard - quarterly	09/17/2020		
Total Trihalomethane (THM)	4	Apr 2020 - Jun 2020	standard - quarterly	09/17/2020		
Total Trihalomethane (THM)	4	Jul 2020 - Sep 2020	standard - quarterly	09/17/2020		
Total Trihalomethane (THM)	4	Oct 2020 - Dec 2020	standard - quarterly	09/17/2020	***Dec 2020***	
Halo-Acetic Acids (HAA5)	4	Jan 2020 - Mar 2020	standard - quarterly	09/17/2020		
Halo-Acetic Acids (HAA5)	4	Apr 2020 - Jun 2020	standard - quarterly	09/17/2020		
Halo-Acetic Acids (HAA5)	4	Jul 2020 - Sep 2020	standard - quarterly	09/17/2020		
Halo-Acetic Acids (HAA5)	4	Oct 2020 - Dec 2020	standard - quarterly	09/17/2020	***Dec 2020***	

Notes on Distribution System Chemical Monitoring

For *Lead and Copper*:
- Collect samples from the COLD WATER side of a KITCHEN or BATHROOM faucet that is used daily.
- Before sampling, make sure the water has sat unused in the pipes for at least 6 hours, but no more than 12 hours (e.g. overnight).
- If you are sampling from a faucet that has hot water, make sure cold water is the last water to run through the faucet before it sits overnight.
- If your sampling frequency is annual or every 3 years, collect samples between June 1 and September 30.

For *Asbestos:* Collect the sample from one of your routine coliform sampling sites in an area of your distribution system that has asbestos concrete pipe.

For *Disinfection Byproducts (HAA5 and THM):* Collect the samples at the locations identified in your Disinfection Byproducts (DBP) monitoring plan.

Water Quality Monitoring Schedule

Other Information

Other Reporting Schedules	*Due Date*
Measure chlorine residuals and submit monthly reports if your system uses continuous chlorination:	monthly
Submit Consumer Confidence Report (CCR) to customers and ODW (Community systems only):	07/01/2020
Submit CCR certification form to ODW (Community systems only):	10/01/2020
Submit Water Use Efficiency report online to ODW and to customers (Community and other municipal water systems only):	07/01/2020
Send notices of lead and copper sample results to the customers sampled:	30 days after you receive the laboratory results
Submit Certification of customer notification of lead and copper results to ODW:	90 days after you notify customers

Special Notes

None

Northwest Regional Water Quality Monitoring Contacts

For questions regarding chemical monitoring:	Steve Hulsman: (253) 395-6777 or Steve.Hulsman@doh.wa.gov
For questions regarding DBPs:	Steve Hulsman: (253) 395-6777 or Steve.Hulsman@doh.wa.gov
For questions regarding coliform bacteria and microbial issues:	Ingrid Salmon: (253) 395-6775 or ingrid.salmon@doh.wa.gov

Additional Notes

The information on this monitoring schedule is valid as of the date in the upper left corner on the first page. However, the information may change with subsequent updates in our water quality monitoring database as we receive new data or revise monitoring schedules. There is often a lag time between when you collect your sample and when we credit your system with meeting the monitoring requirement.

We have not designed this monitoring schedule to display all compliance requirements. The purpose of this schedule is to assist water systems with planning for most water quality monitoring, and to allow systems to compare their records with DOH ODW records. Please be aware that this monitoring schedule does not include constituents that require a special monitoring frequency, such as monitoring affiliated with treatment.

Any inaccuracies on this schedule will not relieve the water system owner and operator of the requirement to comply with applicable regulations.

If you have any questions about your monitoring requirements, please contact the regional office staff listed above.

Seattle Public Utilities

CITY OF SEATTLE PUBLIC UTILITIES
Water Quality Laboratory

800 South Stacy Street Seattle WA 98134 (206) 684-7406

LEAD and COPPER REPORT - Residential Monitoring

Regional
Participant Name: **Tukwila Water Department**

Method: **EPA 200.8**

Source Name:
DOH Source No. **D93**
County: **King**

Participant in Regional Lead and copper monitoring. Report under PWS No.: 77050Y Seattle Public Utilities

	Collection Date	Recieved Date	Analysis Date	LCR Site Code	DOH # :	Lead, mg/L 0009	Copper, mg/L 0023	Analyst
					SRL:	0.0005	0.010	
					Action Level:	0.015	1.30	
074-2101393-02	06/23/2021	06/23/2021	06/30/2021	211CW094s		0.0000	0.029	VISTAL
074-2101393-01	06/23/2021	06/23/2021	06/30/2021	212CW461s		0.0009	0.026	VISTAL
074-2101393-03	06/23/2021	06/23/2021	06/30/2021	212CW462s		0.0031	0.041	VISTAL

Total samples: 3

Barbara Szczachor
Chemistry/Limnology Supervisor

Appendix O

ANNUAL CONSUMER CONFIDENCE REPORTS

DRINKING WATER QUALITY ANNUAL REPORT FOR THE YEAR 2010

System ID #89500F

Presented by the City of Tukwila
Public Works Department – Water Utility Division

Drink up!

Quality drinking water is fundamental to our way of life. The City of Tukwila is committed to providing you with high-quality drinking water, and we are pleased to present a summary of our services for 2010. If you have questions about the information in this report, please call Tukwila's Public Works Department at 206-433-0179.

Tukwila's drinking water comes from Seattle's highly protected Cedar River Watershed in the Cascade Mountains. The Cascade Water Alliance – a regional water supplier – purchases this water from Seattle and provides it to Tukwila, along with other members, in a cost-effective and environmentally sensitive way.

Treating the water we drink

Currently, there are four steps in the treatment of the Cedar water supply: screening, fluoridation, corrosion control, and disinfection. The water first passes through coarse screens to remove debris, and fluoride is added for dental health protection. At the Cedar Treatment Facility, lime is added for pH-adjusted corrosion control to minimize lead leaching in older plumbing systems, and the water is disinfected to eliminate microbial contaminants. The disinfection process is a combination of chlorination, ozonation to improve taste and odor and Giardia control, and ultraviolet light disinfection to disable chlorine resistant contaminants.

Water system security

There is a heightened awareness throughout the nation among those who provide safe drinking water. Your Tukwila Public Works Department has taken extra steps to ensure the safety and integrity of the water distribution system and storage facilities in this area to protect the quality of water at your tap.

Notice: Important information

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons (such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV, AIDS or other immune system disorders), some elderly persons, and infants can be particularly at risk for infections. These people or their caregivers should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

2010 water quality monitoring results

2010 water quality monitoring results listed in the table below show that there were no contaminants at or above levels allowed by federal and state agencies. The first column lists each compound that was found and the units of measure. The MCLG and MCL columns list the U.S. Environmental Protection Agency's allowable limits ***(refer to the definitions of MCLG and MCL below the table)***. Tukwila customers and nearly all other regional customers living south of the Seattle ship canal receive water from the Cedar River.

The Washington State Department of Health assesses all water sources for susceptibility to contamination. Being a surface water source, the Cedar River Watershed was given a high susceptibility rating regardless of whether there are any sources of contamination in the watershed.

If you would like a copy of the list of undetected contaminants (compounds monitored for but not found), please call Tukwila Public Works Operations at 206-433-1860.

Water Quality Monitoring Results for 2010

Detected Compounds (Units)		MCLG	MCL	Average	Range	Typical Sources
Turbidity	(NTU)	NA	5	0.4	0.2–4.5	Soil runoff
Fluoride	(ppm)	4	4	0.95	0.7–1.1	Water additive which promotes strong teeth
Barium	(ppb)	2000	2000	1.8	1 sample	Erosion of natural deposits
Nitrate	(ppm)	10	10	0.02	1 sample	Erosion of natural deposits
Arsenic	(ppb)	0	10	0.5	1 sample	Erosion of natural deposits
Chromium	(ppb)	100	100	0.8	1 sample	Erosion of natural deposits
Total Trihalomethanes	(ppb)	NA	80	24	11–43	By-products of drinking water chlorination (samples collected in 2008)
Haloacetic Acids (five)	(ppb)	NA	60	28	13–44	
Chlorine	(ppm)	MRDLG=4	MRDL=4	1.23	0.65–1.79	Water additive used to control microbes

Definitions

MCLG	Maximum Contaminant Level Goal	The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
MCL	Maximum Contaminant Level	The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible, using the best available treatment technology.
MRDL	Maximum Residual Disinfectant Level	The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
MRDLG	Maximum Residual Disinfectant Level Goal	The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
NTU	Nephelometric Turbidity Unit	Turbidity is a measure of how clear the water looks. High turbidity can hinder the effectiveness of disinfectants.

NA: Not Applicable

ppm: 1 part per million = 1 mg/L = 1 milligram per liter
ppb: 1 part per billion = 1 ug/L = 1 microgram per liter

1 ppm = 1000 ppb

Lead and copper and your drinking water – are you at risk?

Our source waters do not contain lead or copper. However, lead and copper can leach into water from building plumbing systems containing copper pipes, lead-based solder, brass fixtures, or some types of zinc coatings used on galvanized pipes and fittings. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Tukwila Water Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at www.epa.gov/safewater/lead.

Lead and Copper Monitoring Results

Parameter and Units	MCLG	Action Level(1)	2009 Results(2)	Homes Exceeding Action Level	Source
Lead, ppb	0	15	6.3	3 of 53	Corrosion of household plumbing systems
Copper, ppm	1.3	1.3	0.10	0 of 53	

(1) The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

(2) 90th Percentile: i.e. out of every 10 homes sampled, 9 were at or below this level.

The monitoring results in the above table are from a regional sampling program conducted in 2009 (most recent). Of the 53 homes sampled, three were in Tukwila, none of which exceeded the action levels for lead or copper.

Cryptowhat?

Cryptosporidium parvum is a microscopic organism that, when ingested, can result in diarrhea, fever and other gastrointestinal symptoms. These disease-causing organisms are commonly found in the natural environment and in most surface water sources. Seattle's Cedar treatment facility increases public protection by destroying cryptosporidium and other microbial organisms.

Source water monitoring in 2010 did not detect cryptosporidium in any of the three samples collected from the Cedar supply.

Ensuring your water is pure

To ensure that tap water is safe to drink, the U.S. Environmental Protection Agency prescribes regulations limiting the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulates contaminants in bottled water, which must provide the same level of public health protection. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (1-800-426-4791), or from the EPA's Office of Ground Water and Drinking Water website at http://www.epa.gov/safewater/index.html.

Conservation

In 2010, Tukwila supplied over 688 million gallons of drinking water to its retail and commercial customers. We recognize conservation as an important component in providing a safe, reliable supply of water to meet our customer's needs today and in the future.

The Tukwila Water Department has strived to keep water loss in the distribution system below 10% as required under the Municipal Water Law through aggressive leak detection and repair work.

To assist our customers in using water more efficiently, in 2007 the Tukwila City Council formally adopted a six-year water conservation goal under Resolution #1645. The Tukwila conservation plan is being implemented through the Cascade Water Alliance's regional water conservation program. Many highly successful water-saving offers are available to Tukwila customers, including the Washwise rebates for efficient clothes washers, the high efficiency toilet rebate program, commercial irrigation audits, and commercial kitchen rebates. To look for the water conservation rebates available to Tukwila water customers, please visit the Cascade Water Alliance website at www.cascadewater.org.

Frequently Asked Questions

What are DBPs?

DBP stands for "Disinfection Byproducts". When disinfectants are added to water they help maintain the safety of the water but they can also mix with natural materials to form DBPs. The EPA has finalized the Stage 2 D/DBP rule for safe drinking water and is implementing the initial phases now. The City of Tukwila has completed the required monitoring plan for the "Initial Distribution System Evaluation."

What is the pH of water supplied to Tukwila customers?

The average pH of Seattle's source water is 7.0. The pH is boosted to 8.2 in the distribution system as part of SPU's corrosion control policy.

Does the water I receive have fluoride in it?

In accordance with a Seattle public vote held in November 1968, Seattle Public Utilities also adds fluoride to the drinking water at appropriate levels to prevent tooth decay.

How can I get more involved in decisions affecting my drinking water?

Please contact the Tukwila Public Works office at 206-433-0179 with any concerns you might have. The Tukwila Utilities Committee also welcomes public comment; they meet twice monthly at 6300 Southcenter Boulevard, Suite 100, in Tukwila. To find out more about the current Utilities Committee agenda and meeting times, call us at 206-433-1800, or check on the City's website: www.TukwilaWA.gov.

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	Website: www.cascadewater.org/ Conservation Rebates: 425-453-0930
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
WA STATE	Health Dept: www.doh.wa.gov/ehp/dw/

Presented by the City of Tukwila Public Works Department, Water Utility Division

DRINKING WATER QUALITY ANNUAL REPORT FOR THE YEAR 2011

System ID Number 89500F

Access to safe, healthful drinking water is a vital part of our lives and the Tukwila Water Department is committed to providing its customers with the highest quality water possible. This report is our opportunity to provide our customers with the results of water quality testing conducted in 2011 and is required by state and federal law. If you have questions about the information in this report, call Tukwila's Public Works Department at 206-433-0179.

Tukwila's drinking water comes from the Cedar River Watershed, a highly protected water source in the Cascade Mountains owned and maintained by Seattle Public Utilities. The City of Tukwila is a member of Cascade Water Alliance, a regional water supply nonprofit made up of eight municipalities that collectively purchase water from Seattle Public Utilities currently and are working towards developing a new source to meet future demand.

Treating the water we drink

There are four steps in the treatment of the Cedar water supply: screening, fluoridation, corrosion control, and disinfection. The water first passes through coarse screens to remove debris, and fluoride is added for dental health protection. At the Cedar Treatment Facility, lime is added for pH-adjusted corrosion control to minimize lead leaching in older plumbing systems, and the water is disinfected to eliminate microbial contaminants. The disinfection process is a combination of chlorination, ozonation to improve taste and odor and Giardia control, and ultraviolet light disinfection to disable chlorine resistant contaminants.

2011 Water Quality Monitoring Results

Detected Compounds (Units)	MCLG	MCL	Average	Range	Typical Sources
Turbidity (NTU)	NA	5	0.4	0.2–2.9	Soil runoff
Fluoride (ppm)	4	4	0.8	0.6–1.0	Water additive which promotes strong teeth
Barium (ppb)	2000	2000	1.4	1 sample	Erosion of natural deposits
Nitrate (ppm)	10	10	0.09	1 sample	Erosion of natural deposits
Chromium (ppb)	100	100	0.2	1 sample	Erosion of natural deposits
Total Trihalomethanes (ppb)	NA	80	24	11–43	By-products of drinking water chlorination *(samples collected in 2008)*
Haloacetic Acids (five) (ppb)	NA	60	28	13–44	
Chlorine (ppm)	MRDLG = 4	MRDL = 4	1.20	0.65–1.64	Water additive used to control microbes

Definitions

MCLG *Maximum Contaminant Level Goal – The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.*

MCL *Maximum Contaminant Level – The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible, using the best available treatment technology.*

MRDL *Maximum Residual Disinfectant Level – The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.*

MRDLG *Maximum Residual Disinfectant Level Goal – The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.*

NTU *Nephelometric Turbidity Unit – Turbidity is a measure of how clear the water looks. High turbidity can hinder the effectiveness of disinfectants.*

NA *Not Applicable*

ppm *1 part per million = 1 mg/L = 1 milligram per liter*

ppb *1 part per billion = 1 ug/L = 1 microgram per liter 1 ppm = 1000 ppb*

2011 water quality monitoring results

Listed in the table below are all regulated contaminants that were detected in water quality testing conducted in 2011 and the level at which they were found. None of the contaminants detected were at or above levels allowed by state and federal agencies. Not listed are the more than 200 compounds tested for but not found. The first column lists each compound that was found and the units of measure. The MCLG and MCL columns list the U.S. Environmental Protection Agency's allowable limits (refer to the definitions of MCLG and MCL below the table). Tukwila customers and nearly all other regional customers living south of Green Lake receive water from the Cedar River.

The Washington State Department of Health assesses all water sources for susceptibility to contamination. Being a surface water source, the Cedar River Watershed was given a high susceptibility rating regardless of whether there are any sources of contamination in the watershed. Information on the source water assessments is available from the DOH website at

https://fortress.wa.gov/doh/eh/dw/swap/maps/

If you would like a copy of the list of undetected contaminants (compounds monitored for but not found), please call Tukwila Public Works Operations at 206-433-1860.

Lead and copper and your drinking water – are you at risk?

Our source waters do not contain lead or copper. However, lead and copper can leach into water from building plumbing systems containing copper pipes, lead-based solder, brass fixtures, or some types of zinc coatings used on galvanized pipes and fittings. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Tukwila Water Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at www.epa.gov/safewater/lead.

Lead and Copper Monitoring Results

Parameter and Units	MCLG	Action Level(1)	2009 Results(2)	Homes Exceeding Action Level	Source
Lead, ppb	0	15	6.3	3 of 53	Corrosion of household plumbing systems
Copper, ppm	1.3	1.3	0.10	0 of 53	

(1) The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

(2) 90th Percentile: i.e. out of every 10 homes sampled, 9 were at or below this level.

The monitoring results in the above table are from a regional sampling program conducted in 2009 (most recent). Of the 53 homes sampled, three were in Tukwila, none of which exceeded the action levels for lead or copper.

Cryptowhat?

Cryptosporidium parvum is a microscopic organism that, when ingested, can result in diarrhea, fever and other gastrointestinal symptoms. These disease-causing organisms are commonly found in the natural environment and in most surface water sources. Seattle's Cedar Treatment Facility increases public protection by destroying cryptosporidium and other microbial organisms.

Source water monitoring in 2011 did not detect cryptosporidium in any of the samples collected from the Cedar supply.

Ensuring your water is pure

To ensure that tap water is safe to drink, the U.S. Environmental Protection Agency and Washington State Department of Health prescribe regulations limiting the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulates contaminants in bottled water, which must provide the same level of public health protection. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (1-800-426-4791).

Notice: Important information from the EPA

Sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Since the Cedar River Watershed is publicly owned and managed for water quality, agricultural, industrial, residential, and recreational uses are prohibited. This means there is little opportunity for contaminants to enter the water. However, there is always some potential for naturally occurring sources of contamination. In the Cedar River Watershed the potential sources of contamination include:

- microbial contaminants, e.g., viruses and bacteria from wildlife,
- inorganic contaminants, such as salts and metals, which are naturally occurring; and
- organic contaminants, which result from chlorine combining with naturally occurring organic matter.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons (such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV, AIDS or other immune system disorders), some elderly persons, and infants can be particularly at risk for infections. These people or their caregivers should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

Conservation

In 2011, Tukwila supplied over 705 million gallons of drinking water to its retail and commercial customers. We recognize conservation as an important component in providing a safe, reliable supply of water to meet our customer's needs today and in the future.

The Tukwila Water Department has strived to keep water loss in the distribution system below 10% as required under the Municipal Water Law through aggressive leak detection and repair work.

To assist our customers in using water more efficiently, in 2007 the City of Tukwila adopted a six-year water conservation goal to save 52,000 gallons of water per day by the end of 2014. By the end of 2011 the program has achieved an estimated savings of 40,000 gallons per day. The Tukwila conservation plan is being implemented through the Cascade Water Alliance's regional water conservation program. Many highly successful water-saving offers are available to Tukwila customers, including the high efficiency toilet rebate program, commercial irrigation audits, commercial kitchen rebates, and free low-flow showerheads. Visit the Cascade Water Alliance website at www.cascadewater.org to look for the water conservation rebates and programs available to Tukwila water customers.

Frequently Asked Questions

What are DBPs?

DBP stands for "Disinfection Byproducts". When disinfectants are added to water they help to prevent disease. However, they can also combine with naturally occurring organic material to form DBPs. The EPA has finalized the Stage 2 D/DBP rule for safe drinking water and is implementing the initial phases now. The City of Tukwila completed preliminary evaluation sampling in 2008 and will begin regular quarterly sampling for DBP's in 2012.

What is the pH of water supplied to Tukwila customers?

The average pH of Seattle's source water is 7.0. The pH is boosted to 8.2 in the distribution system as part of SPU's corrosion control policy.

Does the water I receive have fluoride in it?

In accordance with a Seattle public vote held in November 1968, Seattle Public Utilities also adds fluoride to the drinking water at appropriate levels to prevent tooth decay. The concentration of fluoride was reduced beginning in January 2011 from 1.0 parts per million to 0.8 parts per million, the lowest level allowed by current state law. This reduction is in response to new federal recommendations and is strongly supported by local health officials.

How can I get more involved in decisions affecting my drinking water?

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WA STATE DEPARTMENT OF HEALTH
Website: www.doh.wa.gov/ehp/dw/

TUKWILA 2012 DRINKING WATER ANNUAL REPORT

System ID Number 89500F

from the City of Tukwila Public Works Department, Water Utility Division

Access to safe, healthful drinking water is a vital part of our lives and the Tukwila Water Department is committed to providing its customers with the highest quality water possible. This report is our opportunity to provide our customers with the results of water quality testing conducted in 2012 and is required by state and federal law. If you have questions about the information in this report, call Tukwila's Water Department at 206-433-1863.

Tukwila's drinking water comes from the Cedar River Watershed, a highly protected water source in the Cascade Mountains owned and maintained by Seattle Public Utilities. The City of Tukwila is a member of Cascade Water Alliance, a regional water supply non-profit made up of eight municipalities that collectively purchase water from Seattle Public Utilities currently and are working towards developing a new source to meet future demand.

Treating the water we drink

There are four steps in the treatment of the Cedar water supply: screening, fluoridation, corrosion control, and disinfection. The water first passes through coarse screens to remove debris, and fluoride is added for dental health protection. At the Cedar Treatment Facility, lime is added for pH-adjusted corrosion control to minimize lead leaching in older plumbing systems, and the water is disinfected to eliminate microbial contaminants. The disinfection process is a combination of chlorination, ozonation to improve taste and odor and Giardia control, and ultraviolet light disinfection to disable chlorine resistant contaminants.

2012 water quality monitoring results

Listed in the table below are all regulated contaminants that were detected in water quality testing conducted in 2012 and the level at which they were found. None of the contaminants detected were at or above levels allowed by state and federal agencies. Not listed are the more than 200 compounds tested for but not found. Tukwila customers and nearly all other regional customers living south of Green Lake receive water from the Cedar River.

The Washington State Department of Health (DOH) assesses all water sources for susceptibility to contamination. Being a surface water source, the Cedar River Watershed was given a high susceptibility rating regardless of whether there are any sources of contamination in the watershed. Information on the source water assessments is available from the DOH website at https://fortress.wa.gov/doh/eh/dw/swap/maps/. If you would like a copy of the list of undetected contaminants (compounds monitored for but not found), please call Tukwila Public Works Operations at 206-433-1860.

2012 Water Quality Monitoring Results

Detected Compounds (Units)	MCLG	MCL	Average	Range	Typical Sources
RAW WATER					
Total Organic Carbon (ppm)	NA	TT	0.7	0.4–1.1	Naturally present in the environment
FINISHED WATER					
Turbidity (NTU)	NA	TT	0.3	0.2–2.3	Soil runoff
Fluoride (ppm)	4	4	0.8	0.7–0.9	Water additive which promotes strong teeth
Barium (ppb)	2000	2000	1.8	1 sample	Erosion of natural deposits
Nitrate (ppm)	10	10	0.02	1 sample	Erosion of natural deposits
Total Trihalomethanes (ppb)	NA	80	39.4	15.8–55.5	By-products of drinking water chlorination
Haloacetic Acids (five) (ppb)	NA	60	37.9	19–62.5	
Chlorine (ppm)	MRDLG = 4	MRDL = 4	1.1	0.7–1.5	Water additive used to control microbes

Definitions

MCLG Maximum Contaminant Level Goal – The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

MCL Maximum Contaminant Level – The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible, using the best available treatment technology.

MRDL Maximum Residual Disinfectant Level – The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

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TT Treatment Technique – A required process intended to reduce the level of a contaminant in drinking water.

NTU Nephelometric Turbidity Unit – Turbidity is a measure of how clear the water looks. High turbidity can hinder the effectiveness of disinfectants.

NA Not Applicable

ppm 1 part per million = 1 mg/L = 1 milligram per liter

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Lead and copper and your drinking water – are you at risk?

Our source waters do not contain lead or copper. However, lead and copper can leach into water from building plumbing systems containing copper pipes, lead-based solder, brass fixtures, or some types of zinc coatings used on galvanized pipes and fittings. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Tukwila Water Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at www.EPA.gov/safewater/lead.

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Parameter and Units	MCLG	Action Level(1)	2012 Results(2)	Homes Exceeding Action Level	Source
Lead, ppb	0	15	3.6	0 of 52	Corrosion of household plumbing systems
Copper, ppm	1.3	1.3	0.096	0 of 52	

(1) The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

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The monitoring results in the above table are from a regional sampling program conducted in 2012. Of the 52 homes sampled, three were in Tukwila, none of which exceeded the action levels for lead or copper.

Cryptowhat?

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Important information from the EPA

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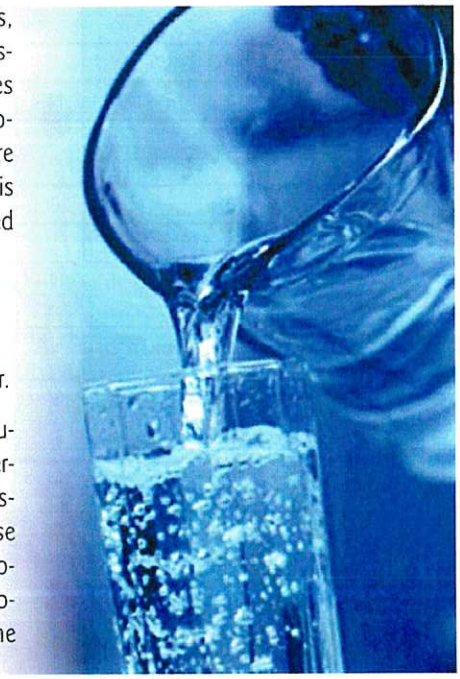

Frequently Asked Questions

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DBP stands for "Disinfection By-products". When disinfectants are added to water they help to prevent disease. However, they can also combine with naturally occurring organic material to form DBPs. The EPA has enacted new sampling regulations for two groups of DBPs: Trihalomethanes and Haloacetic Acids. The maximum contaminant level (MCL) for disinfection by-products set by the EPA is for the average of all samples collected over a 12-month period. The City of Tukwila completed preliminary evaluation sampling in 2008 and began regular quarterly sampling for DBPs in 2012.

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The average pH of Seattle's source water is 7.0. The pH is boosted to 8.2 in the distribution system as part of SPU's corrosion control policy.

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How can I get more involved in decisions affecting my drinking water?

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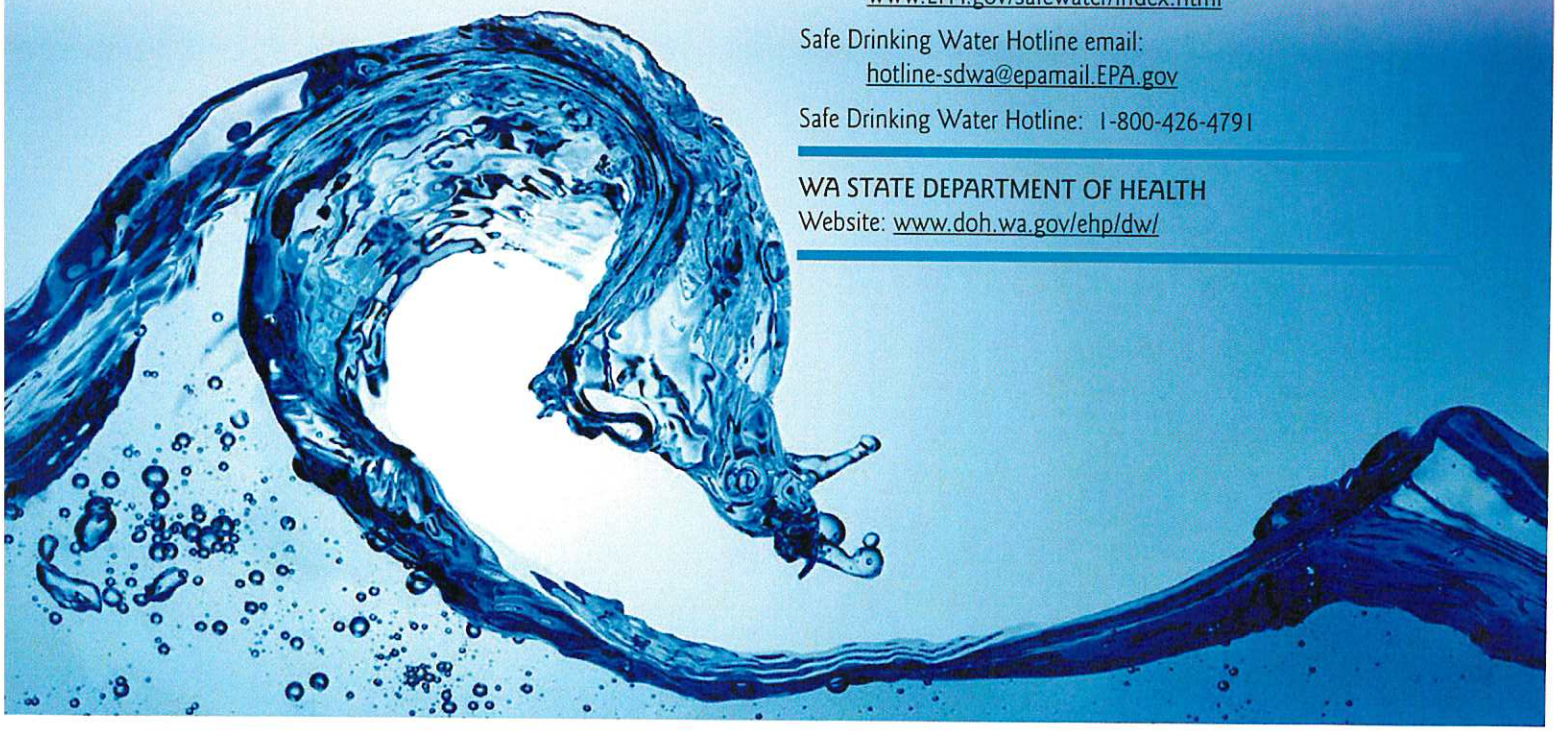

TUKWILA 2013 DRINKING WATER ANNUAL REPORT

System ID Number 89500F

from the City of Tukwila Public Works Department, Water Utility Division

Access to safe, healthful drinking water is a vital part of our lives and the Tukwila Water Department is committed to providing its customers with the highest quality water possible. This report is our opportunity to provide our customers with the results of water quality testing conducted in 2013 and is required by state and federal law. If you have questions about the information in this report, call Tukwila's Water Department at 206-433-1863.

Tukwila's drinking water comes from the Cedar River Watershed, a highly protected water source in the Cascade Mountains owned and maintained by Seattle Public Utilities. The City of Tukwila is a member of Cascade Water Alliance, a regional water supply non-profit made up of seven municipalities that collectively purchase water from Seattle Public Utilities currently and are working towards developing a new source to meet future demand.

Treating the water we drink

There are four steps in the treatment of the Cedar water supply: screening, fluoridation, corrosion control, and disinfection. The water first passes through coarse screens to remove debris, and fluoride is added for dental health protection. At the Cedar Treatment Facility, lime is added for pH-adjusted corrosion control to minimize lead leaching in older plumbing systems, and the water is disinfected to eliminate microbial contaminants. The disinfection process is a combination of chlorination, ozonation to improve taste and odor and Giardia control, and ultraviolet light disinfection to disable chlorine resistant contaminants.

2013 water quality monitoring results

Listed in the table below are all regulated contaminants that were detected in water quality testing conducted in 2013 and the level at which they were found. None of the contaminants detected were at or above levels allowed by state and federal agencies. Not listed are the more than 200 compounds tested for but not found.

The Washington State Department of Health (DOH) assesses all water sources for susceptibility to contamination. Being a surface water source, the Cedar River Watershed was given a high susceptibility rating regardless of whether there are any sources of contamination in the watershed. Information on the source water assessments is available from the DOH website at https://fortress.wa.gov/doh/eh/dw/swap/maps/. If you would like a copy of the list of undetected contaminants (compounds monitored for but not found), please call Tukwila Public Works Operations at 206-433-1860.

2012 Water Quality Monitoring Results

Detected Compounds (Units)	MCLG	MCL	Average	Range	Typical Sources
RAW WATER					
Total Organic Carbon (ppm)	NA	TT	0.8	0.4–1.4	Naturally present in the environment
FINISHED WATER					
Turbidity (NTU)	NA	TT	0.4	0.2–2.7	Soil runoff
Fluoride (ppm)	4	4	0.8	0.7–0.8	Water additive which promotes strong teeth
Bromate (ppb)	0	10	0.08	ND–2	By-product of drinking water disinfection
Barium (ppb)	2,000	2,000	1.8	1 sample	Erosion of natural deposits
Total Trihalomethanes (ppb)	NA	80	25	12.6–41.7	By-products of drinking water chlorination
Haloacetic Acids (five) (ppb)	NA	60	30	18.0–49.8	
Chlorine (ppm)	MRDLG = 4	MRDL = 4	1.18	0.64–1.53	Water additive used to control microbes

NA – Not Applicable *ND – Not Detected*

Definitions

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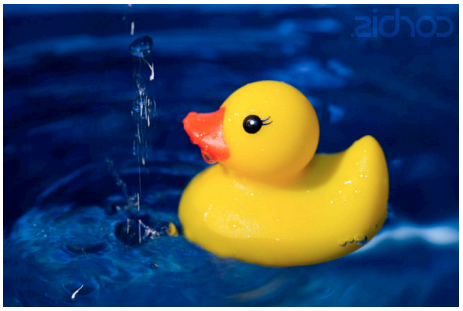
Construction Activity

The City of Tukwila plans for and funds upgrades to the water system through the Capital Improvement Program. Due to limited available funding, the Public Works Department must prioritize the scheduling of projects to provide the greatest system reliability, as well as coordinate City projects with those of other public or private entities.

Several dramatic water main failures in the central business district south of I-405 have highlighted the need to replace the aging cast iron water main found in much of that area with new, stronger ductile iron pipe. In 2014, 2,100 feet of cast iron water main on Andover Park West north of Strander Boulevard will be replaced with new 12" ductile iron pipe, in conjunction with the construction of the new Transit Center. This project will provide increased fire flow and system reliability, while minimizing construction-related disruptions by coordinating with other infrastructure improvements.



Conservation

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The Tukwila Water Department has strived to keep water loss in the distribution system below 10% as required under the Municipal Water Law through aggressive leak detection and repair work.

To assist our customers in using water more efficiently, in 2007 the City of Tukwila adopted a six-year water conservation goal to save 52,000 gallons of water per day by the end of 2014. By the end of 2013 the program has achieved an estimated savings of 50,861 gallons per day. The Tukwila conservation plan is being implemented through the Cascade Water Alliance's regional water conservation program. Many highly successful water-saving offers are available to Tukwila customers, including free low-flow showerheads, faucet aerators, and shower timers. Visit the Cascade Water Alliance website at www.cascadewater.org to look for the water conservation rebates and programs available to Tukwila water customers.

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
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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

WA STATE DEPARTMENT OF HEALTH
Website: www.doh.wa.gov/ehp/dw/

TUKWILA DRINKING WATER ANNUAL REPORT FOR 2014

System ID Number 89500F

Prepared by the City of Tukwila
Public Works Department, Water Utility Division

Access to safe, healthful drinking water is a vital part of our lives and the Tukwila Water Department is committed to providing its customers with the highest quality water possible. This report is our opportunity to provide our customers with the results of water quality testing conducted in 2014 and is required by state and federal law. If you have questions about the information in this report, call Tukwila's Water Department at 206-433-1863.

Tukwila's drinking water comes from the Cedar River Watershed, a highly protected water source in the Cascade Mountains owned and maintained by Seattle Public Utilities. The City of Tukwila is a member of Cascade Water Alliance, a regional water supply nonprofit made up of seven municipalities that collectively purchase water from Seattle Public Utilities currently and are working towards developing a new source to meet future demand.

Treating the water we drink

There are four steps in the treatment of the Cedar water supply: screening, fluoridation, corrosion control, and disinfection. The water first passes through coarse screens to remove debris, and fluoride is added for dental health protection. At the Cedar Treatment Facility, lime is added for pH-adjusted corrosion control to minimize lead leaching in older plumbing systems, and the water is disinfected to eliminate microbial contaminants. The disinfection process is a combination of chlorination, ozonation to improve taste and odor and Giardia control, and ultraviolet light disinfection to disable chlorine resistant contaminants.

Conservation

In 2014, the Tukwila Water Department supplied over 723 million gallons of water to its retail and commercial customers. This water comes from a finite regional supply that must be used efficiently in order to meet the needs of people as well as maintaining adequate in-stream flows to protect salmon and other wildlife. Recognizing the importance of conservation in meeting the water needs of future generations, in 2003 the Washington Legislature enacted the Municipal Water Law, which requires municipalities to use water more efficiently.

Being connected to a regional water supply means we must take a regional approach to water conservation. In October 2013, with authorization from the Washington State Department of Health, Cascade Water Alliance adopted a single, regional savings goal on behalf of all its members for the next six years. The new goal is a cumulative savings of 600,000 gallons per day on an annual basis. In 2014 Cascade Water Alliance members saved an estimated 178,000 gallons per day or approximately 30% of the six year savings goal on an annual basis. These savings were realized by employing a number of different measures including installation of high-efficiency showerheads and spray nozzles in area hotels, irrigation system update projects, and residential leak detection mailers. Some of the water saving offers available to Tukwila customers include free low-flow showerheads, faucet aerators, and shower timers. Visit the Cascade Water Alliance website at www cascadewater.org to look for the water conservation rebates and programs available to Tukwila water customers.

The Municipal Water Law also requires water suppliers to keep water loss in their distribution systems below 10%. In 2014 the Tukwila Water Department kept water loss in the system down to 3% with an aggressive program of leak detection and repair. This is considered very low by industry standards and is a testament to the investments made in water infrastructure by the City of Tukwila.

Ensuring your water is pure

To ensure that tap water is safe to drink, the U.S. Environmental Protection Agency and Washington State Department of Health prescribe regulations limiting the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulates contaminants in bottled water, which must provide the same level of public health protection. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (1-800-426-4791).

2014 water quality monitoring results

Listed in the table below are all regulated contaminants that were detected in water quality testing conducted in 2014 and the level at which they were found. None of the contaminants detected were at or above levels allowed by state and federal agencies. Not listed are the more than 200 compounds tested for but not found.

The Washington State Department of Health (DOH) assesses all water sources for susceptibility to contamination. Being a surface water source, the Cedar River Watershed was given a high susceptibility rating regardless of whether there are any sources of contamination in the watershed. Information on the source water assessments is available from the DOH website at https://fortress.wa.gov/doh/eh/dw/swap/maps/. If you would like a copy of the list of undetected contaminants (compounds monitored for but not found), please call Tukwila Public Works Operations at 206-433-1860.

Definitions used in the table

MCLG *Maximum Contaminant Level Goal – The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.*

MCL *Maximum Contaminant Level – The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible, using the best available treatment technology.*

MRDL *Maximum Residual Disinfectant Level – The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.*

MRDLG *Maximum Residual Disinfectant Level Goal – The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.*

TT *Treatment Technique – A required process intended to reduce the level of a contaminant in drinking water.*

NTU *Nephelometric Turbidity Unit – Turbidity is a measure of how clear the water looks. High turbidity can hinder the effectiveness of disinfectants.*

Detected Compounds (Units)	MCLG	MCL	Average	Range	Typical Sources
RAW WATER					
Total Organic Carbon (ppm)	NA	TT	0.9	0.4–1.9	Naturally present in the environment
FINISHED WATER					
Turbidity (NTU)	NA	TT	0.4	0.2–1.6	Soil runoff
Barium (ppb)	2,000	2,000	1.4	1 sample	Erosion of natural deposits
Fluoride (ppm)	4	4	0.8	0.7–0.8	Water additive which promotes strong teeth
Nitrate (ppm)	10	10	0.02	1 sample	Erosion of natural deposits
Total Trihalomethanes (ppb)	NA	80	25	7.4–43.7	By-product of drinking water chlorination
Haloacetic Acids (5) (ppb)	NA	60	33	22.8–45.6	By-product of drinking water chlorination
E. coli (# of samples)	0	0	1 positive sample, 11/25/14*		Human and animal fecal waste
Chlorine (ppm)	MRDLG= 4	MRDL= 4	1.19	0.67–1.59	Water additive used to control microbes

ppm: 1 part per million = 1 mg/L = 1 milligram per liter
ppb: 1 part per billion = 1 ug/L = 1 microgram per liter
1 ppm = 1,000 ppb

NA – Not Applicable

** Follow-up sampling showed no indication of contamination. Compliance was maintained.*

Lead and copper and your drinking water – are you at risk?

Our source waters do not contain lead or copper. However, lead and copper can leach into water from building plumbing systems containing copper pipes, lead-based solder, brass fixtures, or some types of zinc coatings used on galvanized pipes and fittings. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Tukwila Water Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at www.EPA.gov/safewater/lead.

Lead and Copper Monitoring Results

The data in the table below comes from a regional sampling program conducted in 2012 (most recent testing required by regulation). Of the 52 homes sampled, three were in Tukwila, none of which exceeded the action levels for lead or copper.

Parameter and Units	Lead, ppb	Copper, ppm
MCLG	0	1.3
Action Level(1)	15	1.3
2012 Results(2)	3.6	0.096
Homes Exceeding Action Level	0 of 52	0 of 52
Source	Corrosion of household plumbing systems	

(1) The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

(2) 90th percentile, i.e., out of every 10 homes sampled, 9 were at or below this level.

Cryptowhat?

Cryptosporidium parvum is a microscopic organism that, when ingested, can result in diarrhea, fever and other gastrointestinal symptoms. These disease-causing organisms are commonly found in the natural environment and in most surface water sources. Seattle's Cedar Treatment Facility increases public protection by destroying cryptosporidium and other microbial organisms. Source water monitoring in 2014 did not detect cryptosporidium in any of the samples collected from the Cedar supply.

Important information from the EPA

Sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Since the Cedar River Watershed is publicly owned and managed for water quality, agricultural, industrial, residential, and recreational uses are prohibited. This means there is little opportunity for contaminants to enter the water. However, there is always some potential for naturally occurring sources of contamination. In the Cedar River Watershed the potential sources of contamination include:

- microbial contaminants, e.g., viruses and bacteria from wildlife,
- inorganic contaminants, such as salts and metals, which are naturally occurring; and
- organic contaminants, which result from chlorine combining with naturally occurring organic matter.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons (such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV, AIDS or other immune system disorders), some elderly persons, and infants can be particularly at risk for infections. These people or their caregivers should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

Frequently Asked Questions

What are DBPs?

DBP stands for "Disinfection By-products". When disinfectants are added to water they help to prevent disease. However, they can also combine with naturally occurring organic material to form DBPs. The EPA has enacted new sampling regulations for two groups of DBPs: Trihalomethanes and Haloacetic Acids. The maximum contaminant level (MCL) for disinfection by-products set by the EPA is for the average of all samples collected over a 12-month period. The City of Tukwila completed preliminary evaluation sampling in 2008 and began regular quarterly sampling for DBPs in 2012.

What is the pH of water supplied to Tukwila customers?

The average pH of Seattle's source water is 7.0. The pH is boosted to 8.2 in the distribution system as part of SPU's corrosion control policy.

Does the water I receive have fluoride in it?

Yes. In accordance with a Seattle public vote held in November 1968, Seattle Public Utilities adds fluoride to the drinking water at appropriate levels to prevent tooth decay. The concentration of fluoride was reduced beginning in January 2011 from 1.0 parts per million to 0.8 parts per million, the lowest level allowed by current state law. This reduction is in response to new federal recommendations and is strongly supported by local health officials.

How can I get more involved in decisions affecting my drinking water?

Please contact the Tukwila Public Works office at 206-433-0179 with any concerns you might have. The Tukwila Utilities Committee also welcomes public comment; they meet twice monthly at 6300 Southcenter Boulevard, Suite 100, in Tukwila. To find out more about the current Utilities Committee agenda and meeting times, give us a call at 206-433-1800, or check on the City's website at www.TukwilaWA.gov.

Construction Activity

The City of Tukwila plans for and funds upgrades to the water system through the Capital Improvement Program. Due to limited available funding, the Public Works Department must prioritize the scheduling of projects to provide the greatest system reliability, as well as coordinate City projects with those of other public or private entities.

If you have travelled down Interurban Avenue South recently you have seen that there is a project underway to completely rebuild the roadway. As part of that project, approximately 4000 feet of old cast iron water main will be replaced with new 12 inch ductile iron pipe from South 143rd Street to Fort Dent Way. The new pipe will increase water system integrity in a very important corridor. By combining the pipe replacement with the other infrastructure improvements, costs are significantly reduced and construction-related disruptions are minimized.

For more information

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WA STATE DEPARTMENT OF HEALTH
Website: www.doh.wa.gov/ehp/dw

TUKWILA DRINKING WATER ANNUAL REPORT FOR 2015

System ID Number 89500F

Prepared by the City of Tukwila Public Works Department, Water Utility Division

Access to safe, healthful drinking water is a vital part of our lives and the Tukwila Water Department is committed to providing its customers with the highest quality water possible. This report is our opportunity to provide our customers with the results of water quality testing conducted in 2015 and is required by state and federal law. If you have questions about the information in this report, call Tukwila's Water Department at 206-433-1863.

Tukwila's drinking water comes from the Cedar River Watershed, a highly protected water source in the Cascade Mountains owned and maintained by Seattle Public Utilities. The City of Tukwila is a member of Cascade Water Alliance, a regional water supply non-profit made up of seven municipalities that collectively purchase water from Seattle Public Utilities currently and are working towards developing a new source to meet future demand if it is ever needed.

Treating the water we drink

There are four steps in the treatment of the Cedar water supply: screening, fluoridation, corrosion control, and disinfection. The water first passes through coarse screens to remove debris, and fluoride is added for dental health protection. At the Cedar Treatment Facility, lime is added for pH-adjusted corrosion control to minimize lead leaching in older plumbing systems, and the water is disinfected to eliminate microbial contaminants. The disinfection process is a combination of chlorination, ozonation to improve taste and odor and Giardia control, and ultraviolet light disinfection to disable chlorine resistant contaminants.

Ensuring your water is pure

To ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (EPA) and Washington State Department of Health (DOH) prescribe regulations limiting the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulates contaminants in bottled water, which must provide the same level of public health protection. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (1-800-426-4791).

Cedar River Watershed

2015 water quality monitoring results

Listed in the table below are all regulated contaminants that were detected in water quality testing conducted in 2015 and the level at which they were found. None of the contaminants detected were at or above levels allowed by state and federal agencies. Not listed are the more than 200 compounds tested for but not found. If you would like a copy of the list of undetected contaminants (compounds monitored for but not found), please call Tukwila Public Works Operations at 206-433-1860.

		EPA'S ALLOWABLE LIMITS		LEVELS IN TUKWILA'S WATER		
Detected Compounds (Units)		**MCLG**	**MCL**	**Average**	**Range**	**Typical Sources**
RAW WATER						
Total Organic Carbon	(ppm)	NA	TT	0.7	0.5–1.5	Naturally present in the environment
Crytosporidium	#/100L	NA	NA	1.0	ND–8.0	Naturally present in the environment
FINISHED WATER						
Turbidity	(NTU)	NA	5	0.4	0.1–1.2	Soil runoff
Arsenic	(ppb)	0	10	0.5	0.4–0.7	Erosion of natural deposits
Barium	(ppb)	2,000	2,000	1.6	1 sample	Erosion of natural deposits
Chromium	(ppb)	100	100	0.27	0.25–0.33	Erosion of natural deposits
Fluoride	(ppm)	4	4	0.8	0.7–0.9	Water additive which promotes strong teeth
Nitrate	(ppm)	10	10	0.01	1 sample	Erosion of natural deposits
Total Trihalomethanes	(ppb)	NA	80	30	16.0–46.1	By-product of drinking water chlorination
Haloacetic Acids (5)	(ppb)	NA	60	30	13.9–42.8	By-product of drinking water chlorination
Chlorine	(ppm)	MRDLG= 4	MRDL= 4	1.21	0.74–1.65	Water additive used to control microbes

ppm: *1 part per million = 1 mg/L = 1 milligram per liter* ***ppb:*** *1 part per billion = 1 ug/L = 1 microgram per liter* *1 ppm = 1,000 ppb*

Definitions used in the table

MCLG *Maximum Contaminant Level Goal – The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.*

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MRDL *Maximum Residual Disinfectant Level – The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.*

MRDLG *Maximum Residual Disinfectant Level Goal – The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.*

TT *Treatment Technique – A required process intended to reduce the level of a contaminant in drinking water.*

NTU *Nephelometric Turbidity Unit – Turbidity is a measure of how clear the water looks. High turbidity can hinder the effectiveness of disinfectants.*

ND *Not Detected*

NA *Not Applicable*

Lead and copper and your drinking water – are you at risk?

Our source waters do not contain lead or copper. However, lead and copper can leach into water from building plumbing systems containing copper pipes, lead-based solder, brass fixtures, or some types of zinc coatings used on galvanized pipes and fittings. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Tukwila Water Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at www.EPA.gov/safewater/lead.

Lead and Copper Monitoring Results

Parameter and Units	MCLG	Action Level (1)	2015 Results (2)	Homes Exceeding Action Level	Source
Lead, ppb	0	15	4.0	0 of 50	Corrosion of household plumbing systems
Copper, ppm	1.3	1.3	0.161	0 of 50	

(1) The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

(2) 90th Percentile: i.e. out of every 10 homes sampled, 9 were at or below this level.

The data in this table comes from a regional sampling program conducted in 2015. Of the 50 homes sampled, three were in Tukwila, none of which exceeded the action levels for lead or copper.

Important information from the EPA and DOH

Sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. The Washington State Department of Health (DOH) oversees the Source Water Assessment Program. According to DOH, all surface waters in Washington are given a susceptibility of "high", regardless of whether contaminants have been detected or whether there are any sources of contaminants in the watershed. Since the Cedar River Watershed is publicly owned and managed for water quality, agricultural, industrial, residential, and recreational uses are prohibited. This means there is little opportunity for contaminants to enter the water. However, there is always some potential for naturally occurring sources of contamination. In the Cedar River Watershed the potential sources of contamination include:

- microbial contaminants, e.g., viruses and bacteria from wildlife,
- inorganic contaminants, such as salts and metals, which are naturally occurring; and
- organic contaminants, which result from chlorine combining with naturally occurring organic matter.

Information on the source water assessments is available from the DOH website at www.fortress.wa.gov/doh/eh/dw/swap/maps/.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons (such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV, AIDS or other immune system disorders), some elderly persons, and infants can be particularly at risk for infections. These people or their caregivers should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

Construction Activity

The City of Tukwila plans for and funds upgrades to the water system through the Capital Improvement Program. Due to limited available funding, the Public Works Department must prioritize the scheduling of projects to provide the greatest system reliability, as well as coordinate City projects with those of other public or private entities.

Several dramatic water main failures in the Central Business District south of I-405 have highlighted the need to replace the aging cast iron water main found in much of that area with new, stronger ductile iron pipe. In 2016, 2000 feet of cast iron water main on Andover Park East north of Strander Boulevard will be replaced with new 16" ductile iron pipe. This project will provide increased fire flow and system reliability while minimizing construction related disruptions by coordinating with other infrastructure improvements.

Another water main project to be completed in 2016 is the installation of 4,000 feet of 10" ductile iron pipe on Macadam Road South, from South 144th Street to Southcenter Boulevard. This project increases fire flow and system reliability by replacing smaller, older pipe and also creates an additional connection to the North Hill area for improved system redundancy.

Conservation

In 2015, the Tukwila Water Department supplied over 755 million gallons of water to its retail and commercial customers. This water comes from a finite regional supply that must be used efficiently in order to meet the needs of people as well as maintaining adequate in-stream flows to protect salmon and other wildlife. Recognizing the importance of conservation in meeting the water needs of future generations, in 2003 the Washington Legislature enacted the Municipal Water Law, which requires municipalities to use water more efficiently.

Being connected to a regional water supply means we must take a regional approach to water conservation. In October 2013, with authorization from the Washington State Department of Health, Cascade Water Alliance adopted a single, regional savings goal on behalf of all its members for the next six years. The new goal is a cumulative savings of 600,000 gallons per day on an annual basis. In 2015 Cascade Water Alliance members saved an estimated 79,200 gallons per day or approximately 13% of the six year savings goal on an annual basis. Along with savings from 2014, Cascade has achieved approximately 42% of its 6-year cumulative savings goal. These savings were realized by employing a number of different measures including installation of high-efficiency showerheads and spray nozzles in area hotels, irrigation system update projects, and implementation of a WaterSense Labeled New Homes program for builders. Some of the water saving offers available to Tukwila customers include free low-flow showerheads, faucet aerators, and shower timers. Visit the Cascade Water Alliance website at www cascadewater.org to look for the water conservation rebates and programs available to Tukwila water customers.

The Municipal Water Law also requires water suppliers to keep water loss in their distribution systems below 10%. In 2015 the Tukwila Water Department kept water loss in the system down to 4.5% with an aggressive program of leak detection and repair. This is considered low by industry standards and is a testament to the investments made in water infrastructure by the City of Tukwila.

Masonry Pool in the Cedar River Watershed

Frequently Asked Questions

Can what happened in Flint, Michigan happen here?

No. Seattle Public Utilities developed the current corrosion optimization program for our source water in 2003. Since then all suppliers of SPU water routinely monitor the corrosive nature of the water supply and potential interaction with pipes. Lead and copper sampling is the one instance where water samples are collected inside residences. Sample sites are selected based on what are believed to be the most likely, worst-case sample sites for lead exposure and water is left in the household plumbing for a minimum of six hours before drawing the sample. The results from lead and copper sampling in 2015 revealed levels significantly below the federally designated Action Level (see table).

Are there any lead pipes in Tukwila's water system?

No. Lead service lines were never installed on the connections between the water mains and the water meters in Tukwila. Additionally, all known galvanized steel residential service lines (which can have traces of lead in their exterior coating) owned by the City have been replaced with copper.

What are DBPs?

DBP stands for "Disinfection Byproducts". When disinfectants are added to water they help to prevent disease. However, they can also combine with naturally occurring organic material to form DBPs. The EPA has enacted new sampling regulations for two groups of DBPs: Trihalomethanes and Haloacetic Acids. The maximum contaminant level (MCL) for disinfection by-products set by the EPA is for the average of all samples collected over a 12-month period. The City of Tukwila completed preliminary evaluation sampling in 2008 and began regular quarterly sampling for DBPs in 2012.

Cryptowhat?

Cryptosporidium parvum is a microscopic organism that, when ingested, can result in diarrhea, fever and other gastrointestinal symptoms. These disease-causing organisms are commonly found in the natural environment and in most surface water sources. Seattle's Cedar Treatment Facility increases public protection by destroying cryptosporidium and other microbial organisms. Source water monitoring in 2015 detected cryptosporidium in 2 of 9 samples taken from the Cedar supply prior to treatment.

Does the water I receive have fluoride in it?

Yes. In accordance with a Seattle public vote held in 1968, Seattle Public Utilities adds fluoride to the drinking water at appropriate levels to prevent tooth decay. The concentration of fluoride was reduced beginning in January 2011 from 1.0 parts per million to 0.8 parts per million, the lowest level allowed by current State law. This reduction is in response to new federal recommendations and is strongly supported by local health officials.

What is the pH of water supplied to Tukwila customers?

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How can I get more involved in decisions affecting my drinking water?

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For more information

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WASHINGTON STATE DEPT. OF HEALTH
Website: www.doh.wa.gov/ehp/dw

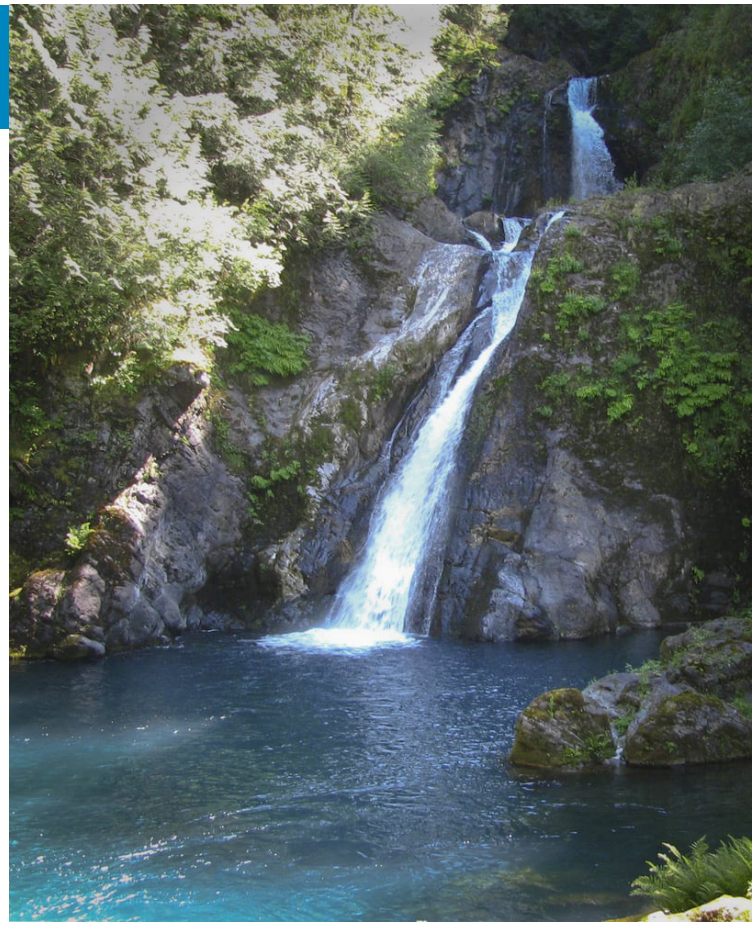
TUKWILA DRINKING WATER ANNUAL REPORT FOR 2016

Access to safe, healthful drinking water is a vital part of our lives and the Tukwila Water Department is committed to providing its customers with the highest quality water possible. This report is our opportunity to provide our customers with the results of water quality testing conducted in 2016 and is required by state and federal law. You'll be pleased to know that your drinking water met or exceeded all state and federal drinking water standards during extensive testing in 2016. If you have questions about the information in this report, call Tukwila's Water Department at 206-433-1863.

Tukwila's drinking water comes from the Cedar River Watershed, a highly protected water source in the Cascade Mountains owned and maintained by Seattle Public Utilities. The City of Tukwila is a member of Cascade Water Alliance, a regional water supply non-profit made up of seven municipalities that collectively purchase water from Seattle Public Utilities currently and are working towards developing a new source to meet future demand if it is ever needed.

Prepared by the City of Tukwila Public Works Department, Water Utility Division

System ID Number 89500F



Cedar Falls, in the Cedar River watershed

Treating the water we drink

There are four steps in the treatment of the Cedar water supply: screening, fluoridation, corrosion control, and disinfection. The water first passes through coarse screens to remove debris, and fluoride is added for dental health protection. At the Cedar Treatment Facility, lime is added for pH-adjusted corrosion control to minimize lead leaching in older plumbing systems, and the water is disinfected to eliminate microbial contaminants. The disinfection process is a combination of chlorination, ozonation to improve taste and odor and Giardia control, and ultraviolet light disinfection to disable chlorine resistant contaminants.

Ensuring your water is pure

To ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (EPA) and Washington State Department of Health (DOH) prescribe regulations limiting the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulates contaminants in bottled water, which must provide the same level of public health protection. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (1-800-426-4791).

2016 water quality monitoring results

Listed in the table below are all regulated contaminants that were detected in water quality testing conducted in 2016 and the level at which they were found. None of the contaminants detected were at or above levels allowed by state and federal agencies. Not listed are the more than 200 compounds tested for but not found. If you would like a copy of the list of undetected contaminants (compounds monitored for but not found), please call Tukwila Public Works Operations at 206-433-1860.

	EPA'S ALLOWABLE LIMITS		LEVELS IN TUKWILA'S WATER		
Detected Compounds (Units)	**MCLG**	**MCL**	**Average**	**Range**	**Typical Sources**
RAW WATER					
Total Organic Carbon (ppm)	NA	TT	0.8	0.3–2.1	Naturally present in the environment
Crytosporidium #/100L	NA	NA	0.3	ND–2.0	Naturally present in the environment
FINISHED WATER					
Turbidity (NTU)	NA	5	0.3	0.2–2.3	Soil runoff
Arsenic (ppb)	0	10	0.5	0.4–0.6	Erosion of natural deposits
Barium (ppb)	2,000	2,000	1.6	1.5–1.8	Erosion of natural deposits
Chromium (ppb)	100	100	0.27	0.25–0.33	Erosion of natural deposits
Fluoride (ppm)	4	4	0.7	0.6–0.9	Water additive which promotes strong teeth
Nitrate (ppm)	10	10	0.02	1 sample	Erosion of natural deposits
Total Trihalomethanes (ppb)	NA	80	27.2	16.2–39.8	By-product of drinking water chlorination
Haloacetic Acids (5) (ppb)	NA	60	28.5	16.0–39.8	By-product of drinking water chlorination
Chlorine (ppm)	MRDLG= 4	MRDL= 4	1.14	0.30–1.53	Water additive used to control microbes

ppm: *1 part per million = 1 mg/L = 1 milligram per liter* ***ppb:*** *1 part per billion = 1 ug/L = 1 microgram per liter* *1 ppm = 1,000 ppb*

Definitions used in the table

MCLG *Maximum Contaminant Level Goal – The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.*

MCL *Maximum Contaminant Level – The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible, using the best available treatment technology.*

MRDL *Maximum Residual Disinfectant Level – The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.*

MRDLG *Maximum Residual Disinfectant Level Goal – The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.*

TT *Treatment Technique – A required process intended to reduce the level of a contaminant in drinking water.*

NTU *Nephelometric Turbidity Unit – Turbidity is a measure of how clear the water looks. High turbidity can hinder the effectiveness of disinfectants.*

ND *Not Detected*

NA *Not Applicable*

Lead and copper and your drinking water – are you at risk?

Our source waters do not contain lead or copper. However, lead and copper can leach into water from building plumbing systems containing copper pipes, lead-based solder, brass fixtures, or some types of zinc coatings used on galvanized pipes and fittings. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Tukwila Water Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at www.EPA.gov/safewater/lead.

Lead and Copper Monitoring Results

Parameter and Units	MCLG	Action Level (1)	2015 Results (2)	Homes Exceeding Action Level	Source
Lead, ppb	0	15	4.0	0 of 50	Corrosion of household plumbing systems
Copper, ppm	1.3	1.3	0.161	0 of 50	

(1) The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

(2) 90th Percentile: i.e. out of every 10 homes sampled, 9 were at or below this level.

The data in this table comes from a regional sampling program conducted in 2015 (most recent testing required by regulation). Of the 50 homes sampled, three were in Tukwila, none of which exceeded the action levels for lead or copper.

Important information from the EPA and DOH about all drinking water

Sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. The Washington State Department of Health (DOH) oversees the Source Water Assessment Program. According to DOH, all surface waters in Washington are given a susceptibility of "high", regardless of whether contaminants have been detected or whether there are any sources of contaminants in the watershed. Since the Cedar River Watershed is publicly owned and managed for water quality, agricultural, industrial, residential, and recreational uses are prohibited. This means there is little opportunity for contaminants to enter the water. However, there is always some potential for naturally occurring sources of contamination. In the Cedar River Watershed the potential sources of contamination include:

- microbial contaminants, e.g., viruses and bacteria from wildlife,
- inorganic contaminants, such as salts and metals, which are naturally occurring; and
- organic contaminants, which result from chlorine combining with naturally occurring organic matter.

Information on the source water assessments is available from the DOH website at www.fortress.wa.gov/doh/eh/dw/swap/maps/.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons (e.g., cancer patients undergoing chemotherapy, organ transplant recipients, people with HIV, AIDS or other immune system disorders), some elderly persons, and infants can be particularly at risk for infections. These people or their caregivers should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

Conservation

In 2016, the Tukwila Water Department supplied over 719 million gallons of water to its retail and commercial customers. This water comes from a finite regional supply that must be used efficiently in order to meet the needs of people as well as maintaining adequate in-stream flows to protect salmon and other wildlife. Recognizing the importance of conservation in meeting the water needs of future generations, in 2003 the Washington Legislature enacted the Municipal Water Law, which requires municipalities to use water more efficiently.

Being connected to a regional water supply means we must take a regional approach to water conservation. In October 2013, with authorization from the Washington State Department of Health, Cascade Water Alliance adopted a single, regional savings goal on behalf of all its members for the next six years. The new goal is a cumulative savings of 600,000 gallons per day on an annual basis. In 2016 Cascade Water Alliance members saved an estimated 257,728 gallons per day or approximately 43% of the six- year savings goal on an annual basis. Along with savings from 2014 and 2015, Cascade has achieved approximately 86% of its 6-year cumulative savings goal. These savings were realized by employing a number of different measures including installation of high-efficiency showerheads and aerators on commercial accounts, free online ordering of conservation items through Cascade's website, training for landscape contractors, and implementation of a WaterSense Labeled New Homes program for builders. Some of the water saving offers available to Tukwila customers include free low-flow showerheads, faucet aerators, and shower timers. Visit the Cascade Water Alliance website at **www cascadewater.org** to look for the water conservation rebates and programs available to Tukwila water customers.

The Municipal Water Law also requires water suppliers to keep water loss in their distribution systems below 10%. In 2016 the Tukwila Water Department kept water loss in the system down to 4.8% with an aggressive program of leak detection and repair. This is considered low by industry standards and is a testament to the investments made in water infrastructure by the City of Tukwila.

Construction Activity

The City of Tukwila plans for and funds upgrades to the water system through the Capital Improvement Program. Due to limited available funding, the Public Works Department must prioritize the scheduling of projects to provide the greatest system reliability, as well as coordinate City projects with those of other public or private entities.

One of the water system construction projects scheduled to begin in 2017 is the installation of 4,000 feet of 10" ductile iron pipe on Macadam Road South, from South 144th Street to Southcenter Boulevard. This project increases fire flow and system reliability by replacing smaller, older pipe and also creates an additional connection to the North Hill area for improved system redundancy.

Another water main construction project scheduled for 2017 is the replacement of 680 feet of 8" cast iron water main on 58th Avenue South from South 142nd Street to South 144th Street with new ductile iron pipe. The new water main will significantly reduce the likelihood of failure in the future.

Frequently Asked Questions

What are DBPs?

DBP stands for "Disinfection Byproducts". When disinfectants are added to water they help to prevent disease. However, they can also combine with naturally occurring organic material to form DBPs. The EPA has enacted new sampling regulations for two groups of DBPs: Trihalomethanes and Haloacetic Acids. The maximum contaminant level (MCL) for disinfection by-products set by the EPA is for the average of all samples collected over a 12-month period. *(See results in table on Page 2.)*

Cryptowhat?

Cryptosporidium parvum is a microscopic organism that, when ingested, can result in diarrhea, fever and other gastrointestinal symptoms. These disease-causing organisms are commonly found in the natural environment and in most surface water sources. Seattle's Cedar Treatment Facility increases public protection by destroying cryptosporidium and other microbial organisms. Source water monitoring in 2016 detected cryptosporidium in 2 of 12 samples taken from the Cedar supply prior to treatment.

For more information

TUKWILA PUBLIC WORKS DEPARTMENT
6300 Southcenter Blvd., Tukwila, WA 98188
206-433-0179 Water Maint.: 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

WASHINGTON STATE DEPT. OF HEALTH
Website: www.doh.wa.gov/ehp/dw

Does the water I receive have fluoride in it?

Yes. In accordance with a Seattle public vote held in 1968, Seattle Public Utilities adds fluoride to the drinking water at appropriate levels to prevent tooth decay. The concentration of fluoride was reduced beginning in January 2011 from 1.0 parts per million to 0.7 parts per million, the lowest level allowed by State law. This reduction is in response to new federal recommendations and is strongly supported by local health officials.

What is the pH of water supplied to Tukwila customers?

The average pH of Seattle's source water is 7.0. The pH is boosted to 8.2 in the distribution system as part of SPU's corrosion control program.

How can I get more involved in decisions affecting my drinking water?

Please contact the Tukwila Public Works office at 206-433-0179 with any concerns you might have. The Tukwila Utilities Committee also welcomes public comment; they meet twice monthly at 6300 Southcenter Boulevard, Suite 100, in Tukwila. To find out more about the current Utilities Committee agenda and meeting times, give us a call at 206-433-1800, or check on the City's website at www.TukwilaWA.gov.

[Message: This report contains important information about your drinking water. Have someone translate it for you, or speak with someone who understands it.]

Este informe contiene información importante acerca de su agua potable. Haga que alguien lo traduzca para usted, o hable con alguien que lo entienda.	तपाईको समुदायको निम्ति यो मत्त्वपूर्ण जानकारी हो, कृपया अनुवादको सहायताको लागि भन्नुहोस् ।
Warbixintan waxay wadataa macluumaad muhiim ah ee la xiriira biyaha aad cabtid. Cid ha kuu tarjunto ama la hadl cid fahmaysa.	Hi hi nan zatlang nunnak a biapi mi thawngthanh nak asi ruang ah zaangfah nak in holh leh bawmhnak pek ding ah rak hal te.
Tài liệu này có tin tức quan trọng về nước uống của quý vị. Hãy nhờ người dịch cho quý vị, hoặc hỏi người nào hiểu tài liệu này.	هذا التقرير يحتوي على معولمات مهمة عن ماء الشرب الذي تسخدمه. اطلب من شخص ما ان يترجمه لك او يستطيع فهمه.
၎င်းသည် သင့်ကန့်မနုတိအတက် အရေးပသည့် အကေအလက်မားဖစ်နေသောကောင့် ဘာသာပန်အကူအညီကို ကေးဇူးပ၍ တောင်းဆိုပ။	Naglalaman ang report na ito ng importanteng impormasyon tungkol sa iyong iniinom na tubig. Magkaroon ng isang tao na isasalin ito sa iyong wika para sa iyo, o makipag-usap sa isang tao na nakakaintindi dito.
	Ovo je važna informacija o vašoj zajednici, molimo potražite pomoć prevoditelja.

TUKWILA DRINKING WATER ANNUAL REPORT FOR 2017

Prepared by the City of Tukwila Public Works Department, Water Utility Division

System ID Number 89500F

Sharing the knowledge of safe water

Access to safe, healthful drinking water is a vital part of our lives and the Tukwila Water Department is committed to providing its customers with the highest quality water possible. This report is our opportunity to provide our customers with the results of water quality testing conducted in 2017 and is required by state and federal law. You'll be pleased to know that your drinking water met or exceeded all state and federal drinking water standards during extensive testing in 2017. If you have questions about the information in this report, call Tukwila's Water Department at 206-433-1863.

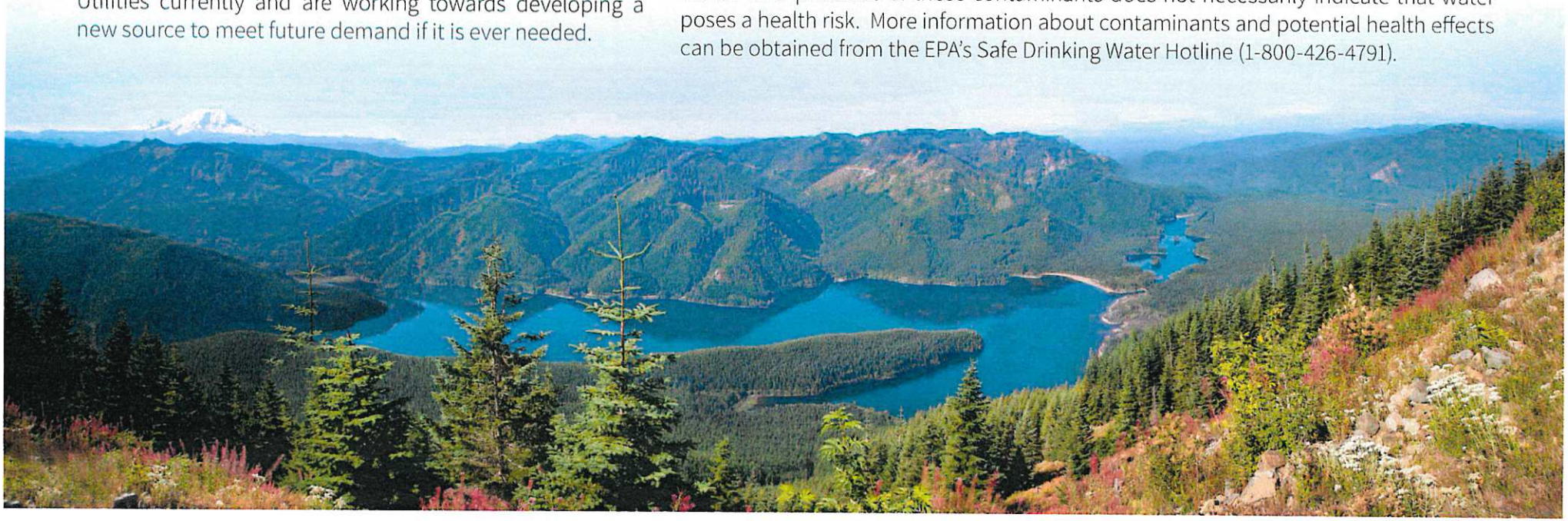
Tukwila's drinking water comes from the Cedar River Watershed, a highly protected water source in the Cascade Mountains owned and maintained by Seattle Public Utilities. The City of Tukwila is a member of Cascade Water Alliance, a regional water supply non-profit made up of seven municipalities that collectively purchase water from Seattle Public Utilities currently and are working towards developing a new source to meet future demand if it is ever needed.

Treating the water we drink

There are four steps in the treatment of the Cedar water supply: screening, fluoridation, corrosion control, and disinfection. The water first passes through coarse screens to remove debris, and fluoride is added for dental health protection. At the Cedar Treatment Facility, lime is added for pH-adjusted corrosion control to minimize lead leaching in older plumbing systems, and the water is disinfected to eliminate microbial contaminants. The disinfection process is a combination of chlorination, ozonation to improve taste and odor and Giardia control, and ultraviolet light disinfection to disable chlorine resistant contaminants.

Ensuring your water is pure

To ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (EPA) and Washington State Department of Health (DOH) prescribe regulations limiting the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulates contaminants in bottled water, which must provide the same level of public health protection. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained from the EPA's Safe Drinking Water Hotline (1-800-426-4791).



2017 water quality monitoring results

Listed in the table below are all regulated contaminants that were detected in water quality testing conducted in 2017 and the level at which they were found. None of the contaminants detected were at or above levels allowed by state and federal agencies. Not listed are the more than 200 compounds tested for but not found. If you would like a copy of the list of undetected contaminants (compounds monitored for but not found), please call Tukwila Public Works Operations at 206-433-1860.

		EPA'S ALLOWABLE LIMITS		LEVELS IN TUKWILA'S WATER		
Detected Compounds (Units)		**MCLG**	**MCL**	**Average**	**Range**	**Typical Sources**
RAW WATER						
Total Organic Carbon	(ppm)	NA	TT	0.8	0.3–1.5	Naturally present in the environment
FINISHED WATER						
Turbidity	(NTU)	NA	5	0.3	0.2–2.5	Soil runoff
Arsenic	(ppb)	0	10	0.5	0.4–0.6	Erosion of natural deposits
Barium	(ppb)	2,000	2,000	1.7	1.4–1.9	Erosion of natural deposits
Bromate	(ppb)	0	10	0.04	ND – 1	By-product of drinking water disinfection
Chromium	(ppb)	100	100	0.27	0.25–0.33	Erosion of natural deposits
Fluoride	(ppm)	4	4	0.7	0.3–0.9	Water additive which promotes strong teeth
Total Trihalomethanes	(ppb)	NA	80	35	12.9–44.9	By-product of drinking water chlorination
Haloacetic Acids (5)	(ppb)	NA	60	37	12.7–49.9	By-product of drinking water chlorination
Chlorine	(ppm)	MRDLG= 4	MRDL= 4	Average = 1.19 Range = 0.40–1.42		Water additive used to control microbes

ppm: 1 part per million = 1 mg/L = 1 milligram per liter *ppb: 1 part per billion = 1 ug/L = 1 microgram per liter* *1 ppm = 1,000 ppb*

Definitions used in the table

MCLG Maximum Contaminant Level Goal – The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

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TT Treatment Technique – A required process intended to reduce the level of a contaminant in drinking water.

NTU Nephelometric Turbidity Unit – Turbidity is a measure of how clear the water looks. High turbidity can hinder the effectiveness of disinfectants.

ND Not Detected

NA Not Applicable

Lead and copper and your drinking water – are you at risk?

Our source waters do not contain lead or copper. However, lead and copper can leach into water from building plumbing systems containing copper pipes, lead-based solder, brass fixtures, or some types of zinc coatings used on galvanized pipes and fittings. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Tukwila Water Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components.

When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at **EPA.gov/safewater/lead**.

Lead and Copper Monitoring Results

Parameter and Units	MCLG	Action Level (1)	2015 Results (2)	Homes Exceeding Action Level	Source
Lead, ppb	0	15	4.0	0 of 50	Corrosion of household plumbing systems
Copper, ppm	1.3	1.3	0.161	0 of 50	

(1) The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

(2) 90th Percentile: i.e. out of every 10 homes sampled, 9 were at or below this level.

The data in this table comes from a regional sampling program conducted in 2015 (most recent testing required by regulation). Of the 50 homes sampled, three were in Tukwila, none of which exceeded the action levels for lead or copper.

Important information from the EPA and DOH about all drinking water

Sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. The Washington State Department of Health (DOH) oversees the Source Water Assessment Program. According to DOH, all surface waters in Washington are given a susceptibility of "high," regardless of whether contaminants have been detected or whether there are any sources of contaminants in the watershed. Since the Cedar River Watershed is publicly owned and managed for water quality, agricultural, industrial, residential and recreational uses are prohibited. This means there is little opportunity for contaminants to enter the water. However, there is always some potential for naturally occurring sources of contamination. In the Cedar River Watershed the potential sources of contamination include:

- microbial contaminants, e.g., viruses and bacteria from wildlife,
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- organic contaminants, which result from chlorine combining with naturally occurring organic matter.

Information on the source water assessments is available from the DOH website at **Fortress.WA.gov/doh/eh/dw/swap/maps/.**

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons (e.g., cancer patients undergoing chemotherapy, organ transplant recipients, people with HIV, AIDS or other immune system disorders), some elderly persons, and infants can be particularly at risk for infections. These people or their caregivers should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

Frequently Asked Questions

Is Tukwila's water hard or soft?

Water hardness refers to the amount of calcium, magnesium and other minerals dissolved in the water. Hard water has more of the dissolved minerals, which prevents soap from lathering, causes spots or film on glass, and can cause scale buildup. The hardness of Tukwila's water is approximately 1.5 grains per gallon, which is considered soft.

What is the pH of water supplied to Tukwila customers?

The average pH of Seattle's source water is 7.0. The pH is boosted to 8.2 in the distribution system as part of SPU's corrosion control program. This reduces the possibility of metals leaching into the water from plumbing pipes and fixtures.

Does the water I receive have fluoride in it?

Yes. In accordance with a Seattle public vote held in 1968, Seattle Public Utilities adds fluoride to the drinking water at appropriate levels to prevent tooth decay. The concentration of fluoride was reduced beginning in January 2011 from 1.0 parts per million to 0.7 parts per million, the lowest level allowed by State law. This reduction is in response to new federal recommendations and is strongly supported by local health officials.

Cryptowhat?

Cryptosporidium parvum is a microscopic organism that, when ingested, can result in diarrhea, fever and other gastrointestinal symptoms. These disease-causing organisms are commonly found in the natural environment and in most surface water sources. Seattle's Cedar Treatment Facility increases public protection by destroying cryptosporidium and other microbial organisms. Source water monitoring in 2017 did not detect Cryptosporidium in any of the three samples taken from the Cedar supply prior to treatment.

How can I get more involved in decisions affecting my drinking water?

Please contact the Tukwila Public Works office at 206-433-0179 with any concerns you might have. The Tukwila Transportation and Infrastructure Committee also welcomes public comment; they meet twice monthly at 6300 Southcenter Boulevard, Suite 100, in Tukwila. To find out more about the current Committee agenda and meeting times, give us a call at 206-433-0179, or check on the City's website at **TukwilaWA.gov**.

Conservation

In 2017, the Tukwila Water Department supplied 700 million gallons of water to its retail and commercial customers. This water comes from a finite regional supply that must be used efficiently in order to meet the needs of people as well as maintaining adequate in-stream flows to protect salmon and other wildlife. Recognizing the importance of conservation in meeting the water needs of future generations, in 2003 the Washington Legislature enacted the Municipal Water Law, which requires municipalities to use water more efficiently.

Being connected to a regional water supply means we must take a regional approach to water conservation. In October 2013, with authorization from the Washington State Department of Health, Cascade Water Alliance adopted a single, regional savings goal on behalf of all its members for the next six years. The goal is a cumulative savings of 600,000 gallons per day on an average annual basis and 1,000,000 gallons per day on an average peak season basis. In 2017 Cascade Water Alliance members saved an estimated 165,722 gallons per day or approximately 28% of the six-year savings goal on an annual basis. Along with savings from 2014 through 2016, Cascade has achieved approximately 114% of its six-year cumulative savings goal and 68% of its peak season goal. These savings were realized by employing a number of different measures including installation of high-efficiency showerheads and aerators on commercial accounts, free online ordering of conservation items through Cascade's website, and training for landscape contractors. Some of the water saving offers available to Tukwila customers include free low-flow showerheads, faucet aerators, and shower timers. Visit the Cascade Water Alliance website at **CascadeWater.org** to look for the water conservation rebates and programs available to Tukwila water customers.

The Municipal Water Law also requires water suppliers to keep water loss in their distribution systems below 10% measured as a three-year average. For the three-year period ending in 2017, the Tukwila Water Department kept water loss in the system down to 4.8% with an aggressive program of leak detection and repair. This is considered low by industry standards and is a testament to the investments made in water infrastructure by the City of Tukwila.

For more information

TUKWILA PUBLIC WORKS DEPARTMENT

6300 Southcenter Blvd., Tukwila, WA 98188
206-433-0179 Water Maint.: 206-433-1860
Email: Public Works@TukwilaWA.gov
Website: TukwilaWA.gov

CASCADE WATER ALLIANCE

Conservation Rebates: 425-453-0930
Website: CascadeWater.org

ENVIRONMENTAL PROTECTION AGENCY

Groundwater and Drinking Water site:
EPA.gov/safewater/index.html
Safe Drinking Water Hotline email:
hotline-sdwa@EPAmail.EPA.gov
Safe Drinking Water Hotline: 1-800-426-4791

WASHINGTON STATE DEPT. OF HEALTH

Website: DOH.WA.gov/ehp/dw

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	Hi hi nan zatlang nunnak a biapi mi thawngthanh nak asi ruang ah zaangfah nak in holh leh bawmhnak pek ding ah rak hal te.
Warbixintan waxay wadataa macluumaad muhiim ah ee la xiriira biyaha aad cabtid. Cid ha kuu tarjunto ama la hadl cid fahmaysa.	هذا التقرير يحتوي على معلومات مهمة عن ماء الشرب
Tài liệu này có tin tức quan trọng về nước uống của quý vị. Hãy nhờ người dịch cho quý vị, hoặc hỏi người nào hiểu tài liệu này.	
၎င်းသည် သင့်ကန်မနတီအတွက် အရေးပသည့် အခက်အလက်မားဖစ်နေသောကောင့် ဘာသာပန်အကူအညီကို ကေးဇူးပ၍ တောင်းဆိုပး	Ovo je važna informacija o vašoj zajednici, molimo potražite pomoć prevoditelja.

TUKWILA DRINKING WATER ANNUAL REPORT FOR 2018

Prepared by the City of Tukwila Public Works Department, Water Utility Division

System ID Number 89500F

Sharing the knowledge of safe water

Access to safe, healthful drinking water is a vital part of our lives and the Tukwila Water Department is committed to providing its customers with the highest quality water possible. This report is our opportunity to provide our customers with the results of water quality testing conducted in 2018 and is required by state and federal law. You'll be pleased to know that your drinking water met or exceeded all state and federal drinking water standards during extensive testing in 2018. If you have questions about the information in this report, call Tukwila's Water Department at 206-433-1863.

Tukwila's drinking water comes from the Cedar River Watershed, a highly protected water source in the Cascade Mountains owned and maintained by Seattle Public Utilities. The City of Tukwila is a member of Cascade Water Alliance, a regional water supply non-profit made up of seven municipalities that collectively purchase water from Seattle Public Utilities currently and are working towards developing a new source to meet future demand if it is ever needed.

Treating the water we drink

There are four steps in the treatment of the Cedar water supply: screening, fluoridation, corrosion control, and disinfection. The water first passes through coarse screens to remove debris, and fluoride is added for dental health protection. At the Cedar Treatment Facility, lime is added for pH-adjusted corrosion control to minimize lead leaching in older plumbing systems, and the water is disinfected to eliminate microbial contaminants. The disinfection process is a combination of chlorination, ozonation to improve taste and odor and Giardia control, and ultraviolet light disinfection to disable chlorine resistant contaminants.

Ensuring your water is pure

To ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (EPA) and Washington State Department of Health (DOH) prescribe regulations limiting the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulates contaminants in bottled water, which must provide the same level of public health protection. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained from the EPA's Safe Drinking Water Hotline (1-800-426-4791).

2018 water quality monitoring results

Listed in the table below are all regulated contaminants that were detected in water quality testing conducted in 2018 and the level at which they were found. None of the contaminants detected were at or above levels allowed by state and federal agencies. Not listed are the more than 200 compounds tested for but not found. If you would like a copy of the list of undetected contaminants (compounds monitored for but not found), please call Tukwila Public Works Operations at 206-433-1860.

	EPA'S ALLOWABLE LIMITS		LEVELS IN TUKWILA'S WATER		
Detected Compounds (Units)	MCLG	MCL	Average	Range	Typical Sources
RAW WATER					
Total Organic Carbon (ppm)	NA	TT	0.9	0.4–2.1	Naturally present in the environment
FINISHED WATER					
Turbidity (NTU)	NA	5	0.3	0.2–2.3	Soil runoff
Arsenic (ppb)	0	10	0.4	0.4–0.6	Erosion of natural deposits
Barium (ppb)	2,000	2,000	1.5	1.3–1.6	Erosion of natural deposits
Chromium (ppb)	100	100	0.27	0.25–0.33	Erosion of natural deposits
Fluoride (ppm)	4	4	0.7	0.4–0.8	Water additive which promotes strong teeth
Total Trihalomethanes (ppb)	NA	80	34	14.5–36.3	By-product of drinking water chlorination
Haloacetic Acids (5) (ppb)	NA	60	35	13.7–41.0	By-product of drinking water chlorination
Chlorine (ppm)	MRDLG= 4	MRDL= 4	Average = 1.2 Range = 0.2–1.6		Water additive used to control microbes

ppm: *1 part per million = 1 mg/L = 1 milligram per liter* ***ppb:*** *1 part per billion = 1 ug/L = 1 microgram per liter* *1 ppm = 1,000 ppb*

Definitions used in the table

MCLG *Maximum Contaminant Level Goal – The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.*

MCL *Maximum Contaminant Level – The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible, using the best available treatment technology.*

MRDL *Maximum Residual Disinfectant Level – The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.*

MRDLG *Maximum Residual Disinfectant Level Goal – The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.*

TT *Treatment Technique – A required process intended to reduce the level of a contaminant in drinking water.*

NTU *Nephelometric Turbidity Unit – Turbidity is a measure of how clear the water looks. High turbidity can hinder the effectiveness of disinfectants.*

ND *Not Detected*

NA *Not Applicable*

Lead and copper and your drinking water – are you at risk?

Our source waters do not contain lead or copper. However, lead and copper can leach into water from building plumbing systems containing copper pipes, lead-based solder, brass fixtures, or some types of zinc coatings used on galvanized pipes and fittings. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Tukwila Water Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components.

When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at EPA.gov/safewater/lead.

Lead and Copper Monitoring Results

Parameter and Units	MCLG	Action Level (1)	2018 Results (2)	Homes Exceeding Action Level	Source
Lead, ppb	0	15	1.6	0 of 50	Corrosion of household plumbing systems
Copper, ppm	1.3	1.3	0.07	0 of 50	

(1) The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

(2) 90th Percentile: i.e. out of every 10 homes sampled, 9 were at or below this level.

The data in this table comes from a regional sampling program conducted in 2018. Of the 50 homes sampled, three were in Tukwila, none of which exceeded the action levels for lead or copper.

Important information from the EPA and DOH about all drinking water

Sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. The Washington State Department of Health (DOH) oversees the Source Water Assessment Program. According to DOH, all surface waters in Washington are given a susceptibility of "high," regardless of whether contaminants have been detected or whether there are any sources of contaminants in the watershed. Since the Cedar River Watershed is publicly owned and managed for water quality, agricultural, industrial, residential and recreational uses are prohibited. This means there is little opportunity for contaminants to enter the water. However, there is always some potential for naturally occurring sources of contamination. In the Cedar River Watershed the potential sources of contamination include:

- microbial contaminants, e.g., viruses and bacteria from wildlife,
- inorganic contaminants, such as salts and metals, which are naturally occurring; and
- organic contaminants, which result from chlorine combining with naturally occurring organic matter.

Information on the source water assessments is available from the DOH website at Fortress.WA.gov/doh/eh/dw/swap/maps/.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons (e.g., cancer patients undergoing chemotherapy, organ transplant recipients, people with HIV, AIDS or other immune system disorders), some elderly persons, and infants can be particularly at risk for infections. These people or their caregivers should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

Frequently Asked Questions

Is Tukwila's water hard or soft?

Water hardness refers to the amount of calcium, magnesium and other minerals dissolved in the water. Hard water has more of the dissolved minerals, which prevents soap from lathering, causes spots or film on glass, and can cause scale buildup. The hardness of Tukwila's water is approximately 1.5 grains per gallon, which is considered soft.

What is the pH of water supplied to Tukwila customers?

The average pH of Seattle's source water is 7.0. The pH is boosted to 8.2 in the distribution system as part of SPU's corrosion control program. This reduces the possibility of metals leaching into the water from plumbing pipes and fixtures.

Does the water I receive have fluoride in it?

Yes. In accordance with a Seattle public vote held in 1968, Seattle Public Utilities adds fluoride to the drinking water at appropriate levels to prevent tooth decay. The concentration of fluoride was reduced beginning in January 2011 from 1.0 parts per million to 0.7 parts per million, the lowest level allowed by State law. This reduction is in response to new federal recommendations and is strongly supported by local health officials.

How can I get more involved in decisions affecting my drinking water?

Please contact the Tukwila Public Works office at 206-433-0179 with any concerns you might have. The Tukwila Transportation and Infrastructure Committee also welcomes public comment; they meet twice monthly at 6300 Southcenter Boulevard, Suite 100, in Tukwila. To find out more about the current Committee agenda and meeting times, give us a call at 206-433-0179, or check on the City's website at TukwilaWA.gov.

Conservation

In 2018, the Tukwila Water Department supplied 690 million gallons of water to its retail and commercial customers. This water comes from a finite regional supply that must be used efficiently in order to meet the needs of people as well as maintaining adequate in-stream flows to protect salmon and other wildlife. Recognizing the importance of conservation in meeting the water needs of future generations, in 2003 the Washington Legislature enacted the Municipal Water Law, which requires municipalities to use water more efficiently.

Being connected to a regional water supply means we must take a regional approach to water conservation. In October 2013, with authorization from the Washington State Department of Health, Cascade Water Alliance adopted a single, regional savings goal on behalf of all its members for the next six years. The goal is a cumulative savings of 600,000 gallons per day on an average annual basis and 1,000,000 gallons per day on an average peak season basis. In 2018 Cascade Water Alliance members saved an estimated 193,228 gallons per day or approximately 32% of the six-year savings goal on an annual basis. Along with savings from 2014 through 2017, Cascade has achieved approximately 146% of its six-year cumulative savings goal and 92% of its peak season goal. These savings were realized by employing a number of different measures including installation of high-efficiency showerheads and aerators on commercial accounts, free online ordering of conservation items through Cascade's website, and training for landscape contractors. Some of the water saving offers available to Tukwila customers include free low-flow showerheads, faucet aerators, and shower timers. Visit the Cascade Water Alliance website at **CascadeWater.org** to look for the water conservation rebates and programs available to Tukwila water customers.

The Municipal Water Law also requires water suppliers to keep water loss in their distribution systems below 10% measured as a three-year average. For the three-year period ending in 2018, the Tukwila Water Department kept water loss in the system down to 4.8% with an aggressive program of leak detection and repair. This is considered low by industry standards and is a testament to the investments made in water infrastructure by the City of Tukwila.

For more information

TUKWILA PUBLIC WORKS DEPARTMENT
6300 Southcenter Blvd., Tukwila, WA 98188
206-433-0179 Water Maint.: 206-433-1860
Email: Public Works@TukwilaWA.gov
Website: TukwilaWA.gov

CASCADE WATER ALLIANCE
Conservation Rebates: 425-453-0930
Website: CascadeWater.org

ENVIRONMENTAL PROTECTION AGENCY
Groundwater and Drinking Water site:
EPA.gov/safewater/index.html
Safe Drinking Water Hotline email:
hotline-sdwa@EPAmail.EPA.gov
Safe Drinking Water Hotline: 1-800-426-4791

WASHINGTON STATE DEPT. OF HEALTH
Website: DOH.WA.gov/ehp/dw

[Message: This report contains important information about your drinking water. Have someone translate it for you, or speak with someone who understands it.]

Este informe contiene información importante acerca de su agua potable. Haga que alguien lo traduzca para usted, o hable con alguien que lo entienda.	तपाईको समुदायको निम्ति यो मत्त्वपूर्ण जानकारी हो, कृपया अनुवादको सहायताको लागि भन्नुहोस् ।
Warbixintan waxay wadataa macluumaad muhiim ah ee la xiriira biyaha aad cabtid. Cid ha kuu tarjunto ama la hadl cid fahmaysa.	Hi hi nan zatlang nunnak a biapi mi thawngthanh nak asi ruang ah zaangfah nak in holh leh bawmhnak pek ding ah rak hal te.
Tài liệu này có tin tức quan trọng về nước uống của quý vị. Hãy nhờ người dịch cho quý vị, hoặc hỏi người nào hiểu tài liệu này.	هذا التقرير يحتوي على معولمات مهمة عن ماء الشرب الذي تسخدمه. اطلب من شخص ما ان يترجمه لك او يستطيع فهمه.
၎င်းသည် သင့်ကန်မနတီအတက် အရေးပသည့် အခက်အလက်မားဖစ်နေသောကောင့် ဘာသာပန်အကူအညီကို ကေးဇူးပ၍ တောင်းဆိုပ။	Naglalaman ang report na ito ng importanteng impormasyon tungkol sa iyong iniinom na tubig. Magkaroon ng isang tao na isasalin ito sa iyong wika para sa iyo, o makipag-usap sa isang tao na nakakaintindi dito.
	Ovo je važna informacija o vašoj zajednici, molimo potražite pomoć prevoditelja.

TUKWILA DRINKING WATER ANNUAL REPORT FOR 2019

Prepared by the City of Tukwila Public Works Department, Water Utility Division

System ID Number 89500F

Sharing the knowledge of safe water

Access to safe, healthful drinking water is a vital part of our lives and the Tukwila Water Department is committed to providing its customers with the highest quality water possible. This report is our opportunity to provide our customers with the results of water quality testing conducted in 2019 and is required by state and federal law. You'll be pleased to know that your drinking water met or exceeded all state and federal drinking water standards during extensive testing in 2019. If you have questions about the information in this report, call Tukwila's Water Department at 206-433-1863.

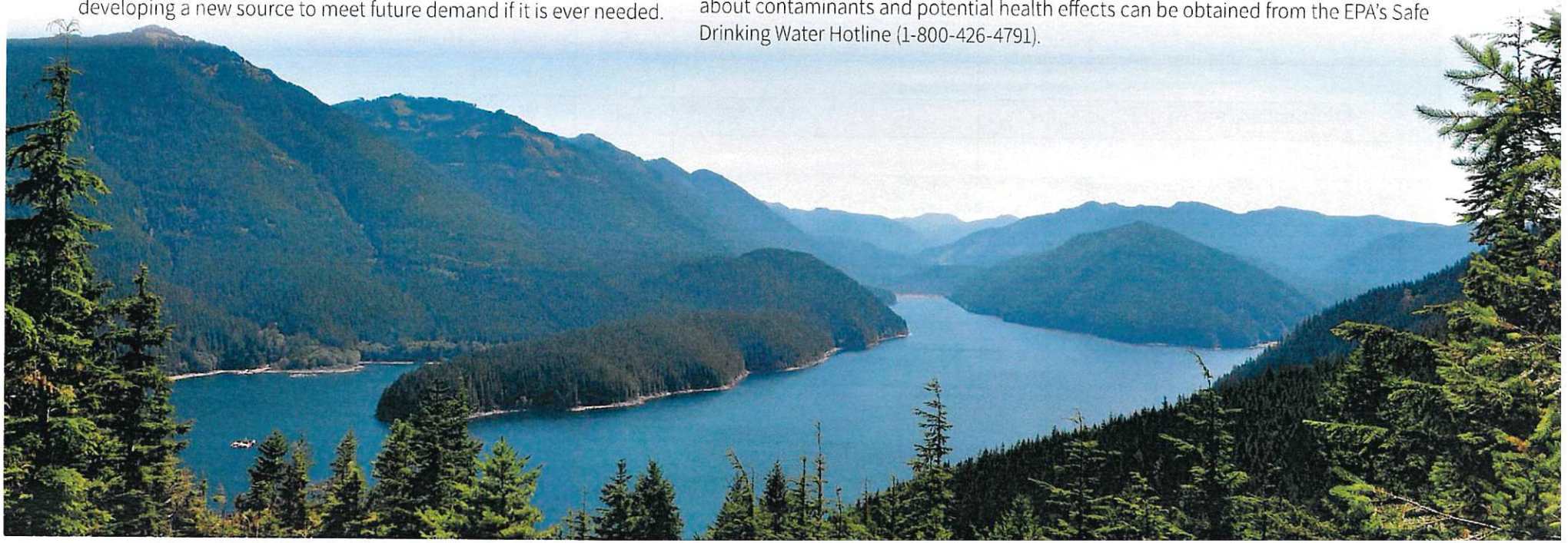
Tukwila's drinking water comes from the Cedar River Watershed, a highly protected water source in the Cascade Mountains owned and maintained by Seattle Public Utilities. The City of Tukwila is a member of Cascade Water Alliance, a regional water supply non-profit made up of seven municipalities that collectively purchase water from Seattle Public Utilities currently and are working towards developing a new source to meet future demand if it is ever needed.

Treating the water we drink

There are four steps in the treatment of the Cedar water supply: screening, fluoridation, corrosion control, and disinfection. The water first passes through coarse screens to remove debris, and fluoride is added for dental health protection. At the Cedar Treatment Facility, lime is added for pH-adjusted corrosion control to minimize lead leaching in older plumbing systems, and the water is disinfected to eliminate microbial contaminants. The disinfection process is a combination of chlorination, ozonation to improve taste and odor and Giardia control, and ultraviolet light disinfection to disable chlorine-resistant contaminants.

Ensuring your water is pure

To ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (EPA)and Washington State Department of Health (DOH) prescribe regulations limiting the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulates contaminants in bottled water, which must provide the same level of public health protection. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained from the EPA's Safe Drinking Water Hotline (1-800-426-4791).



2019 water quality monitoring results

Listed in the table below are all regulated contaminants that were detected in water quality testing conducted in 2019 and the level at which they were found. None of the contaminants detected were at or above levels allowed by state and federal agencies. Not listed are the more than 200 compounds tested for but not found. If you would like a copy of the list of undetected contaminants (compounds monitored for but not found), please call Tukwila Public Works Operations at 206-433-1860.

	EPA'S ALLOWABLE LIMITS		LEVELS IN TUKWILA'S WATER		
Detected Compounds (Units)	MCLG	MCL	Average	Range	Typical Sources
RAW WATER					
Total Organic Carbon (ppm)	NA	TT	0.5	0.3–0.8	Naturally present in the environment
FINISHED WATER					
Turbidity (NTU)	NA	5	0.3	0.2–1.8	Soil runoff
Arsenic (ppb)	0	10	0.4	0.4–0.6	Erosion of natural deposits
Barium (ppb)	2,000	2,000	1.6	1.4–1.9	Erosion of natural deposits
Chromium (ppb)	100	100	0.27	0.25–0.33	Erosion of natural deposits
Fluoride (ppm)	4	4	0.7	0.6–0.8	Water additive which promotes strong teeth
Total Trihalomethanes (ppb)	NA	80	35	17.1–45.8	By-product of drinking water chlorination
Haloacetic Acids (5) (ppb)	NA	60	31	15.3–38.7	By-product of drinking water chlorination
Chlorine (ppm)	MRDLG= 4	MRDL= 4	Average = 1.16 Range = 0.32–1.6		Water additive used to control microbes

ppm: 1 part per million = 1 mg/L = 1 milligram per liter *ppb: 1 part per billion = 1 ug/L = 1 microgram per liter* *1 ppm = 1,000 ppb*

Definitions used in the table

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TT Treatment Technique – A required process intended to reduce the level of a contaminant in drinking water.

NTU Nephelometric Turbidity Unit – Turbidity is a measure of how clear the water looks. High turbidity can hinder the effectiveness of disinfectants.

NA Not Applicable

Lead and copper and your drinking water – are you at risk?

Our source waters do not contain lead or copper. However, lead and copper can leach into water from building plumbing systems containing copper pipes, lead-based solder, brass fixtures, or some types of zinc coatings used on galvanized pipes and fittings. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Tukwila Water Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components.

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Lead and Copper Monitoring Results

Parameter and Units	MCLG	Action Level [1]	2018 Results [2]	Homes Exceeding Action Level	Source
Lead, ppb	0	15	1.6	0 of 50	Corrosion of household plumbing systems
Copper, ppm	1.3	1.3	0.07	0 of 50	

1 – The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

2 – 90th Percentile: i.e., out of every 10 homes sampled, 9 were at or below this level.

The monitoring results in the above table are from a regional sampling program conducted in 2018 (most recent testing required by regulation). Of the 50 homes sampled, three were in Tukwila, none of which exceeded the action levels for lead or copper.

Important information from the EPA and DOH about all drinking water

Sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. The Washington State Department of Health (DOH) oversees the Source Water Assessment Program. According to DOH, all surface waters in Washington are given a susceptibility of "high," regardless of whether contaminants have been detected or whether there are any sources of contaminants in the watershed. Since the Cedar River Watershed is publicly owned and managed for water quality, agricultural, industrial, residential and recreational uses are prohibited. This means there is little opportunity for contaminants to enter the water. However, there is always some potential for naturally occurring sources of contamination. In the Cedar River Watershed the potential sources of contamination include:

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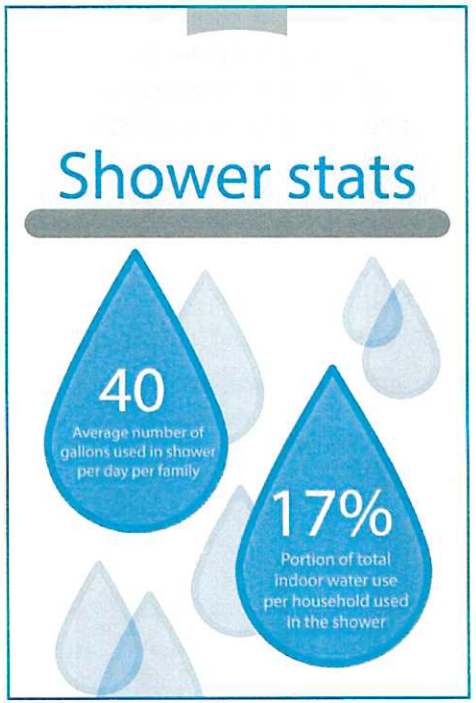
These savings were realized by employing a number of different measures including installation of high-efficiency showerheads and aerators on commercial accounts, free online ordering of conservation items through Cascade's website, and training for landscape contractors. Some of the water saving offers available to Tukwila customers include free low-flow showerheads, faucet aerators, and shower timers. Visit their website at CascadeWater.org to look for the water conservation rebates and programs available to Tukwila water customers.



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For more information

TUKWILA PUBLIC WORKS DEPARTMENT	6300 Southcenter Blvd., Tukwila, WA 98188 206-433-0179 Water Maint.: 206-433-1860 Email: Public Works@TukwilaWA.gov Website: TukwilaWA.gov
CASCADE WATER ALLIANCE	Conservation Rebates: 425-453-0930 Website: CascadeWater.org
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Este informe contiene información importante acerca de su agua potable. Haga que alguien lo traduzca para usted, o hable con alguien que lo entienda.	तपाईको समुदायको निम्ति यो मत्त्वपूर्ण जानकारी हो, कृपया अनुवादको सहायताको लागि भन्नुहोस् ।
Warbixintan waxay wadataa macluumaad muhiim ah ee la xiriira biyaha aad cabtid. Cid ha kuu tarjunto ama la hadl cid fahmaysa.	Hi hi nan zatlang nunnak a biapi mi thawngthanh nak asi ruang ah zaangfah nak in holh leh bawmhnak pek ding ah rak hal te.
Tài liệu này có tin tức quan trọng về nước uống của quý vị. Hãy nhờ người dịch cho quý vị, hoặc hỏi người nào hiểu tài liệu này.	هذا التقرير يحتوي على معولمات مهمة عن ماء الشرب الذي تسخدمه. اطلب من شخص ما ان يترجمه لك او يستطيع فهمه.
၎င်းသည် သင့်ကန်မနတီအတက် အရေးပသည့် အခက်အလက်မားဖစ်နေသောကောင့် ဘာသာပန်အကူအညီကို ကေးဇူးပ၍ တောင်းဆိုပ။	Naglalaman ang report na ito ng importanteng impormasyon tungkol sa iyong iniinom na tubig. Magkaroon ng isang tao na isasalin ito sa iyong wika para sa iyo, o makipag-usap sa isang tao na nakakaintindi dito.
	Ovo je važna informacija o vašoj zajednici, molimo potražite pomoć prevoditelja.

TUKWILA DRINKING WATER ANNUAL REPORT FOR 2020

Prepared by the City of Tukwila Public Works Department, Water Utility Division

System ID Number 89500F

Sharing the knowledge of safe water

Access to safe, healthful drinking water is a vital part of our lives and the Tukwila Water Department is committed to providing its customers with the highest quality water possible. This report is our opportunity to provide our customers with the results of water quality testing conducted in 2020 and is required by state and federal law. You'll be pleased to know that your drinking water met or exceeded all state and federal drinking water standards during extensive testing in 2020. If you have questions about the information in this report, call Tukwila's Water Department at 206-433-1863.

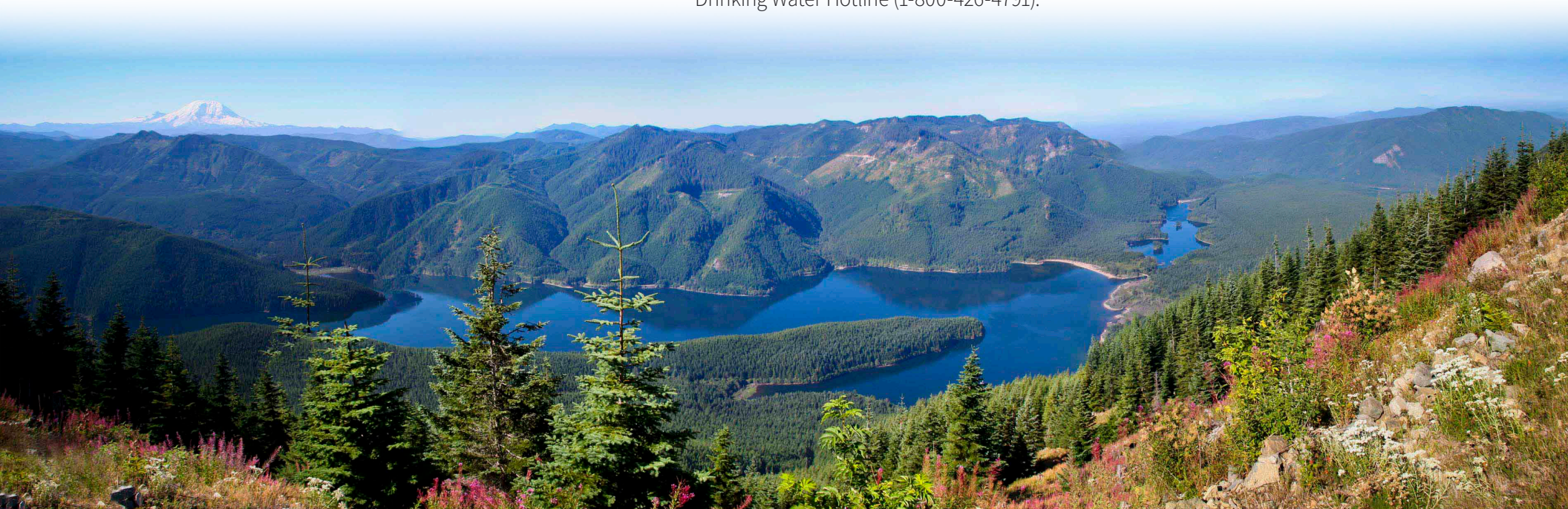
Tukwila's drinking water comes from the Cedar River Watershed, a highly protected water source in the Cascade Mountains owned and maintained by Seattle Public Utilities. The City of Tukwila is a member of Cascade Water Alliance, a regional water supply non-profit made up of seven municipalities that collectively purchase water from Seattle Public Utilities currently and are working towards developing a new source to meet future demand if it is ever needed.

Treating the water we drink

There are four steps in the treatment of the Cedar water supply: screening, fluoridation, corrosion control, and disinfection. The water first passes through coarse screens to remove debris, and fluoride is added for dental health protection. At the Cedar Treatment Facility, lime is added for pH-adjusted corrosion control to minimize lead leaching in older plumbing systems, and the water is disinfected to eliminate microbial contaminants. The disinfection process is a combination of chlorination, ozonation to improve taste and odor and Giardia control, and ultraviolet light disinfection to disable chlorine-resistant contaminants.

Ensuring your water is pure

To ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (EPA) and Washington State Department of Health (DOH) prescribe regulations limiting the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulates contaminants in bottled water, which must provide the same level of public health protection. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained from the EPA's Safe Drinking Water Hotline (1-800-426-4791).



2020 water quality monitoring results

Listed in the table below are all regulated contaminants that were detected in water quality testing conducted in 2020 and the level at which they were found. None of the contaminants detected were at or above levels allowed by state and federal agencies. Not listed are the more than 200 compounds tested for but not found. If you would like a copy of the list of undetected contaminants (compounds monitored for but not found), please call Tukwila Public Works Operations at 206-431-1936.

	EPA'S ALLOWABLE LIMITS		LEVELS IN TUKWILA'S WATER		
Detected Compounds (Units)	**MCLG**	**MCL**	**Average**	**Range**	**Typical Sources**
RAW WATER					
Total Organic Carbon (ppm)	NA	TT	0.7	0.3–1.1	Naturally present in the environment
FINISHED WATER					
Turbidity (NTU)	NA	5	0.3	0.15–3.1	Soil runoff
Arsenic (ppb)	0	10	0.4	0.4–0.5	Erosion of natural deposits
Barium (ppb)	2,000	2,000	1.5	1.4–1.7	Erosion of natural deposits
Bromate (ppb)	0	10	0.2	ND to 5	By-product of drinking water disinfection
Fluoride (ppm)	4	4	0.7	0.6–0.8	Water additive which promotes strong teeth
Total Trihalomethanes (ppb)	NA	80	34	15.1–58.2	By-product of drinking water chlorination
Haloacetic Acids (5) (ppb)	NA	60	38	15.1–60	By-product of drinking water chlorination
Chlorine (ppm)	MRDLG= 4	MRDL= 4	Average = 1.14 Range = 0.49–1.83		Water additive used to control microbes

ppm: *1 part per million = 1 mg/L = 1 milligram per liter* ***ppb:*** *1 part per billion = 1 ug/L = 1 microgram per liter* *1 ppm = 1,000 ppb*

Definitions used in the table

MCLG *Maximum Contaminant Level Goal – The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.*

MCL *Maximum Contaminant Level – The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible, using the best available treatment technology.*

MRDL *Maximum Residual Disinfectant Level – The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.*

MRDLG *Maximum Residual Disinfectant Level Goal – The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.*

TT *Treatment Technique – A required process intended to reduce the level of a contaminant in drinking water.*

NTU *Nephelometric Turbidity Unit – Turbidity is a measure of how clear the water looks. High turbidity can hinder the effectiveness of disinfectants.*

NA *Not Applicable*

Lead and copper and your drinking water – are you at risk?

Our source waters do not contain lead or copper. However, lead and copper can leach into water from building plumbing systems containing copper pipes, lead-based solder, brass fixtures, or some types of zinc coatings used on galvanized pipes and fittings. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Tukwila Water Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components.

When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at EPA.gov/safewater/lead.

Lead and Copper Monitoring Results

Parameter and Units	MCLG	Action Level [1]	2018 Results [2]	Homes Exceeding Action Level	Source
Lead, ppb	0	15	1.6	0 of 50	Corrosion of household plumbing systems
Copper, ppm	1.3	1.3	0.07	0 of 50	

1 – The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

2 – 90th Percentile: i.e., out of every 10 homes sampled, 9 were at or below this level.

The monitoring results in the above table are from a regional sampling program conducted in 2018 (most recent testing required by regulation). Of the 50 homes sampled, three were in Tukwila, none of which exceeded the action levels for lead or copper.

Important information from the EPA and DOH about all drinking water

Sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. The Washington State Department of Health (DOH) oversees the Source Water Assessment Program. According to DOH, all surface waters in Washington are given a susceptibility of "high," regardless of whether contaminants have been detected or whether there are any sources of contaminants in the watershed. The Cedar River Watershed is publicly owned and managed for water quality. Agricultural, industrial, residential and recreational uses are prohibited. This means there is little opportunity for contaminants to enter the water. However, there is always some potential for naturally occurring sources of contamination. In the Cedar River Watershed the potential sources of contamination include:

- microbial contaminants, e.g., viruses and bacteria from wildlife,
- inorganic contaminants, such as salts and metals, which are naturally occurring; and
- organic contaminants, which result from chlorine combining with naturally occurring organic matter.

Information on the source water assessments is available from the DOH website at Fortress.WA.gov/doh/eh/dw/swap/maps/.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons (e.g., cancer patients undergoing chemotherapy, organ transplant recipients, people with HIV, AIDS or other immune system disorders), some elderly persons, and infants can be particularly at risk for infections. These people or their caregivers should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

Frequently Asked Questions

Is Tukwila's water hard or soft?

Water hardness refers to the amount of calcium, magnesium and other minerals dissolved in the water. Hard water has more of the dissolved minerals, which prevents soap from lathering, causes spots or film on glass, and can cause scale buildup. The hardness of Tukwila's water is approximately 1.5 grains per gallon, which is considered soft.

What is the pH of water supplied to Tukwila customers?

The average pH of Seattle's source water is 7.0. The pH is boosted to 8.2 in the distribution system as part of SPU's corrosion control program. This reduces the possibility of metals leaching into the water from plumbing pipes and fixtures.

Does the water I receive have fluoride in it?

Yes. In accordance with a Seattle public vote held in 1968, Seattle Public Utilities adds fluoride to the drinking water at appropriate levels to prevent tooth decay. The concentration of fluoride was reduced beginning in January 2011 from 1.0 parts per million to 0.7 parts per million, the lowest level allowed by State law. This reduction is in response to new federal recommendations and is strongly supported by local health officials.

How can I get more involved in decisions affecting my drinking water?

Please contact the Tukwila Public Works office at 206-433-0179 with any concerns you might have. The Tukwila Transportation and Infrastructure Committee also welcomes public comment; they meet twice monthly at 6300 Southcenter Boulevard, Suite 100, in Tukwila. To find out more about the current Committee agenda and meeting times, give us a call at 206-433-0179, or check on the City's website at TukwilaWA.gov.

Conservation

In 2020, the Tukwila Water Department supplied over 596 million gallons of water to its retail and commercial customers. This water comes from a finite regional supply that must be used efficiently in order to meet the needs of people as well as maintaining adequate in-stream flows to protect salmon and other wildlife. Recognizing the importance of conservation in meeting the water needs of future generations, in 2003 the Washington Legislature enacted the Municipal Water Law, which requires municipalities to use water more efficiently.

Being connected to a regional water supply means we must take a regional approach to water conservation. In October 2013, with authorization from the Washington State Department of Health, Cascade Water Alliance adopted a single, regional savings goal on behalf of all its members for the next six years. The goal is a cumulative savings of 600,000 gallons per day on an average annual basis and 1,000,000 gallons per day on an average peak season basis. In 2020, Cascade Water Alliance members saved an estimated 48,316 gallons per day or approximately 24% of the six-year savings goal on an annual basis. Along with savings from 2019, Cascade has achieved approximately 47.7% of Cascade's 2019-2022 Water Use Efficiency Goal.

These savings were realized by employing a number of different measures including installation of high-efficiency showerheads and aerators on commercial accounts, free online ordering of conservation items through Cascade's website, and training for landscape contractors. Some of the water saving offers available to Tukwila customers include free low-flow showerheads, faucet aerators, and shower timers. Visit their website at CascadeWater.org to look for the water conservation rebates and programs available to Tukwila water customers.

The Municipal Water Law also requires water suppliers to keep water loss in their distribution systems below 10% measured as a three-year average. For the three-year period ending in 2020, the Tukwila Water Department kept water loss in the system down to 3.4% with an aggressive program of leak detection and repair. This is considered low by industry standards and is a testament to the investments made in water infrastructure by the City of Tukwila.

For more information

TUKWILA PUBLIC WORKS DEPARTMENT
6300 Southcenter Blvd., Tukwila, WA 98188
206-433-0179 Water Maint.: 206-433-1860
Email: Public Works@TukwilaWA.gov
Website: TukwilaWA.gov

CASCADE WATER ALLIANCE
Conservation Rebates: 425-453-0930
Website: CascadeWater.org

ENVIRONMENTAL PROTECTION AGENCY
Groundwater and Drinking Water site:
EPA.gov/safewater/index.html
Safe Drinking Water Hotline email:
hotline-sdwa@EPAmail.EPA.gov
Safe Drinking Water Hotline: 1-800-426-4791

WASHINGTON STATE DEPT. OF HEALTH
Website: DOH.WA.gov/ehp/dw

[Message: This report contains important information about your drinking water. Have someone translate it for you, or speak with someone who understands it.]

Este informe contiene información importante acerca de su agua potable. Haga que alguien lo traduzca para usted, o hable con alguien que lo entienda.

तपाईको समुदायको निम्ति यो मत्त्वपूर्ण जानकारी हो, कृपया अनुवादको सहायताको लागि भन्नुहोस् ।

Hi hi nan zatlang nunnak a biapi mi thawngthanh nak asi ruang ah zaangfah nak in holh leh bawmhnak pek ding ah rak hal te.

Warbixintan waxay wadataa macluumaad muhiim ah ee la xiriira biyaha aad cabtid. Cid ha kuu tarjunto ama la hadl cid fahmaysa.

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Tài liệu này có tin tức quan trọng về nước uống của quý vị. Hãy nhờ người dịch cho quý vị, hoặc hỏi người nào hiểu tài liệu này.

Naglalaman ang report na ito ng importanteng impormasyon tungkol sa iyong iniinom na tubig. Magkaroon ng isang tao na isasalin ito sa iyong wika para sa iyo, o makipag-usap sa isang tao na nakakaintindi dito.

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Ovo je važna informacija o vašoj zajednici, molimo potražite pomoć prevoditelja.

Appendix P

WATER SHORTAGE CONTINGENCY PLAN

CASCADE WATER ALLIANCE

Water Shortage Contingency Plan

DRAFT

June 2011

HDR

Cascade Water Alliance
Water Shortage Contingency Plan

June 2011

(DRAFT)

HDR

500 108th Avenue NE
Suite 1200
Bellevue, WA 98004-5549
(425) 450-6200

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1.0 Introduction and Purpose

Municipal water suppliers must be prepared for water shortages in order to minimize effects on the communities they serve. This Water Shortage Contingency Plan (WSCP) outlines how Cascade Water Alliance (Cascade) will respond to a water supply shortage affecting its regional water supply.

At the present time Cascade purchases all of its water from Seattle Public Utilities (SPU). Various events could cause a shortage in the SPU water supply system. These include reduced snowpack in the Cascade Range due to a dry winter or early spring melt; an earthquake or other event that damages reservoirs, treatment facilities or transmission lines; water quality problems; or intentional destructive acts. These different kinds of events may cause shortages with different characteristics in terms of advance warning, severity and duration. The WSCP offers flexibility for a range of appropriate responses.

As required under Washington State Department of Health (DOH) regulations, SPU and each Member of Cascade has its own WSCP to guide water system operations and interaction with end-use customers in each community during a water shortage. Cascade's WSCP complements the SPU and Member WSCPs. ***Cascade's primary role in the event of a water shortage is to coordinate responses among the Cascade Member water systems that receive water from the regional supply, and SPU as the source of the regional supply. Therefore this WSCP focuses on the communication and coordination activities to be carried out by Cascade staff during a water shortage.***

2.0 Related Agreements

2.1 Cascade Interlocal Contract

Cascade's *Interlocal Contract* (2004) provides the basis for Cascade's operations. Section 7.3 of the Interlocal Contract addresses water shortages and emergencies. The agreement says Cascade Members "must respond to water shortages in a collective, shared fashion under a Cascade shortage management plan adopted by the Board." The agreement allows the Board to impose penalty charges or to impose a disproportionate reduction in supply on any Cascade Member who does not comply with the shortage management plan during a shortage. However the agreement also indicates that Members are not required to impose Cascade's shortage management plan in areas not served by Cascade's regional supply; and that Members with independent supply may decline to participate in Cascade's shortage management program without penalty if they cease taking Cascade water during the period of the emergency or shortage.

A copy of Section 7.3 of the *Interlocal Contract* is included in Appendix A of this WSCP.

2.2 Seattle Block Contract

In 2004 Cascade and SPU entered into a *50-Year Declining Block Water Supply Agreement between the City of Seattle and the Cascade Water Alliance* (Block Contract; amended in 2006). Article VII of the Block Contract provides for shortage management. Section 7.2 says that Cascade and SPU "shall coordinate the development, adoption and implementation" of shortage

management plans and "shall communicate with each other concerning current and projected water supply conditions" prior to invoking shortage management plans.

Section 12.1 of the Block Contract recognizes that unilateral actions by Seattle may be needed at times due to unforeseen and unavoidable events, including water shortages. It indicates that any curtailment of supply by Seattle shall be imposed proportionately among its wholesale and retail customers.

Consistent with Section 7.2 of the Block Contract, this WSCP was provided to SPU for review prior to adoption by the Cascade Board.

As a separate matter, Section 7.3 of the Block Contract provides that if water use restrictions are imposed on SPU by the terms of its agreements with Federal and State agencies and Tribes, such restrictions will be borne proportionally by SPU and its wholesale customers, including Cascade. In this event, Cascade and its Members will need to review the restrictions and determine appropriate short-term or long-term actions.

2.3 Lake Tapps Community Agreement

Cascade entered into a *2009 Agreement Regarding Lake Tapps* with the Lake Tapps Community. The agreement addresses the Lake Tapps Community's desire for a management approach that assures the recreational and ecological viability of Lake Tapps. It stipulates that Cascade will maintain "Normal Full Pool" during an "Annual Recreation Period."

Cascade's obligation to maintain recreational Lake Levels will be implemented consistent with the following priority of interests for use of White River flows: (i) provision of minimum stream flows; (ii) provision of recreational lake levels; and (iii) provision of municipal water supply.

One way in which Cascade intends to meet this obligation is to reduce and minimize the need for Lake Tapps to provide for municipal water supply during drought conditions. Therefore, once Lake Tapps begins providing municipal supply, consideration of maintaining recreational water levels in Lake Tapps should become a criterion for triggering curtailment actions under Cascade's WSCP.

Lake Tapps lake level triggers are not established in this WSCP at this time, for the following reasons:

- Cascade is not currently using Lake Tapps for municipal supply.
- Cascade's current planning vision indicates that Cascade's use of Lake Tapps is at least 20 years away.
- Curtailment by Cascade Members now would have no effect on lake levels.

Cascade will update the WSCP to include lake level triggers at such time as Lake Tapps is brought on line for municipal supply purposes.

2.4 Tacoma Public Utilities Water Supply Agreement

Cascade has an *Agreement for the Sale of Wholesale Water* (2005) with Tacoma Public Utilities (TPU). At this time Cascade is not using this supply source, and will not begin using it until a transmission pipeline is constructed to deliver the water from Tacoma's Second Supply Pipeline. Therefore at this time direct coordination with Tacoma is not addressed in this Water Shortage

Contingency Plan. At such time as Cascade begins receiving regional water supply from Tacoma, the need to incorporate shortage response actions in coordination with TPU will be reviewed.

3.0 Plan Activation and Applicability to Cascade Members

3.1 Activation of WSCP

It is anticipated that the initial need for shortage management will be identified through a communication from SPU indicating that a supply shortage may occur or is in progress. If this is the case, SPU will activate its own WSCP. Cascade's response to activation of the SPU WSCP will be guided by the Block Contract between Cascade and SPU. Action by the Cascade Board will be required in order to activate Cascade shortage management actions under this WSCP. This action could be taken during a regularly scheduled Board meeting, or during an emergency meeting called in response to the expected or actual water shortage. The Board may adopt a resolution directing Cascade's Chief Executive Officer (CEO) or designee to activate the Cascade WSCP, including water use curtailment actions from Section 4.

Alternatively the Board also has the authority to activate the Cascade WSCP without activation of SPU's WSCP.

In the event of an emergency that requires immediate action to prevent risks to public health and safety, Cascade's CEO may activate the WSCP on a temporary basis. In this event the Board shall meet as soon as possible to review the CEO's action.

Once the WSCP has been activated, it may be necessary to move from one level of shortage management to another. This will likely be in response to a change in the stage of curtailment by SPU, but could also be done as an independent action by Cascade if conditions warrant. Cascade's Executive Committee shall have the authority to direct Cascade's CEO or designee to either elevate or diminish the level of curtailment from one level to another.

3.2 Water Shortage Management Committee

The Cascade CEO shall designate a member of Cascade's staff to lead Cascade's shortage response actions while the WSCP remains activated. The CEO shall also designate a Water Shortage Management Committee consisting of select Cascade staff and Member staff to advise Cascade on implementation of the WSCP once it has been activated and for the duration of the water shortage.

3.3 Coordination with SPU

Cascade's CEO or designee will communicate closely with SPU regarding activation of the WSCP and a change in the level of shortage designated. Cascade will take the following actions in the event SPU activates its plan:

- 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.
- If SPU activates its **Voluntary or Mandatory stages**, Cascade (and its Members) should again assess the situation and consider whether to: a) activate their WSCPs (if not already activated), and b) rely more heavily on non-SPU sources of supply, in the Member service areas where this is applicable.

- If SPU activates its **Emergency Curtailment stage**, Cascade anticipates that Section 12.1 (Emergency Events) of the Block Contract would also be triggered. This section permits SPU to curtail supplies to Cascade, on a proportional basis with its retail customers and other wholesale customers. In the event of significant curtailment, Cascade and its Members would need to activate their WSCPs in order to manage the situation effectively.
- Cascade and its Members have a key role in the communications strategy during a regional water shortage. It is anticipated that SPU will communicate with its own retail customers, wholesale customers, large retail customers, regional stakeholders, state/federal resource agencies, and regional media. Cascade Members should communicate with retail customers, wholesale customers, local stakeholders, and local media. Cascade will help to coordinate and facilitate communications between the regional level and the local level.

Cascade will maintain a current copy of SPU's Water Shortage Contingency Plan on file at Cascade offices, and encourages Members that receive water from Cascade's regional water supply system maintain a copy of both the Cascade WSCP and SPU WSCP readily available with their own Member WSCP.

3.4 Applicability to Cascade Members

Consistent with the Interlocal Contract, Section 7.3 activation of shortage management applies to Cascade Members as follows:

- **Members receiving all of their water supply from Cascade:** Required to comply with Cascade's WSCP.
- **Members receiving partial supply from Cascade:** Required to comply, in portions of their service areas that receive regional supply; *or* to discontinue use of Cascade supply during the water shortage.
- **Members not receiving Cascade supply.** Not required to comply with Cascade's WSCP.

At the present time Covington Water District does not receive water from Cascade. As long as this remains true, the District would not be required to implement shortage management actions under this WSCP.

3.5 Member Shortage Plans

DOH regulations at Chapter 246-290-100 Washington Administrative Code require water utilities to have their own water shortage response plan. These are typically submitted to DOH every six years with their comprehensive water system plan update. Cascade recommends that Members receiving a significant supply of Cascade water review their water shortage response plans and consider modifications if needed to ensure the Member plans use similar stages of curtailment as listed in the Cascade WSCP, and that provisions in the Member WSCPs support effective coordination with SPU and Cascade during a water shortage.

4.0 Stages of Water Use Curtailment

Cascade's WSCP has the same four stages of curtailment as SPU's WSCP. These are designed for progressive implementation during a drought or other long-range disruption of water supply. However if a shortage occurs due to a sudden, unexpected event, any of the four stages can be activated from the outset of the event.

Table 1 summarizes actions to be taken in the four stages of curtailment. Additional detail is provided in the subsections following Table 1.

4.1 Advisory Stage

This stage is advisory only, and does not require curtailment actions by water users. The public is informed as early as meaningful data are available that a water shortage may occur.

4.1.1 Objectives

- Prepare Cascade, its Members and water users for a potential water shortage, thereby allowing for adequate planning and coordination.
- Support distribution system management actions by Cascade Members that can help to forestall or minimize the need for more stringent demand or supply management actions.

4.1.2 Triggers

- Notice from SPU that they have activated the Advisory Stage of their WSCP and that Cascade is requested to do the same; and
- An action of the Cascade Board authorizing activation of Cascade's advisory stage.

4.1.3 Theme of Public Messages

- Cascade's public messaging will be consistent with SPU's messaging during the shortage event. The 2006 SPU WSCP provides the following description for this stage: "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."

Table 1: Four Stages of Curtailment

	Advisory	Voluntary	Mandatory	Emergency
Theme of Public Messages from SPU	A shortage may occur soon; get ready.	A shortage has occurred. We are requesting voluntary curtailment to reduce demand by x percent.	A severe shortage has occurred. Mandatory curtailment is necessary and specific uses of water are restricted.	An emergency shortage has occurred. Mandatory curtailment is necessary and public health and safety uses are the priority.
Cascade Communication Actions	• Inform Members they are required to activate their Advisory Stage (see exemptions). • Establish a regular communication mechanism with Members. • Request Cascade Members carry out supply-side management actions. • Participate on SPU's Water Shortage Advisory Group. • Assist Members to acquire and distribute public information materials.	• Inform Members they are required to activate their Voluntary Stage. • Request Cascade Members report to Cascade regarding supply-side management actions. For Members that have independent supply, this may include relying more heavily on these supplies. • Request Cascade Members communicate with their largest customers. • Communicate regularly with Cascade Members. • Communicate with the Washington State Department of Health. • Participate on SPU's Water Shortage Advisory Group. • Assist Cascade Members to acquire and distribute public information materials.	• Inform Cascade Members that they are required to activate their Mandatory Stage, including enforcement as appropriate. • Gather information from SPU on water quality or pressure problems, and communicate these to Members. • Continue communication actions from the Voluntary Stage, with modifications as appropriate for the Mandatory Stage.	• Inform Cascade Members that they are required to activate their Emergency Stage, including enforcement as appropriate. • Continue and intensify communication actions from the Mandatory Stage. • Alert Members of particular operational problems that may occur with system-wide reduced water consumption. • Assist Cascade Members to define and communicate exemptions for public health and safety.
Cascade Operating Actions	• Initiate planning and preparation for Voluntary Stage actions.	• Assess revenue implications and remedies. • Initiate planning and preparation for Mandatory Stage actions.	• Continue operating actions from the Voluntary Stage • Initiate planning and preparation for Emergency Stage actions.	• Continue operating actions from Mandatory Stage. • Make staff resources available to Cascade Members. • Coordinate volunteers on behalf of Members.

4.1.4 Communication Actions

- Once the Advisory Stage has been activated by Cascade, inform Cascade Members that they are required to activate their Advisory Stage (or equivalent actions per each Member's individual WSCP). This will not apply to Cascade Members exempted per Section 3.3 of this WSCP.
- Establish a regular communication mechanism to keep Cascade Members and the Cascade Board informed regarding stages of curtailment; water supply conditions; actions taken by Cascade Members and others in the region; and information that should be communicated to the public, local parks departments, large customers, landscape industry professionals and others.
- Request Cascade Members carry out supply-side management actions they will take during the Advisory Stage to reduce use of water for local water distribution system operations, and compile information on the actions taken.
- Participate on SPU's Water Shortage Advisory Group to help develop public information messages and materials and to provide input on Cascade Member actions.
- Assist Cascade Members acquire and distribute public information materials as needed. This may include materials from SPU or other sources, as appropriate. Post information on Cascade's web site regarding the Advisory Stage.

4.1.5 Operating Actions

- Initiate planning and preparation for Voluntary Stage actions, including an assessment of potential staffing impacts, training needs and communications strategies. Assist Members plan specific actions for the Voluntary Stage, including distribution system actions by the Member and voluntary water use curtailment actions Members can suggest to their end-use customers if the Voluntary Stage is activated.

4.2 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 residential and commercial customers.

4.2.1 Objectives

- Encourage Members to take distribution system management actions to further stretch available supply.
- Encourage customer voluntary actions to maintain or reduce demand to meet target consumption levels.
- Forestall or minimize need for later more stringent demand or supply management actions.
- Maintain drinking water quality at acceptable levels throughout the shortage.

4.2.2 Triggers

- Notice from SPU that they have activated the Voluntary Stage of their WSCP and that Cascade is requested to do the same; and
- Action by Cascade's Executive Committee can authorize a change in curtailment level to the Voluntary Stage. (Alternatively the Board may authorize the Voluntary Stage as Cascade's initial response to a shortage).

4.2.3 Theme of Public Messages

- Cascade's public messaging will be consistent with SPU's messaging during the shortage event. The 2006 SPU WSCP provides the following description for this stage: "Regional water demands need to be reduced by *x* percent [the level will be determined in consultation with SPU]. 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."

4.2.4 Communication Actions

- Once the Voluntary Stage has been activated by Cascade, inform Cascade Members that they are required to activate their Voluntary Stage (or equivalent actions per each Member's individual WSCP). This will not apply to Cascade Members exempted per Section 3.3 of this WSCP.
- Request Cascade Members report to Cascade regarding supply-side management actions they will take during the Voluntary Stage. For Members that have independent supply, this may include relying more heavily on these supplies where feasible, to reduce pressure on the Cascade regional supply.
- Request Cascade Members communicate with their largest customers to request percentage reductions.
- Communicate regularly with Cascade Members regarding information that should be communicated to the public, local parks departments, large customers, landscape industry professionals and others. At the voluntary stage, this will include specific recommendations on how customers can reduce water consumption, including links to the *savingwater.org* website or equivalent information resources.
- Communicate with the Washington State Department of Health regarding actions being taken by Cascade and its Members.
- Participate on SPU's Water Shortage Advisory Group to help develop public information messages and materials and to provide input on Cascade Member actions.
- Assist Cascade Members acquire and distribute public information materials as needed. Review information from SPU, including materials in the SPU Water Shortage Contingency Plan, regarding actions customers can take to reduce their

water consumption. As appropriate, post information for Cascade Members and their customers on Cascade's web site regarding the Voluntary Stage. Appendix B provides examples of water saving actions customers can take.

4.2.5 Operating Actions

- Assess revenue implications and potential remedies and report to the Cascade Board.
- Initiate planning and preparation for Mandatory Stage actions, including an assessment of potential staffing impacts, training needs and communications strategies. Assist Cascade Members identify mandatory restrictions that may apply during the Mandatory Stage, if it is needed.

4.3 Mandatory Stage

If the voluntary stage does not result in the demand reduction needed, or supply conditions worsen, the Mandatory Stage would be implemented. This stage prohibits or limits certain water actions. Cascade will rely on its Members to enforce mandatory actions, using techniques as appropriate to each service area or jurisdiction.

4.3.1 Objectives

- Achieve targeted goals for reducing consumption, by restricting certain water uses. Goals will be determined in consultation with SPU, based on the characteristics and severity of the water shortage.
- Ensure that adequate water supply will be available for the duration of the supply shortage.
- Minimize the disruption to customers' lives and businesses while meeting target consumption goals.
- Maintain drinking water quality at acceptable levels throughout the shortage.
- Promote equity among Cascade Members in responding to the supply shortage.

4.3.2 Triggers

- Notice from SPU that they have activated the Mandatory Stage of their WSCP and that Cascade is requested to do the same; and
- Action by Cascade's Executive Committee can authorize a change in curtailment level to the Mandatory Stage. (Alternatively the Board may authorize the Mandatory Stage as Cascade's initial response to a shortage).

4.3.3 Theme of Public Messages

- Cascade's public messaging will be consistent with SPU's messaging during the shortage event. The 2006 SPU WSCP provides the following description for this stage: "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."

4.3.4 Communication Actions

- Once the Mandatory Stage has been activated by Cascade, inform Cascade Members that they are required to activate their Mandatory Stage (or equivalent actions per each Member's individual WSCP). This will not apply to Cascade Members exempted per Section 3.3 of this WSCP. Enforcement actions may be needed in the Mandatory Stage. Cascade expects each Member to enforce restrictions in a manner suitable to the local service area or to work with other local governments having enforcement powers to do so.
- Gather information from SPU regarding any water quality or water pressure problems, if any, that are identified or that may possibly occur at the mandatory stage, and communicate these to Cascade Members management, operations staff and public affairs staff.
- Continue communication actions from the Voluntary Stage, with modifications as appropriate for the Mandatory Stage (as determined in consultation with SPU and Cascade Members).

4.3.5 Operating Actions

- Continue operating actions from the Voluntary Stage, and:
- Initiate planning and preparation for Emergency Stage actions, including an assessment of potential staffing impacts, training needs, and communications strategies. Assist Members plan specific actions that may be needed if the Emergency Stage is activated.

4.4 Emergency Stage

At this stage Cascade and its Members recognize 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 would be used as the last stage of a progressive drought or similar situation, or to address an immediate crisis such as a disruption to water sources, treatment or transmission facilities. This type of situation has never occurred in Cascade or SPU history, but could occur during a very severe drought or under emergency conditions such as a major earthquake that ruptures transmission pipelines.

4.4.1 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. Goals will be determined in consultation with SPU, based on the characteristics and severity of the water shortage.

- Promote equity among Cascade Members in responding to the supply shortage.

4.4.2 Triggers

- Notice from SPU that they have activated the Emergency Stage of their WSCP and that Cascade is requested to do the same; and
- If Cascade's WSCP has already been activated, action by Cascade's Executive Committee can authorize a change in curtailment level to the Emergency Stage. (Alternatively the Board may authorize the Emergency Stage as Cascade's initial response to a shortage; or the CEO may authorize the Emergency Stage if there is an emergency that requires immediate action to prevent risks to public health and safety. See Section 3.1.).

4.4.3 Theme of Public Messages

- Cascade's public messaging will be consistent with SPU's messaging during the shortage event. The 2006 SPU WSCP provides the following description for this stage: "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 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."

4.4.4 Communication Actions

- Once the Emergency Stage has been activated by Cascade, inform Cascade Members that they are required to activate their Emergency Stage (or equivalent actions per each Member's individual WSCP). This will not apply to Cascade Members exempted per Section 3.3 of this WSCP. Enforcement actions may be needed in the Emergency Stage. Cascade anticipates each Member will enforce restrictions in a manner suitable to the local service area or will work with other local governments having enforcement powers to do so.
- Continue and intensify communication actions from the Mandatory Stage, with modifications as appropriate for the Emergency Stage (as determined in consultation with SPU and Cascade Members). This includes, but is not limited to, Cascade's role in supporting effective communications between individual Cascade Members and SPU.
- Alert Members of particular operational problems that may occur with system-wide reduced water consumption, and communicate these to Cascade Members management, operations staff and public affairs staff and on the Cascade website. These could include, for example, taste and odor problems; and reduced pressures in Member distribution systems.
- Assist Cascade Members to define and communicate exemptions for medical facilities and other facilities having key responsibilities for public health and safety.

4.4.5 Operating Actions

- Continue to monitor staffing impacts, training needs and communications strategies and make adjustments where feasible to enhance effectiveness of the regional water shortage response.
- If feasible and applicable, make staff resources available to Cascade Members to assist them in the water shortage response. This may include temporary reassignment of Cascade staff; and/or outsourcing of specialized functions or additional staffing resources that could provide assistance to Cascade Members.
- If volunteer services are available and deemed valuable to the water shortage response, and if desired by the Members, Cascade will coordinate volunteers on behalf of its Members.

5.0 Communications During Water Shortages

In the event of a water shortage that requires this WSCP to be activated, Cascade will coordinate closely with its Members and SPU regarding public communications. It is anticipated that SPU will take the lead on communications involving regional media such as major radio, television and newspaper outlets. Members will have the primary responsibility for communicating directly with their own customers and local communities. Cascade will coordinate communications among Members and SPU and will assist its Members issue consistent and effective communications to the communities that they serve.

Appendix A

Cascade Interlocal Contract Section 7.3 (Shortages and Emergencies)

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.

Appendix B

Actions that Can Reduce Water Usage by Distribution Systems and Customers

POSSIBLE ADVISORY STAGE WATER CONSERVATION TIPS FOR CUSTOMERS (Adapted from SPU 2006 WSCP)

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 lukewarm 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 WaterSense model.
- If you are buying a new washing machine, purchase a high-efficiency model. WashWise rebates may be 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 SPU 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.

POSSIBLE VOLUNTARY STAGE CUSTOMER WATER SAVING ACTIONS (Adapted from SPU 2006 WSCP)

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 WaterSense 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 in utility bills. Check www.savingwater.org for WaterSense toilet models.
- **Install a high-efficiency clothes washer**. New washers are typically one-third more water efficient than old washers.
- **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

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)

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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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Attachments

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.

- 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 –

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.

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

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?

- 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:

- 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.

- **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

- 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.

- 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.

- 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.

- 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.

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.

- 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.

- 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.

<u>Possible Exemptions from Water Use Restrictions</u>
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 <u>possibilities</u> for Tukwila Public Works to consider in creating actual exemptions at the time of the event.

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.

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.

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.

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 grasscyle lawns, drought proof new plantings, mulch all planting beds
Stage 2 Voluntary Curtail-ment	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	**$ xx**	**$ xx**	**$ xx**	**$ xx**
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	**xx**	**xx**	**xx**	
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.

- **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%.

- ☐ 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.

Appendix Q

INFRASTRUCTURE DESIGN AND CONSTRUCTION STANDARDS / WATER DEPARTMENT ROUTINE MAINTENANCE SCHEDULE

Infrastructure Design and Construction Standards

City of Tukwila - Department of Public Works

6300 Southcenter Blvd, Suite #100 • Tukwila, Washington 98188 • www.ci.tukwila.wa.us • Phone: (206)433-0179

CITY OF TUKWILA

PUBLIC WORKS DEPARTMENT

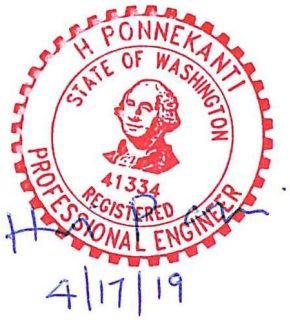
INFRASTRUCTURE DESIGN AND CONSTRUCTION STANDARDS

2019

Available On-line at:

https://www.tukwilawa.gov/

Revision date: 04/08/2019



THIS DOCUMENT HAS BEEN REVIEWED AND APPROVED
BY THE CITY ENGINEER OF THE CITY OF TUKWILA, WA.

Revision date: 04/08/2019

MAYOR

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Revision date: 04/08/2019

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Contents

CHAPTER 1 INTRODUCTION

SECTION 1.0 PURPOSE

These standards are intended to ensure consistent design and construction requirements and adherence to the City's comprehensive plans.

It is this City's policy to maintain a high level of quality in the construction of public facilities. The standards detailed herein have been prepared to foster consistent requirements of quality and value for both public and private construction, and are to be applied to both.

The standards in this document set forth the minimum criteria and specifications for both public and private construction projects. In addition, these standards provide the minimum design and construction requirements for utility and street improvements to be accepted by the City of Tukwila. The Director may substitute more stringent design standards and specifications where special conditions warrant. The Director, or their Designee, may relax these standards upon approval of a variance.

These standards shall not substitute for engineering design, nor are these standards intended to limit innovative design where equal performance in value, safety, and maintenance economy can be demonstrated.

SECTION 1.1 AUTHORITY

Ordinance 1783, filed with the City Clerk, authorizes the Public Works Department to create and to amend these Standards.

SECTION 1.2 REVISIONS

The City periodically reviews and revises the Standards. Additionally, anyone may submit to the Director a written request for a revision to these standards. The request shall include a brief description of the revision, justification for the revision, and a copy of the proposed text or drawing. If the revision is accepted, the Director revises these standards at the periodic review. The revision request form is in Appendix D.

SECTION 1.3 REFERENCES, STANDARDS, AND CODES

The following lists of references, standards, and codes provide the basis for design and construction requirements for residential, commercial, or industrial development, or construction of public infrastructure within the

City. Where conflicts in design and construction requirements arise, these Development Guidelines and Design and Construction Standards (Standards) prevail.

1.3.1 ALL PROJECTS

The City of Tukwila recognizes and uses the most current edition of the following references, standards, and codes.

1. City of Tukwila Standards
2. City of Tukwila Municipal Code
3. City of Tukwila Comprehensive Plans, including Sewer, Water, Surface Water, Land Use
4. Standard Specifications for Road, Bridge, and Municipal Construction, prepared by the Washington State Chapter of the American Public Works Association and the Washington State Department of Transportation (Standard Specifications)
5. Local Agency General Special Provisions (GSP's) as part of the Standard Specifications
6. Standard Plans for Road, Bridge and Municipal Construction, prepared by the Washington State Department of Transportation
7. Washington State Department of Transportation Bridge Design Manual (LRFD)
8. Manual on Uniform Traffic Control Devices (MUTCD), U.S. Department of Transportation as amended and approved by Washington State Department of Transportation
9. King County Surface Water Design Manual (2016)
10. The City's NPDES Phase II permit and Construction Stormwater General Permit
11. Sensitive Areas Overlay (TMC 21)
12. State and National Environmental Policy Acts
13. Shoreline Management Act, State of Washington
14. Tukwila and King County Shoreline Master Plans
15. WISHA - Washington Industrial Safety & Health Administration
16. OSHA - Occupational Safety & Health Administration
17. All other federal, state, and local requirements including, but not limited to:
    a. Right of Entry Agreements
    b. Geotechnical Investigation
    c. Utility coordination and Agreements
    d. Applicable WSDOT and Railroad ROW work permits
    e. Noise variance permits for contracts requiring night work

In cases where the above references, standards, and codes do not cover elements of the project design and construction, the City recognizes and uses the most current edition of the following:

1.3.2 STREETS

1. AASHTO, A Policy on Geometric Design of Highways and Streets
2. AASHTO Guide for the Development of Bicycle Facilities
3. AASHTO LRFD Bridge Design Specifications
4. AASHTO LRFD Bridge Construction Specifications
5. WSDOT Design Manual
6. WSDOT Construction Manual
7. WSDOT Highway Runoff Manual
8. WSDOT Pedestrian Facilities Guidebook
9. WSDOT Local Agency Guidelines
10. WSDOT Bridge Design Manual
11. NEC- National Electrical Code
12. IMSA - International Municipal Signal Association
13. City of Tukwila Walk and Roll Plan

1.3.3 SURFACE WATER

1. Washington State Department of Fish and Wildlife Requirements
2. King County Stormwater Pollution Prevention Manual
3. King County Surface Water Design Manual, current edition
4. Stormwater Management Manual for Western Washington, Department of Ecology (for WSDOT projects)

1.3.4 FLOOD ZONE CONTROL

1. Flood Insurance Study, current revision, Federal Emergency Management Agency
2. King County Flood Hazard Policy
3. King County Riverbank Stabilization Guidelines
4. Green River Management (A.G.#85-043)
5. City of Tukwila Allentown Policy #2000-01 Revision 1

1.3.5 WATER SUPPLY

1. American Water Works Association Standards, Accepted Procedure and Practice, AWWA
2. Manual of Cross-Connection Control, Foundation for Cross-Connection Control and Hydraulic Research

3. Backflow Prevention Assemblies Approved for Installation in Washington State, Washington State Department of Health
4. City of Tukwila Cross Connection Control Program Policy #99-01
5. Standards and specifications of all districts providing service within the City
6. Uniform Plumbing Code

1.3.6 SANITARY SEWER

1. Criteria for Sewerage Works Design, Washington State Department of Ecology
2. Uniform Plumbing Code
3. Standards and specifications of all sewer districts providing service within the City

CHAPTER 2 DEVELOPMENT GUIDELINES

SECTION 2.0 ERRORS AND OMISSIONS

At the Director's discretion, any significant error or omission in the approved plans, or information used as a basis for approval, will constitute grounds for withdrawal of any permit approvals and/or stoppage of any or all of the permitted work. The Permittee shall show cause why such work should continue and make such changes in plans as required by the Director.

SECTION 2.1 PERMITS

Prior to beginning multifamily-residential, commercial, or industrial development, or development requiring construction of public infrastructure within the City, the Applicant shall submit a permit application, plans, and specifications to the Permit Center for review and approval by the Public Works Department.

Development design and construction shall meet all of the applicable standards, codes, and recommendations in specific reports, such as the geotechnical report, the traffic impact analysis, and the surface water Technical Information Report.

Depending on particular project elements, the Director may require submittals in addition to those described in this chapter.

Any significant changes to the approved plans or specifications of a permitted project require a REVISION submittal to the City for approval.

Type A Short-term Nonprofit

Issued for 72 hours to nonprofit organizations for assemblies, bike races, block parties, parades, parking, processions, non-motorized vehicle races, street dances, street runs.

Type B Short-term Profit

Issued for 72 hours to for-profit entities for fairs, house moves, sales, street closure.

Type C Construction

Issued for 180 days for activities in the right-of-way and on private property. These activities include sewer, water, surface water, grading, street improvements, boring, culverts, curb cuts, paving, driveways, fences, landscaping, painting/striping, sidewalks, trenching, utility installation/repair, traffic signals and illumination.

Type C Right-of-way

Issued for 180 days for activities that will disturb the right-of-way, including boring, installation of culverts, curb cuts, and public facilities, paving, landscaping, and trenching.

Type C Grading

Issued for 180 days for all grading activities occurring within the City limits except the following:

1. Excavation for construction of a structure permitted under the International Building Code;
2. Cemetery graves;
3. Refuse disposal sites controlled by other regulations;
4. Excavations for wells, or trenches for utilities;
5. Mining, quarrying, excavating, processing or stockpiling rock, sand, gravel, aggregate or clay controlled by other regulations, provided such operations do not affect the lateral support of, or significantly increase stresses in, soil on adjoining properties;
6. Exploratory excavations performed under the direction of a registered design professional, as long as this exploratory excavation does not constitute the beginning of construction of a building prior to obtaining a permit.

Type D Long-term

Issued for periods greater than 72 hours for activities which do not disturb the right-of-way including: air rights, bus shelters, access to construction sites, loading zones, newspaper sales, recycling facilities, sales structures, sidewalk cafes, awnings, benches etc, underground rights, utility facilities, waste facilities.

Type E Potential Disturbance

Issued for 180 days for activities having a potential to disturb the right-of-way, such as hauling 6 loaded vehicles/hr/8 hr day for 2 or more consecutive days, hauling hazardous waste as defined in the Revised

Code of Washington, or surveying (other than for a Tukwila capital improvement project).

Type F Blanket

Issued for 365 days to telecommunications and cable franchisee, and utilities for connections, repairs, and emergencies.

Flood Zone

Any construction or development within any special flood hazard area, including manufactured homes, watercourse alteration, excavation, fill, requires a Flood Zone Control permit (FZCP). An FZCP grants approval to construct or develop within a special hazard area, a flood-prone area or the shoreline, but does not replace the need for additional permits such as a building permit or a Type C Construction permit.

A permit shall be obtained before construction or development begins within any area of special flood hazard established in TMC 16.52.050. The permit shall be for all structures including manufactured homes, and for all development including fill and other activities.

Water Meter – Permanent

Issued for domestic water supply of all new or reestablished services when sewer discharge rates are calculated based on water usage. Each individual building requires a separate water main tap. The fee includes a City-provided water meter.

Water Meter – Water Only

Issued for a separate service from the main for water that will not discharge to the public sewer. The fee includes a City-provided water meter.

Water Meter – Deduct

Required to meter water that will not discharge to the public sewer. The Permittee provides, owns, installs, and maintains the meter. This meter is installed downstream of a permanent water meter. An example is landscape irrigation.

Water Meter – Temporary

Required for use of public water, on a short-term basis, where a metered supply does not already exist. The Permittee rents the meter from the City. Examples include dust suppression during construction or water supply during hydroseeding.

SECTION 2.2 FEES

2.2.1 PERMIT

Public Works establishes and collects fees as set forth in the fee schedule adopted by the City Council. Most of the permit fees are flat rates that are due when the permit is issued. Type C permit fees are based on the estimated construction value of the public works elements in a project. For Type C permits, Public Works collects an Application and Plan Review Fee when the application is submitted and a Permit Issuance and Inspection fee when the permit is issued.

After the permit is issued, Public Works may assess additional fees for revisions and inspections and may adjust pavement mitigation fees. Any additional fees must be paid before the PUBLIC WORKS Final Inspection occurs.

Public Works charges 25% of the Total Plan Review Fee for each additional review, which is attributable to the Applicant's action or inaction. Each revision to approved plans is charged 25% of the Issuance and Inspection fee. Each re-inspection after the first two inspections is charged $60.00/inspection per inspection item.

Refer to Public Works Bulletin for permit fee estimates.

2.2.2 PAVEMENT MITIGATION

The City calculates the square footage used to determine a mitigation fee according to the following:

1. For repairs requiring an overlay, the City uses the total square feet of overlay.
2. For pavement repair, the City uses the cut area plus two feet on each side of the cut.
3. Public Works may adjust this fee when the actual field measurements differ from the proposed measurements shown on the permit application. Any adjustment to the mitigation fees must be completed before the Public Works Final Inspection. Refer to

Public Works Customer Assistance Bulletins for a more complete description of Pavement Mitigation fees.

2.2.3 TRANSPORTATION IMPACT FEES

Consistent with the Comprehensive Plan, the Six-year Transportation Plan and the Capital Improvement Plan, transportation impact fees help ensure that new development bears its proportionate fair share of transportation facilities necessitated by the new development. The fee applies to any construction, reconstruction, conversion, structural alteration, relocation or enlargement of any structure that requires a building permit and generates any new PM peak hour trips. The transportation impact fee is charged to each development according to an impact fee schedule based on defined zones. The fees are assessed as part of the building permit and are due and payable when the permit is issued (TMC 9.48 and Ordinance 211).

2.2.4 INDEPENDENT REVIEW

Depending on the site conditions and design complexity, reports submitted to the City may receive independent review. The Applicant pays the review fee.

2.2.5 CONNECTION CHARGES

Some City water and sewer services have special connection charges. When these charges apply, the Applicant shall provide a legal description of the property to aid in calculating the charges.

2.2.6 CAPACITY CHARGES

King County Metro determines the sanitary sewer capacity charge based on the information provided on the Sewer Use Certification form. For new construction within the City's service area and for all tenant improvements within the city limits, the Applicant submits a completed Sewer Use Certification form. This form is available in Public Works. Upon completion of the project work, Public Works forwards the completed form to Metro.

2.2.7 OVERTIME FEES

Inspections that occur during non-regular business hours are subject to "after hours" inspection fees. The Director determines when these

inspections are allowed. The fees are charged at the inspector's overtime-hourly rate and include vehicle, overhead, and expense charges.

2.2.8 SPECIAL BILLING FEES

The City shall charge for any work or services provided by Public Works, such as traffic control or utility relocation, which occurs under an Authorization for Special Billing or provided by Public Works as a response to infrastructure damage during construction.

SECTION 2.3 SUBMITTALS

2.3.1 PLANS

Plans submitted to Public Works for review and approval, except for single family residences that are not in or adjacent to a sensitive area and that do not trigger surface water drainage review, shall be prepared, signed, stamped, and dated by a Washington State registered Professional Engineer. These plans must be submitted to the City for plan review and approval prior to the commencement of any construction.

Public Works will review all submittals for compliance with these Standards. Plan approval does not relieve the Applicant, the Applicant's Engineer, or the Contractor from responsibility for ensuring that all facilities are safe and that calculations, plans, specifications, construction drawings, record drawings, and as-built information complies with normal engineering standards, these Standards, and applicable federal, state, and local laws and codes. Refer to Appendix C for a plan completeness checklist.

2.3.2 SPECIFICATIONS

Specifications shall be submitted with the plans, when the plans and notes do not adequately describe the proposed work and materials.

2.3.3 PLAN CHECKLIST

A completed Plan Checklist may be submitted with the plans. The engineer should use the Plan Checklist to ensure the plans meet the specific minimum requirements. A Plan Checklist is included as Appendix C.

2.3.4 EROSION PREVENTION AND SEDIMENT CONTROL PLAN

Any project that will clear, grade, or otherwise disturb a site must provide erosion prevention and sediment controls to prevent, as much as possible, sediment transportation offsite to downstream drainage facilities and water resources, or onto other properties.

The erosion prevention and sediment control plan shall meet or exceed the standards in the adopted King County Surface Water Design Manual.

2.3.5 POLLUTION PREVENTION PLAN

Any construction project that includes any of the following activities must provide best management practices to prevent pollution:

1. Dewatering
2. Paving
3. Structure construction and painting
4. Material delivery, use, or storage (soil, pesticides, herbicides, fertilizers, detergent, plaster, petroleum products, acids, lime, paints, solvents, curing compounds)
5. Solid waste
6. Hazardous waste
7. Contaminated soils
8. Concrete waste
9. Sanitary/septic waste
10. Vehicle or equipment cleaning, fueling, or maintenance

2.3.6 PROJECT SCHEDULE

The project schedule shall include the proposed sequence and expected start and end dates for all major activities. The schedule shall include installation of temporary and permanent erosion prevention and sediment control measures and schedules for monitoring, operation, and maintenance of these measures.

2.3.7 WORK IN RIGHT-OF-WAY

Required permit application submittals when proposing work within City right-of-way include the following (TMC 11.08):

A. Applicant/Owner information

1. Applicant name, address, phone number, email address
2. Owner name, address, phone number (if not the Applicant)

B. Activity Description
   1. Cut and fill volumes
   2. Location
   3. Proposed use
   4. Excavation method and areas, surface and subsurface
   5. Restoration method
   6. Start and end dates and expected duration

C. Plans, profiles, cross sections
D. Copy of franchise agreement, easement, encroachment permit, license or other legal authorization
E. Document from Owner and Applicant saying they are in compliance
F. Hold Harmless Agreement
G. Traffic control plan
H. City of Tukwila business license
I. Copy of the contractor estimate or engineer estimate for the activity being permitted. Public Works will review and may adjust. Any fee adjustment will be made when the permit is issued
J. Application fee
K. Comprehensive general liability insurance with limits not less than $2,000,000, naming City of Tukwila as additional insured
L. Business automobile liability insurance with limits not less than $1,000,000
M. Contractor's pollution liability insurance, on an occurrence form, with limits not less than $1,000,000 each occurrence and deductible not more than $25,000
N. Corporate surety bond, cash deposit or letter of credit for 150% of the value of the right-of-way work to be done, in order to guarantee faithful performance of the permitted work
O. Maintenance Bond - Two years – minimum 10% of construction costs

2.3.8 TECHNICAL INFORMATION REPORT (SURFACE WATER)

The scope of drainage review varies with the project complexity and potential surface water impacts. Refer to the adopted King County Surface Water Design Manual to determine Technical Information Report and design requirements appropriate for the project.

2.3.9 GEOTECHNICAL REPORT

A geotechnical report helps determine if the proposal for a site is appropriate. A geotechnical report contains information used to design retaining walls, foundations, permeable pavements, hazardous waste facilities, and infiltration systems, such as trench drains, sand filters and septic drain fields. Geotechnical reports also supply information for settlement analysis, liquefaction, structural fill, and storm water design. The report shall meet the City's current sensitive area, Public Works, and Uniform Building Code requirements.

The City may require a geotechnical investigation and report based on the nature of the proposal. All of the following require a geotechnical investigation and report prepared by a Geotechnical Engineer.

A. Unless waived by the Building Official:
    1. All new buildings except a residential structure that falls under the International Residential Code
    2. Any structure, including a rockery, that retains a surcharge
    3. Any retaining structure, including a rockery, that is over four feet above existing grade
    4. Grease interceptors that are 1000 gallons or larger
    5. Surface water retention/detention structures, including bioretention and permeable pavements
B. Unless waived by the Department of Community Development Director:
    1. Any work on sites containing or adjacent to slopes that are 15% or steeper
    2. Grading that requires environmental review under the State Environmental Policy Act
C. Unless waived by the Public Works Director:
    1. Surface water infiltration, including bioretention and permeable pavements
    2. Riverbank Stability (Ordinance 2038)
    3. Hazardous Waste Facility Design

The reporting requirements for single-family permits may be waived, if a report for the site meeting the City of Tukwila's criteria has been filed less than five years before the date of application and the Geotechnical Engineer who signed the report prepares a written letter

stating the report is still applicable to the site and currently proposed project. Similarly, reporting requirements may be waived for single-family permits if the applicant can demonstrate, to the City's satisfaction, that soil or groundwater conditions at or near the site pose little or no risk.

2.3.10 TRAFFIC CONTROL PLAN

Prior to beginning any activity which might affect City right-of-way, the Applicant/Permittee shall provide the City, for review and approval, a traffic control plan that meets MUTCD standards. The traffic control plan shall accurately reflect existing site conditions including accesses, channelization, sidewalks, bike/pedestrian paths, bus stops and such. The Applicant must provide the location, address and description of expected traffic flow during the proposed work. Refer to section 2.4.4-F for City Right-Of-Way work restrictions.

2.3.11 RIVERBANK STABILITY ANALYSIS

As part of the Flood Control Zone permit application, the Applicant must provide a riverbank stability analysis for projects adjacent to the Green/Duwamish River, whenever the natural riverbank is expected to provide bank protection for the life of the project. A geotechnical engineer must prepare the analysis. The geotechnical engineer must certify that the riverbank is stable for the lifetime of the proposed project.

The analysis scope will vary with the site conditions. All elevations shall use the same datum as the FZCP submittal. The analysis report shall include assessment of current conditions, conclusions, and construction recommendations. At a minimum, the report shall include:

A. Site map showing location of riverbank cross-sections, structures, roads, drainage, wells, septic tanks, utilities, and other significant features at the project site.
B. Riverbank cross-sections at intervals sufficient to provide accurate detail for analysis. Cross sections should show the top-of-bank, grade-breaks, toe-of-bank, and, whenever feasible, streambed geometry.
C. Soil strength and erodibility parameters, current slope stability and expected slope stability during rapid drawdown, including factors of safety. Provide possible failure modes and failure causes.

D. Discussion of risk and possible environmental effects, both locally and downstream.
E. Prevention measures, repair and monitoring requirements.

2.3.12 SANITARY SEWER

Your project may require submittal of any of the following:

A. King County Sewer Use Certification form for new or modified facilities,
B. South King County Health Department septic system approval for construction on a site having a septic tank,
C. Copy of King County Industrial Waste Discharge approval for gas stations and some industrial operations that discharge to a sanitary sewer,
D. Septic tank abandonment documentation,
E. Copy of King County Department of Natural Resources approval for direct side sewer connection to interceptor lines.

2.3.13 FINANCIAL GUARANTEE

A. For work in the right-of-way Applicant shall provide:
    1. A corporate surety bond, cash deposit or letter of credit for 150% of the value of the proposed right-of-way work, in order to guarantee faithful performance of the permitted work.
    2. A corporate surety bond, cash deposit or letter of credit for 10% (minimum) of the value of the right-of-way work, to guarantee workmanship and materials for two years following completion of work.
B. For hauling, the applicant shall provide a $2,000 financial guarantee to assure clean up and repair of any damage.
C. For moving an oversize load, the applicant shall provide a $5,000 financial guarantee to assure repair of any damage.
D. For the Public Works part of a subdivision, short plat, or projects containing or abutting sensitive areas, the Owner shall provide a corporate surety bond, cash deposit or letter of credit for 150% of the total cost of the proposed work to guarantee performance of proposed work.
E. For street lighting as part of subdivision, the Owner shall provide financial guarantee according to TMC 11.12.110.
F. The Director may require a financial guarantee for 10% of the project costs for erosion prevention and sediment control on projects which clear more than 6000 square feet or contain or abut sensitive areas

such as Class 2 or steeper slopes, wetlands, or critical drainage.

2.3.14 INSURANCE

A. Permittee performing work within City right-of-way shall provide proof of the following insurance, showing the City as additional insured:
    1. Comprehensive general liability insurance with limits not less than $2,000,000.
    2. Business automobile liability insurance with limits not less than $1,000,000.
    3. Contractor's pollution liability insurance, on an occurrence form, with limits not less than $1,000,000 each occurrence and deductible not more than $25,000.
B. If the Director determines the nature of any work is such that it may create a hazard to human life, endanger adjoining property, street, street improvement, or any other public property, the Director may require the applicant to file a certificate of insurance. The Director, based on the nature of the risks involved, shall determine the amount of insurance.

2.3.15 HOLD HARMLESS

The Applicant shall complete a hold harmless agreement for activities in the right-of-way, for activities in or near a sensitive area, and for major deviation from City standards. Hold harmless agreements are available in Public Works.

2.3.16 EASEMENT(S)

The City reviews and approves all easements prior to recording with King County Records.

For easements granted to the City, the legal description(s) and exhibit(s) shall be prepared and stamped by a land surveyor, or professional engineer registered in Washington State. The easement document shall include the easement legal description and a site plan showing the easement location, and shall specify maintenance responsibility, when applicable. (TMC 11.12.050)

A. Utility
    Water, sewer, drainage facilities, minimum 20 feet wide, generally, ten feet either side of the centerline of the facility. Additional width may be required to accommodate maintenance.

Utility easements adjacent to public right-of-way shall be ten feet wide.

B. Traffic
   Where needed for purposes of traffic safety or access to schools, playgrounds, urban trails, shopping facilities, or other community facilities, public easements for bikeways or walkways, not less than ten feet in width, will be provided.
C. Levee access
   All proposed development adjacent to the Green River shall, as part of their permit submittal, grant access and maintenance easements for existing or future dikes/levees and riverbanks along the Green River. The City, in cooperation with King County, shall determine these easement locations and widths.
D. Non-motorized easements
   The easement shall be wide enough to include the trail plus at least two feet on each side.

2.3.17 PROPERTY DEDICATION

The City may require right-of-way dedication to incorporate necessary transportation improvements. Property shall be deeded to the City using a statutory warranty deed. The dedication must be accompanied by a Title report less than 6 months old and a completed excise tax affidavit.

2.3.18 MAINTENANCE AGREEMENT(S)

A. Before Public Works final project approval, the Permittee/ Owner/ Contractor shall provide Maintenance Agreements, in recordable format, for common improvements such as access, utilities, surface water elements, and cul-de-sac landscape island.
B. For street lighting as part of subdivision, the Owner shall provide financial guarantee according to TMC 11.12.110.

2.3.19 PERMITS FROM OTHER AGENCIES

It is the Applicant's responsibility to obtain permits from outside agencies such as WDFW, Department of Natural Resources, Corps of Engineers, Department of Ecology, Department of Health, WSDOT or FEMA. The Director requires proof of other required permits prior to issuing permit approval.

2.3.20 DEVELOPER AGREEMENT

The City and the Developer shall enter a Developer Agreement whenever required by the City. The Developer Agreement shall be written and signed before the permit is issued. The Developer Agreement should contain work descriptions and estimated costs. The Agreement should assign responsibilities for the work performance and shall provide an expiration date.

2.3.21 DEVELOPER REIMBURSEMENT AGREEMENT (LATECOMER AGREEMENT)

The City may enter into agreements with developers who have installed public improvements valued at $50,000 or more, in order to provide for reimbursement of a fair prorated share by any real estate owners who have not contributed to the original cost of such facilities, and who subsequently connect to, or use the improvement. Such agreements shall be entered into at the time of, or prior to, issuance of a Certificate of Occupancy. The Public Works Department shall approve the prorated share based on construction cost provided by the Developer.

The developer is responsible for initiating, executing, and, after City approval, recording the latecomers agreement with the County. The agreement must include a list of those properties that will benefit from the improvement, a map outlining and designating these properties, legal descriptions as required by the City, backup data supporting the costs submitted, and an expiration date.

There are three acceptable methods for the determination of benefit: 1) gross parcel area, 2) property frontage, or 3) number of connections. The proponent will submit the format most appropriate to the nature of the project, as approved by the City. No credit will be given for open space, recreation areas, or undevelopable portions of the development proposal when calculating gross parcel area. The City will collect the latecomer's fee from property owners, which benefit from the improvements and will meet the Revised Code of Washington when disbursing payment to the developer.

SECTION 2.4 CONSTRUCTION

Contractor/Permittee shall perform all work in accordance with all federal, state, and local laws and shall be in accordance with

approved plans, specifications, and permit conditions. The Permittee/Contractor shall maintain a set of approved plans, specifications, and associated permits on the job site. Permittee shall apply for a revision for any work proposed that is not according to approved plans and specifications, and permit conditions.

2.4.1 MATERIALS

Materials proposed for use in construction of publicly owned or publicly maintained utilities must be in conformance to approved material standards. Unapproved materials cannot be adequately evaluated within the plan review period.

2.4.2 PRECONSTRUCTION CONFERENCE

Prior to beginning any work, Permittee/Contractor shall contact the City's Inspector to arrange a preconstruction conference.

2.4.3 CONSTRUCTION ON EASEMENT

Construction on easement(s) shall be performed strictly in accordance with the easement provisions. The Permittee/Contractor shall make himself aware of all conditions pertaining to the easement agreement. No work shall be permitted in easement areas where City utilities may be located until specifically authorized by the City.

2.4.4 RIGHT-OF-WAY

A. Access
    1. During construction and until permanent access is installed and approved, provide pedestrian/ADA and emergency access to any abutting public school, public building, urban trail, transit stop, or business.
    2. Provide temporary sidewalk, curb ramp, or bike path, meeting the Director's approval, when construction blocks existing.
    3. Maintain access to fire stations, fire hydrants, fire escapes, and firefighting equipment. Do not place materials or obstructions within 15 feet of fire hydrants.
B. Monuments
    1. Locate and protect survey monuments, property corners, bench marks, and other such.

2. All disturbed monuments shall be replaced by a Washington State licensed surveyor at the Owner's expense.

C. Drainage
   1. Keep existing drainage features free of dirt and other debris.
   2. Reroute flow when it is necessary to block or otherwise interrupt a drainage feature. (TMC11.08.220)

D. Cuts
   1. Roadway crossings for utilities shall be by jacking, tunneling, or boring with "windows" or shafts 20 feet or more apart.
   2. Crossing under State Highways and crossings involving railroads or other easements and rights-of-way will also require approval from the appropriate agency.
   3. Newly constructed or recently overlaid streets shall not be open cut for three years. Open cuts are allowed on an exception basis and only when roadway conditions warrant or in cases of undue hardship.
   4. All pavement cuts in right-of-way are subject to a pavement mitigation fee.
   5. All pavement cuts in right-of-way must have a preapproved street and pavement restoration plan.

E. Restoration

Any disturbance of right-of-way or right-of-way facilities, including sidewalks and vegetation, shall be restored to current City standards. The City shall approve all backfill and pavement base. All damaged or broken pavement and other disturbed pavement shall be replaced with the same type and depth of pavement adjoining the disturbed area.

F. Restrictions
   1. Any lane closure within the City of Tukwila shall have traffic control plans reviewed and approved by the City Engineer.
   2. From the third Thursday in November through the following January 1st, the Director restricts lane closures in the Tukwila Urban Center. The Director will consider exceptions to these restrictions upon written request on a case by case basis.
   3. Maintain emergency, pedestrian, and vehicular access to buildings, trails, and transit at all times.
   4. Keep all roadways free of dirt and debris using street sweepers. Use of water trucks for cleaning roadways requires preapproval from the Director.
   5. Install and secure non-skid steel plates over any trench at any time work has stopped and the trench is left open.

Place warning signs in locations adequate to warn drivers and bicyclists. Warning signs shall read "Motorcycles Use Extreme Caution" and "Caution Steel Plates Ahead".

2.4.5 TRENCH EXCAVATION

Construct per City of Tukwila standard detail G-1 and WISHA/OSHA requirements and meet the erosion prevention and sediment control requirements.

A. All trench excavation operations shall meet or exceed all applicable shoring laws for trenches.
B. During excavation, divert any surface water and pump the trench as needed to keep the trench free of water. Store pumping equipment near the trench excavation to ensure that these provisions are carried out.
C. Completely excavate boulders, rocks, roots, and other obstructions or excavate to the width of the trench, and to a depth of 6 inches below the bottom pipe grade.
D. Use hand tools to:
    1. Finish the trench bottom in such a manner that the pipe will have a uniform slope along the entire length of the pipe.
    2. Excavate the bell holes enough to make up the joint.
E. Extend trenching operations a maximum of 100 feet in advance of the pipe laying operation. For excavation greater than 100 feet, the Permittee must obtain written approval from the Director.

2.4.6 STOP WORK ORDER

A. Following written notice to the Permittee, the Director may suspend or revoke any permit for any of the following reasons:
    1. Changes in site runoff characteristics upon which the permit is granted.
    2. Construction not in accordance with the approved plans.
    3. Noncompliance with correction notice(s) or stop work order(s) issued for erosion or sediment controls.
    4. Immediate danger to a downstream area or adjacent property as determined by the Director.
B. The Director may post a site with a "stop work" order directing that all construction activity cease immediately. The issuance of a "stop work" order may include any "discretionary conditions" or "standard requirements" which must be fulfilled before work under the Permit may continue.

C. No person shall continue or permit the continuance of work in an area covered by a "stop work" order, except work required to correct an imminent safety hazard as prescribed by the Director.
D. The cost of any corrective measures shall be borne by the Permittee.

2.4.7 INSPECTIONS

A. All public infrastructure construction is to be done under the control and at the direction of the Public Works Director. Public Works supervises and inspects the design and installation of public improvements.
B. For private development, Public Works approves permits and inspects the public works elements of the development.
C. Field Inspections
    1. The Permittee shall schedule Public Works inspections at least 24-hours in advance. The inspections shall occur at completion of significant work segments, at intervals sufficient to confirm all work is performed in accordance with the plans and specifications, and at the project completion.
    2. Work covered prior to inspection will be uncovered at the expense of the Permittee.
    3. At a minimum, the Permittee shall request inspections for the following events:
        a. Before backfilling, for compliance with all construction standards.
        b. After placement of rock, for compaction and material quantity and quality verification.
        c. Prior to the placement of any materials, which would preclude full and complete inspection of construction, which will be buried or covered.
        d. At completion of sub-grade, for compaction and grade.
        e. During and after placement of finish course for compaction and material (quantity and quality).
        f. After placement of forms and before pouring for line, grade, and compaction.
        g. All pressure testing, including air and water tests.
D. Sampling and Testing
    1. Tests and material sampling for the purposes of determining compliance with the specifications shall be required at the Director's discretion. All costs incurred for testing or sampling, done at the Director's request, shall be the responsibility of the Permittee.

2. Determination of field density of compacted earth will be per ASTM D1557: "Modified Proctor."

E. Video Pipe Inspection

1. Prior to inspection and acceptance of any sanitary sewer and storm drainage pipes, all pipes and structures shall be cleaned and flushed. Any obstructions to flow within the system, (such as rubble, mortar and wedged debris), shall be removed at the nearest structure.
2. Cleaning and flushing of the pipes and structures shall be at the sole cost of the permittee.
3. Video Inspection: The permittee shall perform a complete video inspection of all 8-inch and larger pipes and associated appurtenances. The contractor shall provide to the City a digital video disk (DVD) audio-visual recording of these inspections. The DVD shall be formatted to allow real time fast forward and reverse review of the inspections. Individual structure-to-structure pipe runs shall be saved as separate files on DVD with file names relating to structures identifications numbers and plan set, or as approved by the City. All equipment and materials shall be compatible with existing City-owned equipment. It shall be the permittee's responsibility to confirm equipment compatibility and DVD file formats with the City prior to inspection. A Pan-And-Tilt Camera with the proper sized light head for the size of pipe being inspected shall be utilized by the Contractor at all times for televised inspection. The finished product shall be clear and have the proper amount of lighting to see any and all defects encountered during the inspection. Camera shall be equipped with a 1" reference ball at all times to aid with inspection of 8-inch diameter pipe. Pipe of 12-inch diameter or larger will require a 2" reference ball to aid with the inspection.

At all times during the video inspection process, the City shall be present. The City shall be notified forty-eight (48) hours prior to any video inspection.

The Permittee shall bear all costs of video inspection and all costs incurred in correcting any deficiencies found during video inspection including the cost of additional television inspection that may be required by the City to verify the correction of said deficiency.

SECTION 2.5 FINAL PROJECT APPROVAL

2.5.1 WORK COMPLETION

Upon completion of all required project elements, the Permittee shall request a final inspection by contacting the Public Works Inspector. The permit process is complete upon sign-off of the issued permit(s) by the Director.

2.5.2 PERMANENT STABILIZATION

All disturbed areas must have permanent stabilization in place and functioning before the temporary erosion prevention and sediment control measures are removed.

2.5.3 FLOOD CERTIFICATE

Upon completion of construction and prior to Final Public Works Inspection, the Permittee shall provide Public Works with a completed Elevation Certificate for residential. For non-residential, Permittee shall provide a completed Flood-proof Certificate or Elevation Certificate.

2.5.4 FINANCIAL GUARANTEE

The owner/agent shall provide a two-year guarantee for the faithful performance of the operation and maintenance to improvements in the right-of-way or on City property. The guarantee shall be by a surety approved by the Director.

2.5.5 TURNOVER DOCUMENTS

The City requires Turnover Documents when a developer constructs public infrastructure as part of private development. The owner/agent shall provide a complete set of turnover documents before Final Public Works Inspection. The Mayor's Office or the City Council must accept constructed infrastructure, when the value exceeds $25,000. If the City does not accept the constructed infrastructure, the ownership and maintenance of the facilities remains the sole responsibility of the Developer.

2.5.6 RECORD DRAWINGS

All projects, including most single-family residences with a constructed drainage facility, require Record Drawings. Projects will not receive

final approval from Public Works until a complete set of Record Drawings is submitted and approved. For public facilities and facilities installed in the right-of-way, the owner/agent shall provide record construction drawings at project closeout.

Record drawings shall accurately reflect design revisions that were made to the approved plans during construction. The record drawings shall locate all existing and abandoned utilities encountered during construction, but not shown on the approved plans.

A Washington State registered professional engineer of record shall approve the record drawings. As-built survey information provided on a record drawing shall be provided by a Professional Land Surveyor currently licensed in the State of Washington, who certifies that the as-built survey and revisions to the Record Drawings were performed under the surveyor's direction. Information from sources such as the contractor's red-lined drawings, for which the surveyor is not responsible, shall be clearly noted/identified on the face of the Record Drawings.

The owner/agent shall provide record drawings on 4.0 mil double matte mylar drafting film (24" by 36") and in AutoCAD format and PDF on CD (or DVD). Each drawing, except for the digital file, shall bear the engineer and the surveyor stamps, signed and dated.

2.5.7 SURVEY DATUM

The drawing and all utility features shall be accurately located in Washington State Plane (grid) Coordinates, North Zone, using NAD 83/91 survey control and tied to at least two City of Tukwila Horizontal Control Monuments. Elevations shall be NAVD 88.

CHAPTER 3 PLANS AND SPECIFICATIONS

SECTION 3.0 GENERAL

A. Plans, as used herein, means the plans, profiles, and cross-sections showing all work related to a specific project. To ensure completeness and clarity and a timely response from the City, the Engineer should exercise particular care when preparing the plans.
B. The plans shall clearly indicate the location, nature, and extent of the proposed work and shall provide sufficient detail to show that all provisions of the standards and codes are met. The Engineer/Applicant shall provide specifications along with the plans whenever the plans and notes do not adequately describe the proposed work and materials.
C. A complete plan set includes:
    1. Cover sheet
    2. Survey sheet
    3. Plans, profiles, cross-sections
    4. Typical details
    5. Construction notes
    6. Specifications
D. Refer to Appendix C for a Plan Review Checklist to help ensure completeness.

SECTION 3.1 RECORD DRAWINGS

Record drawings shall conform to these Standards (Chapter 2) and to the Plan Review Checklist (Appendix C) and shall accurately reflect all design revisions. As-built survey information provided on a record drawing shall be provided by a Washington licensed land-surveyor.

SECTION 3.2 DRAFTING STANDARDS

3.2.1 PROFESSIONAL ENGINEER

A professional engineer, registered in Washington State, shall prepare the plans, and stamp, date, and sign each sheet, except for a single family residence that is not in or adjacent to a sensitive area and does not trigger a Technical Information Report for the surface water.

3.2.2 SUBMITTAL OF PLANS

All plans submitted for either design approval or permanent record will be free of photographs, stick-ons, or shading. Hatching may be acceptable, if the pattern is not excessively dense.

3.2.3 SHEET SIZE

A. Engineering Drawings: 11" X 17" (min), 24" X 36" (max)
B. Survey Drawings: 18" x 24"

3.2.4 TEXT

Text - Prepare plans understanding that each sheet might be microfilmed. Use nominal text size 1/8" as a minimum.

3.2.5 LINE STYLE

A. Provide plans in a clean, legible, blue or black line format.
B. Produce all existing features with a small pen or half tones.
C. Distinguish proposed features from existing features by using a larger or bolder line weight.
D. Use different line types to distinguish different features. For example: centerline and right-of-way will have different line types.

3.2.6 MONUMENTS

A. Show all existing and proposed monuments.
B. Describe all monuments using current City of Tukwila coordinates.
C. Reference roadway centerlines, easements (with type and dimensions), and other pertinent data to existing monuments.
D. Show or describe protection of monuments, including property corners.

3.2.7 DATUM

A. For public facilities, work in the right-of-way, and Capital Improvement Projects:
    1. Horizontal - Washington State Plane (grid) Coordinates, North Zone, using NAD 83/91 survey control and tied to any two City of Tukwila Horizontal Control Monuments
    2. Vertical - NAVD 1988
B. For private property other than a single family residence:

1. Horizontal - Washington State Plane (grid) Coordinates, North Zone, using NAD 83/91 survey control and tied to any two City of Tukwila Horizontal Control Monuments
2. Vertical - NAVD 1988

C. For Flood Control Zones provide conversion calculations to NAVD 1929

3.2.8 TITLE BLOCK

A. Title:
B. Date:
C. Design by:
D. Drawn by:
E. Checked by:
F. Signature Approval block
G. Sheet number of total sheets (e.g., 2 of 5)
H. Revisions and revisions dates

3.2.9 SCALE

Scale - Scale the drawings using an engineer's scale. No engineering plans will be accepted with architect's scale.

A. For site work:
   1" = 40' Horizontal
   1" = 4' Vertical
B. For Public Facility:
   1" = 20' Horizontal
   1" = 2' Vertical
C. For Signal Drawing Sheet:
   1" = 10'
D. For Illumination:
   1" = 30'

3.2.10 LABELED RECORD DRAWING

Labeled as-built drawing, (minimum text height ¼")

SECTION 3.3 DESIGN ELEMENTS

The plans shall show existing and proposed for all elements on and near the site, including the following:

A. Topography - Existing and proposed topography (two-foot contours) for 15 feet outside the property lines. Projects within flood control zones and some storm drainage plans require 1-foot intervals.
B. Easements – existing and proposed, type, and dimensions.
C. Clearing limits.
D. Construction limits.
E. No work zones.
F. Sensitive areas – Flood zone, shoreline, steep slopes, wetlands, streams.
G. Buffers and set-backs.
H. Finished floor elevation.
I. Building footprints onsite and within 15' of the property lines.
J. Rights-of-way accesses.
K. Adjacent property lines and addresses.
L. Street names with quadrant prefix or suffix.
M. Existing and proposed pedestrian and bicycle facilities.
N. Existing and proposed utilities and improvements (above and below ground). Show information and location of all existing and proposed utilities, above and below ground. Include Cable, conduit, telephone, gas, water, sewer, fire hydrants.
O. Landscaping: trees, shrubs, ground cover.
P. Onsite and offsite - Fire hydrants, mail boxes, street lights, traffic signals, meters, electrical cabinets, and other such.

SECTION 3.4 DESIGN CONSIDERATIONS

3.4.1 SENSITIVE AREAS

The plans must show location, type, and rating of all sensitive areas in and near the project site. The plans must show the buffers and building setbacks.

3.4.2 FLOOD ZONE

Show the nature, location, dimensions, and elevations of the area in question, including existing or proposed structures, proposed fill, materials storage, drainage facilities. Specifically, the following information is required:

A. Elevation in relation to mean sea level, of the lowest floor of all structures,
B. Elevation in relation to mean sea level to which any structure has been flood proofed.

3.4.3 SEWER SEPARATION

Install water lines at least 10 feet horizontally, measured edge to edge, from any existing or proposed sewer line. 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.

3.4.4 SURFACE WATER

Public Works requires design to the most current King County Surface Water Design Manual. Public Works recommends referring to the City's latest Surface Water Comprehensive plan and contacting the City's Surface Water Engineer during the early design stages of surface water design.

3.4.5 STREAM CROSSING

All stream crossings require written hydraulic project approval from the WDFW. The Applicant shall provide the Director a copy of the WDFW approval prior to permit issuance. Refer to Section 5.6 for additional information.

3.4.6 WATER COURSE RELOCATION

If a watercourse will be relocated, provide description of the extent to which the watercourse will be altered or relocated because of proposed development. All work within the City shall conform to the requirements of the current NPDES (National Pollution Discharge and Elimination System) Western Washington Phase II Municipal Stormwater Permit, of which the City is a permittee. Refer to Sections 5.5 through 5.7 for additional requirements. The Director, acting for FEMA, will require:

A. Notification to adjacent communities and the Department of Ecology (DOE) prior to any alteration or relocation of a watercourse, and evidence that notification was provided to the Federal Insurance Administration.
B. Maintenance within the altered or relocated portion of said watercourse so that the flood carrying capacity is not diminished.

3.4.7 EROSION AND SEDIMENT CONTROL (ESC) PLAN

Plans for any activity that disturbs ground shall include an erosion prevention and sediment control plan designed in accordance with the current edition of the King County Surface Water Design Manual. The plan shall provide information for temporary erosion prevention and sediment control during all phases of construction and shall provide permanent stabilization for disturbed areas. Refer to Section 5.10 for additional ESC requirements.

3.4.8 POLLUTION PREVENTION PLAN

Refer to the King County Storm Water Pollution Prevention Manual, current edition, for best management practices for pollution prevention plan. Refer to Section 5.11 for specific Pollution Prevention Plan requirements.

3.4.9 LOW IMPACT DEVELOPMENT

Low impact development is the preferred approach to planning, design and construction where feasible. Refer to the following:

A. King County Surface Water Design Manual, current edition
B. Department of Ecology Stormwater Management Manual for Western Washington December, current edition
C. Western Washington Low Impact Development (LID) Operations and Maintenance (O&M), by the Washington State Department of Ecology Water Quality Program, May 2013.
D. Low Impact Development Technical Guidance Manual for Puget Sound (LID Technical Guidance Manual) by Puget Sound Partnership and WSU Extension Center, Puyallup, Washington, December 2012
E. Rain Garden Handbook for Western Washington Homeowners (Rain Garden Handbook) by the Pierce County Extension of Washington State University, June 2013.

CHAPTER 4 STREETS

SECTION 4.0 GENERAL

4.0.1 TRANSPORTATION ELEMENT

All roadway design in the City shall meet the design guidelines and requirements in the Transportation Element of the Comprehensive Land Use Plan, other applicable subarea plans, and the Subdivision Code (TMC 17.20).

4.0.2 MANUFACTURING/INDUSTRIAL CENTER

For projects in the MIC/L or MIC/H according to the City of Tukwila Zoning Map and Sections 18.36 and 18.38 of the TMC, provide driveway design and location per RS-37.

4.0.3 DEVELOPMENT SITES

A paved street surface shall serve all development sites. This street surface shall connect to an existing paved street surface. (TMC 11.12.060)

4.0.4 FRONTAGE IMPROVEMENTS

A. The installation of street frontage improvements is required prior to issuance of a certificate of occupancy for new construction, other than single-family homes, or prior to final approval for subdivisions and 5-9 lot short plats and Planned Residential Developments. For additions and remodels to existing buildings, see TMC 11.12.070.
B. Complete street frontage improvements shall be installed along the entire frontage of the property at the sole cost of the permittee as directed by the Director. Street frontage improvements may include curb, gutter, sidewalk, storm drainage, street lighting, traffic signal equipment, utility installation or relocation, landscaping strip, street trees and landscaping, irrigation, street widening, and channelization. Beyond the property frontage, the Permittee shall provide ramps from the new sidewalk or walkway to the exiting shoulder, and pavement and channelization tapering back to the existing pavement and channelization as needed for safety.
C. When (due to site topography, city plans for improvement projects, or other similar reasons) the Director determines that street frontage improvements cannot or should not be constructed at the time of

building construction, the property owner shall, prior to issuance of the building permit, at the direction of the Director:

1. Pay to the City an amount equal to the property owner's cost of installing the required improvements prior to issuance of a building permit. The property owner shall provide documentation satisfactory to the Director that establishes the cost of the materials, labor, quantities; or
2. Record an agreement which provides for these improvements to be installed by the property owner by a date acceptable to the Director; or
3. Record an agreement to not protest a local improvement district to improve the street frontage.

D. If, at a time subsequent to the issuance of a building permit, a local improvement district is established that includes the property for which the building permit was issued, the property may be considered in the compilation of the local improvement district assessment with the appropriate amount of costs of construction expended by the developer.

E. The Director under either of the following conditions may waive the requirement for installation of frontage improvements:

1. If the exact location of the adjacent street frontage improvements cannot be determined at this time; or
2. If the installation of the required improvement would cause significant adverse environmental impacts.

F. For additions, alterations, repairs adding square footage to existing structure, or new accessory building:

1. Street improvements shall be constructed and shall be determined by the Director.
2. Property owner costs shall be 10% or less of the total improvement cost.
3. Director may waive.

G. For additional structure(s) on private campus

1. Street improvements shall be constructed and shall be determined by the Director.
2. Property owner costs shall be 10% or less of the total improvement cost.

H. For additional structure(s) on Public campus

1. Street improvements shall be installed along entire frontage.
2. Corner lots, etc. when cost does not dictate all frontage be improved, Director will determine which frontage will be improved.

I. For single Family Residence (TMC 11.12.080)

1. In all cases install surface water drainage on all frontage.

2. Abutting unpaved street, not a corner lot, requires a ½ street section of pavement or a No Protest LID for pavement and storm drainage.
3. Abutting both paved and unpaved requires ½ street pavement and drainage on unpaved right-of-way.
4. Contiguous to a parcel served by paved street requires ½ street and drainage frontage abutting existing paved right-of-way.
5. Abutting a paved street surface requires complete minor pavement edge improvements.

J. For landscaping, easement, access tracts (TMC 11.12.100) the following apply when there are frontage improvements:
   1. Retain existing vegetation, and replace and replant existing vegetation that gets disturbed during development.
   2. Arterial street landscaping must include installation of ground cover in erosion areas and installation of trees per City standards.
   3. Abutting property owners maintain landscaping, unless City specifically accepts the responsibility.
   4. City may require removal of landscaping that encroaches on right-of-way.

4.0.5 RIGHTS-OF-WAY, EASEMENTS, AND IMPROVEMENTS

The developer shall dedicate right-of-way and grant easements for all public streets and non-motorized facilities needed to serve a proposed development. (TMC 11.12.050)

4.0.6 DEAD END STREET (TMC 17.20.030)

New public and private dead-end streets are not allowed, unless justification can be provided for their necessity. If new or necessary, they must terminate with a cul-de-sac and a landscaped island. The maximum cul-de-sac length allowed is 600', measured from the edge of curb or edge of pavement at the connection to the end of the right-of-way at the cul-de-sac.

A hammerhead is allowed when the road is less than 200 feet and serves less than six lots. A temporary dead end can terminate with barricade(s). (TMC 11.12.170) Refer to RS-02 for cul-de-sac and hammerhead dimensions.

4.0.7 GRADE

The maximum grade for all roadways and driveways shall be fifteen percent (15%). Grades over 15% require approval of the Director and the Fire Department. Streets with slopes greater than 15% shall be concrete.

4.0.8 PARKING LOTS

All permanent parking lots shall be paved. Temporary lots can be gravel with paved driveway aprons if lot is paved within three (3) years of operating temporary lot.

4.0.9 BUS

Provide bus pullouts as required on principal arterials. Bus pullouts shall be cement concrete pavement.

4.0.10 UTILITY RELOCATION

The developer shall relocate any utilities that must be relocated to accommodate street or other required improvements.

4.0.11 NON-MOTORIZED FACILITIES (TMC 11.12.150)

A. Pedestrian Systems
   1. Internal pedestrian circulation systems shall be provided within and between existing, new and redeveloping commercial, multifamily and single family developments, activity centers, and existing frontage pedestrian systems.
   2. Concrete sidewalks
      a. Arterial street - on both sides.
      b. Non-arterial street longer than 200 feet –both sides.
      c. Non-arterial less than 200 feet – one side.
      d. Public streets accessing existing or planned sidewalk, activity centers, parks, schools, neighborhoods, or public transit facilities – both sides.
      e. Director may grant exception.
   3. Pavement in lieu of concrete is acceptable when:
      a. The facility is temporary.
      b. Flexible pavement is required due to soils and topography.
      c. The neighborhood character does not warrant concrete.

B. Bikeways and Walkways
   1. Bikeways and walkways will be surfaced with asphalt concrete. Bikeways and walkways will be illuminated in accordance with the specifications set forth in this standard. Install posts or other facilities to prohibit the passage of motor vehicles through pedestrian easements.

C. Non-motorized easements
   1. Following City approval, record with King County Records, an easement titled "City of Tukwila Non-motorized Public Easement".
   2. The easement shall be the trail width plus 2 feet on each side (can vary). A designated bicycle route may require additional paved right-of-way.
   3. The easement shall specify the maintenance requirements and designate responsible parties.

4.0.12 NEW STREETS

A. Where a street is designated by the Land Use Comprehensive Plan and is within the boundaries of a development, the developer shall dedicate the entire right-of-way, and shall construct frontage improvement.
B. Where a street designated in the Comprehensive Plan is adjacent to a boundary of a development, the developer shall dedicate the necessary right-of-way and shall construct frontage improvement.

4.0.13 HALF STREET

The construction of half-street improvements will be permitted only along the boundaries of a development. Pavement, at least twenty (20) feet in width or as required for that street classification (measured from curb face) will be provided, and an adequate right-of-way width may be dedicated.

4.0.14 ALLEYS

The Director may allow an alley at the rear of single-family residential, multifamily residential, commercial, or industrial property. An alley not required for fire suppression access, solid waste collection, or other public purposes may be privately owned. A private alley must conform to all improvement standards for public alleys, must be posted as a private alley and must meet all other provisions

applicable to private streets. A dead-end on a public alley is prohibited.

4.0.15 SIGHT DISTANCE

Sight distance at intersections and right-of-way access points shall meet the most current edition of AASHTO Policy on Geometric Design and shall be clear of sight obstructions.

4.0.16 PAVEMENTS AND PERMEABLE PAVEMENTS

Where the terms "asphalt" and "concrete" are used in these standards as general descriptors of surfacing materials, the terms shall be understood to include both the impermeable and the permeable versions of the pavement.

Where a permeable pavement is proposed on a fire lane, the surface must be capable of supporting a live load of HS-25 (AASHTO Load Factor Design) and an outrigger load of 45,000 lbs applied to an area of 2 feet x 2 feet on 16-foot centers.

SECTION 4.1 PRIVATE STREETS (TMC 17.20.030.C(5))

A. The City allows private streets when the street:
    1. Serves four or fewer lots,
    2. Is part of a Planned Residential Development, or
    3. Serves commercial or industrial facilities where no circulation continuity is necessary.
B. Owner(s) must provide:
    1. Recorded covenant granting the City the right to fully use the private street for emergency access and public service vehicles.
    2. Recorded provision for the ownership and maintenance of the private street by the owners within the development.
    3. Final site plans showing private streets must include an unconditional and irrevocable offer of dedication that may be accepted by the City Council at such time as the street is needed for development of contiguous property or for the protection of public health, safety and welfare. The design and improvement of any private street will be subject to all of the requirements prescribed by this document for public streets.
C. Owner(s) must install and maintain a sign indicating the street is private.

SECTION 4.2 PUBLIC STREETS

Streets longer than 200 feet or streets that serve more than four lots shall be constructed to public street standards. See City of Tukwila standard detail RS-01.

4.2.1 GEOMETRIC DESIGN

On the plans, note the sight distance for horizontal and vertical curves, intersections, and access points. Setbacks shall meet the current edition of the AASHTO Policy on Geometric Design. (TMC 11.20.090)

4.2.2 ALIGNMENT AND CONNECTIONS

A. Alignment
    1. Align proposed streets and other primary accesses with existing streets or accesses.
    2. Relate alignments, where practical, to natural topography.
    3. Select alignment to minimize grading and avoid excessive runoff.
B. Connections
    1. Provide street connection to any existing public street or right-of-way "stub" abutting the proposed development.
    2. Provide "stub" roads for connection to any adjacent undeveloped, or partially developed, contiguous land, and to any site officially designated for a public facility.
    3. Locate a stub so that it allows for future block sizes consistent with the Land Use Comprehensive Plan.
    4. Locate "stub" connections to other "stub" roads on adjacent and nearby property.
    5. Install "Dead End" signage. Dead End Sign 30x30 W14-1 or W14-2 No Outlet installed per RS-23A.
    6. Install "End of Sidewalk" sign where sidewalk ends abruptly.

4.2.3 STREET INTERSECTIONS

A. Primary points of access or street intersections with centerline offsets of less than one hundred fifty (150) feet will not be allowed unless the Director finds special conditions requiring a reduction. The intersection spacing requirements will not be used as criteria/justification to close existing streets.
B. Unless required by street spacing standards, intersections on curves will be avoided.

C. Right-of-way and curb radii will be provided at all intersections in accordance with the Land Use Comprehensive Plan and the Transportation Element. Curb radii will be the smallest necessary to achieve the goals at each intersection.
D. Turning lanes and acceleration/deceleration lanes will be provided as required by the current edition of the AASHTO Policy on Geometric Design.

4.2.4 UNDERGROUND UTILITIES

A. Where several utilities are planned or required in the same right-of-way corridor, joint trenches shall be used whenever possible.
B. Where underground utilities are planned in the right-of-way corridor, utilities shall be placed under the paved portions of the right-of-way whenever possible.
C. Where underground utilities are planned under an existing permeable pavement or an existing bioretention facility, the utility shall take measures to protect the utility trench from infiltration of stormwater, without compromising the function of the permeable pavement of the bioretention facility.
D. Where a permeable pavement or a bioretention facility is planned over an existing underground utility, the developer shall protect the utility trench from infiltration of stormwater.
E. All new electrical and communication facilities shall be underground per TMC 11.28.
F. Undergrounding requirements for new facilities or rebuild, replacements and additions are described in TMC 11.28.070 and TMC 11.28.080.

4.2.5 ACCESS

A. Pedestrian/ADA and emergency vehicle access will be provided to any abutting public school, public building, trail, or transit stop. (TMC 11.12.150)
B. Development
    1. All development sites shall be served by a paved street surface that connects to an existing paved street surface. (TMC 11.12.060)
    2. Applicant may provide an access lane rather than a private street if the access serves four or fewer lots and is 200' or shorter. The access lane may be on an easement, shall be 20 feet wide and paved the full 20' width and will be owned and maintained by the property owners served by the lane.

3. Provide more than one connection to the existing public street system for any development, or part thereof, of four acres or more. If not otherwise prohibited, each connection will be to a different collector or arterial street. Where the site includes only a single frontage of less than 400 feet, this requirement may be met by provision of one or more stub roads.

4.2.6 RIGHT-OF-WAY VEGETATION

A. New vegetation must match or complement existing street vegetation or be approved by the Director (refer to TMC Title 11.20).
B. New vegetation in the Tukwila Urban Center must meet the adopted plan (refer to TMC Title 18.28).
C. Notify owners within 100 feet when removing or pruning vegetation that is 4-inch diameter or larger.
D. No maple, Lombardy poplar, cottonwood, gum, or other trees with invasive root system. (TMC 11.20.070)
E. Vegetation removed from right-of-way or damaged during construction shall be replaced with equivalent number, size, quality, and species. (TMC 11.20.110)
F. The design shall include a plan for irrigation. Irrigation is required for two years following project acceptance.

SECTION 4.3 ILLUMINATION

4.3.1 GENERAL

A. A licensed engineer experienced in illumination design shall prepare all contract documents for new installations and modifications to existing systems. The Director or designee shall approve all illumination system equipment submittals. The City shall be the sole judge of any materials to be considered equal or better.
B. Required along all public streets, including new public streets in subdivisions and short subdivisions. (TMC 11.12.110)
C. Required at the intersection of a public and a private street.
D. Not required along a private street. (TMC 11.12.110)
E. All wiring, conduit and power connections, new or relocated, shall be underground.
F. For a new subdivision, Developer assumes maintenance and power cost until the development is 50% or more occupied. (TMC 11.12.010.c)

G. Developer designs to City standards, installs new lighting, and relocates existing lighting along development frontage.
H. Provide lighting calculations using illumination design software AGi32 by Lighting Analysts. For illumination design guidelines, see City of Tukwila standard details, sheet RS-24.

4.3.2 MATERIALS

A. New installations shall use LED type luminaires. For roadway luminaire and pole details see City of Tukwila standard details, sheets RS-25. For pedestrian luminaire and pole details see City of Tukwila standard details, sheet RS-26.
B. Photocell shall be installed on the closest roadway luminaire located to the electrical service cabinet and shall be controlling all illumination circuits in the cabinet. The remaining luminaires shall be provided with a shorting cap.
C. Junction Boxes shall be furnished and installed per the latest edition of WSDOT Standard Specifications, Section 8-20.3(6) and Standard Plans J-40.10 and J-40.30.
D. For most applications, conduit shall be Schedule 80, polyvinyl chloride (PVC) with bell ends, unless capped for non-use. For additional conduit installation guidelines, see WSDOT Standard Specifications, Section 8-20.3(5).
E. Circuit conductors, pole wiring, splice kits, quick disconnects and fuses shall be per City of Tukwila standard details, sheet RS-28. All conductors shall be stranded copper sized and shall conform to current NEC. All grounds will be green, stranded copper and shall match the largest conductor (minimum #8 AWG).
F. Electrical service cabinets (with or without BBS) shall be furnished and installed per City of Tukwila standard details, sheet RS-29.
G. Submit catalog cuts and material data sheets to the City for review and approval. The City will be the sole judge of a product being approved as equal or better.

4.3.3 INSTALLATION

A. Installation method and materials for all illuminations systems equipment shall be compliant with the latest editions of WSDOT Standard Specifications and the City of Tukwila standard details.
B. Junction boxes shall be installed so the top of the box is at grade and positioned so that all conduits are 4 inches from the inside walls. Fill with clean drainage gravel, leaving at least 6 inches of free space between the conduit and the top of the box.

C. Illumination circuit splices shall be installed per WSDOT Standard Specifications, Section 9-29.12(1).

SECTION 4.4 TRAFFIC SIGNALS

4.4.1 GENERAL

A. A licensed engineer experienced in traffic signal design shall prepare all traffic signal design and modifications. The Director or designee shall approve all traffic signal system equipment submittals. The City shall be the sole judge of any materials to be considered equal or better.
B. When a proposed street or driveway design will interfere with existing traffic signal facilities, the developer shall modify or relocate the signal. (TMC 11.12.160)

4.4.2 MATERIALS

A. All new or revised traffic signal systems shall include, but not be limited to the following minimum requirements:
   1. The Contractor shall coordinate installation of new "SP" Type signal controller cabinets with the City of Tukwila Traffic Operations and Maintenance Department. The fully populated cabinets, including controllers, shall be furnished, configured and tested by the City and installed by the Contractor. The Contractor shall contact the City of Tukwila Traffic Operations and Maintenance Department to coordinate the cabinet pickup and the construction details regarding cabinet foundation dimensions and anchor bolt configuration at least 12 (twelve) weeks prior to cabinet installation.
   2. The Contractor shall furnish and install PTZ traffic monitoring camera at each signal controlled intersection (coordinate with the City Engineer for exceptions).
   3. Electrical service cabinets at signal locations shall include BBS cabinets per City of Tukwila standards details, sheet RS-29.
   4. Foundations for traffic signal and electrical service cabinets shall be per WSDOT Standard Plan J-10.10.
   5. Traffic signal systems shall be interconnected to the City's traffic operations fiber-optic network.
   6. All signal heads and visors shall be powder-coated yellow. Back plates shall be louvered, powder coated black and shall include 2" wide yellow retroreflective tape. All vehicular signal indications will be 12" tinted LED modules meeting the current ITE specifications. Installation method and materials shall be

compliant with the latest editions of WSDOT Standard Specifications.

7. All pedestrian signal indications shall be LED, countdown type with solid symbols and equipped with "z" crate visors. Pedestrian signal heads shall be powder-coated yellow. Installation method and materials shall be compliant with the latest editions of WSDOT Standard Specifications.
8. Prior to design, preference for video or induction loop detection shall be determined by the City Engineer.
    a. Video detection system shall be Vantage Vector Hybrid System by Iteris and shall include video detection equipment, auxiliary equipment, cameras, housings, and mounts, and all required mounting hardware, cables, connectors, and wiring. The video detection equipment shall be of the quantities shown in the Plans and Specifications.
    b. Vehicle loop induction system shall be installed per the Plans and Specifications and shall conform to the latest edition of WSDOT Standard Specifications and Standard Details.
9. All pedestrian push button shall be APS type and shall comply with the latest ADA guidelines. Pedestrian push button stations shall be EZ Communicator Navigator 2 Wire Push Button Station (EN2-3-C-B-1-B) by Polara Engineering and shall include the following features:
    a. Confirmation of button push via LED, sound and tactile bounce
    b. Locating tone during Don't Walk
    c. Vibrating button during Walk
    d. Sounds adjust to ambient noise
    e. Sounds synchronized across all push buttons
    f. 9"x15" sign (per WSDOT Standard Plan J-20.26)
    g. Braille on the Face Plate
    h. Audible Message during the Walk phase (shall be approved by the Engineer)
    i. Black Frame
    j. One Central Control Unit (CCU2EN) by Polara Engineering shall be provided and installed in the traffic controller cabinet per intersection as an interface between the signal controller and the pedestrian push button stations. The Central Control Unit shall:
        i. Accommodate up to 16 push button stations
        ii. Include a built in conflict monitoring system that monitors pedestrian push button stations and pedestrian signal head lights and powers off in the

event of a conflict
iii. Include an Ethernet port for communication
iv. Include the Interconnect Board for termination of field wiring

k. All emergency preemption devices and cabling will be current model "Opticom" brand.
l. All new or modified signal poles shall have aluminum terminal cabinets installed.

B. Submit catalog cuts and material data sheets to the City for review and approval. The City will be the sole judge of a product being approved as equal or better.

4.4.3 INSTALLATION

Installation method and materials for all signal equipment shall be compliant with the latest editions of WSDOT Standard Specifications and the City of Tukwila standard details.

SECTION 4.5 SIGNS AND MARKINGS

The Director determines the type, size, and location of signs and markings in the right-of-way. Signs shall meet the URBAN AREAS criteria in the MUTCD and meet the criteria in TMC 11.24 Placement of Signs or Banners.

4.5.1 MATERIALS

A. Markings
1. All pavement markings shall comply with the MUTCD, Standard Plans and the Standard Specifications, unless otherwise specified herein, or if waived by the City Engineer.
2. Crosswalks shall be per RS-20.
3. All arrows shall be per RS-21 (WSDOT Standard Plan M-24.40-02).
4. Buttons only in areas with speed limit 35 and greater. Button layout per RS-17 through RS-19.
5. Residential roadway striping shall be low voc traffic paint.
6. Profiled and embossed plastic lines per RS-22 (WSDOT Standard Plan M-20.20-02).
7. All traffic signalized intersections that include bicycle lanes must include the bicycle detector pavement marking per the Guide for the Development of Bicycle Facilities, AASHTO, 1999. (http://www.wsdot.wa.gov/bike/pdf/bikebook.pdf)

8. All bike lane symbols shall be installed per WSDOT Standard Plan M-9.50-02.
9. Bicycle lanes shall be 8" thermoplastic.
10. If precast traffic curbing is used instead of markings, the curbing shall be installed with a two part epoxy, no mortar mix or cement.

B. Street Signs
   1. Refer to City of Tukwila standard detail RS-23A AND RS-23B for Street Name Signs. 2"x2" steel square channel post, steel anchor set in concrete, reflector shield may also be used or required.

C. Other Signs
   1. Posts:
      a. Round posts are not allowed.
   2. Signs:
      a. Street markers shall have white lettering and border on a green background. The sign shall be six inches high and shall have 4-inch letters. Street markers need to meet the new federal requirements. Upper case and lower case letters with white border. Also letter size.
      b. Stop and regulatory signs shall be High Intensity Prismatic reflective sheeting, or City Engineer approved equivalent.
      c. All signs shall be high intensity prismatic sheeting.
      d. All signs shall have a border.

4.5.2 INSTALLATION

A. Street Signs
   a. The Developer shall install all street signs on public right-of-way (including street name signs, warning signs, and regulatory signs) per RS-23A and RS-23B

B. Other Signs
   1. Posts: 2"x2" steel square channel post
      a. In soil, dig hole at least 24" deep.
      b. On a raised island or in asphalt or concrete, dig a hole that is at least two feet in diameter, and at least 30 inches deep.
      c. For street markers, install at intersection.
   2. Mount:
      a. Primary signs so that there are seven feet from the ground to the bottom of the sign.
      b. Secondary signs on the same post so there is at least six feet from the ground to the bottom of the sign.

c. Object markers and large single or double arrows so there is at least four to five feet from the ground to the bottom of the sign.
d. Opposing chevrons or signs for both directions on same post, if they are clearly visible from both directions.
e. Street markers on top of post using a metal bracket.
f. On street light poles using stainless bands and mounting hardware.
g. So that posts do not show above the sign, except when installing a street marker bracket.

CHAPTER 5 SURFACE WATER

SECTION 5.0 DESIGN STANDARDS

5.0.1 SURFACE WATER DESIGN MANUAL

Surface Water design shall meet the 2016 King County Surface Water Design Manual (KCSWDM). Exceptions, modifications, specifications, and additions to the items contained in the KCSWDM are listed below.

1. Flow Control

   a. Flow control standards within the City of Tukwila are basin specific and shown on Map 5.12.1. In addition to the flow control standards used in the KCSWDM, the City of Tukwila adds three additional flow control standards, referred to as a Basic Flow Control (FC), Conservation FC, and Flood FC. The flow control standards for the City of Tukwila Basins are defined below.

Table 5.0.1 –Flow Control Standard by Drainage Basin

Drainage Basin Name	Flow Control Standard
Duwamish River Basin	Basic Flow Control (FC) Area[1]
Riverton Creek Basin	Conservation FC Area[2] (Historic)
Southgate Creek Basin	Conservation FC Area[2] (Historic)
Gilliam Creek Basin – West of Interstate 5	Conservation FC Area[2] (Historic)
Gilliam Creek Basin – East of Interstate 5	Flood FC Area[4] (Existing)
Nelson Place Long Acres Basin	Flood FC Area[4] (Existing)
Strander Pump Station Basin	Flood FC Area[4] (Existing)
Southeast CBD Basin	Flood FC Area[4] (Existing)
P17 Basin	Flood FC Area[3,4] (Existing)
Lower Mill Creek Basin	Flood FC Area[4] (Existing)
Tukwila South Basin	Basin Specific Standard[5]

Notes:

(1) For the Duwamish River Basin projects that drain to the Duwamish River below River Mile 6 may be eligible for a lesser standard as follows:

a) Projects that discharge directly to the Duwamish River via a manmade system having adequate capacity per Section 1.2.3.1 (under direct discharge exemption) of the KCSWDM may be exempt from flow control if all requirements are met.
b) Projects that drain directly to the Duwamish River that do not have adequate capacity per Section 1.2.3.1 of the KCSWDM should provide flow control to the

Basic Flow Control (FC) standard.

(2) Areas within this basin that drain via a pipe system to a different basin may be allowed to apply the flow control requirements for the downstream basin is no possibility of erosion of natural or constructed systems.

(3) A portion of this basin is within the "Tukwila South Project" and shall have flow control standards as approved by Dept. of Ecology.

(4) This area is highly modified drainage systems that contains 40% total impervious area since 1985. Erosion is not expected or observed but downstream flooding problem must be mitigated through this standard.

(5) Through project permitting for the "Tukwila South Project", the applicant obtained a basin specific standard which was approved by the Dept. of Ecology and the City.

Basic Flow Control (FC) and Flood Problem FC Areas:

Runoff from the developed site will be controlled and released at a rate per Table 1.2.3.A (Pg,. 1-40) of the 2016 KCSWDM.

Background: These are areas that have been developed for years and drain to stream channels that have become stabilized to a new hydrologic regime. Ecology has proposed that the existing land cover can be used in basins that have had at least 40% total impervious surface area for the 20 years preceding Ecology's adoption of the 2005 Stormwater Management Manual for Western Washington (called the 40/20 criterion) and the stream channels receiving the runoff are considered stable from the standpoint of excessive erosion or sedimentation. In developing the areas for "40/20 criterion", the City of Tukwila conducted GIS analysis to confirm impervious percentages in 1985.

Flow control facilities designed to the 40/20 criterion will only have to mitigate for the added impervious surface. As a result, these flow control facilities will be smaller than those required to be designed to match runoff from a fully forested site.

Conservation FC Areas:

Runoff from the developed site will be controlled and released at a rate per Table 1.2.3.A (Pg,. 1-40) of the 2016 KCSWDM using historic site conditions (forested).

Background: These are areas that have been developed for years and

drain to stream channels that have experienced severe erosion and must be protected by a higher detention standard.

SECTION 5.1 WATER QUALITY TREATMENT

A. All surface water runoff created by a private development shall be accounted for by the private development, including surface water from public facilities constructed as part of the private development.
B. Currently, the City is not requiring mitigation targeted to address a specific downstream water quality problem (i.e., listing as a 303d water quality problem), but mitigation requirements may be added in future modifications to these standards.

SECTION 5.2 STORMWATER FACILITY DESIGN AND CONSTRUCTION

A. Specifications, materials, and testing are specified in Section 7-04 of the WSDOT Standard Specifications. Corrugated Steel Pipe or Spiral Rib Steel Pipe will not be permitted unless approved by the City Engineer.
B. All surface water facilities constructed as part of a private development shall be owned by the private developer. All maintenance responsibilities remain with the private developer.
C. The City will not approve installation of private surface water facilities in public right-of-way.
D. Open pond side slopes shall be 3H:1V or flatter.
E. All vaults shall be underground and covered. The City will not approve uncovered, above-ground retention/detention vaults.

SECTION 5.3 STORM COMPREHENSIVE SURFACE WATER MANAGEMENT PLAN

The City's Comprehensive Surface Water Management Plan indicates the general location and description of planned surface water improvement projects and spells out the intent of the City's surface water management plan. If a project is adjacent to or within a ¼ mile upstream of an improvement project in the City's Comprehensive Surface Water Plan, the permit application plan submittal shall consider the planned improvement in the Technical Information Report and, when required, shall include it in the project design.

The exact location or configuration of a proposed improvement may be modified or adjusted by the Developer if needed, provided the proposed

improvement remains consistent with the overall intent of the Plan. The Director must approve all modifications to the Comprehensive Plan requirements.

Public Works recommends referring to the City's latest Surface Water Comprehensive plan and contacting the City's Surface Water Engineer during the early stages of surface water design.

SECTION 5.4 OFFSITE DRAINAGE IMPROVEMENTS

With the City's approval, the Applicant may provide offsite improvements in the same drainage basin or threshold discharge area to mitigate water quality and flow control requirements associated with the project. These offsite improvements shall provide equivalent water quality and flow control.

SECTION 5.5 STREAMS (TMC 18.45.100)

Streams should be preserved in their existing channels. Any alteration to a stream channel requires approval by the Director, DOE, WDFW, and requires a U.S. Core of Engineers Section 404 permit.

SECTION 5.6 STREAM CROSSINGS

All stream crossings require written hydraulic project approval from the WDFW. The Applicant shall provide the Director a copy of the WDFW approval prior to permit issuance. Applicant shall design and install all stream crossing elements to withstand all anticipated loading, erosion impacts, hydraulic forces, and to remain water tight and free from changes in alignment or grade.

SECTION 5.7 NPDES

All work within the City shall conform to the requirements of the current NPDES (National Pollution Discharge and Elimination System) Western Washington Phase II Municipal Stormwater Permit, of which the City is a permittee.

Construction projects shall conform to the requirements of the current NPDES Construction Stormwater General Permit (CSWGP). Projects that disturb one or more acres, or meet other thresholds listed in Section S1.B of the CSWGP, must apply to the Department of Ecology for coverage under the CSWGP. Proof of coverage must be provided to the City prior to construction.

SECTION 5.8 STRUCTURES, LIDS, AND GRATES

All grates within sidewalks, walkways, crosswalks or other pedestrian areas must meet ADA requirements for slip resistance.

Grate inlets shall be standard Rectangular Vaned Grate type unless being used within a Sidewalks, walkways, crosswalks or other pedestrian areas where they shall meet ADA requirements.

Sand collars shall be used on pipe to structure connections for all smooth wall pipes with 12'' diameter or smaller, except ductile iron and concrete. Sand collars are not required for pipes larger than 12'' diameter.

The use of grate inlets or catch basins without sumps are only permitted in areas where underground conflicts prevent the use of a sump or where a sump is provided in an offset drainage structure.

SECTION 5.9 OUTFALLS

A. Hydraulics Project Approval
    1. A new outfall or a modification to an existing outfall of a designated watercourse may require a Hydraulic Project Approval (HPA) from the Washington Department of Fish and Wildlife (WDFW). When HPA is required, the Applicant must provide proof of HPA to receive a Public Works permit.
B. Maintenance Access
    1. The Applicant must construct a maintenance access and provide the City a maintenance easement for all new or modified outfalls that the City will maintain.

SECTION 5.10 EROSION PREVENTION AND SEDIMENT CONTROL

A. Plans for any activity that disturbs ground shall include an erosion prevention and sediment control plan (ESC) designed in accordance with the adopted King County Surface Water Design Manual. The plan shall provide information for temporary erosion prevention and sediment control during all phases of construction and shall provide permanent stabilization for disturbed areas. During construction, the Director may require additional measures as needed to prevent erosion and retain sediment.
B. The plan shall emphasize erosion prevention rather than sediment control and shall minimize the extent and duration of soil exposure. In

addition, the plan shall minimize runoff velocities and retain sediment on-site.

C. At a minimum, the ESC plan shall show clearing limits, sensitive area buffers, and shall provide temporary stabilization, sediment retention, and perimeter protection. In addition, some projects will require stabilized traffic areas and surface water controls, which shall be shown on the ESC plan. The plan shall also provide a description of final stabilization methods.
D. The plan shall provide the seed mix for the temporary and permanent seeding.
E. The plan shall require cover measures as follows:
    1. At all times, any disturbed areas left unworked for more than 30 days shall be seeded.
    2. May 1 through September 30, temporary cover measures shall be installed on ALL areas left undisturbed for more than seven days.
    3. October 1 through April 30, minimum wet season requirements:
        a. Install temporary cover measures on all areas that will remain unworked for more than TWO DAYS and on stockpiles and steep cut and fill slopes.
        b. Retain onsite a quantity of cover measures materials sufficient to cover all disturbed areas.
        c. By October 8, temporarily seed and mulch all areas that will be unworked during the wet season.
        d. Mulch all seeded areas.
        e. Stabilize all construction traffic areas, unless already graveled.
F. ESC Maintenance
    1. Failure to maintain ESC measures in accordance with the approved maintenance schedule may result in the work being performed at the direction of the Director and assessed as a lien against the property where such facilities are located.
    2. During the life of the project, the Permittee shall maintain in good condition and promptly repair, restore, or replace all grade surfaces; walls, drains, dams, structures, vegetation, erosion and sediment control measures, and other protective devices in accordance with approved plans.
    3. The Permittee shall monitor the downstream drainage features, and shall, with the Director's approval, remove all sediment deposition resulting from project-related work.
    4. The Director shall assume maintenance and operation responsibilities for all ESC measures located within public easements and rights-of-way following final acceptance of

such facilities by the Director.

5. All projects 1 acre or more require ESC supervisors to have a turbidity meter on site. Projects less than 1 acre will require ESC supervisors to have a turbidity meter on site on a case-by-case basis.

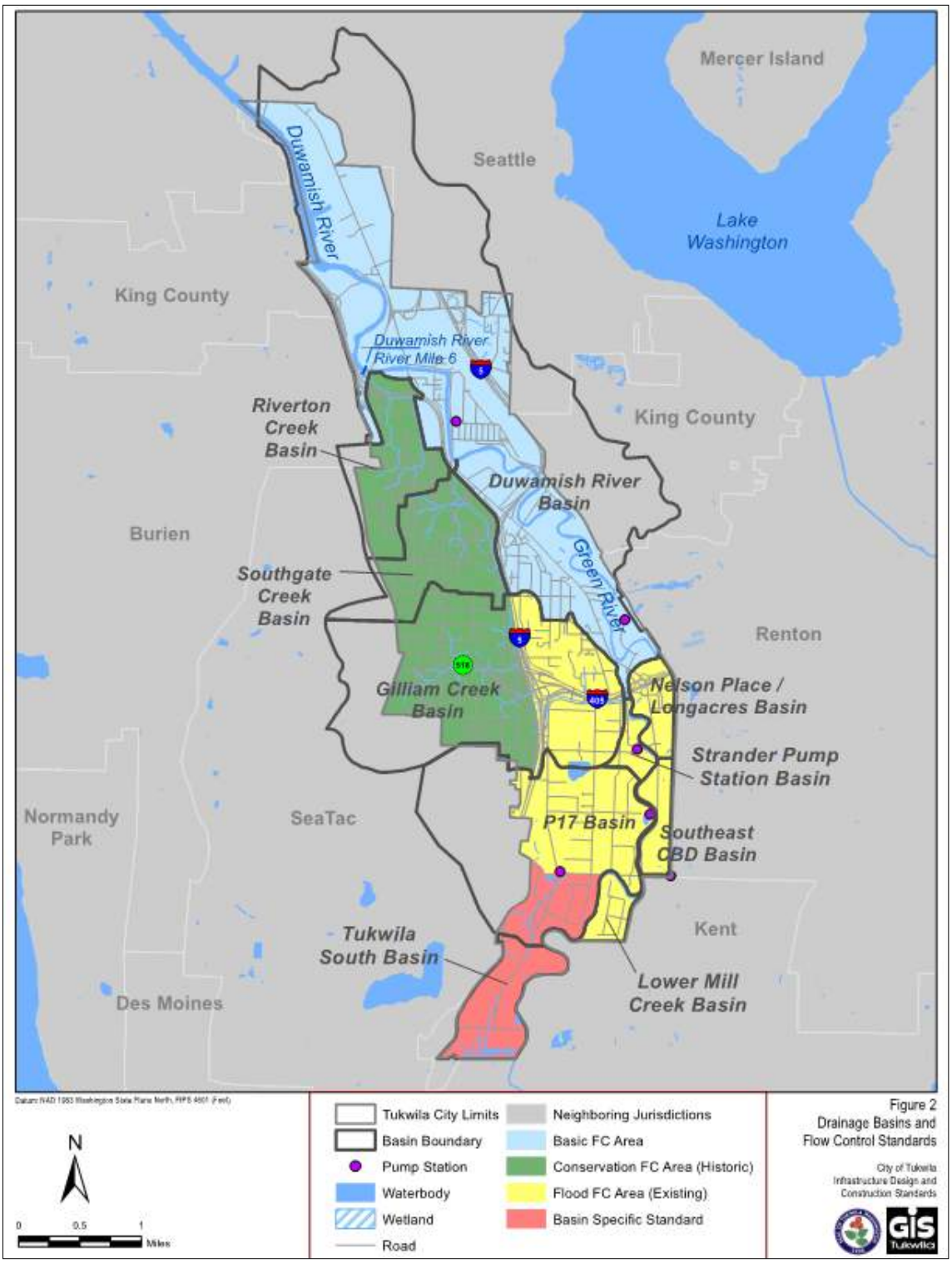
SECTION 5.11 POLLUTION PREVENTION PLAN

Any construction project that includes any of the following activities must provide best management practices to prevent surface water pollution:

A. Dewatering
B. Paving
C. Structure construction and painting
D. Material delivery, use, or storage (soil, pesticides, herbicides, fertilizers, detergent, plaster, petroleum products, acids, lime, paints, solvents, curing compounds)
E. Solid waste
F. Hazardous waste
G. Contaminated soils
H. Concrete waste
I. Sanitary/septic waste
J. Vehicle or equipment cleaning, fueling, or maintenance

SECTION 5.12 SURFACE WATER MAPS

5.12.1 MAP 1 – FLOW CONTROL DRAINAGE BASINS



CHAPTER 6 FLOOD ZONE

SECTION 6.0 GENERAL

This following applies to all special flood hazard areas within the City of Tukwila jurisdiction.

6.0.1 BASE FLOOD ELEVATION

A. The basis for special flood hazard areas identified by the Federal Insurance Administration is a scientific and engineering report entitled "The Flood Insurance Study for King County, Washington dated December 6, 2001, and any revisions thereto, with an accompanying Flood Insurance Rate Map (FIRM), and any revisions thereto, hereby adopted by reference and declared to be a part of this ordinance. The Flood Insurance Study and the FIRM are on file at 6300 Southcenter Boulevard, Suite 100.
B. Where flood elevation data is not available either through the Flood Insurance Study, FIRM, or from another authoritative source, the Director shall review applications for building permits to assure that proposed construction will be reasonably safe from flooding. The test of reasonableness is a local judgment and includes use of historical data, high water marks, photographs of past flooding, etc., where available. Failure to elevate at least two feet above the highest adjacent grade in these zones may result in higher insurance rates.
C. When base flood elevation data has not been provided in A zones, the Director shall set the base flood elevation by using any base flood elevation and floodway data available from a Federal, State or other source.
D. For subdivision proposals and other proposed developments that contain at least 50 lots or 5 acres, where base flood elevation data has not been provided or is not available from another authoritative source, the Developer shall generate base flood elevation data.

6.0.2 BOUNDARY INTERPRETATION

The Director shall determine special flood hazard area boundaries when there is a conflict between a mapped boundary and actual field conditions.

6.0.3 WATER COURSE RELOCATION

If a watercourse will be relocated, provide description of the extent to which the watercourse will be altered or relocated because of proposed development. The Director, acting for FEMA, will require:

A. Notification to adjacent communities and the Department of Ecology (DOE) prior to any alteration or relocation of a watercourse, and evidence that notification was provided to the Federal Insurance Administration.
B. Maintenance within the altered or relocated portion of said watercourse so that the flood carrying capacity is not diminished.

6.0.4 REQUIRED INFORMATION

A. Elevation in relation to mean sea level, of the lowest floor (including basement) of all structures,
B. Elevation in relation to mean sea level to which any structure has been flood proofed,
C. Certification by a registered professional engineer or architect that the flood proofing methods for any nonresidential structure meet the flood proofing criteria in TMC 16.52, and,
D. Description of the extent to which a watercourse will be altered or relocated as a result of proposed development.

SECTION 6.1 STANDARDS

6.1.1 GENERAL

A. All plans shall show the nature, location, dimensions, and elevations of the area in question, including existing or proposed structures, fill, materials storage, drainage facilities. Specifically, the following information is required:
   1. Elevation in relation to mean sea level, of the lowest floor of all structures.
   2. Elevation in relation to mean sea level to which any structure has been flood proofed.
B. In all special flood hazards where flood elevation data is not available, either through the FIRM or from another authoritative source, all new construction and substantial improvements shall be elevated at least two feet above the highest adjacent grade.

6.1.2 ANCHORING

A. All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.
B. All manufactured homes must likewise be anchored to prevent flotation, collapse, or lateral movement, and shall be installed using methods and practices that minimize flood damage. Anchoring methods may include, but are not limited to, use of over-the-top or frame ties to ground anchors (Reference FEMA's "Manufactured Home Installation in Flood Hazard Areas" guidebook for additional techniques).

6.1.3 CONSTRUCTION MATERIALS AND METHODS

A. All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.
B. All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.
C. All new construction and substantial improvements on slopes shall have drainage paths to guide floodwaters around and away from proposed structures.
D. Electrical, heating, ventilation, plumbing, and air-conditioning equipment and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

6.1.4 UTILITIES

A. All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the systems;
B. A proposed water well shall be approved by the Department of Ecology (WAC 173-160-171);
C. New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters; and,
D. Onsite waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

6.1.5 SUBDIVISIONS

A. All subdivision proposals shall be consistent with the need to minimize flood damage;
B. All subdivision proposals shall have public utilities and facilities, such as sewer, gas, electrical, and water systems located and constructed to minimize or eliminate flood damage;
C. All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage; and,
D. Where base flood elevation data has not been provided or is not available from another authoritative source, it shall be generated for subdivision proposals and other proposed developments that contain at least 50 lots or 5 acres.

6.1.6 RESIDENTIAL CONSTRUCTION

A. New construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated one foot or more above the base flood elevation.
B. Fully enclosed areas below the lowest floor that are subject to flooding are prohibited, or shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or must meet or exceed the following minimum criteria:
    1. A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided.
    2. The bottom of all openings shall be no higher than one foot above grade.
    3. Openings may be equipped with screens, louvers, or other coverings or devices if they permit the automatic entry and exit of floodwaters.

6.1.7 NONRESIDENTIAL CONSTRUCTION

A. New construction and substantial improvement of any commercial, industrial or other nonresidential structure shall either have the lowest floor, including basement, elevated one foot or more above the base flood elevation; or, together with attendant utility and sanitary facilities, shall:

1. Be flood proofed so that below one foot or more above the base flood level the structure is watertight with walls substantially impermeable to the passage of water. City shall notify Applicants who propose to flood proof nonresidential buildings that flood insurance premiums will be based on rates that are one foot below the flood proofed level (e.g. a building flood proofed to the base flood level will be rated as one foot below).
2. Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy;
3. Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting provisions of this subsection based on her development and/or review of the structural design, specifications, and plans.

B. Nonresidential structures that are elevated, not flood proofed, must meet the same standards for space below the lowest floor as residential construction.

6.1.8 MANUFACTURED HOMES

A. All manufactured homes to be placed or substantially improved on sites:
   1. outside of a manufactured home park or subdivision,
   2. in a new manufactured home park or subdivision,
   3. in an expansion to an existing manufactured home park or subdivision, or
   4. in an existing manufactured home park or subdivision on which a manufactured home has incurred "substantial damage" as the result of a flood; shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated one foot or more above the base flood elevation and be securely anchored to an adequately designed foundation system to resist flotation, collapse and lateral movement.

B. Manufactured homes to be placed or substantially improved on sites in an existing manufactured home park or subdivision that are not subject to the above manufactured home provisions be elevated so that either:
   1. The lowest floor of the manufactured home is elevated one foot or more above the base flood elevation, or
   2. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be

securely anchored to an adequately designed foundation system to resist flotation, collapse, and lateral movement.

6.1.9 RECREATIONAL VEHICLES

Recreational vehicles placed on sites are required to either:

A. Be on the site for fewer than 180 consecutive days,
B. Be fully licensed and ready for highway use, on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices, and has no permanently attached additions; or
C. Meet the requirements for manufactured homes, including the elevation and anchoring requirements for manufactured homes.

SECTION 6.2 FLOODWAYS

A. Floodways are located within special flood hazard areas. Floodwaters within floodways are extremely hazardous due to high flow velocities. These waters carry debris and potential projectiles, and have a high potential for erosion.
B. The following provisions apply to floodways within the City:
   1. Construction of new residential structures is prohibited.
   2. No construction within a designated floodway can increase base flood levels.
   3. No encroachment is allowed, including fill, new construction, substantial improvements, or other development, unless a registered professional engineer certifies through hydrologic and hydraulic analyses, performed in accordance with standard engineering practice, that the proposed encroachment would not result in any increase in flood levels during the occurrence of the base flood discharge.
   4. Repair, reconstruction, or improvement to a residential structure is allowed, as long as the structure's ground floor area does not increase and the cost of the work does not exceed 50 percent of the market value of the structure either, (A) before the repair, or reconstruction is started, or (B) before the damage occurred (if the structure has been damaged and is being restored). Any project to correct existing violations of state or local health, sanitary, or safety code specifications identified by the code enforcement official and which are the minimum necessary to assure safe living conditions or to structures identified as historic places shall not be included in the 50 percent.

C. If approved, all new construction and substantial improvements shall comply with all applicable standards.

SECTION 6.3 CRITICAL FACILITY

A. Construction of new critical facilities shall be, to the extent possible, located outside the limits of a special flood hazard area. The Director may permit construction of a new critical facility within a special flood hazard area if no feasible alternative is available.
B. Critical facilities constructed within a special flood hazard area shall meet the following:
   1. Lowest floor elevated three feet above base flood elevation or elevated to the 500-year flood elevation, whichever is higher.
   2. Flood proofing and sealing measures ensure that toxic substances will not be displaced by or released into floodwaters.
   3. Access to and from the critical facility protected to three feet above base flood elevation or to the 500-year flood elevation.
   4. Access routes elevated to or above the level of the base flood elevation provided to all critical facilities to the extent possible.

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. The current Comprehensive Water Plan can be found here: http://www.tukwilawa.gov/wp-content/uploads/PW-Comprehensive-Water-Plan.pdf . All extensions, additions, changes, or alterations to the City water system shall be consistent with the Comprehensive Plan. All planned main outages required to construct new water infrastructure shall be coordinated with the City Engineer to ensure adequate fire protection be maintained at all times.

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 in 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.

Combination systems allowed for Single Family with approval from the Director. Pressure and flow calculations shall be provided during meter permit application.

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. Compression joints used in the public system will use only stainless steel gripper band compression sleeves. No pack joints will be allowed.

1. Residential - Connections shall be a minimum of ¾ 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. For residential supply which include fire suppression, a 1'' minimum service is required.
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 PVC conduit.
4. All private service lines shall be backfilled with 1-1/4" minus crushed material (WSDOT Crush Surfacing Base Course 9-03.9(3),or approved equal) to within 18" of the surface. Top 18" section to match surrounding material (WSDOT CSTC 9-03.9(3) under roadway/pavement, Native/Topsoil in landscaped areas, or approved equal).
5. 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

1. Materials
   A. Tapping Saddle: Single strap Romac 101U w/ AWWA I.P. thread tap or approved equal.
   B. Corporation Stop: Mueller B-25028N or B-20013N.
   C. Angle stop: Mueller B-24258N with H14210N or P-14206N tailpiece.
   D. Meter Setter: No setters allowed.
   E. Pipe: Type K copper tubing.
   F. Meter Box:
      1. For ¾" – Olympic Foundary SM-29 or Carson BCF Heavy Wall 1118 – 11''x18''x18'' or equivalent plastic box with D.I. lid.
      2. For 1" - #2 Fogtite or Carson BCF Heavy Wall 1730 – 17''x30''x18'' 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.
2. Installation
   A. Per WS-01.

7.1.3 1-1/2" AND 2" SERVICE

1. Materials
   A. Tapping Saddle: Double strap Romac 202S w/ AWWA I.P. thread tap or approved equal.
   B. Corporation Stop: Mueller B-25028N or B-2969N w/ AWWA I.P. thread or approved equal.
   C. Meter setter: Mueller B2423N-2N, or 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 equal vault. Lids must have a hinged inspection plate, centered over meter. Plastic #3 in planter area is allowed when no traffic can reach the box.
2. Installation
   A. Per WS-01 and WS-02.

7.1.4 3", 4", AND 6" SERVICES

1. Materials
   A. Tapping Tee: Refer to Section 7.2.5.
   B. Gate Valve: Refer to Section 7.2.5.
   C. Meter Valve: Gate valve PER Section 7.2.5 with hand wheel.
   D. Flange Coupling adapter
   E. Pipe Material: Ductile iron, Class 52.
   F. Concrete thrust blocks per WS-10
   G. Steel tie rods with asphalt or epoxy coating.
   H. Meter vault: Watertight 444-LA or 644-LA with spring assisted, galvanized-diamond plate cover with locking latch and recessed lift handle.
   I. Not Used
   J. Double strap service saddle with 2'' IPS Tap
   K. 2'' Brass Nipple
   L. Not Used
   M. 2'' Ball Valve
   N. 90° Brass Elbow
   O. 2'' Compression Couple
2. Installation
   A. Provide dual independent restraint on ductile iron service pipe from point of connection at the main to the first valve in meter vault. If rods and blocks are not feasible, allowable alternative restraint systems shall be designed by a professional engineer and approved by the City Engineer.
   B. All service lines shall be backfilled with 1-1/4" minus crushed material (WSDOT Crush Surfacing Base Course 9-03.9(3),or approved equal) to within 18" of the surface. Top 18" section to match surrounding material (WSDOT CSTC 9-03.9(3) under roadway/pavement, Native/Topsoil in landscaped areas, or approved equal).
   C. Install service with bypass assembly per WS-04.
   D. Install flange coupling adapter on FLxPE spool between meter and downstream meter valve.

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 and capable of withstanding a test pressure of 250 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. Permittee shall provide approved backflow device prior to temporary water meter use.
C. 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.
D. 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.
E. 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

7.2.1.1. 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.

When a 12 inch vertical separation is not achievable between two utilities, provide a minimum 6 inch thick Ethafoam pad between utilities. In cases when the sewer main is crossing above the water

7.2.1.2. 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 and/or other methods to ensure proper support and isolation between the utilities. Refer to G-5.

7.2.1.3. 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 10 feet per second, under maximum flow conditions.
C. Pipe Installation:
    1. Provide at least 3' cover over main.
    2. Pipe deflection is generally not allowed. Follow manufacturer's recommendation if pipe deflection is required. Pipe deflection installation shall be approved by the City of Tukwila Water System Superintendent.
    3. Imbed pipe in 5/8" minus crushed gravel.
    4. According to Standard Specifications and the manufacturer's recommendation.

5. Backfill and perform compaction testing as soon as possible following installation and testing of pipe
6. Install permanent surface restoration as soon as possible after backfill is accepted.
7. Mark all new public water lines with 3M EMS 4" Extended Range Marker Balls. Refer to Markerball installation in section 7.2.6.

7.2.1.4. 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.

7.2.1.5. 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 per WS-09, for flushing purposes. If the Director deems flows and pressure sufficient, a fire hydrant may be required in lieu of the blow-off assembly.

7.2.1.6. 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

1. 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.
2. 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

1. 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 or painted with a bituminous coating.
2. Installation
   A. Provide reaction blocking at all tees, plugs, bends, and hydrants per WS-10.
   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

1. 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 to the City of Tukwila Special Provisions.
   C. The Director allows cut-ins as exception and may require the addition of in-line valve(s).
2. 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.
3. Installation
   A. 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.
   B. 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.

7.2.6 MARKERBALL INSTALLATION

A. General
   1. EMS Marker installation on public water and sewer systems should conform to product standards contained in 3M™ Dynatel™ EMS-iD Locator 1420 Operator's Manual dated September 2015. Installation Locations should be selected and installed using Standard Details G3 and G-4 and reviewed and approved by project engineer/inspector prior to installation.

B. Installation
   1. Depth of installation shall be no greater that 3' and generally be between 2' and 3' regardless of actual utility depth to accommodate signal transmission limitations of the product. Surface markers (Model 1434) shall be a nominal 1 foot below finish grade or 2" below depth of pavement whichever is greater.

   2. Marker ball locations shall be shown on the record drawings with the unique ball ID tagged to each location. Provide completed Marker Ball Log with as built submittal.

C. Data Management
   1. Data included on each EMS Marker should conform to product standards contained in 3M™ Dynatel™ EMS-iD Locator 1420 Operator's Manual dated September 2015 and include, at a minimum the following data (See Marker Ball Log sheet in Appendix F for further information):
   2. Marker ID –10 digit number unique to each marker ball (affix bar code sticker to the tracking spreadsheet)
   3. Facility Owner
      a. City of Tukwila
      b. Other Government Agency (Normally marker balls are not required on other agencies facilities but if used provide specific owner information in the comments field)
   4. Utility Type
      a. Water (Use Model 1423XR/iD - blue)
      b. Sewer (Use Model 1424XR/iD or Model 1434 - green)

      Note – Sewer markers are required only at side sewer connections to the main that do not connect at a manhole and where the side sewer crosses onto private property without any other form of surface feature (cleanout/inspection port).
   5. Depth (Measure down from ball to top of utility in question).
   6. Marker Description

a. Straight Run markers (install a marker ball at least every 150' on straight runs – coordinate exact location with Engineer/Inspector).
b. Vertical Deflection in the utility (at the beginning, the end and the greatest point of deflection, or every 25' along the arc whichever is less)
c. Vertical Bends
   i. 11.25
   ii. 22.5
   iii. 45
d. Lateral Deflection in the utility (at the beginning, the end and the greatest point of deflection, or every 25' along the arc whichever is less)
e. Horizontal Bends
   i. 11.25
   ii. 22.5
   iii. 45
   iv. 90
f. Repair/Rehab – (w/description of repair type or rehab method in comment field)
   i. Repair Band
   ii. Long pattern sleeve
   iii. Slipline
   iv. Other
g. Other Fitting - Saddles, Tees, Crosses, Taps, Stubs, End Cap
h. Side Sewer location (locate at property line if no cleanout/inspection port is present)
i. Roadway Crossing End Point
j. Casing End Point
k. Rail Crossing End Point
l. River/Stream Crossing End Point
m. Specialty Marker – (See Comments field below).

7. Nominal Pipe Size
8. Material
   a. CPE
   b. AC
   c. Concrete
   d. HDPE
   e. PVC
   f. C-900/909
   g. Other
9. Utility Restraint

a. Physical Restraint (w/type recorded in comment field: Flanged spool, RJ, Field Lock Gaskets, Rods/Megalugs, etc.)
b. Thrust Block (w/type/configuration/nominal size recorded in comment field)
c. None (Default value)

10. Date of installation or repair
11. Project or Permit Number
12. Special Condition/Comment Field (could be used for various information not already captured by the normal data dictionary). Examples could be:
    a. Begin/End Cathodic Protection
    b. Begin/End Plastic sleeve over pipe in poor soil conditions
    c. Special Configuration information
        i. Repair description
        ii. Description of fitting (asymmetric cross w/cap on east leg)
        iii. Up-and-Over centered around marker
        iv. Down-and-Under centered around marker
        v. Special Utility Crossing (w/Depth to top of multiple utilities at crossing)

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 without written approval from the City Engineer

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, WAC 246-290-490, 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 assembly. The owner of these assemblies must maintain and provide annual test results to the Department.

7.4.2 NEW CONNECTIONS

A. Water Supply
   1. Every new, commercial residential connection to the City's water supply requires installation of an approved Reduced Pressure Backflow Assembly (an RP Device) immediately downstream of the permanent water meter as premises isolation per WS-21. Installation at another location requires the Director's approval.
B. Fire System
   1. Every new or modified fire line connection to the City's water supply, shall include an approved double check detector valve assembly, installed per WS-15. The City does not require a double check valve detector assembly on a private fire system that is downstream of a connection protected by an RP Device.
C. Irrigation System
   1. Every new or modified irrigation system shall incorporate a double check valve assembly for cross connection control. Install per WS-22 or WS-23 as applicable.
   2. All irrigation systems to be turned over to Tukwila for operation and maintenance require rain sensors. Controllers shall be Rain Bird ESP-ME or approved equal. 3 sets of irrigation as-builts will be provided to Street Maint. Dept. Street scape tree installations within sidewalks or pedestrian paths will use tree well grates

instead of pavers or concrete blocks. All tree pits shall have root barriers installed. Refer to LID-1

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 requires 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 Backflow Assembly (RPBA/RP Device).
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
    1. 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

1. When the backflow prevention device is installed outside the building and underground, the installer must have NICET Level III certificate of competency or a NICET Level U contractor's certificate of competency. 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.

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 calibrated 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.

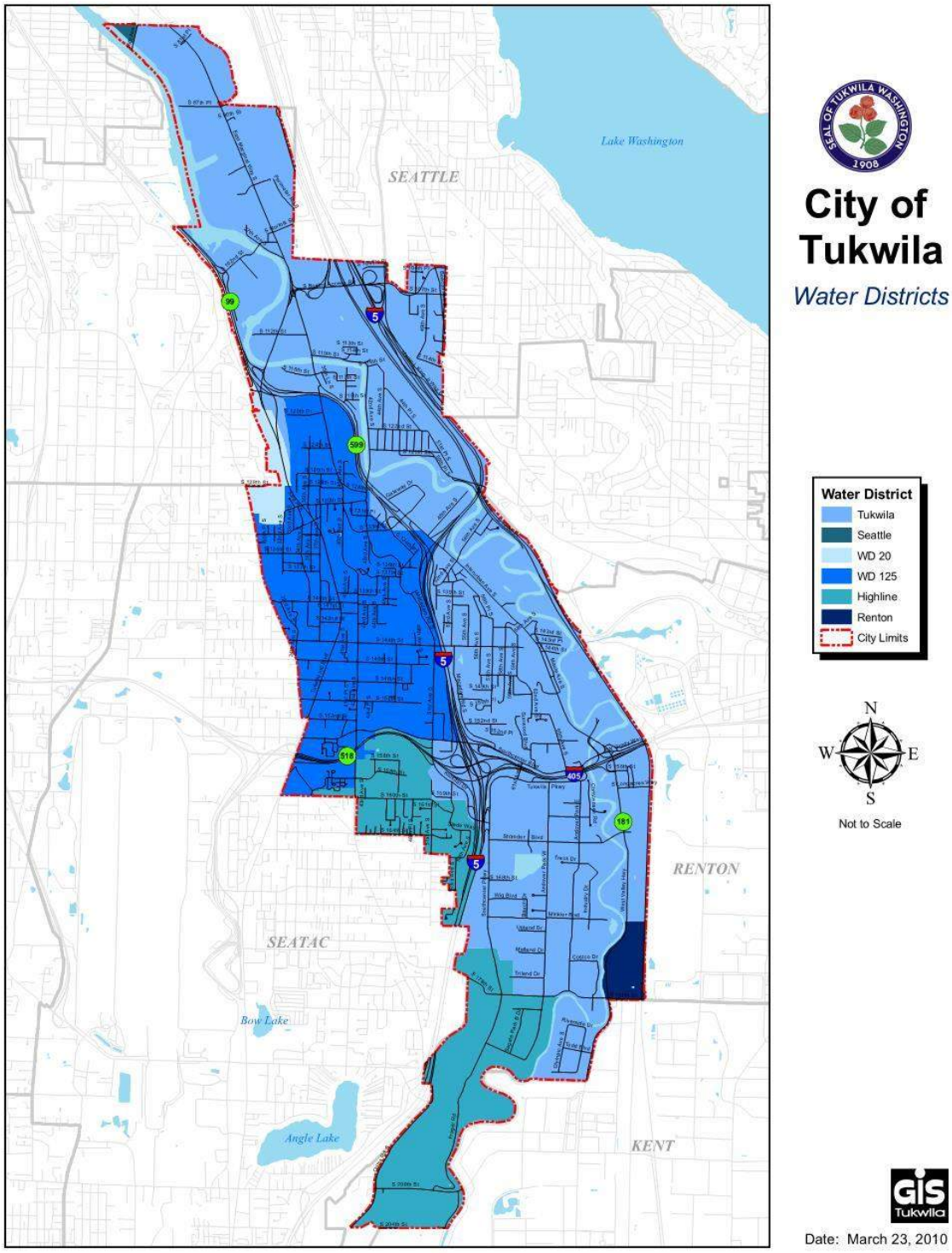
7.5.2 FLUSH AND DISINFECT

A. All new, cleaned or repaired water mains and some backflow preventer installations require disinfecting and flushing per AWWA Standard C-651. 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 until bags show no sign of sand, rock or debris.

SECTION 7.6 WATER DISTRICT BOUNDARIES



Revision date: 04/08/2019

CHAPTER 8 SANITARY SEWER

SECTION 8.0 GENERAL

8.0.1 COMPREHENSIVE SEWER PLAN

The City of Tukwila's Comprehensive Sewer Plan ensures orderly and cost effective development of existing and future sewerage facilities. All proposed sewer improvements and extensions shall be consistent with the Comprehensive Sewer Plan (http://www.tukwilawa.gov/wp-content/uploads/PW-Comprehensive-Sanitary-Sewer-Plan.pdf). All modifications to the Comprehensive Sewer Plan require written approval from the Director.

The Permittee shall extend the sanitary sewer improvements to the extreme boundary of the property in accordance with the comprehensive plans. If the plan does not require future extension at the Permittee's project, the Permittee shall extend the sewer to service the property.

Refer to Figure 9 for sewer district boundaries within Tukwila.

8.0.2 SANITARY SEWER EXTENSION

If the sewer extension provides benefit to other properties, the Permittee may arrange for partial reimbursement through a Developer Reimbursement agreement.

8.0.3 SEPTIC TANKS

The Director may allow a residential septic system, which meets the requirements of King County Health Department, when there is no sanitary sewer main or lateral within 250 feet of the building.

All septic tank removal or abandonment shall be accomplished in accordance with King County Board of Health Code 13.04.054, within thirty (30) days as follows:

1. Pump the tank dry, bleach, and pump again. The tank may be removed or abandoned in place by creating holes in the bottom to allow for drainage and filling it with sand or gravel; and,
2. Provide a receipt from a King County approved pumper documenting septage removal; and,
3. Remove or destroy lid; and,

4. Fill the septic tank with compacted sand or gravel; and,
5. Report the removal or abandonment to the King County Health officer.

8.0.4 CONNECTION TO METRO SEWER

Side sewer connections to King County Department of Natural Resources interceptor sewer lines shall be allowed only by written permission from King County. The City will be the agency through which permits will be obtained for such connections. The Permittee is responsible for all coordination with Metro for necessary inspections and approvals.

8.0.5 INDUSTRIAL SEWER CONNECTION

Special consideration must be given to sanitary sewer design and connection for industrial users. The Designer must consider the potential for pretreatment requirements, excessive sewage flows, special flow metering, or sampling requirements prior to industrial sewer collection/treatment system design. An industrial wastewater discharge permit may be required from King County Metro.

8.0.6 MATERIALS

All materials shall be new, undamaged, inspected and approved by the Director prior to installation. Acceptance of materials does not release the Permittee from the responsibility to guarantee materials and construction. The type, class and/or thickness shall be legibly and permanently marked on sanitary sewer pipe. The supplier shall provide the City with a certificate for materials, as requested.

8.0.7 SIZING

The sanitary side sewer shall be sized to carry all sanitary sewage and waste fluids of any kind from the buildings served. All toilets, sinks, stationary wash stands, floor drains, or any other piece of equipment having waste fluids shall be connected to the sanitary sewer system. Commercial minimum diameter is 6 inches.

New sewer systems, except one-lot, single family residences, shall be designed based on per capita flows or other methods as approved by the City and Department of Ecology. The City requires detailed design calculations and service area maps, stamped, signed, and

dated by a Washington State registered professional engineer, for the system design.

8.0.8 SEWER/WATER SEPARATION

Sewer mains shall be laid at least 10 feet horizontally, measured edge to edge, from any existing or proposed water supply line. The Director may allow a reduction to 5 feet of separation 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.

Install all sanitary sewer crossings under water mains so that the top of the sewer pipe is at least 18 inches below the bottom of the water main. Locate 18 feet of sewer pipe at the crossing so the joints will be as far from the water supply line as possible. This installation may require special structural support for the water and sewer pipe and/or other methods to ensure proper support and isolation between the utilities.

When a 12 inch vertical separation is not achievable between two utilities, provide a minimum 6 inch thick Ethafoam pad between utilities. Refer to G-5. Water/sewer lines must be at least 18" apart with water over sewer at all times. If water is below sewer or at the same depth they need to be separated by at least 10' horizontally.

8.0.9 SEWER/WELL SEPARATION

No sanitary sewer shall be constructed within 100 feet of a well.

8.0.10 MINIMUM SEWER SLOPES

SEWER SIZE (INCHES)	MINIMUM SLOPE (FEET PER 100 FEET)
4	2.00 Side Sewer Only
6	2.00 Side Sewer Only
8	0.40
10	0.28
12	0.22
14	0.17

15	0.15
16	0.14
18	0.12
21	0.10
24	0.08
27	0.07
30	0.06
36	0.05

SECTION 8.1 SIDE (LATERAL) SEWER

8.1.1 GENERAL

A. A side sewer connection longer than 150' from the main is considered a sewer main extension and shall meet requirements of Section 8.2 Sewer Main. The side sewer connection(s) to building(s) shall be made from the sewer main extension and shall meet requirements of section 8.1.
B. The property owner(s) maintains the sewer connection(s) from the right-of-way line to the building.
C. Permittee shall:
    1. Connect:
        a. Buildings within 250 feet of a sanitary sewer line.
        b. One building per side sewer unless approved by the Director. More than one connection requires the Director's approval and recording with King County records a completed Joint Side Sewer Easement and Maintenance Agreement.
    2. Verify the location and depth of the stubs shown on as-builts.
    3. Assume all cost, including street repairs, tapping charges, and bonds for connection to sewer main.
    4. Repair street cuts per RS-03.
    5. Provide:
        a. Minimum diameter of 6 inches within the City right-of-way. Residential side sewers may be reduced to a minimum diameter of 4 inches from the right-of-way to the house depending on number of homes connected to it.
        b. Sewer clean-out and test-tee at property line.
        c. Where clean-out is not installed at property line, a marker ball shall be installed per G-3 and G-4 at the property line.
        d. Sewer clean-out at building with required bends totaling no more than 90°.
D. Refer to SS-02 and SS-03.

8.1.2 MATERIAL

A. Pipe - Ductile iron Class 50 minimum, PVC minimum SDR 35 (ASTM D3034) gasketed pipe, or welded HDPE where its use is justified due to scouring velocities or soil problems.
B. Pipe Encasement – CDF, steel sleeve, PVC. Polyethylene for ductile iron pipe placed in peat areas or areas of potential corrosion.

8.1.3 INSTALLATION

A. Install on not less than 2% grade, nor greater than 1V:2H.
B. Install anchors for pipe having slopes over 15%.
C. Encase ductile iron pipe placed in peat areas or areas of potential corrosion with polyethylene sleeve.
D. Install the side sewer not less than 5 feet from any building, except where the sewer enters the building. If the sewer is below the building foundation, for every one foot of depth the side sewer shall be one foot or greater horizontally from the foundation.
E. Provide clean outs, per SS-03, at 100 foot intervals along the sewer lines, at property lines, at the building, and at all vertical or horizontal bends totaling ninety degrees (90°) or greater from the nearest cleanout.
F. Outside rights-of-way, the pipe shall have at least 2 feet of cover.

SECTION 8.2 SEWER MAIN

8.2.1 MATERIAL

A. All sewer materials shall conform to the applicable Standard Specifications. The pipe shall be legibly and permanently marked with type, class and/or thickness. The Permittee shall provide the City with a certificate for materials when requested.
B. Pipe – Ductile iron Class 50 minimum, PVC minimum SDR 35, or HDPE where its use is justified due to scouring velocities or soil problems.
C. Pipe Size - at least 8 inch diameter. The Comprehensive Plan or design calculations may indicate larger diameter sewers.
D. Fittings - same materials as the pipe or as specified by the pipe manufacturer.

8.2.2 INSTALLATION

A. Refer to SS-09 and SS-10 for manhole drop connections.
B. Uniform slope between manholes.

C. Sewers with 20% or greater slope use concrete anchors approved by the Director.
D. Straight alignment between manholes.
E. Bury deep enough to provide adequate depth to service the lowest fixtures in the properties served.
F. Minimum depth of cover for a sewer in street right-of-way is 4 feet.
G. Sewer line will have a minimum of 12'' separation from other underground utility. A minimum of 18'' separation from any underground water utility is required.
H. Markerballs shall be installed according to Section 7.2.6. and G-3 and G-4.

8.2.3 INSPECTION AND TESTING

TV Inspection per Chapter 2 General Design and Construction Standards.

Channel manholes prior to testing.

A. Air Testing
   1. All sanitary sewer pipelines shall be air tested in accordance with the WSDOT Standard Specifications for air-permeable or non air-permeable pipe, as applicable. The Permittee shall furnish all materials and equipment necessary for conducting the tests and all testing shall be performed under the supervision of the City Inspector. The Permittee may desire to make an air test prior to backfilling for his own purposes. However, the air test for acceptance shall be made after backfilling has been completed and compacted.
B. Water Testing
   1. Required on every sanitary side sewer installation. The side sewer must be water tight to 10 feet of head from the test-tee.

SECTION 8.3 MANHOLES

8.3.1 MATERIALS

Precast Concrete Structure meeting size and dimensions according to SS-04 through SS-08.

For manhole lid refer to SS-11.

For manhole steps and ladder refer to SS-12 and SS-13.

8.3.2 INSTALLATION

A. Sanitary sewer manholes are required at the following locations:
   1. End of all sewer mains.
   2. Change in slope or alignment.
   3. Change in pipe diameter.
   4. Intersection of sewers 8 inch and larger (including side sewers).
   5. Intersection of sewer mains.
   6. Every 500 feet on sewer mains.
   7. On a side sewer 150' or longer.
B. Install a spread foundation or other measure, when Director requires, to prevent differential settlement.
C. Provide an outside drop connection for invert separation of 24 inches or more, measured at the manhole wall. Refer to SS-10. Inside drop connections require the Director's approval. Refer to SS-09.
D. Fully channel to the sewer crown.
E. Install manholes so that the invert of the downstream manhole is at least 0.1 foot below all incoming invert elevations. Approved manhole channels shall be a prefabricated fiberglass/PVC channel insert (GU Liner available from PREDL GU Liner Systems, 26020 31B Avenue, Aldergrove, B.C., Canada, V4W2Z6; Tel: 604-609-7755).
F. Use a Kor-N-Seal flexible pipe connector when connecting new sewer pipes into existing structures and when connecting existing sewer pipe into new structures.
G. All grout shall be "Fast Patch" as manufactured by Basalite with the use of clean potable water.
H. Rubber gaskets between manhole section shall be according to WSDOT Standard Specification 9-04.4(1).
I. Install 12 inch thick CSBC (WSDOT 9-03.9(3)) foundation pad beneath manhole.

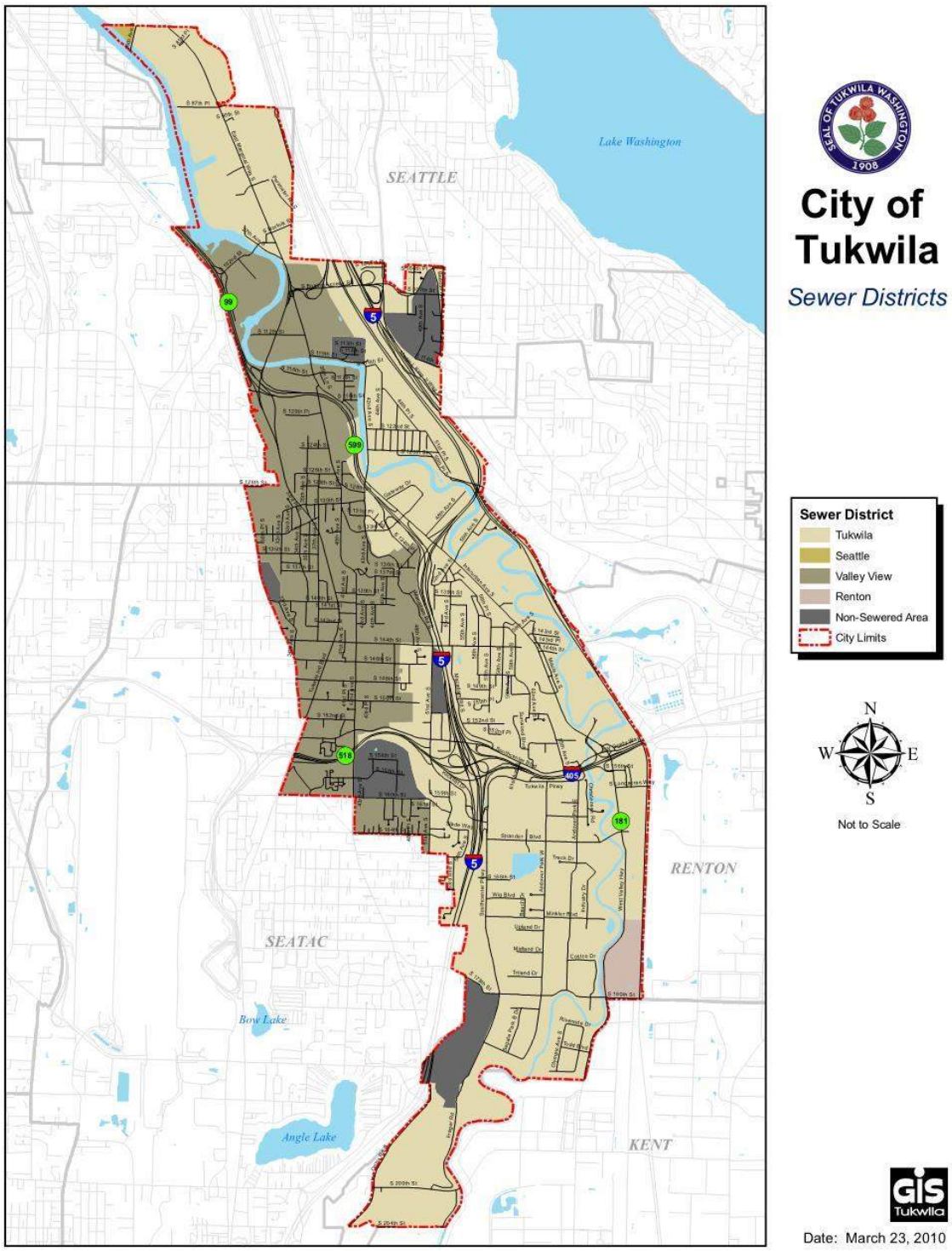
SECTION 8.4 GREASE INTERCEPTOR

The City requires grease interceptors on all buildings where food preparation occurs and at locations determined by the Director as necessary for the proper handling of liquid wastes. Grease interceptors shall comply with Appendix H of the Uniform Plumbing Code and the following:

A. Refer to SS-14.
B. Provide a double baffle type interceptor.
C. Grease interceptor, 6" lines, and reference to related plumbing sheets.

D. Size the tank per the Uniform Plumbing Code, Appendix H, and minimum 1,000 gallon capacity. For sizing, consider the meals per hour as equal to the restaurant's seating capacity.
E. Locate the vault outside the building, between 5 feet and 25 feet from the building foundation.
F. Install a minimum 2" vent from interceptor to the interior plumbing pipe for ventilation purpose.
G. Install the interceptor so that gray water from sinks, floor drains, drains under garbage compactors, is routed through the interceptor. DO NOT route dishwashers through the grease interceptor. NOTE: Route ONLY gray water through the interceptor.
H. Every three months the Owner shall completely pump out the interceptor. Businesses that generate small amounts of grease may, with the Director's approval, pump the interceptor on a 6-month schedule. At any time, the City may inspect the interceptor and require service that is more frequent.

SECTION 8.5 SEWER DISTRICT BOUNDARIES



Revision date: 04/08/2019

STANDARD DETAILS

SECTION 9.0 STREET STANDARD DETAILS

RS-01 Typical Roadway Section

RS-02 Turn Around – Cul-de-sac and Hammerhead

RS-03 Pavement Restoration

RS-04 Cement Concrete Curb and Gutter

RS-05 Residential Driveway (1 of 3)

RS-06 Residential Driveway (2 of 3)

RS-07 Residential Driveway (3 of 3)

RS-08 Commercial Driveway

RS-09 Sidewalk

RS-10 Parallel Curb Ramp (WSDOT STD PLAN F-40.12-03)

RS-11 Combination Curb Ramp (WSDOT STD PLAN F-40.14-03)

RS-12 Perpendicular Curb Ramp (WSDOT STD PLAN F-40.15-03)

RS-13 Single Direction Curb Ramp (WSDOT STD PLAN F-40.16-03)

RS-14 Detectable Warning Surface (WSDOT STD PLAN F-45.10-02)

RS-15 Curb and Gutter: Catch Basin Surround

RS-16 Not In Use

RS-17 Raised Pavement Marker

RS-18 Left Turn: 2-Way Lane Typical

RS-19 Left Turn: Noncontinuous

RS-20 Crosswalk

RS-21 Traffic Arrows – Low Speed (WSDOT STD PLAN M-24.40-02) (2 Sheets)

RS-22 Profiled and Embossed Plastic Lines (WSDOT STD PLAN M-20.20-02)

RS-23A Sign Installation: Sign Post Foundation Installation

RS-23B Sign Installation: Street Name Sign Installation

RS-24 Illumination Design Guidelines: Roadway & Pedestrian Luminaires

RS-25 Roadway Light Pole

RS-26 Pedestrian Light Pole and Foundation

RS-27 Spread Footing Luminaire Foundation: Sidewalk Application

RS-28 Uniform Luminaire Wiring

RS-29 Electrical Service Cabinet

RS-30 Typical Loop Detection Layout

RS-31 Not In Use

RS-32 Street Monument

RS-33 Bollard Type 1 (WSDOT STD PLAN H-60.10-01)

RS-34 Bollard Type 2 (WSDOT STD PLAN H-60.20-01)

RS-35 Metal Safety Railing (2 Sheets)

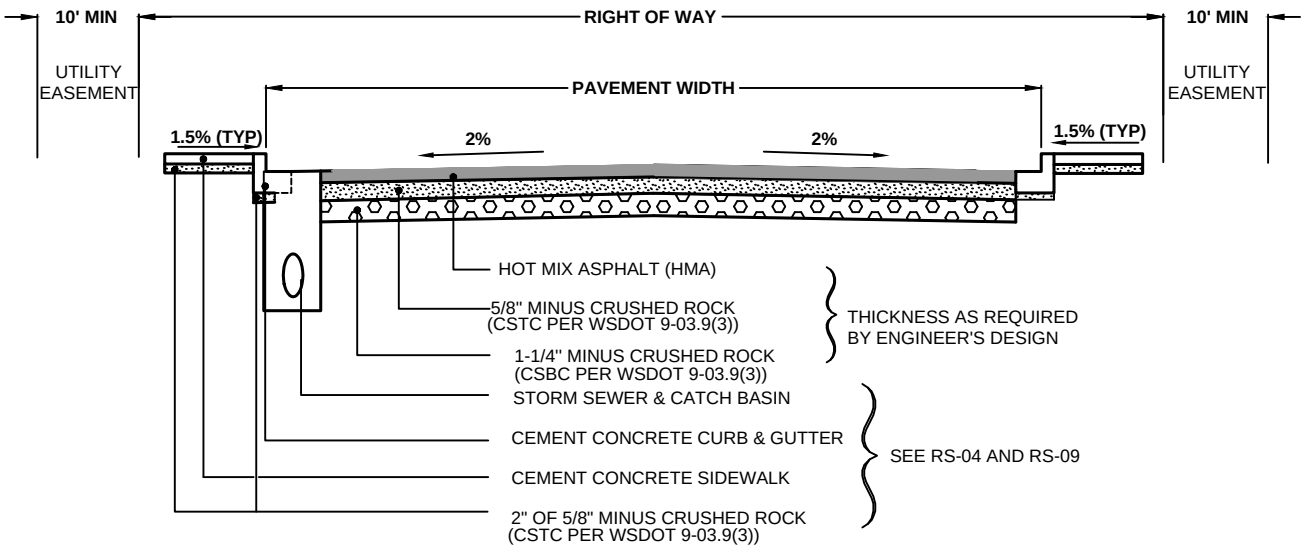
RS-36 Mailbox Installation

RS-37 MIC Driveway Design & Location

RS-38 Street Opening

RS-39 Work Zone Plan: Low Volume Road - Centerline

RS-40 Work Zone Plan: Low Volume Road - Surveying



TYPE 0F STREET	RIGHT-OF-WAY (FEET)	PAVEMENT WIDTH (FEET)
PUBLIC		
ARTERIAL		
PRINCIPAL	80-100	48-84
MINOR	60-80	36-64
COLLECTOR		
COMMERCIAL	60	48
RESIDENTIAL	60	28-36
ACCESS		
COMMERCIAL	60	36
RESIDENTIAL	50	28
ALLEY	20	15
CUL-DE-SAC		
ROADWAY	40	28
TURNAROUND	92 (DIA)	81 (DIA)
PRIVATE		
COMMERCIAL	40	28
RESIDENTIAL	20	20

NOTES:

1. ALL SPECIFICATIONS SHALL MEET CURRENT WSDOT/APWA "STANDARD SPECIFICATIONS FOR ROADS, BRIDGE, AND MUNICIPAL CONSTRUCTION".
2. SEE DETAIL RS-09 FOR THE SIDEWALK WIDTH.
3. STREET CLASSIFICATIONS ARE DESIGNATED BY ORDINANCE.
4. PAVEMENT SECTION MUST BE DESIGNED PER AASHTO FOR A MINIMUM OF HS20 LOADING.
5. ROADWAY SECTIONS IN SOUTHCENTER SUB AREA SUBJECT TO ADDITIONAL REQUIREMENTS.

NOT TO SCALE

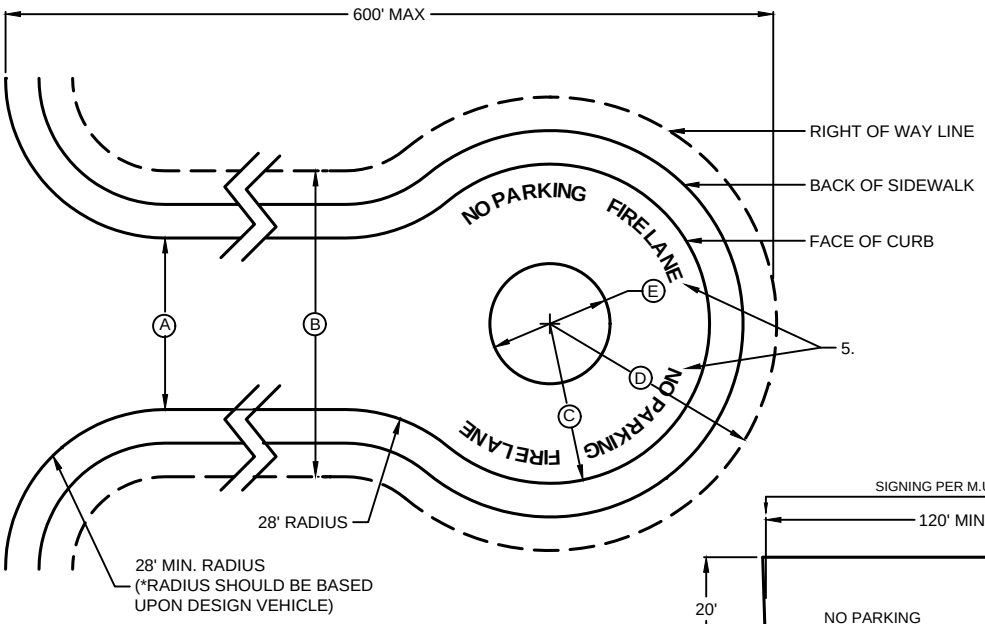
City of Tukwila

TYPICAL ROADWAY SECTION

SHEET: **RS-01**

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI



CUL-DE-SAC

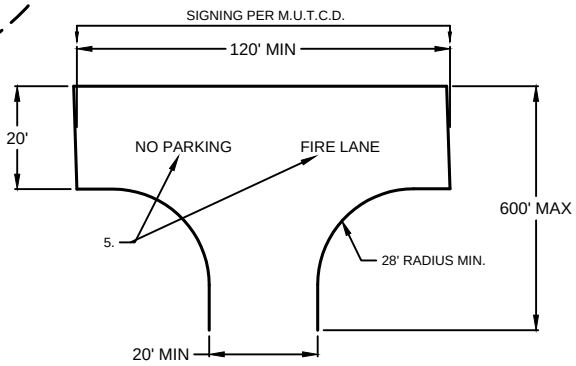
A - VARIES 26' MIN.

B - VARIES 40' MIN.

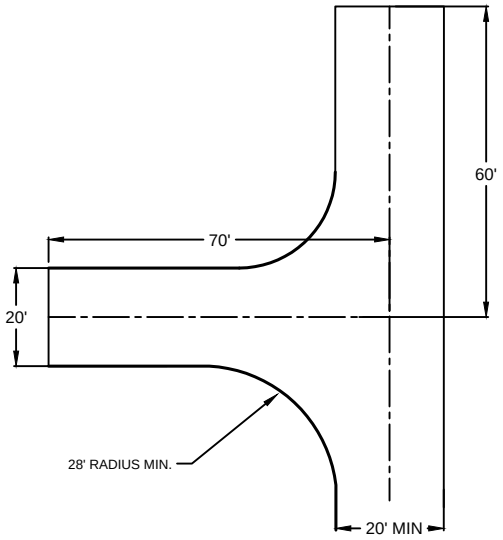
C - 48' MIN.

D - 50' MIN.

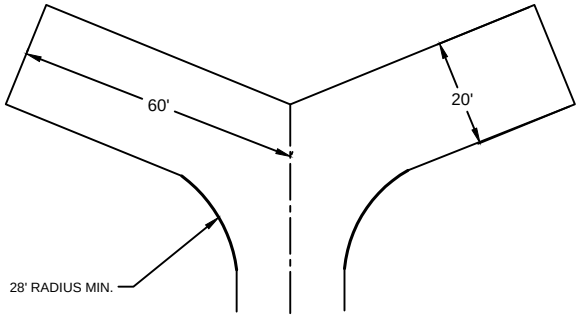
E - 10' MAXIMUM



HAMMERHEAD



OFFSET HAMMERHEAD



"Y" HAMMERHEAD

NOTES:

1. A CUL-DE-SAC IS REQUIRED FOR ALL DEAD END STREETS LONGER THAN 150' IN LENGTH.
2. CUL-DE-SAC LANDSCAPE ISLAND TO BE MAINTAINED BY PROPERTY OWNERS.
3. ALL SIGNS SHALL MEET CURRENT WSDOT/APWA "STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION", AND CURRENT MUTCD.
4. A HAMMERHEAD REQUIRES PRIOR APPROVAL BY THE FIRE DEPARTMENT AND CITY ENGINEER.
5. PAINTED "NO PARKING FIRE LANE" STENCILS. 12" HEIGHT.

NOT TO SCALE

City of Tukwila

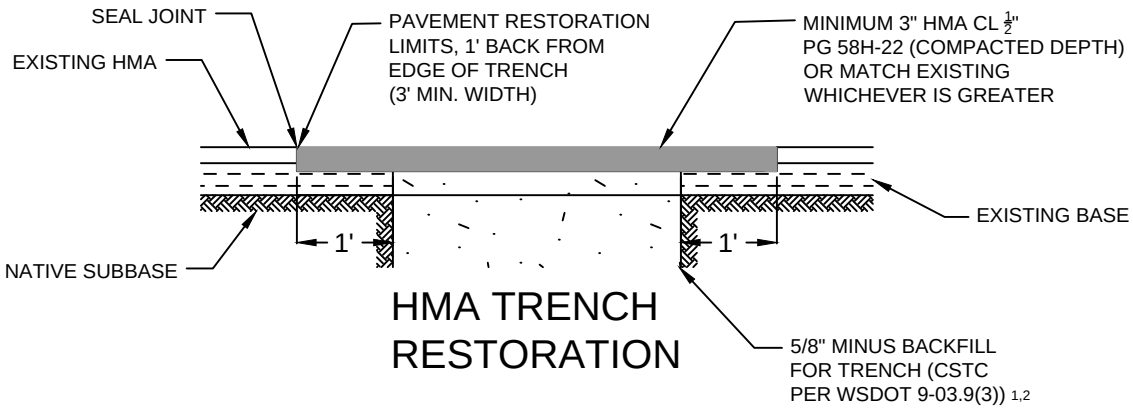
TURN AROUND

CUL DE SAC & HAMMERHEAD

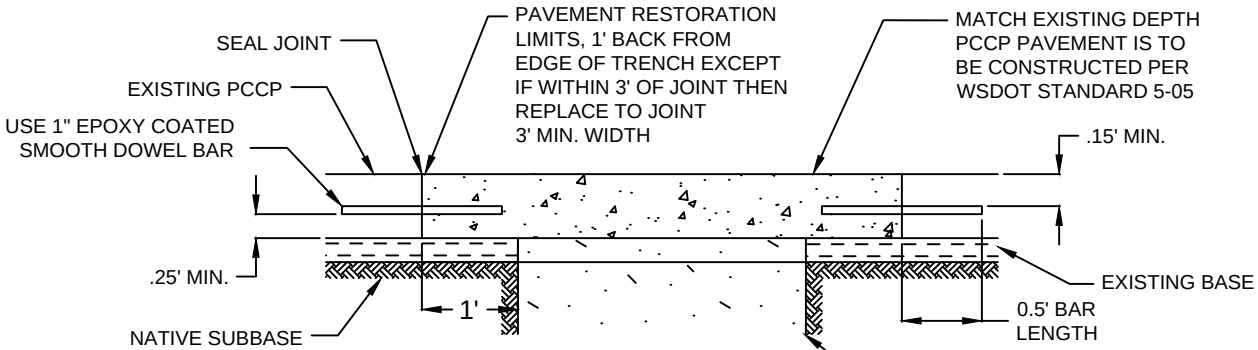
SHEET: RS-02

LAST REVISION: APRIL 2019

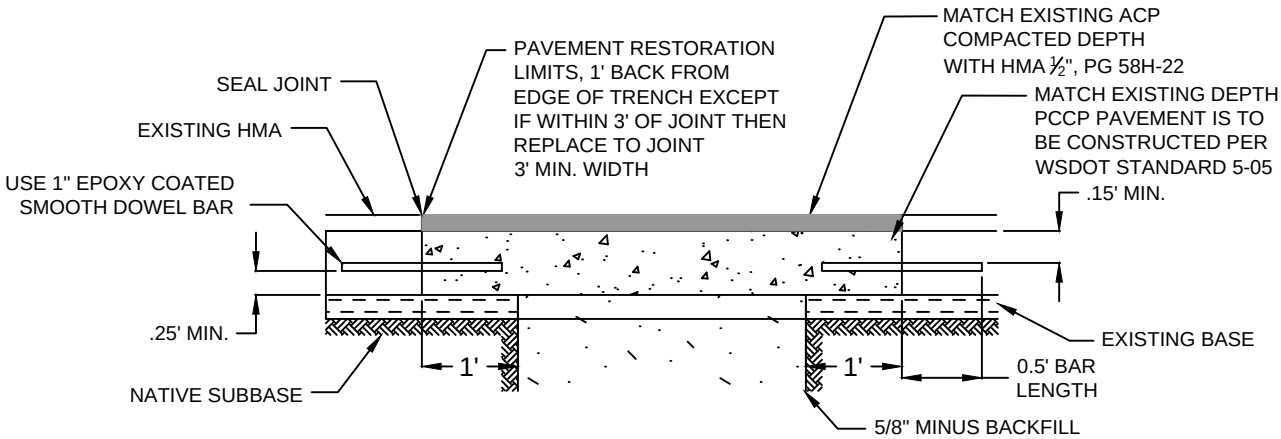
APPROVAL: H. PONNEKANTI



HMA TRENCH RESTORATION



PCCP TRENCH RESTORATION



HMA OVER PCCP TRENCH RESTORATION

NOTES:

1. FOR TRENCHES LESS THAN 18" WIDE, USE 100% CDF FOR TRENCH BACKFILL.
2. FOR TRENCHES GREATER THAN 18" WIDE, ALL BACKFILL IN RIGHT-OF-WAY SHALL BE ⅝" MINUS CRUSHED ROCK (CSTC PER WSDOT 9-03.9(3)).
3. A MINIMUM OF A ONE YEAR GUARANTEE IS REQUIRED ON ALL PAVEMENT PATCHING AND OVERLAYS.

NOT TO SCALE

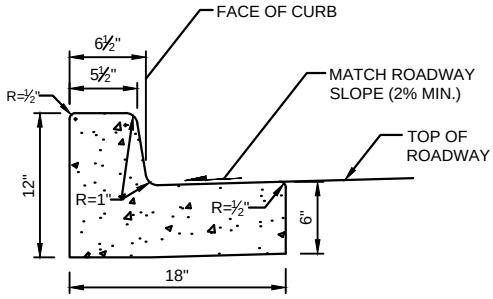
City of Tukwila

PAVEMENT RESTORATION

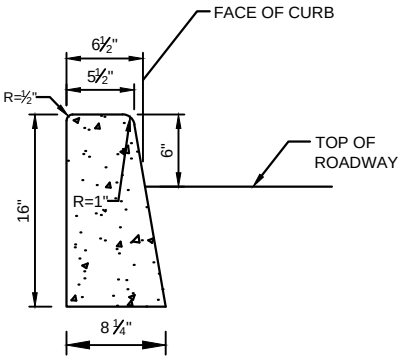
SHEET: RS-03

LAST REVISION: APRIL 2019

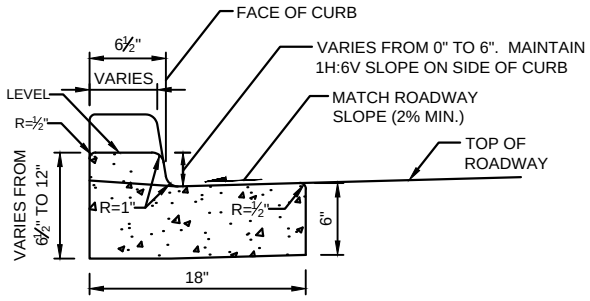
APPROVAL: H. PONNEKANTI



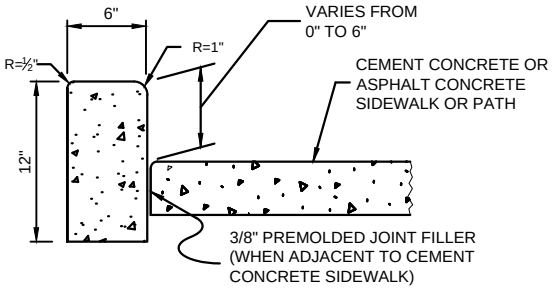
CEMENT CONCRETE
TRAFFIC CURB AND GUTTER



CEMENT CONCRETE TRAFFIC CURB



DEPRESSED CURB SECTION



CEMENT CONCRETE
PEDESTRIAN CURB

NOTES:

1. ALL CEMENT CONCRETE CURBS SHALL BE CONSTRUCTED WITH AIR ENTRAINED CONCRETE CLASS 3000 PSI CONFORMING TO WSDOT STD. SPEC. 6-02 EXCEPT AS SPECIFIED IN NOTE 2.
2. CEMENT CONCRETE CURB OR CURB AND GUTTER ALONG THE FULL WIDTH OF A DRIVEWAY ENTRANCE SHALL BE CONSTRUCTED WITH AIR ENTRAINED CONCRETE CLASS 4000 CONFORMING TO WSDOT STD. SPEC. 6-02.
3. CURB EXPANSION JOINT TO BE PLACED EVERY 15'.
4. REMOVAL/REPLACEMENT OF CEMENT CONCRETE CURB SHALL BE FROM EXPANSION JOINT TO EXPANSION JOINT UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
5. FOR CURB AND GUTTER CATCH BASIN SURROUND SEE RS-15.

NOT TO SCALE

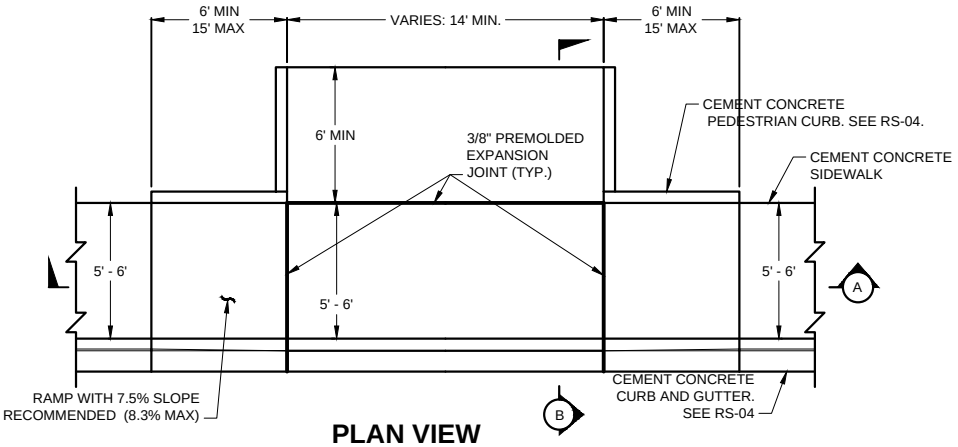
City of Tukwila

CEMENT CONCRETE CURB DETAIL

SHEET: **RS-04**

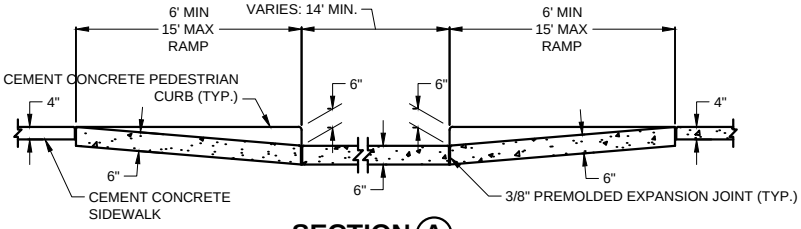
LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI

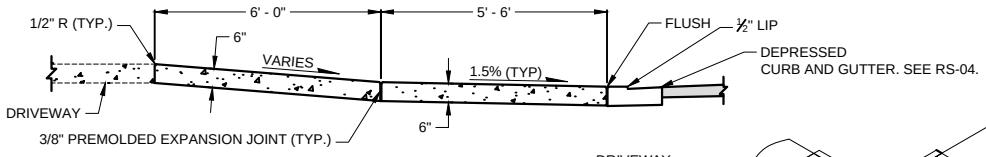


PLAN VIEW

CEMENT CONCRETE DRIVEWAY ENTRANCE TYPE 1



SECTION (A)



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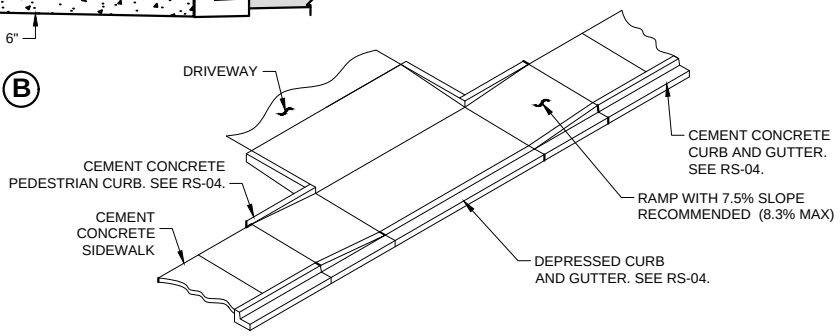


TYPE 1 - ISOMETRIC VIEW

NOTES:

1. THIS ALTERNATE SHOULD BE USED ONLY AFTER STUDYING CLOSENESS OF DRIVEWAYS, DRAINAGE, TOPOGRAPHY, DRIVEWAY GRADES, ETC.
2. CONCRETE SHALL BE CLASS 4000 PSI.
3. INSPECTION REQUIRED BEFORE PLACING CONCRETE. AT LEAST 24 HOUR NOTICE MUST BE GIVEN TO TUKWILA PUBLIC WORKS DEPARTMENT.
4. ALL DRIVEWAY APRONS SHALL BE A MINIMUM OF 6" THICK.
5. WHERE DRIVEWAY WIDTHS EXCEED 15', A 3/8" X 5-1/2" EXPANSION JOINT SHALL BE PLACED LONGITUDINALLY ALONG THE CENTERLINE.
6. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH APWA/WSDOT PLANS AND SPECIFICATIONS OR AS DIRECTED BY THE CITY OF TUKWILA.
7. AN ASPHALT APRON MAY BE USED WITHIN THE ROW IN AREAS WHERE NO CURB EXISTS.
8. REMOVAL OF EXISTING CONCRETE CURB, GUTTER OR SIDEWALK SHALL BE SAW CUT TO THE NEXT CONSTRUCTION JOINT.

NOT TO SCALE

City of Tukwila

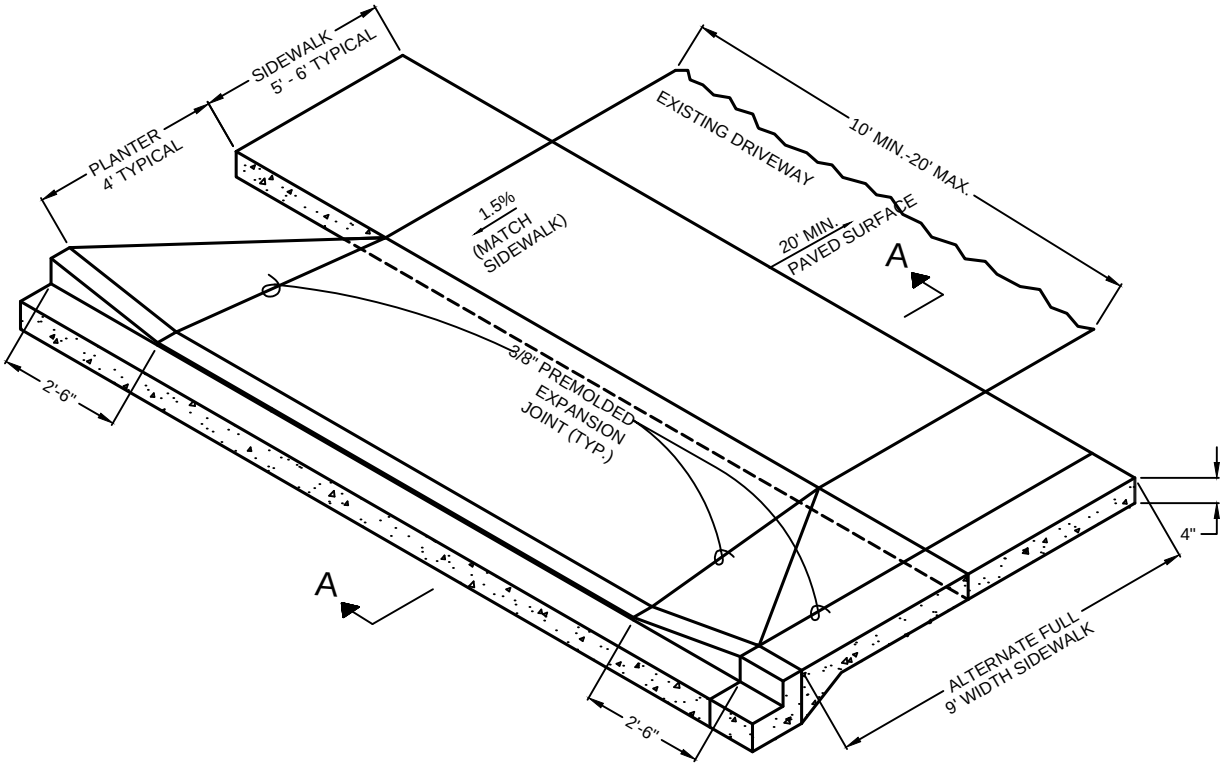
RESIDENTIAL DRIVEWAY

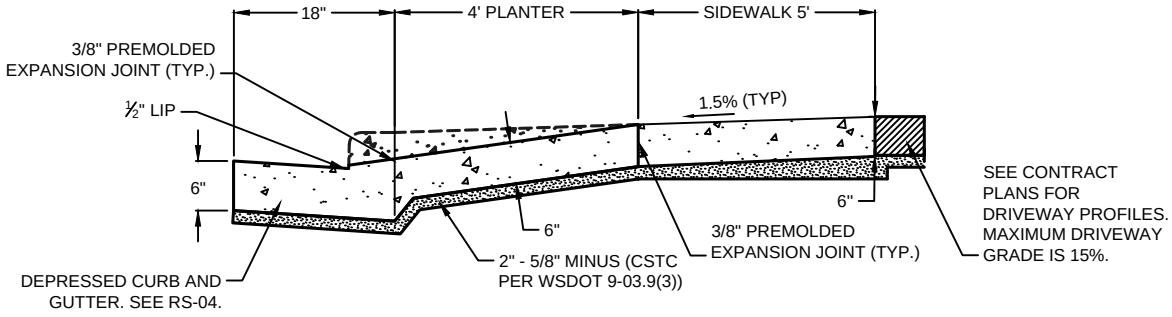
ALTERNATIVE 1 OF 3

SHEET: **RS-05**

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI





SECTION A-A

NOTES:

1. THIS ALTERNATE SHOULD BE USED ONLY AFTER STUDYING CLOSENESS OF DRIVEWAYS, DRAINAGE, TOPOGRAPHY, DRIVEWAY GRADES, RIGHT OF WAY, ETC.
2. CONCRETE SHALL BE CLASS 4000 PSI.
3. INSPECTION REQUIRED BEFORE PLACING CONCRETE. AT LEAST 24 HOUR NOTICE MUST BE GIVEN TO TUKWILA PUBLIC WORKS DEPARTMENT.
4. ALL DRIVEWAY APRONS SHALL BE A MINIMUM OF 6" THICK.
5. WHERE DRIVEWAY WIDTHS EXCEED 15', A 3/8" X 5-1/2" EXPANSION JOINT SHALL BE PLACED LONGITUDINALLY ALONG THE CENTERLINE.
6. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH APWA/WSDOT PLANS AND SPECIFICATIONS OR AS DIRECTED BY THE CITY OF TUKWILA.
7. AN ASPHALT APRON MAY BE USED WITHIN THE ROW IN AREAS WHERE NO CURB EXISTS.
8. REMOVAL OF EXISTING CONCRETE CURB, GUTTER OR SIDEWALK SHALL BE SAW CUT TO THE NEXT JOINT.

NOT TO SCALE

City of Tukwila

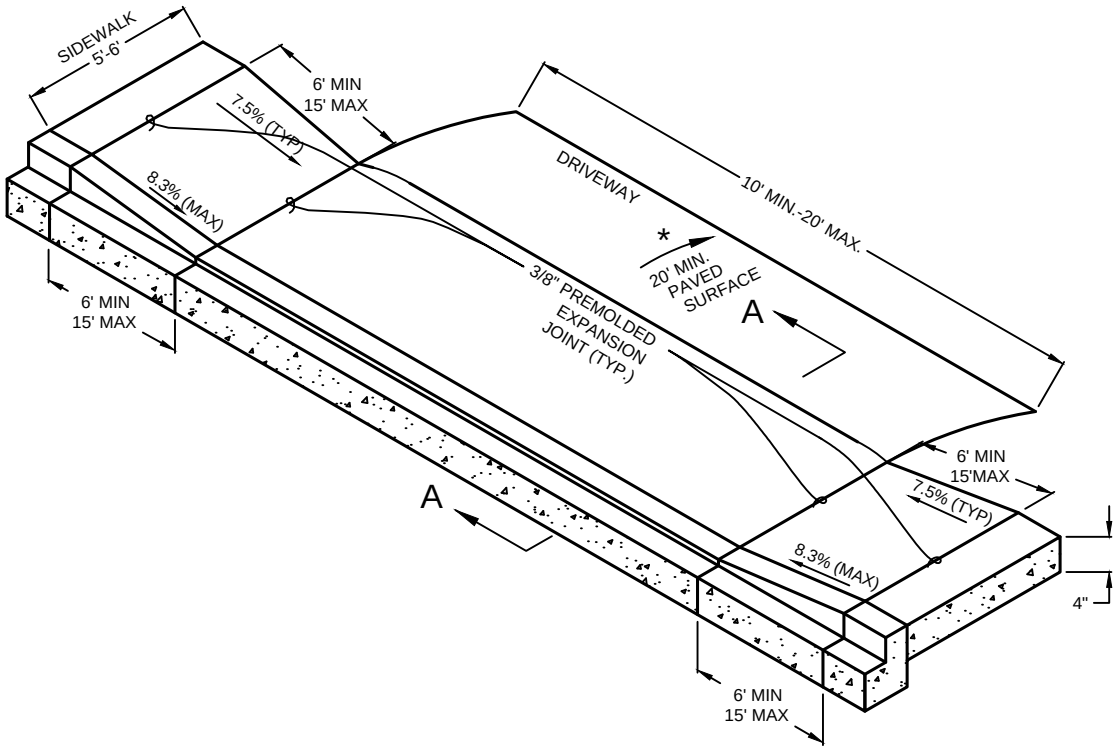
RESIDENTIAL DRIVEWAY

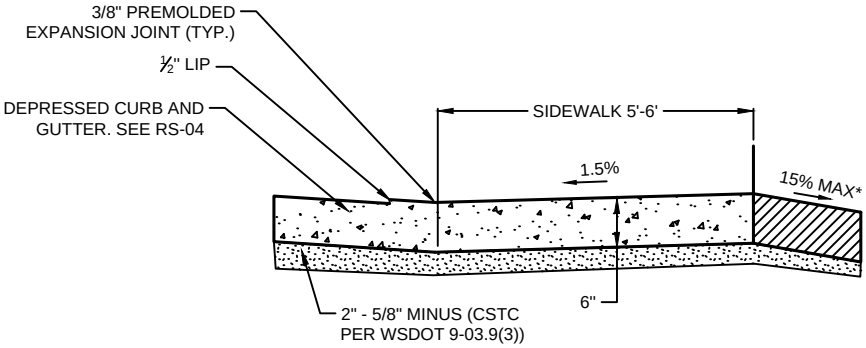
ALTERNATE 2 OF 3

SHEET: **RS-06**

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI





* SEE CONTRACT PLANS FOR DRIVEWAY PROFILE

SECTION A-A

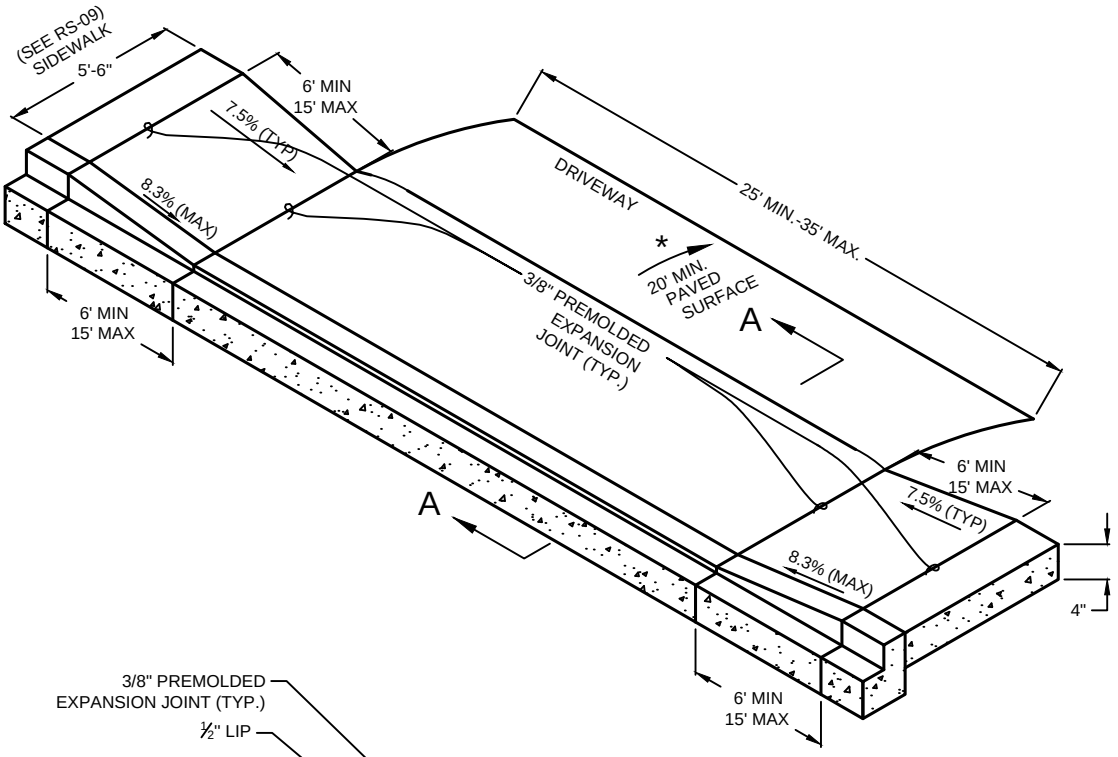
NOTES:

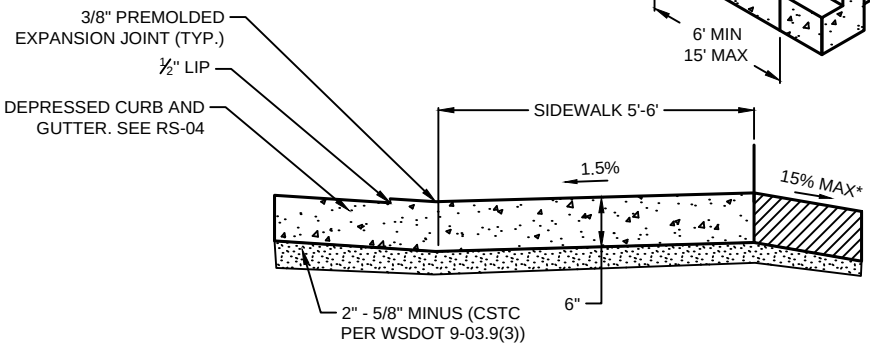
1. THIS ALTERNATE SHOULD BE USED ONLY AFTER STUDYING CLOSENESS OF DRIVEWAYS, DRAINAGE, TOPOGRAPHY, DRIVEWAY GRADES, RIGHT OF WAY, ETC.
2. CONCRETE SHALL BE CLASS 4000 PSI.
3. INSPECTION REQUIRED BEFORE PLACING CONCRETE. AT LEAST 24 HOUR NOTICE MUST BE GIVEN TO TUKWILA PUBLIC WORKS DEPARTMENT.
4. ALL DRIVEWAY APRONS SHALL BE A MINIMUM OF 6" THICK.
5. WHERE DRIVEWAY WIDTHS EXCEED 15', A 3/8" X 5-1/2" EXPANSION JOINT SHALL BE PLACED LONGITUDINALLY ALONG THE CENTERLINE.
6. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH APWA/WSDOT PLANS AND SPECIFICATIONS OR AS DIRECTED BY THE CITY OF TUKWILA.
7. AN ASPHALT APRON MAY BE USED WITHIN THE ROW IN AREAS WHERE NO CURB EXISTS.
8. REMOVAL OF EXISTING CONCRETE CURB, GUTTER OR SIDEWALK SHALL BE SAW CUT TO THE NEXT CONSTRUCTION JOINT.

NOT TO SCALE

City of Tukwila

RESIDENTIAL DRIVEWAY	
ALTERNATE 3 OF 3	
SHEET:	**RS-07**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	





* SEE CONTRACT PLANS FOR DRIVEWAY PROFILE

SECTION A-A

NOTES:

1. DRIVEWAY WIDTH: 25' MIN - 35' MAX.
2. THIS ALTERNATE SHOULD BE USED ONLY AFTER STUDYING CLOSENESS OF DRIVEWAYS, DRAINAGE, TOPOGRAPHY, DRIVEWAY GRADES, RIGHT OF WAY, ETC.
3. DRIVEWAYS WITH HIGH VOLUME (AS NOTED BY CITY ENGINEER) MAY BE APPROVED FOR INTERSECTION TYPE ACCESS.
4. TURNING RESTRICTIONS MAY BE APPLIED BY THE CITY ENGINEER.
5. CONCRETE SHALL BE CLASS 4000 PSI.
6. INSPECTION REQUIRED BEFORE PLACING CONCRETE. AT LEAST 24 HOUR NOTICE MUST BE GIVEN TO TUKWILA PUBLIC WORKS DEPARTMENT FOR INSPECTION.
7. ALL DRIVEWAY APRONS SHALL BE A MINIMUM OF 6" THICK.
8. WHERE DRIVEWAY WIDTHS EXCEED 15', A 3/8" X 5-1/2" EXPANSION JOINT SHALL BE PLACED LONGITUDINALLY ALONG THE CENTERLINE.
9. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH APWA/WSDOT PLANS AND SPECIFICATIONS OR AS DIRECTED BY THE CITY OF TUKWILA.
10. AN ASPHALT APRON MAY BE USED WITHIN THE ROW IN AREAS WHERE NO CURB EXISTS.
11. REMOVAL OF EXISTING CONCRETE CURB, GUTTER OR SIDEWALK SHALL BE TO THE NEXT EXPANSION JOINT; SCORE JOINTS MUST BE SAW CUT AND REPLACED WITH AN EXPANSION JOINT.

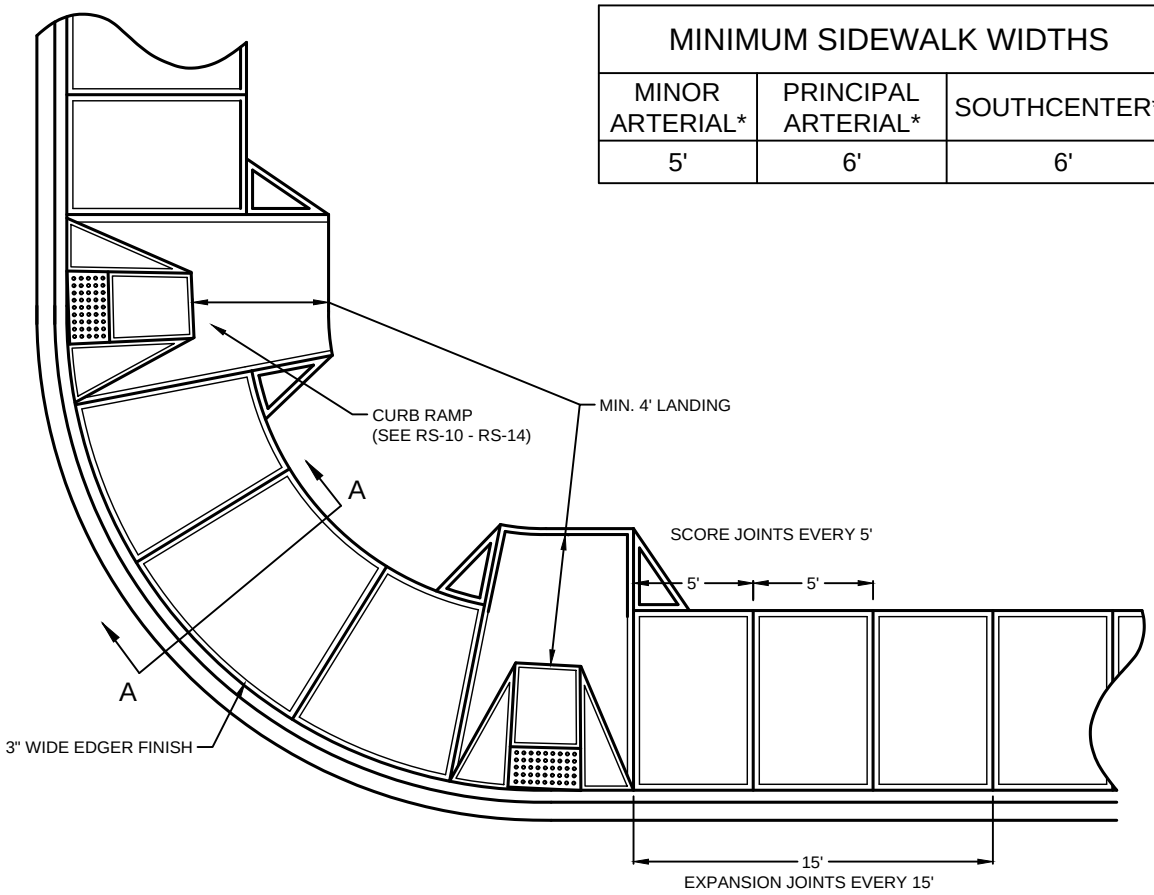
NOT TO SCALE

City of Tukwila

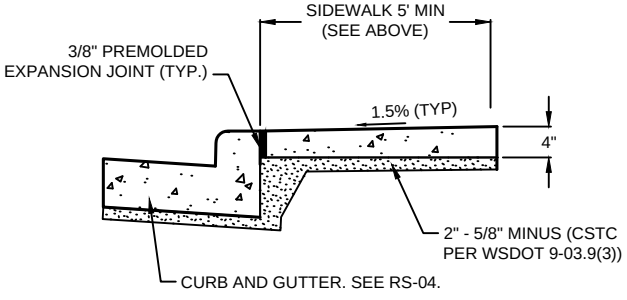
COMMERCIAL DRIVEWAY

SHEET:	**RS-08**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

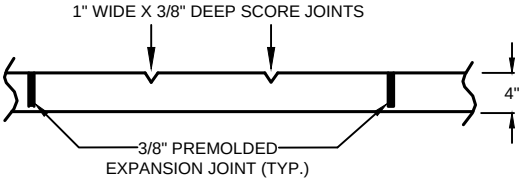
MINIMUM SIDEWALK WIDTHS		
MINOR ARTERIAL*	PRINCIPAL ARTERIAL*	SOUTHCENTER**
5'	6'	6'



PLAN VIEW



SECTION A-A



ELEVATION

NOTES:

1. SIDEWALKS SHALL BE A MINIMUM OF 8 FEET WIDE AT BUS STOPS AND PULLOUTS, OR WHERE THE SPEED LIMIT IS OVER 35 MPH, OR WHERE A TRAIL AND SIDEWALK ARE COMBINED.
2. CONCRETE SHALL BE CLASS 4000 PSI.
3. PLACE CEMENT CONCRETE OVER 2" OF 5/8" MINUS CRUSHED ROCK (CSTC PER WSDOT 9-03.9(3)).
4. REMOVE EXISTING CONCRETE CURB, GUTTER OR SIDEWALK TO THE NEAREST JOINT; SCORE JOINTS MUST BE SAW CUT AND REPLACED WITH NEW.
5. SIDEWALKS CONSTRUCTED WITHIN SOUTHCENTER HAVE ADDITIONAL REQUIREMENTS.

* SEE TMC CHAPTER 9.48.040 FOR MORE INFORMATION

** SEE TMC CHAPTER 18.28 TUKWILA URBAN CENTER (TUC) FOR MORE INFORMATION

NOT TO SCALE

City of Tukwila

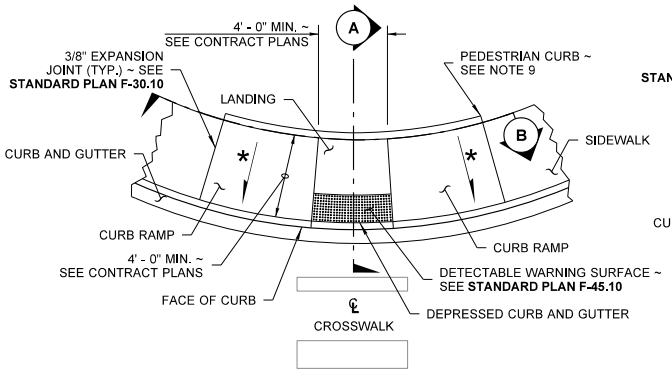
SIDEWALK

SHEET: RS-09

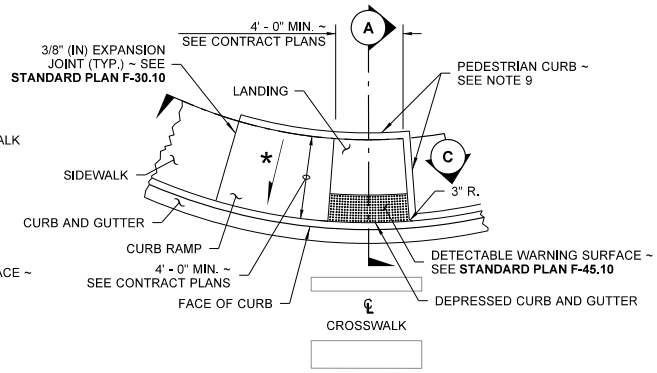
LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI

DRAWN BY: FERN LIDDELL

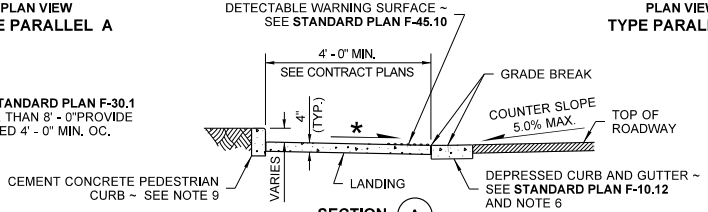


PLAN VIEW
TYPE PARALLEL A

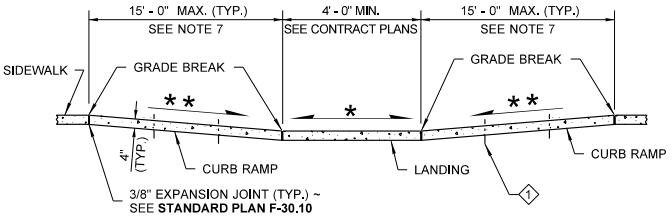


PLAN VIEW
TYPE PARALLEL B

① CONTRACTION JOINT (TYP.) ~ SEE **STANDARD PLAN F-30.1** FOR CURB RAMP LENGTHS GREATER THAN 8' - 0"PROVIDE CONTRACTION JOINT EQUALLY SPACED 4' - 0" MIN. OC.

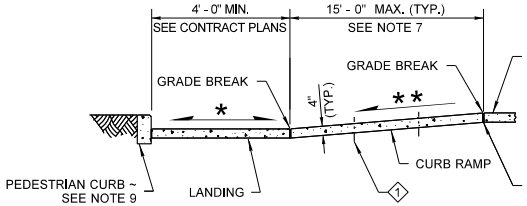


SECTION (A)



SECTION (B)

(ALONG INSIDE RADIUS AT BACK OF WALKWAY)

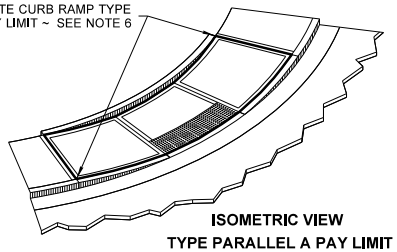


SECTION (C)

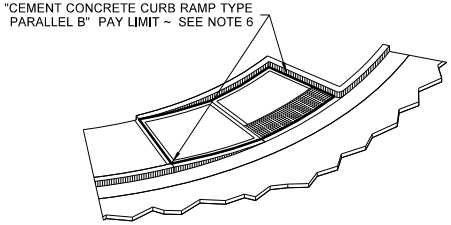
(ALONG INSIDE RADIUS AT BACK OF WALKWAY)

LEGEND

⟷	SLOPE IN EITHER DIRECTION
*	1.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (2% MAX.)
**	7.5% OR FLATTER RECOMMENDED FOR DESIGN/ FORMWORK (8.3% MAX.) ~ SEE NOTE 7



ISOMETRIC VIEW
TYPE PARALLEL A PAY LIMIT



ISOMETRIC VIEW
TYPE PARALLEL B PAY LIMIT

NOTES

1. At marked crosswalks, the connection between the landing and the roadway must be contained within the width of the crosswalk markings.
2. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.
3. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances on any part of the Curb Ramp or Landing, or in the Depressed Curb and Gutter where the Landing connects to the roadway.
4. See Contract Plans for the curb design specified. See **Standard Plan F-10.12** for Curb, Curb and Gutter, Depressed Curb and Gutter, and Pedestrian Curb details.
5. See **Standard Plan F-30.10** for Cement Concrete Sidewalk Details. See Contract Plans for width and placement of sidewalk.
6. The Bid Item "Cement Concrete Curb Ramp Type __" does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalks.
7. The Curb Ramp length is not required to exceed 15 feet (unless otherwise shown in the Contract Plans). When applying the 15-foot max. length, the running slope of the curb ramp is allowed to exceed 8.3%, Use a single constant slope from bottom of ramp to top of ramp to match into the sidewalk over a horizontal distance of 15 feet. Do not include abutting landing(s) in the15-foot max. measurement. When a ramp is constructed on a radius, the 15-foot max. length is measured on the inside radius along the back of the walkway.
8. Curb Ramps and Landings shall receive a broom finish. See **Standard Specifications 8-14.**
9. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will be no material to retain.

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STATE OF WASHINGTON
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PARALLEL CURB RAMP

STANDARD PLAN F-40.12-03

SHEET 1 OF 1 SHEET

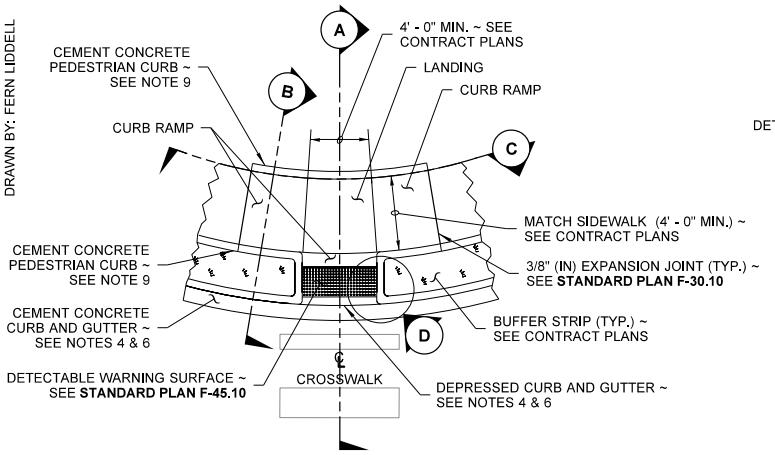
RS-10

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

Washington State Department of Transportation

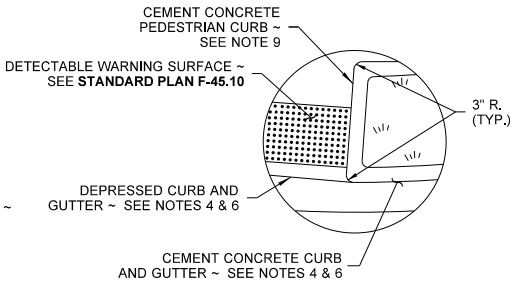
DRAWN BY: FERN LIDDELL



PLAN VIEW

TYPE COMBINATION

WITH BUFFER

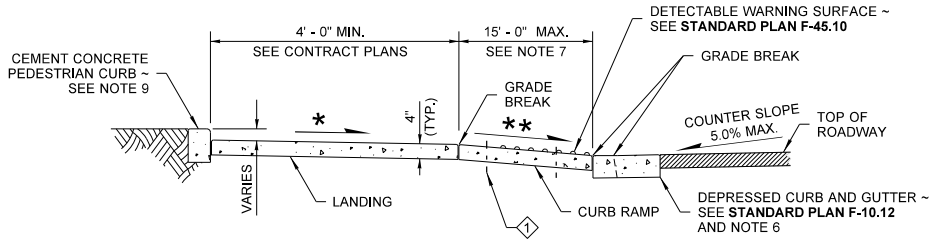


DETAIL (D)

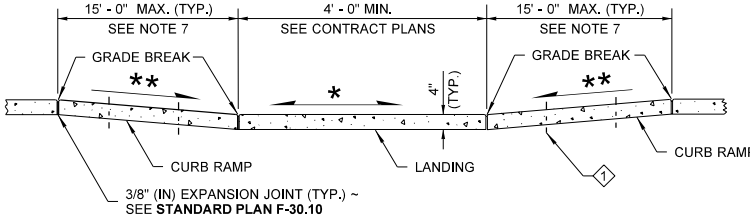
CURB RADIUS DETAIL

NOTES

1. At marked crosswalks, the connection between the curb ramp and the roadway must be contained within the width of the crosswalk markings.
2. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.
3. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances on any part of the Curb Ramp or Landing, or in the Depressed Curb and Gutter where the landing connects to the roadway.
4. See Contract Plans for the curb design specified. See **Standard Plan F-10.12** for Curb, Curb and Gutter, Depressed Curb, Gutter and Pedestrian Curb details.
5. See **Standard Plan F-30.10** for Cement Concrete Sidewalk Details. See Contract Plans for width and placement of sidewalk.
6. The Bid Item "Cement Concrete Curb Ramp Type __" does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalks.
7. The Curb Ramp length is not required to exceed 15 feet (unless otherwise shown in the Contract Plans). When applying the 15-foot max. length, the running slope of the curb ramp is allowed to exceed 8.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the sidewalk over a horizontal distance of 15 feet. Do not included the abutting landing in the 15-foot max. measurement. When a ramp is constructed on a radius, the 15-foot max. length is measured on the inside radius along the back of the walkway.
8. Curb Ramps and Landings shall receive a broom finish. See **Standard Specifications 8-14.**
9. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will not be material to retain.



SECTION (A)



SECTION (C)

(ALONG INSIDE RADIUS AT BACK OF WALKWAY)

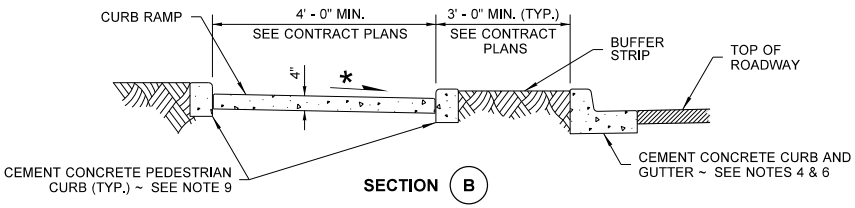
LEGEND

SLOPE IN EITHER DIRECTION

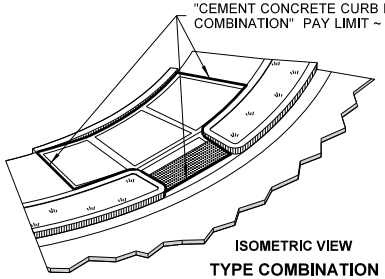
* 1.5 OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (2% MAX.)

** 7.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (8.3% MAX.)

1 CONTRACTION JOINT (TYP.) ~ SEE **STANDARD PLAN F-30.10** FOR CURB RAMP LENGTHS GREATER THAN 8' - 0" PROVIDE CONTRACTION JOINT EQUALLY SPACED 4' - 0" MIN. OC.



SECTION (B)



ISOMETRIC VIEW

TYPE COMBINATION PAY LIMIT

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

COMBINATION CURB RAMP

STANDARD PLAN F-40.14-03

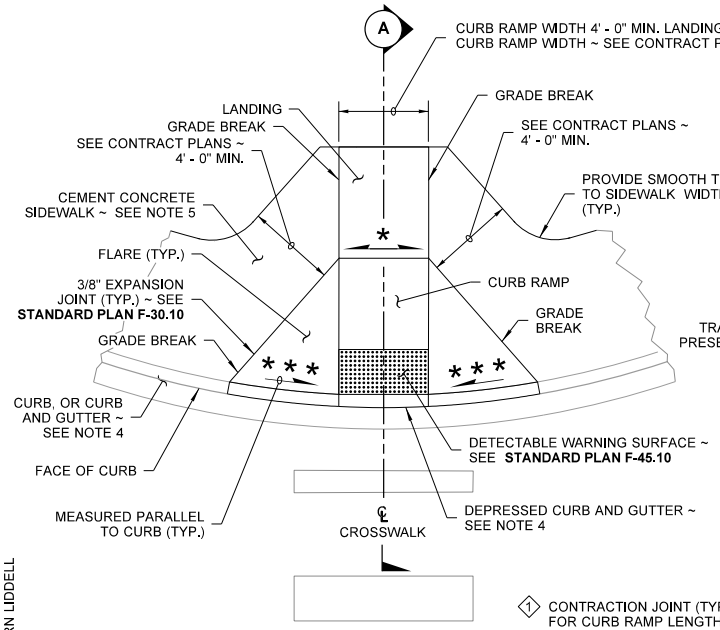
SHEET 1 OF 1 SHEET

RS-11

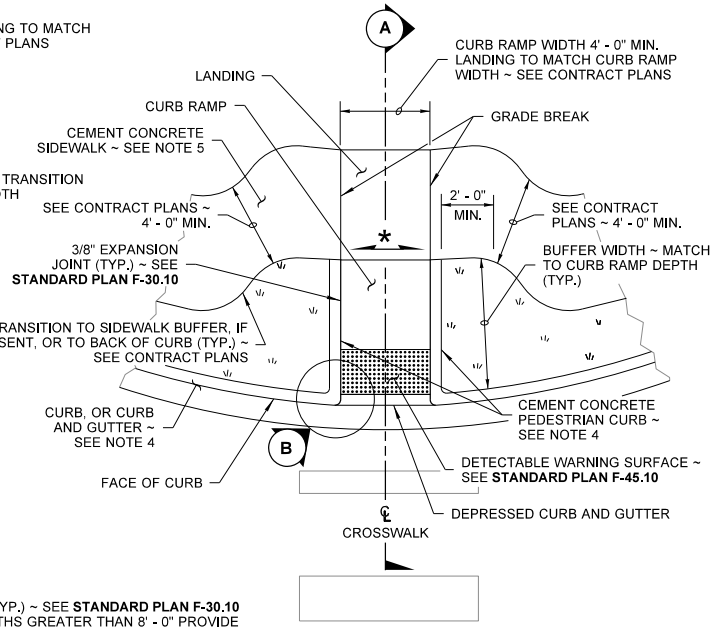
APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

Washington State Department of Transportation

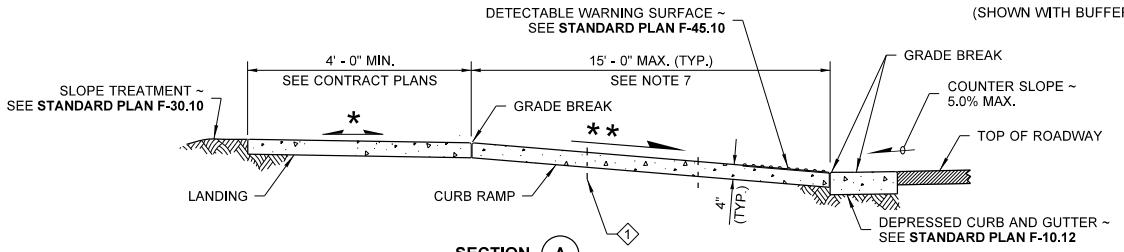


PLAN VIEW
TYPE PERPENDICULAR A

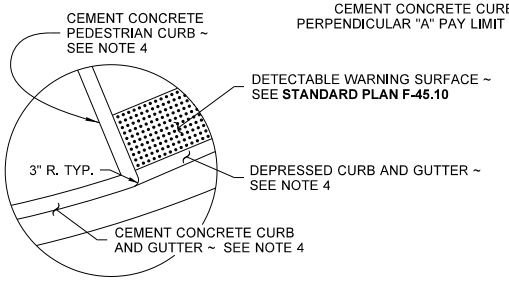


PLAN VIEW
TYPE PERPENDICULAR B
(SHOWN WITH BUFFER)

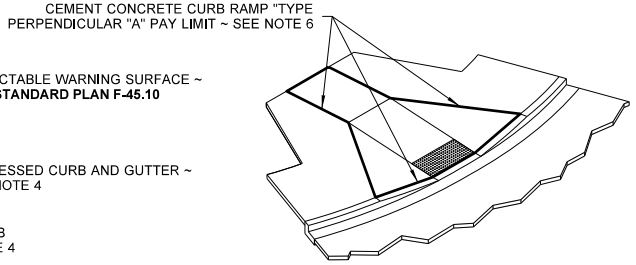
① CONTRACTION JOINT (TYP.) ~ SEE **STANDARD PLAN F-30.10** FOR CURB RAMP LENGTHS GREATER THAN 8' - 0" PROVIDE CONTRACTION JOINT EQUALLY SPACED 4' - 0" MIN. OC.



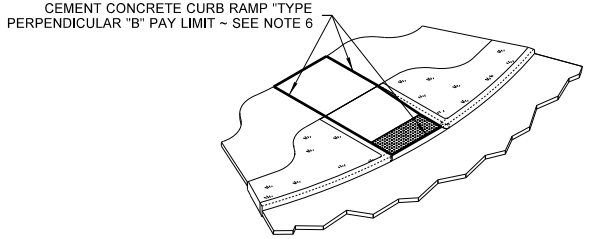
SECTION (A)



CURB RADIUS DETAIL (B)



ISOMETRIC VIEW
TYPE PERPENDICULAR A PAY LIMIT



ISOMETRIC VIEW
TYPE PERPENDICULAR B PAY LIMIT

NOTES

1. At marked crosswalks, the connection between the curb ramp and the roadway must be contained within the width of the crosswalk markings.
2. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.
3. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances on any part of the Curb Ramp or Landing, or in front of the Curb Ramp where it connects to the roadway.
4. See Contract Plans for the curb design specified. See **Standard Plan F-10.12** for Curb, Curb and Gutter, Depressed Curb and Gutter, and Pedestrian Curb details.
5. See **Standard Plan F-30.10** for Cement Concrete Sidewalk Details. See Contract Plans for width and placement of sidewalk.
6. The Bid Item "Cement Concrete Curb Ramp Type __" does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalks.
7. The Curb Ramp length is not required to exceed 15 feet (unless shown otherwise in the Contract Plans). When applying the 15-foot max. length, the running slope of the Curb Ramp is allowed to exceed 8.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the landing over a horizontal distance of 15 feet. Do not include the abutting landing in the 15-foot max. measurement.
8. Curb Ramps and Landings shall receive a broom finish. See **Standard Specifications 8-14.**
9. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will not be material to retain.

LEGEND

⟷	SLOPE IN EITHER DIRECTION
*	1.5 OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (2% MAX.)
* *	7.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (8.3% MAX.)
* * *	9.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (10% MAX.)

DRAWN BY: FERN LIDDELL

RS-12

R. SCOTT ZELLER
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28680
REGISTERED
PROFESSIONAL ENGINEER

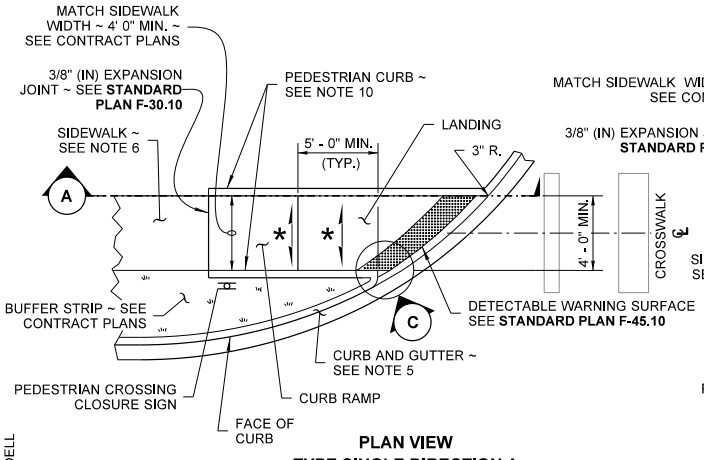
PERPENDICULAR CURB RAMP

STANDARD PLAN F-40.15-03

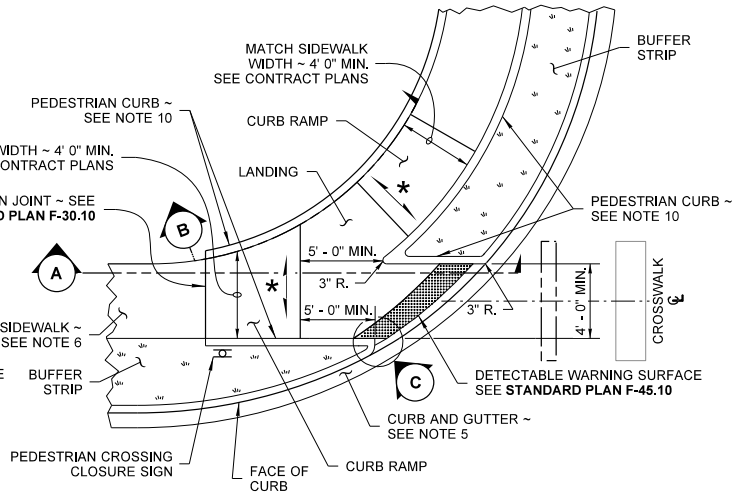
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER
Washington State Department of Transportation

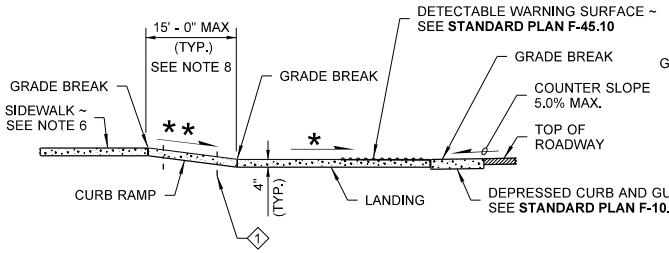


PLAN VIEW
TYPE SINGLE DIRECTION A

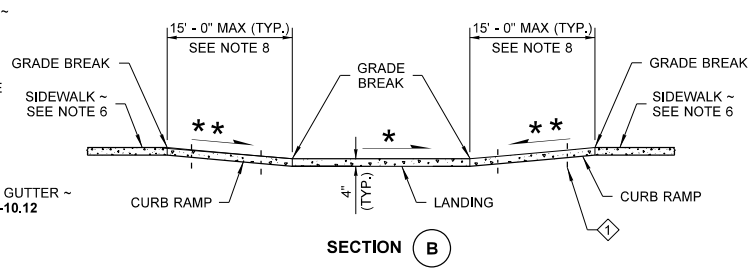


PLAN VIEW
TYPE SINGLE DIRECTION B

DRAWN BY: FERN LIDDELL



SECTION (A)



SECTION (B)

(1) CONTRACTION JOINT (TYP.) ~ SEE **STANDARD PLAN F-30.10** FOR CURB RAMP LENGTHS GREATER THAN 8' - 0" PROVIDE CONTRACTION JOINT EQUALLY SPACED 4' - 0" MIN. OC.

(ALONG INSIDE RADIUS AT BACK OF WALKWAY)

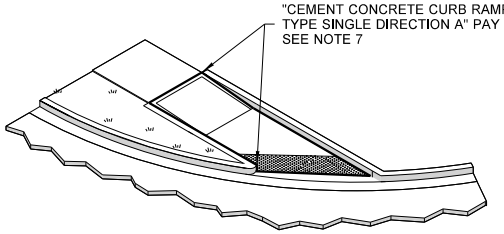
NOTES

1. This plan is to be used where pedestrian crossing in one direction is not permitted.
2. At marked crosswalks, the connection between the Landing and the roadway must be contained within the width of the crosswalk markings.
3. Where "GRADE BREAK" is called out, the entire length of the grade break between the two adjacent surface planes shall be flush.
4. Do not place Gratings, Junction Boxes, Access Covers, or other appurtenances on any part of the Curb Ramp or Landing or in the Depressed Curb and Gutter where the Landing connects to the roadway.
5. See Contract Plans for the curb design specified. See **Standard Plan F-10.12** for Curb, Curb and Gutter, Depressed Curb, Gutter and Pedestrian Curb details.
6. See **Standard Plan F-30.10** for Cement Concrete Sidewalk Details. See Contract Plans for width and placement of sidewalk.
7. The Bid Item "Cement Concrete Curb Ramp Type __" does not include the adjacent Curb, Curb and Gutter, Depressed Curb and Gutter, Pedestrian Curb, or Sidewalks.
8. The Curb Ramp length is not required to exceed 15 feet (unless shown otherwise in the Contract Plans). When applying the 15-foot max. length (measured from back of sidewalk) the running slope of the curb ramp is allowed to exceed 8.3%. Use a single constant slope from bottom of ramp to top of ramp to match into the sidewalk over a horizontal distance of 15 feet.
9. Curb Ramps and Landings shall receive a broom finish. See **Standard Specifications 8-14.**
10. Pedestrian Curb may be omitted if the ground surface at the back of the Curb Ramp and/or Landing will be at the same elevation as the Curb Ramp or Landing and there will not be material to retain.

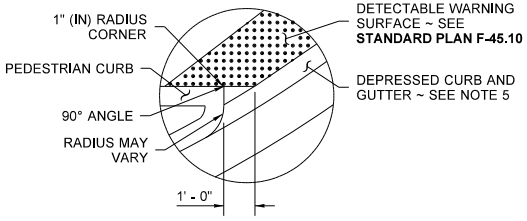
LEGEND

←→	SLOPE IN EITHER DIRECTION
*	1.5 OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (2% MAX.)
**	7.5% OR FLATTER RECOMMENDED FOR DESIGN/FORMWORK (8.3% MAX.) SEE NOTE 7

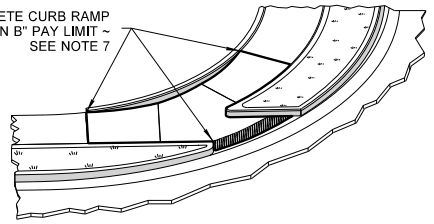
RS-13



ISOMETRIC VIEW
TYPE SINGLE DIRECTION A
PAY LIMIT



DETAIL (C)



ISOMETRIC VIEW
TYPE SINGLE DIRECTION B
PAY LIMIT

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

SINGLE DIRECTION CURB RAMP

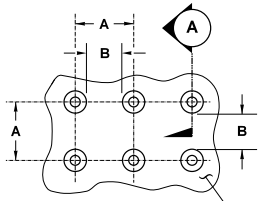
STANDARD PLAN F-40.16-03

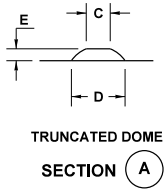
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

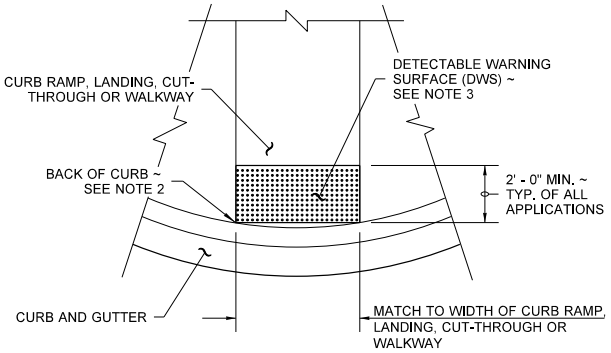
Washington State Department of Transportation





	MIN.	MAX.
A	1.60"	2.40"
B	0.65"	—
C	0.45"	0.90"
D	0.9"	1.40"
E	0.2"	0.2"

TRUNCATED DOME DETAILS

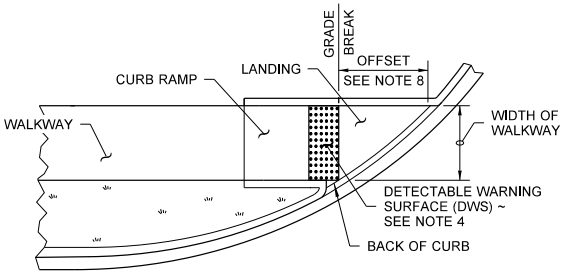


DETECTABLE WARNING SURFACE DETAIL

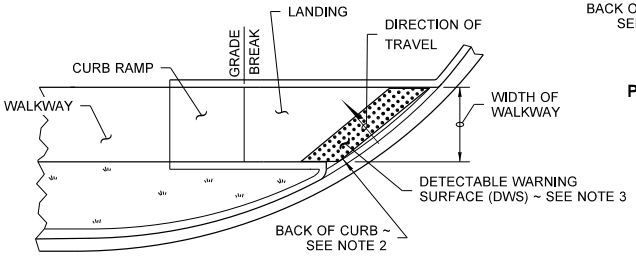
NOTES

1. The Detectable Warning Surface (DWS) shall extend the full width of the curb ramp, landing, or other roadway entrance as applicable. Exception: If the Manufacturer of the DWS requires a concrete border around the DWS, a variance of up to 2 inches on each side of the DWS is permitted.
2. The Detectable Warning Surface (DWS) shall be placed at the back of curb, with the two leading corners of the DWS panel placed adjacent to the back of the curb, and with no more than a 2 inch gap between the DWS and the back of the curb measured at the center of the DWS panel. Exception: If the Manufacturer of the selected DWS requires a concrete border around the DWS, a variance of up to 2 inches from the back of the curb is permitted (measured at the leading corners of the DWS panel).
3. The rows of truncated domes shall be aligned to be perpendicular to the grade break at the back of curb.
4. The rows of truncated domes shall be aligned to be parallel to the direction of travel.
5. If curb and gutter are not present, such as a shared-use path connection, the Detectable Warning Surface shall be placed at the pavement edge.
6. See **Standard Plans** for sidewalk and curb ramp details.
7. If a curb ramp is required, the location of the Detectable Warning Surface must be at the bottom of the ramp and within the required distance from the rail.
8. When the grade break between the curb ramp and the landing is less than or equal to 5 ft. from the back of curb at all points, place the Detectable Warning Surface on the bottom of the curb ramp directly above the grade break.

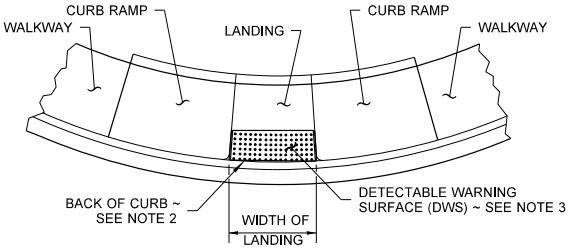
DRAWN BY: FERN LIDDELL



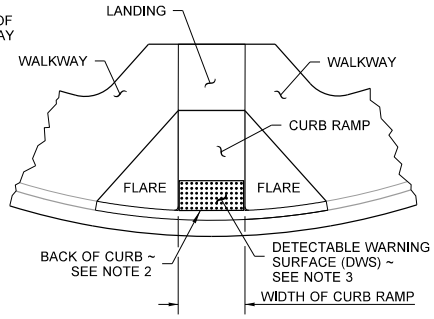
SINGLE DIRECTION CURB RAMP
(GRADE BREAK BETWEEN CURB AND LANDING ≤ 5 FT. FROM BACK OF CURB)
(SEE NOTE 6)



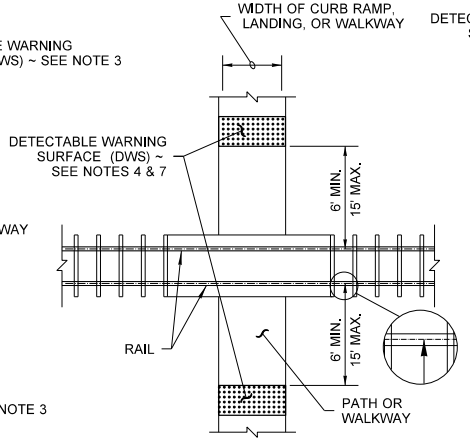
SINGLE DIRECTION CURB RAMP
(GRADE BREAK BETWEEN CURB AND LANDING > 5 FT. FROM BACK OF CURB)
(SEE NOTE 6)



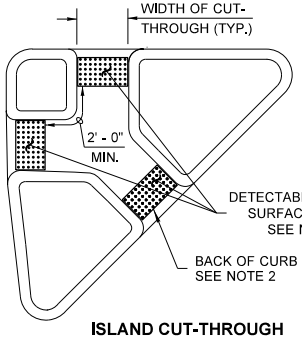
PARALLEL CURB RAMP
(SEE NOTE 6)



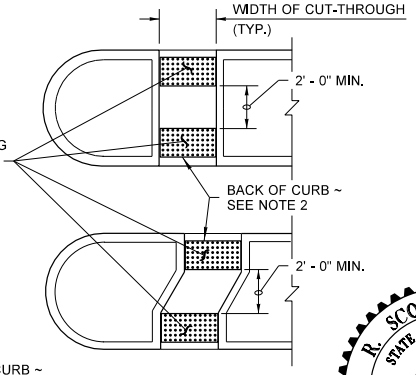
PERPENDICULAR CURB RAMP
(SEE NOTE 6)



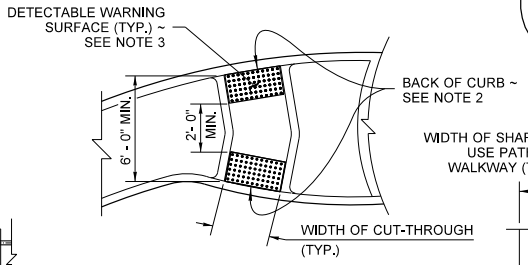
PEDESTRIAN RAILROAD CROSSING



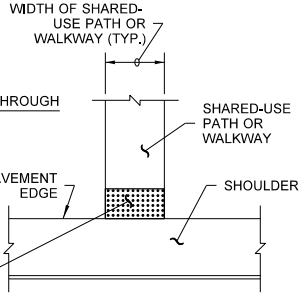
ISLAND CUT-THROUGH



MEDIAN CUT-THROUGH



ROUNDABOUT SPLITTER ISLAND



SHARED-USE PATH CONNECTION

PLACEMENT GUIDELINES

RS-14

R. SCOTT ZELLER
STATE OF WASHINGTON
28680
REGISTERED
PROFESSIONAL ENGINEER

DETECTABLE WARNING SURFACE

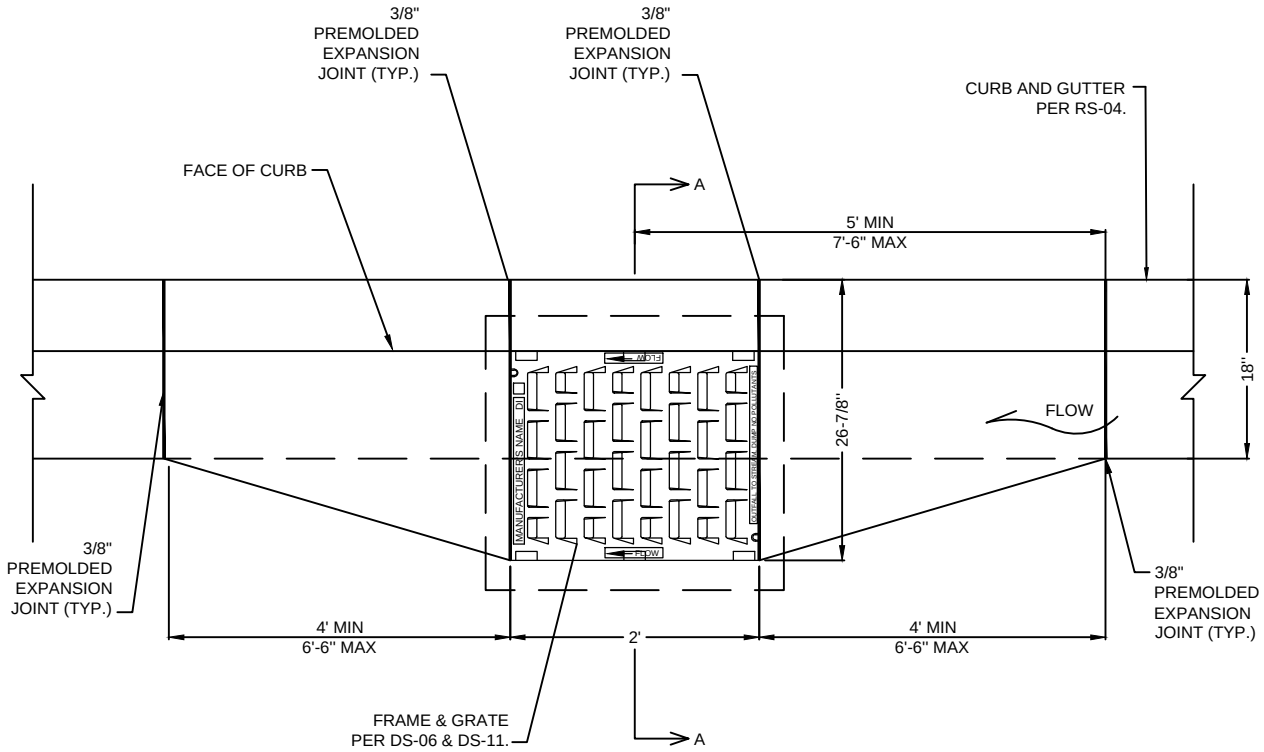
STANDARD PLAN F-45.10-02

SHEET 1 OF 1 SHEET

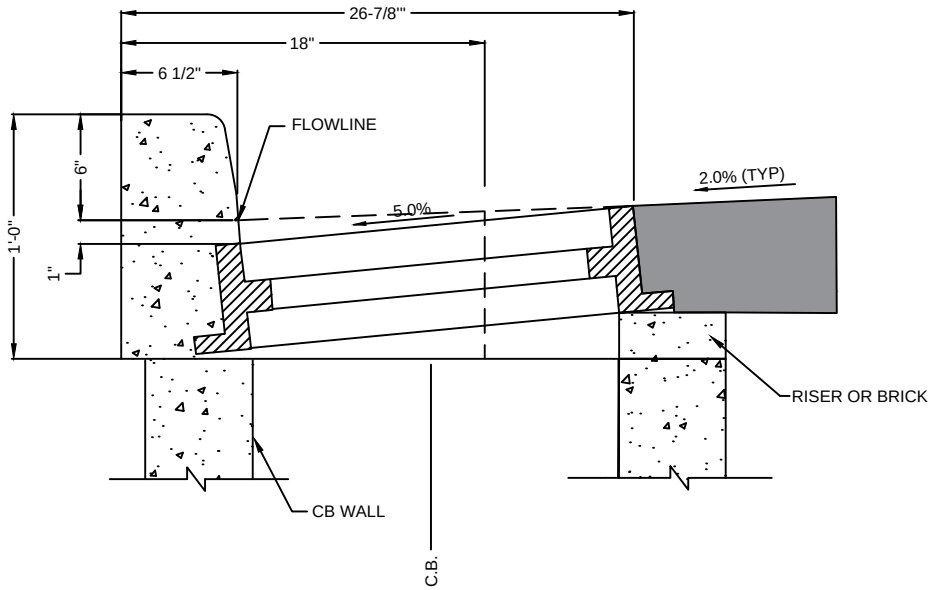
APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

Washington State Department of Transportation



INLET DETAIL

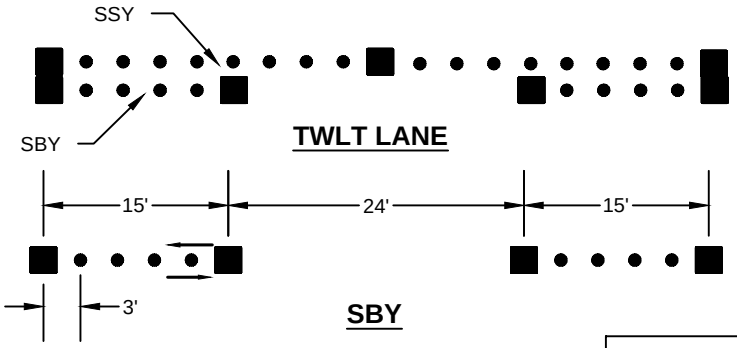


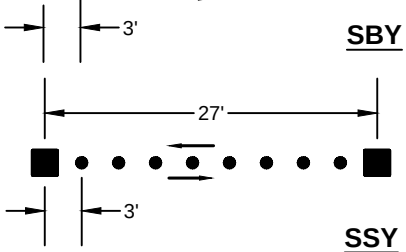
SECTION A-A

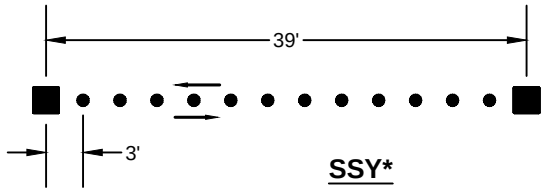
NOT TO SCALE

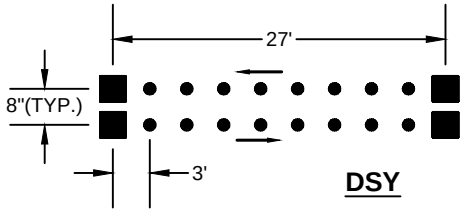
City of Tukwila

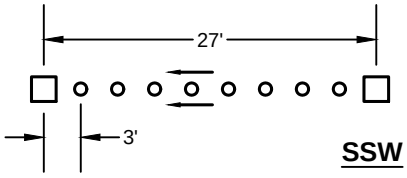
CURB AND GUTTER	
CATCH BASIN SURROUND	
SHEET:	RS-15
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

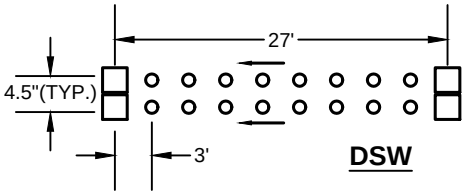


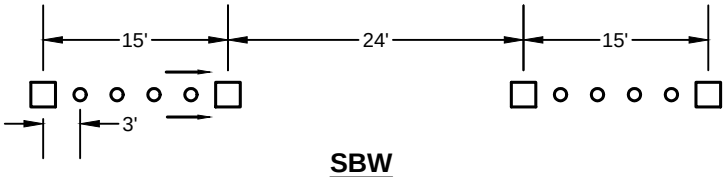












LEGEND

DSY - DOUBLE SOLID YELLOW
DSW - DOUBLE SOLID WHITE
SSY - SINGLE SOLID YELLOW
SSW - SINGLE SOLID WHITE
SBW - SINGLE BROKEN WHITE
SBY - SINGLE BROKEN YELLOW
TWLT - TWO-WAY LEFT TURN LANE

TYPE 2YY REFLECTOR

TYPE #1 YELLOW TRAFFIC BUTTON

TYPE #1 WHITE TRAFFIC BUTTON

TYPE 2WW REFLECTOR

DIRECTION OF TRAVEL

* THIS SPACING SHALL BE USED ONLY WHEN THE (SSY) IS USED IN CONJUNCTION WITH THE (SBY) FOR TWO-WAY LEFT TURN LANES

NOTES:

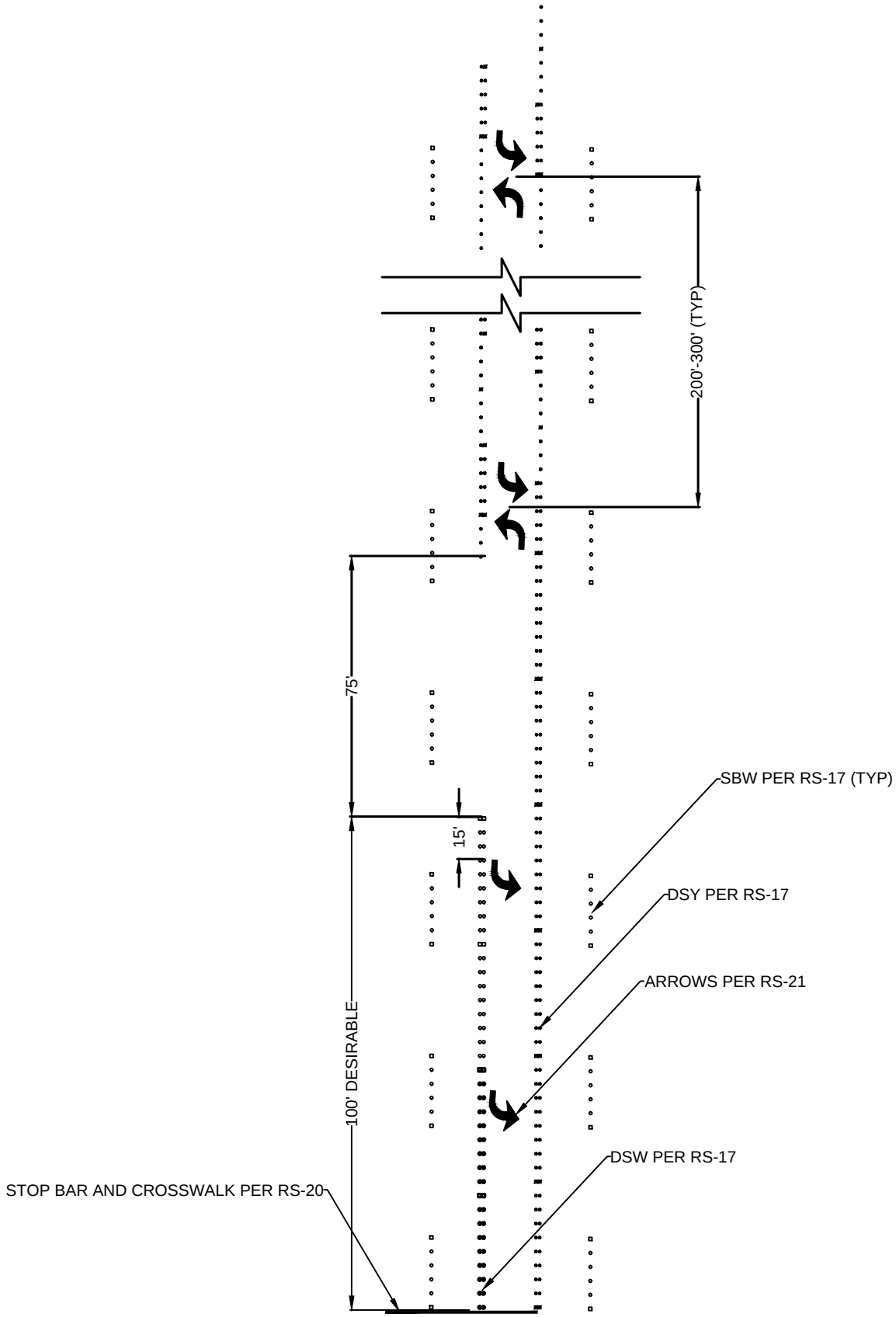
1. ALL PAVEMENT MARKINGS TYPE 1 AND TYPE 2 SHALL MEET THE REQUIREMENTS OF THE APWA/WSDOT STANDARD SPECIFICATIONS AND DETAILS.

NOT TO SCALE

City of Tukwila

RAISED PAVEMENT MARKER

SHEET:	RS-17
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



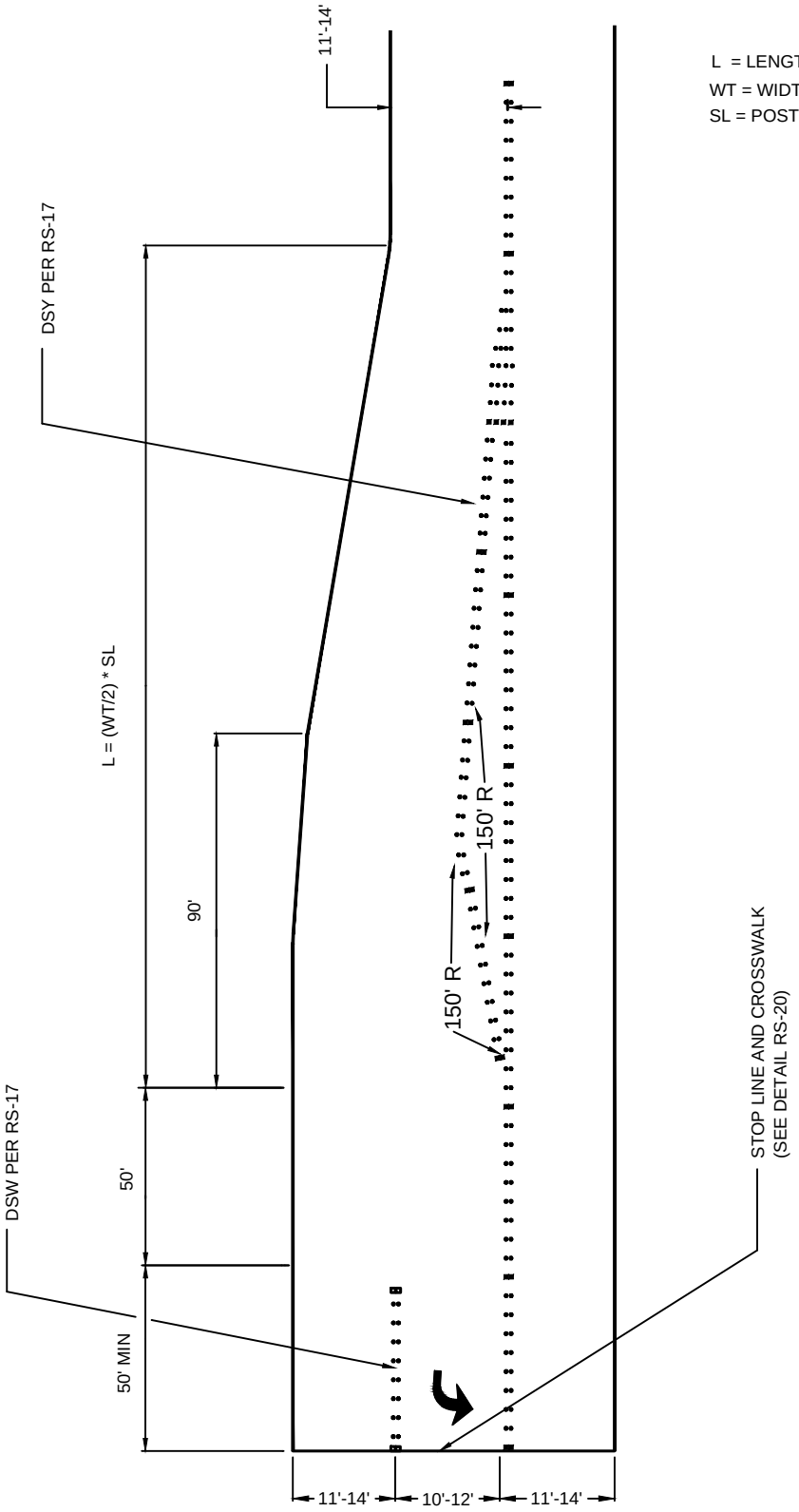
NOT TO SCALE

City of Tukwila

LEFT TURN

2-WAY LANE TYPICAL

SHEET:	RS-18
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



L = LENGTH OF TRANSITION
WT = WIDTH OF TURN LANE
SL = POSTED SPEED LIMIT

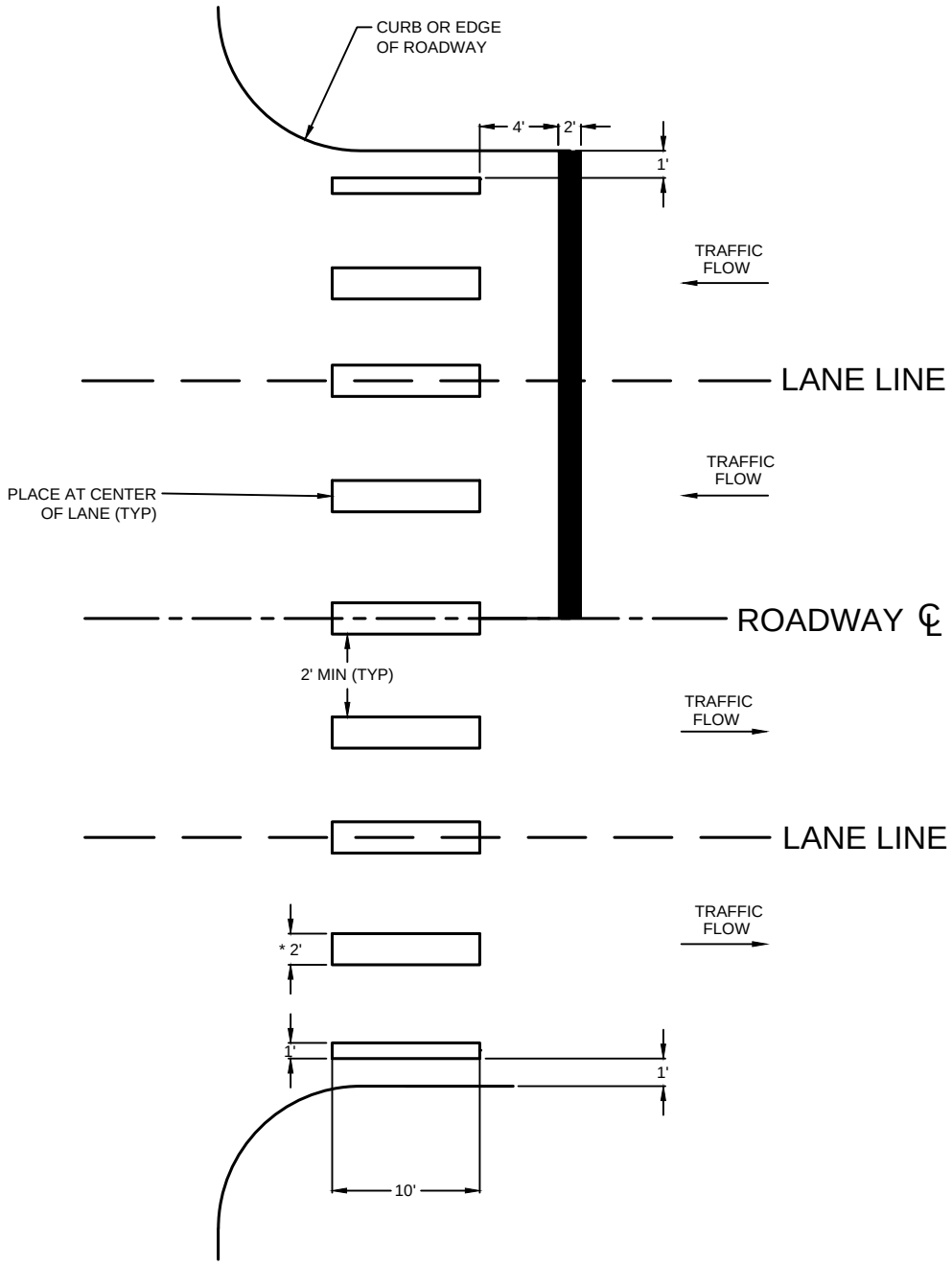
NOT TO SCALE

City of Tukwila

LEFT TURN

NONCONTINUOUS

SHEET:	**RS-19**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



CROSSWALKS

NOTES:

1. CROSSWALK BARS SHALL NOT BE PLACED IN THE WHEEL PATHS AND EVENLY DISTRIBUTED.
2. USE 12" BAR IF SPEED LESS THAN 35 MPH.
3. USE 24" BAR IF SPEED IS GREATER OR EQUAL TO 35 MPH.
4. *2' CROSSWALK BARS TO BE CENTERED ON CENTERLINE, LANE LINES, AND TRAVEL LANES
5. ALL CROSSWALK CHANNELIZATION SHALL BE PLASTIC APPLICATION TYPE A PER WSDOT 9-34.

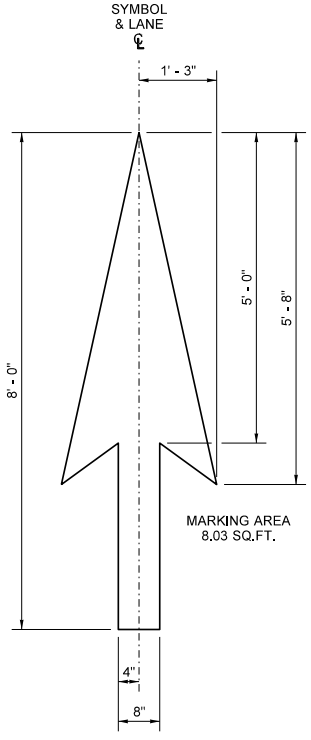
NOT TO SCALE

City of Tukwila

CROSSWALK	
DESIGN AND PLACEMENT	
SHEET:	**RS-20**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

NOTE

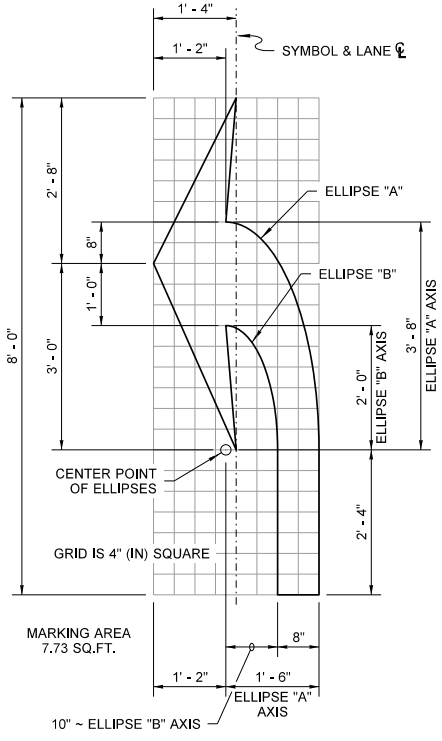
Use the dimensions shown on this plan for each type of Traffic Arrow being placed on roadways with a posted speed limit of 40 mph or lower.



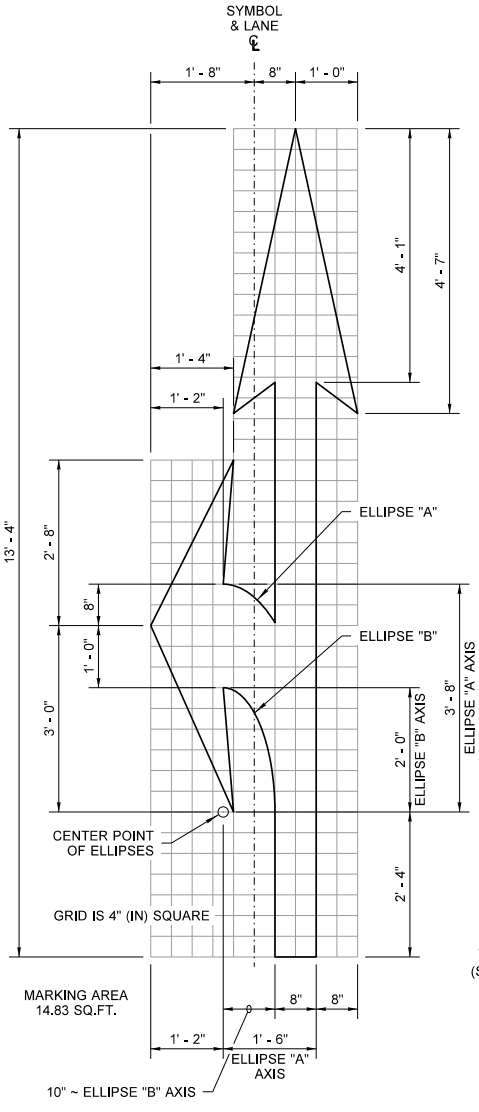
TYPE 1S TRAFFIC ARROW

TYPE 2SR (RIGHT) TRAFFIC ARROW

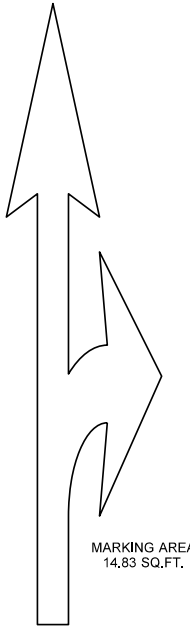
MIRROR IMAGE OF TYPE 2SL TRAFFIC ARROW (SHOWN AT REDUCED SCALE)



TYPE 2SL (LEFT) TRAFFIC ARROW

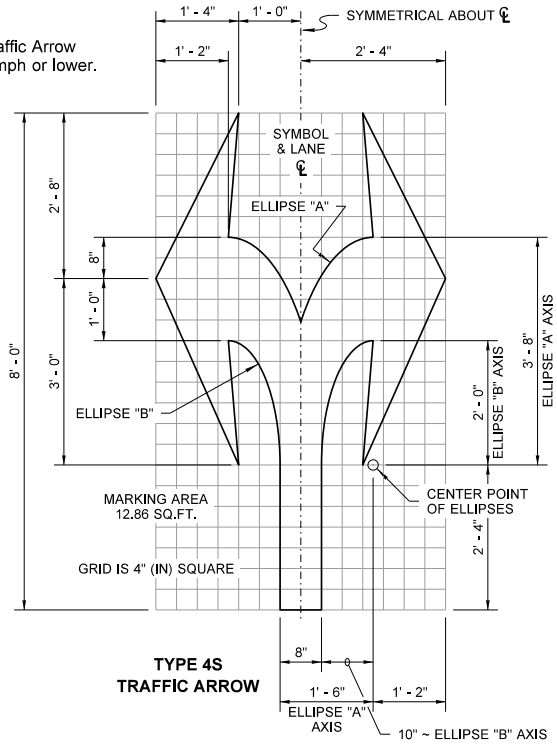


TYPE 3SL (LEFT) TRAFFIC ARROW



TYPE 3SR (RIGHT) TRAFFIC ARROW

MIRROR IMAGE OF TYPE 3SL TRAFFIC ARROW (SHOWN AT REDUCED SCALE)



TYPE 4S TRAFFIC ARROW

RS-21

BRIAN J. WALSH STATE OF WASHINGTON 36103 REGISTERED PROFESSIONAL ENGINEER

SYMBOL MARKINGS ~ TRAFFIC ARROWS FOR LOW-SPEED ROADWAYS STANDARD PLAN M-24.40-02

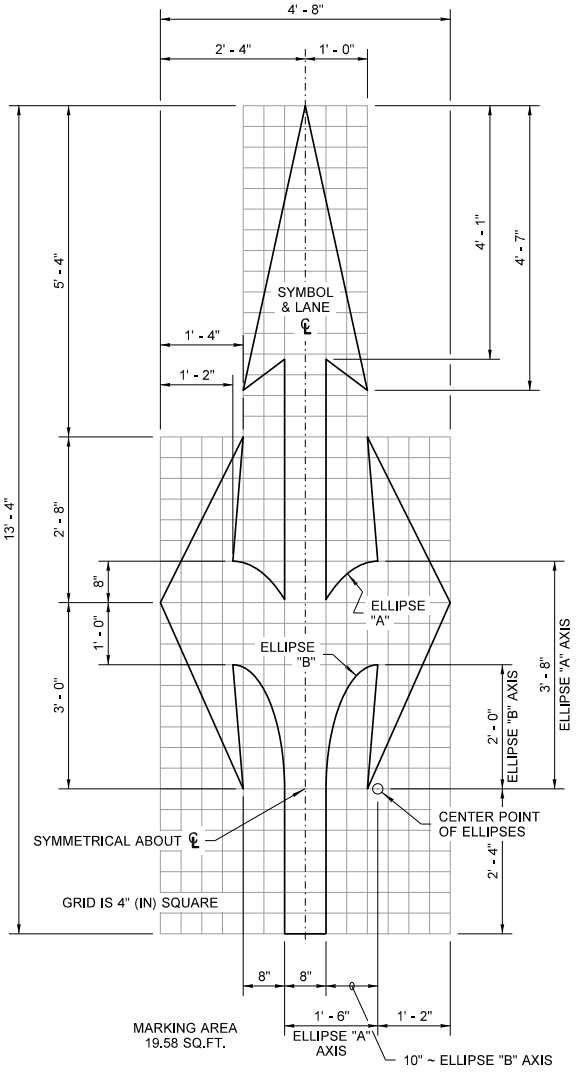
SHEET 1 OF 2 SHEETS

APPROVED FOR PUBLICATION

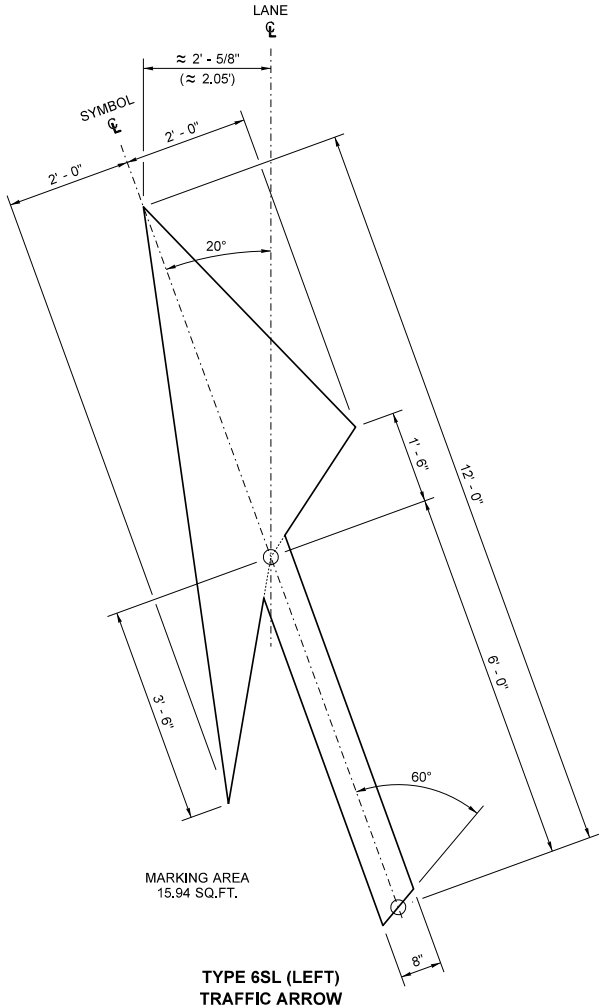
STATE DESIGN ENGINEER

Washington State Department of Transportation

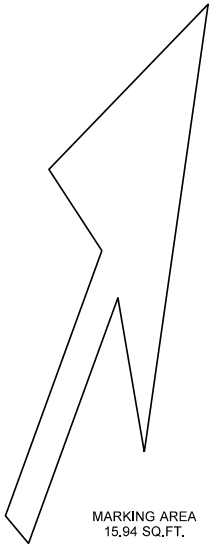
DRAWN BY: COLBY FLETCHER



TYPE 7S TRAFFIC ARROW



TYPE 6SL (LEFT)
TRAFFIC ARROW



TYPE 6SR (RIGHT)
TRAFFIC ARROW

MIRROR IMAGE OF TYPE 6SL
(MIRRORED ABOUT LANE CENTERLINE)
(SHOWN AT REDUCED SCALE)

RS-21

BRIAN J. WALSH
STATE OF WASHINGTON
36103
REGISTERED
PROFESSIONAL ENGINEER

SYMBOL MARKINGS ~ TRAFFIC ARROWS FOR LOW-SPEED ROADWAYS
STANDARD PLAN M-24.40-02

SHEET 2 OF 2 SHEETS

APPROVED FOR PUBLICATION

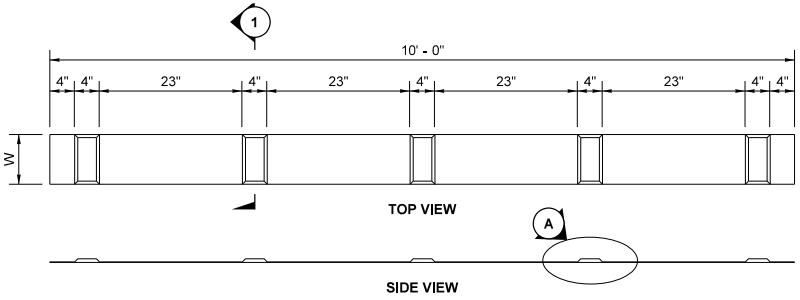
STATE DESIGN ENGINEER

Washington State Department of Transportation

DRAWN BY: COLBY FLETCHER

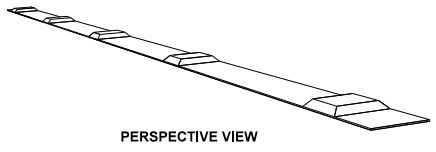
GENERAL NOTE

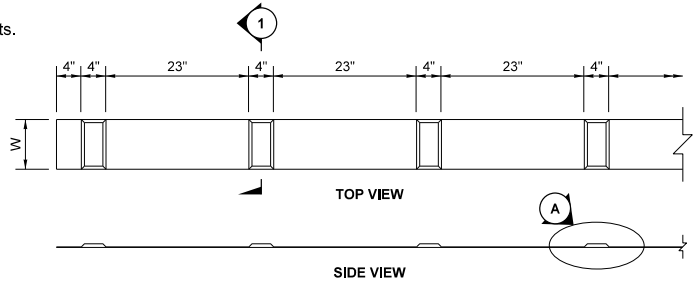
See **Standard Plan M-20.10** for pattern and color requirements.



PROFILED PLASTIC
(BROKEN LINE)

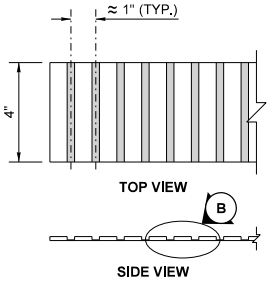
FOR:
CENTERLINE & LANE LINE ~ W = 4"
NO-PASS LINE & TWO-WAY LEFT-TURN CENTERLINE ~ W = 4"
REVERSIBLE LANE LINE ~ W = 4"
WIDE BROKEN LANE LINE ~ W = 8"

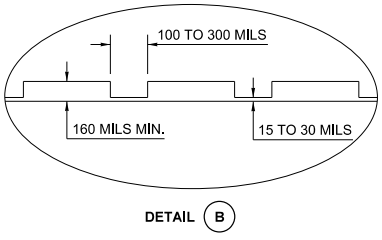




PROFILED PLASTIC
(SOLID LINE)

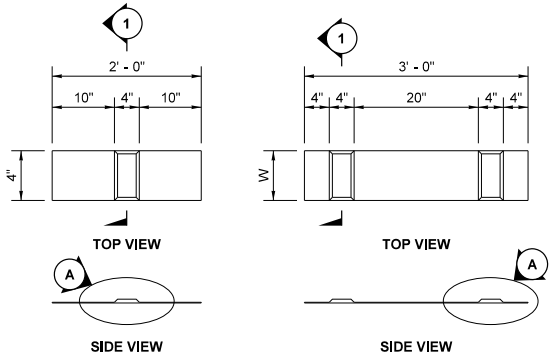
FOR:
NO-PASS LINE ~ W = 4"
TWO-WAY LEFT-TURN CENTERLINE ~ W = 4"
DOUBLE CENTERLINE & DOUBLE LANE LINE ~ W = 4"
EDGE LINE & SOLID LANE LINE ~ W = 4"
WIDE LANE LINE & WIDE LINE ~ W = 8"
DOUBLE WIDE LANE LINE ~ W = 8"
BARRIER CENTERLINE ~ W = 20"





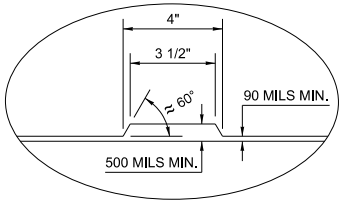
EMBOSSED PLASTIC
(SOLID OR BROKEN LINE)

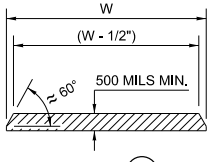
FOR:
CENTERLINE & LANE LINE
NO-PASS LINE & TWO-WAY LEFT-TURN CENTERLINE
REVERSIBLE LANE LINE
DOUBLE CENTERLINE & DOUBLE LANE LINE
EDGE LINE & SOLID LANE LINE



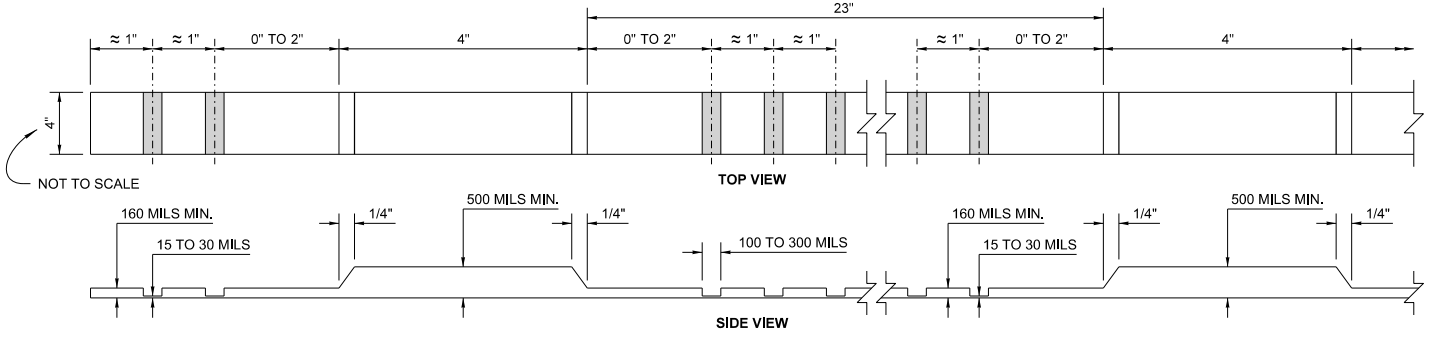
DOTTED EXTENSION LINE

DOTTED LANE LINE ~ W = 4"
WIDE DOTTED LANE LINE ~ W = 8"





PROFILED PLASTIC
(BROKEN LINE)



PROFILED EMBOSSED PLASTIC
(SOLID OR BROKEN LINE)

FOR:
CENTERLINE & LANE LINE
NO-PASS LINE
TWO-WAY LEFT-TURN CENTERLINE
REVERSIBLE LANE LINE
DOUBLE CENTERLINE & DOUBLE LANE LINE
EDGE LINE & SOLID LANE LINE

BRIAN J. WALSH
STATE OF WASHINGTON
36103
REGISTERED
PROFESSIONAL ENGINEER

PROFILED AND EMBOSSED PLASTIC LINES

STANDARD PLAN M-20.20-02

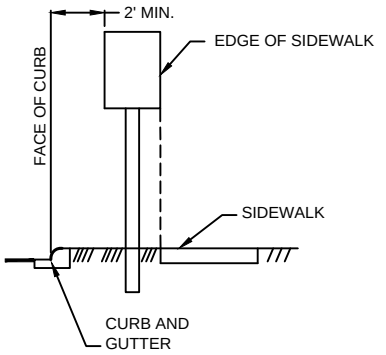
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

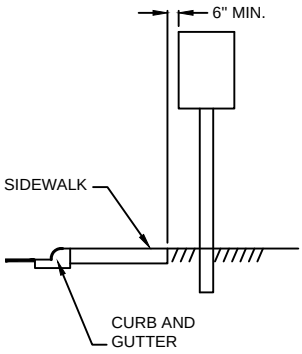
STATE DESIGN ENGINEER
Washington State Department of Transportation

RS-22

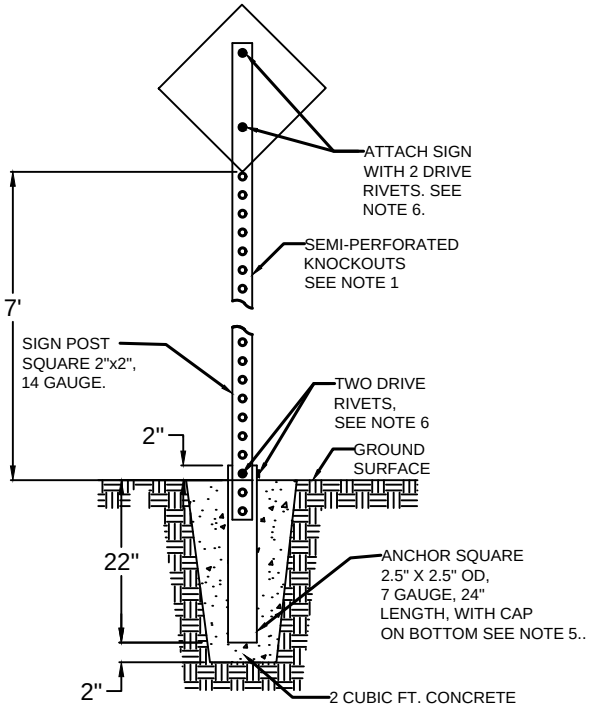
DRAWN BY: COLBY FLETCHER



SIGN LOCATION A



SIGN LOCATION B



SIGN INSTALLATION

SIGN POST NOTES

1. SIGN POST SHALL BE 2"x2" SQUARE STEEL POSTS, MINIMUM 14 GAUGE, WITH $\frac{7}{16}$" SEMI-PERFORATED KNOCKOUTS ON 1" CENTERS FULL LENGTH FOUR SIDES.
2. STOP AND YIELD SIGN POSTS SHALL HAVE 3M HIGH INTENSITY PRISMATIC REFLECTIVE SHEETING WRAPPED AROUND THE POST FOR THE ENTIRE HEIGHT OF THE POST.
3. FOR IN-SIDEWALK INSTALLATIONS, CORE 4" DIAM. HOLE. ANCHOR LENGTH MAY BE DECREASED TO 12". SURFACE ATTACHED SIGN POST MUST BE APPROVED BY ENGINEER.
4. POST SHALL BE ROLLED CARBON SHEET STEEL AND SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A653, G90, STRUCTURAL QUALITY GRADE 50.
5. ANCHOR SHALL HAVE FOUR $\frac{7}{16}$" DIAM. HOLES, ONE EACH SIDE, 2" FROM TOP END.ANCHOR SHALL MEET THE REQUIREMENTS OF ASTM A500 GRADE B AND HALL BE HOT DIPPED GALVANIZED.
6. INSTALL TWO DRIVE RIVETS AT 90 DEGREES TO EACH OTHER. DRIVE RIVETS TO BE 3/8" DIA., ZUMAR TL3806 OR DUNLAP INDUSTRIAL VCR221.

SIGN INSTALLATION NOTES

1. SIGN SHEETING REQUIREMENTS: STOP, YIELD, KEEP RT, TURN RESTRICTION, LARGE ARROW, CHEVRON, CURVE/TURN WARNING, PED & ADV PED CROSSING, SCHOOL AND ADV SCHOOL CROSSING, STOP/YIELD/SIGNAL AHEAD, OBJECT MARKERS, END OF ROAD MARKER, ALL STREET NAME SIGNS AND ALL MAST ARM OR OVERHEAD MOUNTED SIGNS SHALL BE 3M HIGH INTENSITY PRISMATIC SHEETING, OR APPROVED EQUAL.
2. SIGN HEIGHT SHALL BE 7' FROM BOTTOM OF SIGN TO STREET OR SIDEWALK OR 6.5' FROM BOTTOM OF LOWER SIGN FOR MULTIPLE SIGNS ON ONE POST. EXCEPTIONS ONLY AS SPECIFICALLY STATED ON PLANS OR APPROVED BY THE ENGINEER.
3. DESIRED SIGN LOCATION SHALL BE A MINIMUM OF 2' FROM FACE OF CURB OR 6" FROM BACK OF WALK

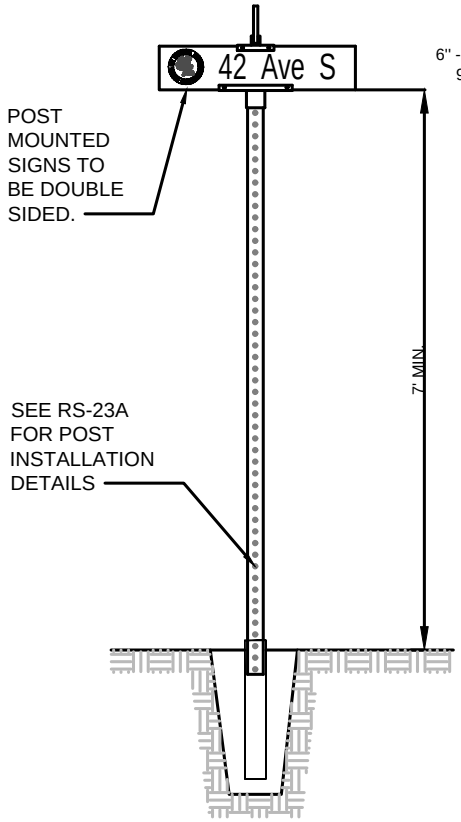
NOT TO SCALE

City of Tukwila

SIGN INSTALLATION

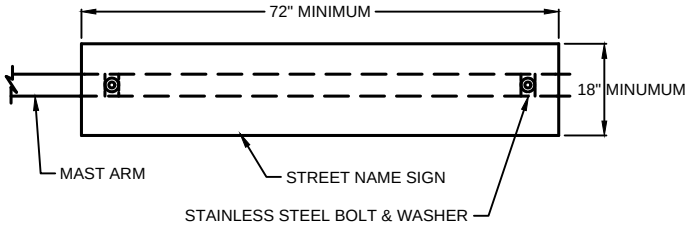
SIGN POST FOUNDATION INSTALLATION

SHEET:	**RS-23A**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

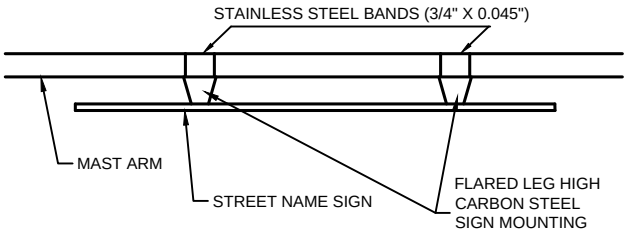


SIGN:
SHEET ALUMINUM, .080 GAUGE, SIZED AS NEEDED WITH ROUNDED CORNERS.
BACKGROUND:
GREEN, 3M HIGH INTENSITY PRISMATIC SHEETING
LETTERS:
WHITE LETTERING FORMED USING 3M ELECTROCUT FILM SERIES 1170, OR APPROVED EQUAL.
NON ARTERIAL INTERSECTION -
4" SERIES C WITH 2" LC SERIES C
ARTERIAL INTERSECTION -
6" SERIES C WITH 3" LC SERIES C
BORDER - SCREEN PRINT
5/16" WIDE WITH 3/4" RADIUS ON CORNERS.
HARDWARE:
MOUNTING HARDWARE SHALL BE ZUMAR Z12RDSQ200EX CAP AND ZUMAR 812EX90X CROSSPIECE, OR APPROVED EQUAL.

POST MOUNT



FRONT VIEW



SIDE VIEW

SIGN:
SHEET ALUMINUM, 0.100, SIZED AS NEEDED WITH ROUNDED CORNERS.
BACKGROUND:
GREEN, 3M HIGH INTENSITY PRISMATIC, OR APPROVED EQUAL.
LETTERS:
WHITE LETTERING FORMED USING 3M ELECTROCUT FILM SERIES 1170, OR APPROVED EQUAL.
12" C SERIES WITH 8" LC C SERIES
BORDER - SCREEN PRINT
5/8" WIDE WITH 3/4" RADIUS ON CORNERS.
HARDWARE:
SIGNS SHALL BE INSTALLED USING EITHER BANDING (TO HORIZONTAL SECTION OF MASTARM) OR PELCO ASTRO SIGN-BRAC (TO CURVED SECTION OF MASTARM OR VERTICAL SECTION OF POLE)

MAST ARM MOUNT

NOTE: SIGNING MATERIAL AND FABRICATION SHALL BE IN ACCORDANCE WITH THE SECTION 9-28 OF THE WSDOT STANDARD SPECIFICATION, CURRENT EDITION AND MUTCD, CURRENT EDITION.

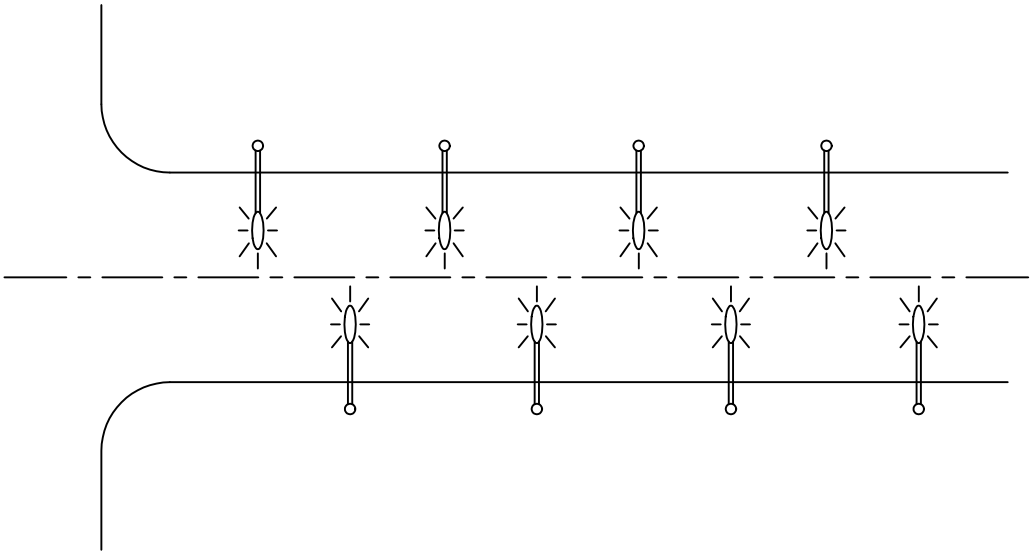
NOT TO SCALE

City of Tukwila

SIGN INSTALLATION

STREET NAME SIGN INSTALLATION

SHEET:	**RS-23B**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



ROADWAY CLASSIFICATION	ROADWAY WIDTH	LUMINAIRE WATTAGE	AVERAGE MAINTAINED FOOTCANDLE	MAXIMUM UNIFORMITY RATIO (AVG:MIN)	LUMINAIRE MOUNTING HEIGHT	LIGHT DISTRIBUTION PATTERN
MAJOR ARTERIAL	OVER 44'	*	1.5	3 TO 1	40'-6"	*
MAJOR ARTERIAL	≤ 44'	*	1.5	3 TO 1	40'-6"	*
COMMERCIAL / INDUSTRIAL	≤ 44'	*	0.8	3 TO 1	40'-6"	*
RESIDENTIAL ARTERIAL	≤ 44'	*	0.6	4 TO 1	30'-6"	*
RESIDENTIAL LOCAL	≤ 34'	*	0.4	6 TO 1	30'-6"	*

* TO BE DESIGNED TO MEET ROADWAY DESIGN CRITERIA

NOTES:

1. MAJOR ARTERIAL AND COMMERCIAL / INDUSTRIAL ROADWAY TYPE LUMINAIRES SHALL BE LED WITH CORRELATED COLOR TEMPERATURE (CCT) OF 4000K +/- 300K. RESIDENTIAL ROADWAY TYPE LUMINAIRES SHALL BE LED WITH CCT OF 3000K +/- 300K. CITY PRE-APPROVED ROADWAY LUMINAIRE FIXTURES SHALL BE "LEOTEK - GREEN COBRA, GS SERIES", "____ - ____" AND "GE - EVOLVE". FINISH COLOR SHALL BE GRAY.

2. ROADWAY LUMINAIRES (ALL CIRCUITS) SHALL BE CONTROLLED BY A SINGLE PHOTOCELL LOCATED ON THE POLE NEAREST TO THE SERVICE CABINET. REMAINING LUMINAIRES SHALL HAVE SHORTING CAPS INSTALLED. LINE VOLTAGE SHALL BE 240V MULTI-VOLT.

3. INSTALLATION OF ROADWAY LIGHTS AND POLES SHALL BE PER CITY OF TUKWILA STANDARD DETAILS, SHEET RS-25 AND SHALL CONFORM TO THE LATEST EDITION OF WSDOT STANDARD SPECIFICATIONS.

4. INSTALLATION OF PEDESTRIAN LIGHTS AND POLES SHALL BE PER CITY OF TUKWILA STANDARD DETAILS, SHEET RS-26 AND SHALL CONFORM TO THE LATEST EDITION OF WSDOT STANDARD SPECIFICATIONS.

5. ALL STREET LIGHTING DESIGN PLANS SHALL BE STAMPED BY A PROFESSIONAL ENGINEER, WITH PREVIOUS EXPERIENCE IN ILLUMINATION DESIGN, REGISTERED IN WASHINGTON STATE AND APPROVED BY CITY STAFF.

6. DEVELOPERS SHALL PROVIDE LIGHTING DESIGN FOR SUBDIVISIONS, INDUSTRIAL OR COMMERCIAL DEVELOPMENTS FOR CITY APPROVAL.

NOT TO SCALE

City of Tukwila

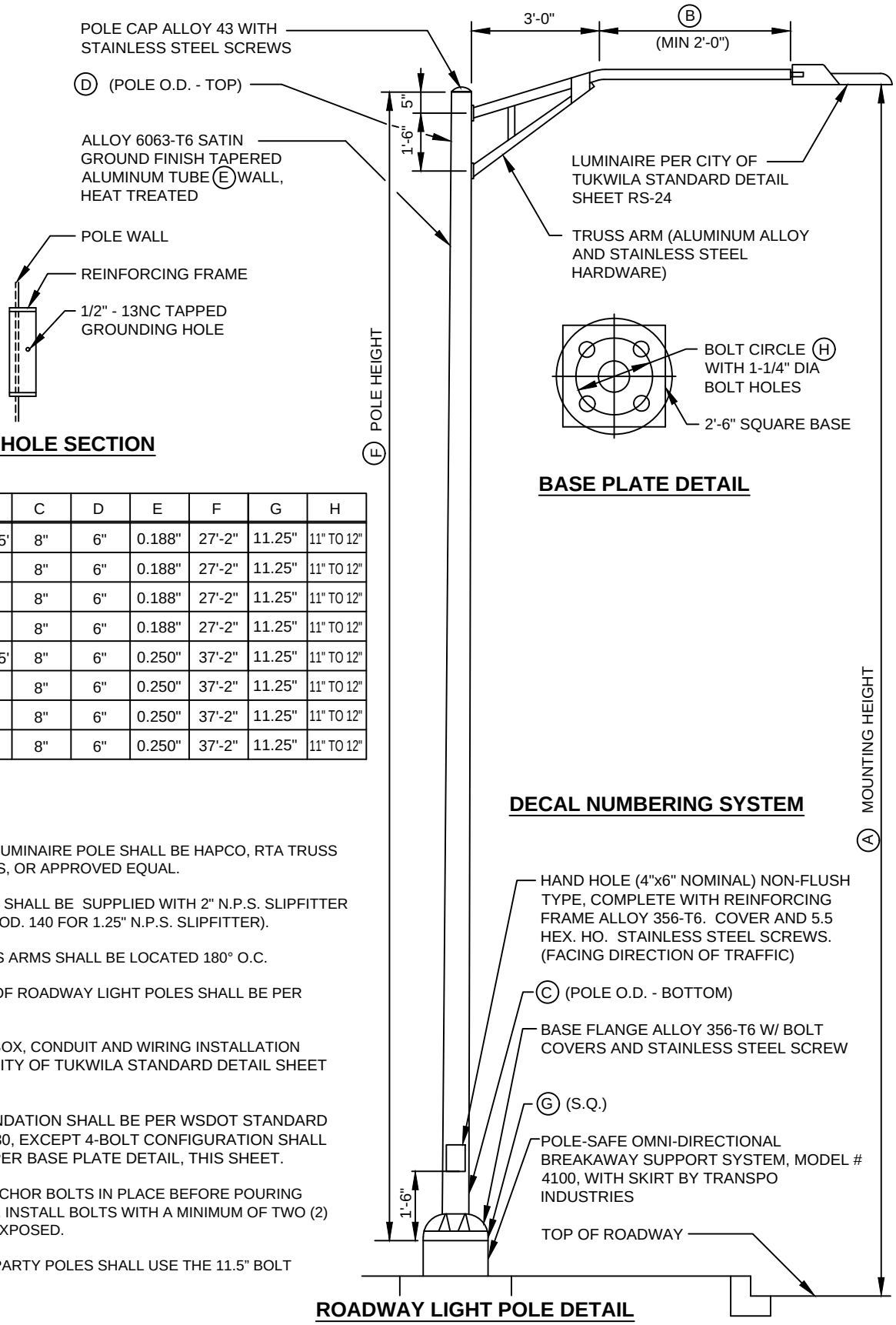
ILLUMINATION DESIGN GUIDELINES

ROADWAY AND PEDESTRIAN LUMINAIRES

SHEET: **RS-24**

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI



HANDHOLE SECTION

BASE PLATE DETAIL

DECAL NUMBERING SYSTEM

ROADWAY LIGHT POLE DETAIL

A	B	C	D	E	F	G	H
30'-6"	2' TO 5'	8"	6"	0.188"	27'-2"	11.25"	11" TO 12"
	7'	8"	6"	0.188"	27'-2"	11.25"	11" TO 12"
	9'	8"	6"	0.188"	27'-2"	11.25"	11" TO 12"
	12'	8"	6"	0.188"	27'-2"	11.25"	11" TO 12"
40'-6"	2' TO 5'	8"	6"	0.250"	37'-2"	11.25"	11" TO 12"
	7'	8"	6"	0.250"	37'-2"	11.25"	11" TO 12"
	9'	8"	6"	0.250"	37'-2"	11.25"	11" TO 12"
	12'	8"	6"	0.250"	37'-2"	11.25"	11" TO 12"

NOTES:

1. ROADWAY LUMINAIRE POLE SHALL BE HAPCO, RTA TRUSS ARM SERIES, OR APPROVED EQUAL.
2. TRUSS ARM SHALL BE SUPPLIED WITH 2" N.P.S. SLIPFITTER (SPECIFY MOD. 140 FOR 1.25" N.P.S. SLIPFITTER).
3. TWIN TRUSS ARMS SHALL BE LOCATED 180° O.C.
4. LOCATION OF ROADWAY LIGHT POLES SHALL BE PER PLANS.
5. JUNCTION BOX, CONDUIT AND WIRING INSTALLATION SHALL BE CITY OF TUKWILA STANDARD DETAIL SHEET RS-28.
6. POLE FOUNDATION SHALL BE PER WSDOT STANDARD PLAN J-28.30, EXCEPT 4-BOLT CONFIGURATION SHALL BE USED, PER BASE PLATE DETAIL, THIS SHEET.
7. SECURE ANCHOR BOLTS IN PLACE BEFORE POURING CONCRETE. INSTALL BOLTS WITH A MINIMUM OF TWO (2) THREADS EXPOSED.
8. ALL THIRD PARTY POLES SHALL USE THE 11.5" BOLT PATTERN.

NOT TO SCALE

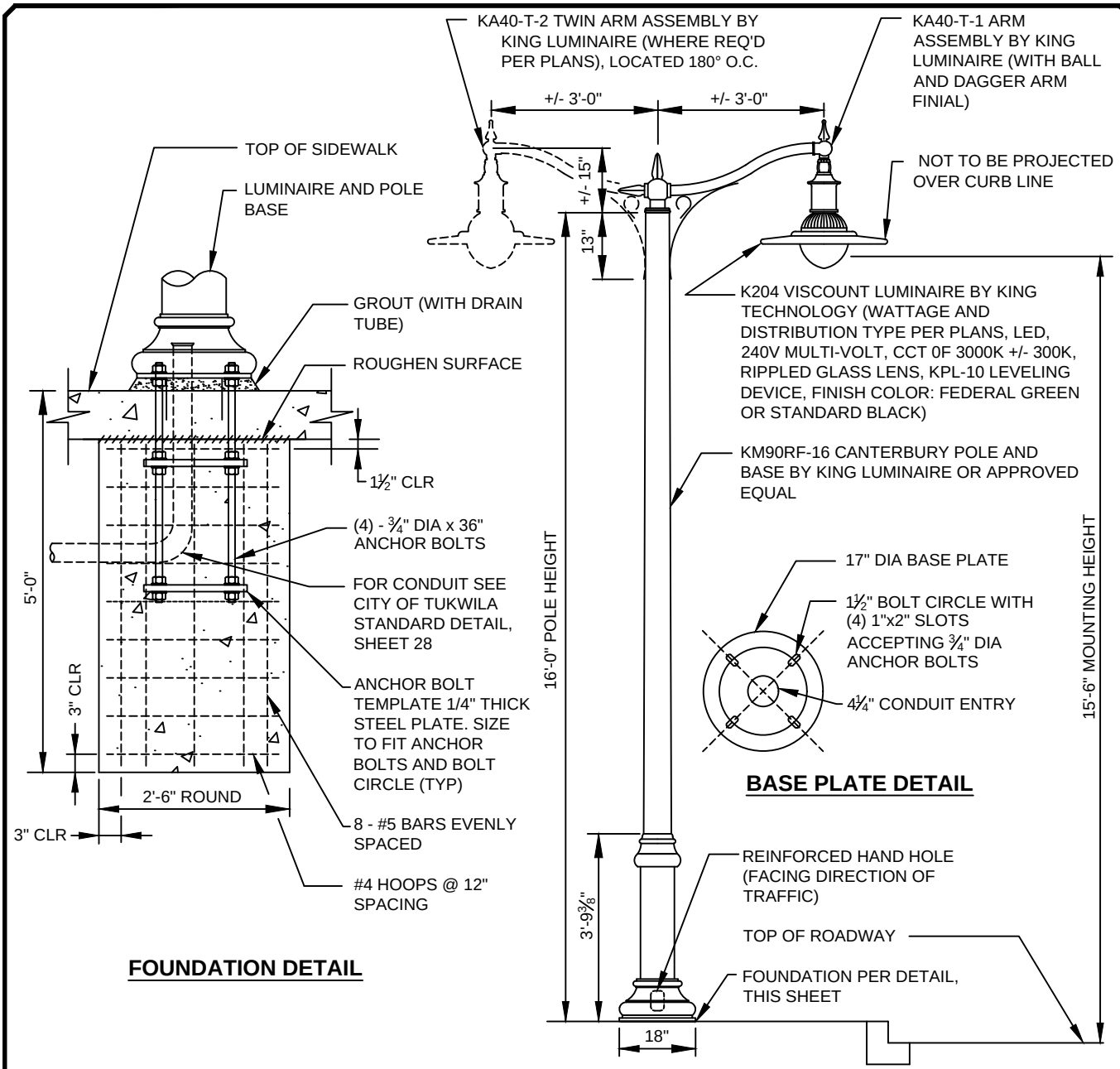
City of Tukwila

ROADWAY LIGHT POLE

SHEET: RS-25

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI



FOUNDATION DETAIL

BASE PLATE DETAIL

PEDESTRIAN LIGHT POLE DETAIL

NOTES:

1. POLE , BASE AND ARM ASSEMBLY SHALL BE TEXTURED FEDERAL GREEN OR STANDARD BLACK COLOR.
2. JUNCTION BOX, CONDUIT AND WIRING INSTALLATION SHALL BE CITY OF TUKWILA STANDARD DETAIL, SHEET RS-28.
3. WHEN INSTALLING FOUNDATION, CAST CONCRETE DIRECTLY AGAINST UNDISTURBED DRILLED SHAFT (CLASS 4000P).
4. FOUNDATION ANCHOR BOLTS SHALL BE HIGH-STRENGHT STEEL, MANUFACTURED FROM ASTM F1554 GRADE 105, WITH HEAVY HEX NUTS AND HARDENED WASHERS. GALVANIZE THE ANCHOR BOLTS ACCORDING TO ASTM F2329.
5. THE FOUNDATION SHALL BE GROUNDED IN ACCORDANCE WITH REQUIREMENTS OF WSDOT STANDARD SPECIFICATIONS 8-20.3(4).
6. SECURE ANCHOR BOLTS IN PLACE BEFORE POURING CONCRETE. INSTALL BOLTS WITH A MINIMUM OF TWO (2) THREADS EXPOSED.

NOT TO SCALE

City of Tukwila

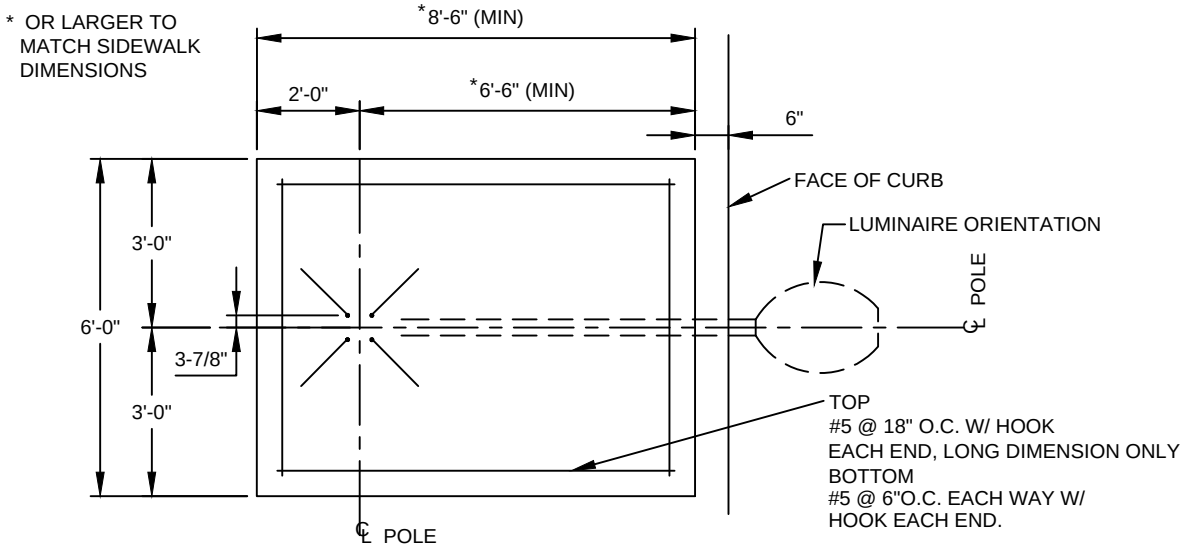
PEDESTRIAN LIGHT POLE

AND FOUNDATION DETAIL

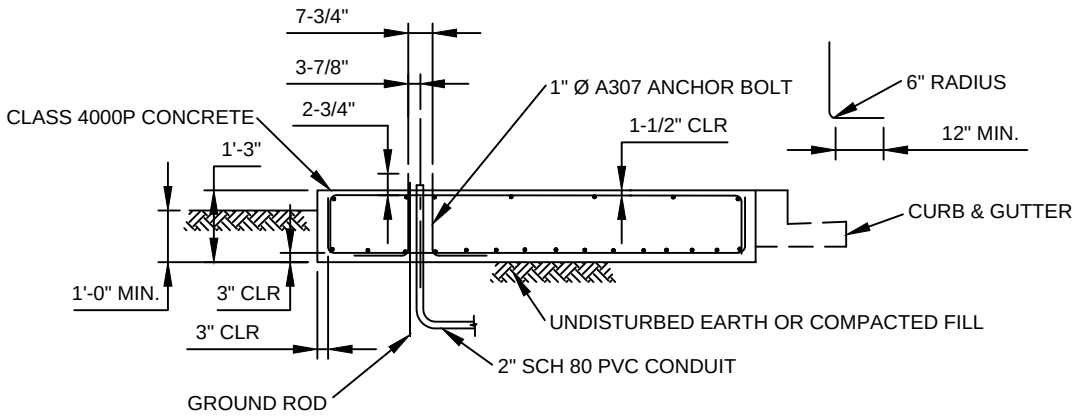
SHEET: **RS-26**

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI



FOUNDATION PLAN



FOUNDATION SECTION

NOTES:

1. THE FOUNDATION SHOWN IS SPECIFICALLY DESIGNED FOR A "HAPCO TYPE" ALUMINUM POLE UP TO 30' MOUNTING HEIGHT AND 8' MAST ARM.
2. CONCRETE FOR FOUNDATION SHALL BE CLASS 4000P, COMPRESSIVE STRENGTH AT 28 DAYS. USE OF PERVIOUS CONCRETE IS PROHIBITED WITHIN FOUNDATION.
3. REINFORCING STEEL SHALL CONFORM TO MINIMUM REQUIREMENTS OF ASTM A615 GRADE 60.
4. ALL PERMANENT CONDUCTORS SHALL BE COPPER. ALL ELECTRICAL WORKMANSHIP AND MATERIALS SHALL CONFORM TO LATEST NATIONAL ELECTRICAL CODE (NEC) REQUIREMENTS.

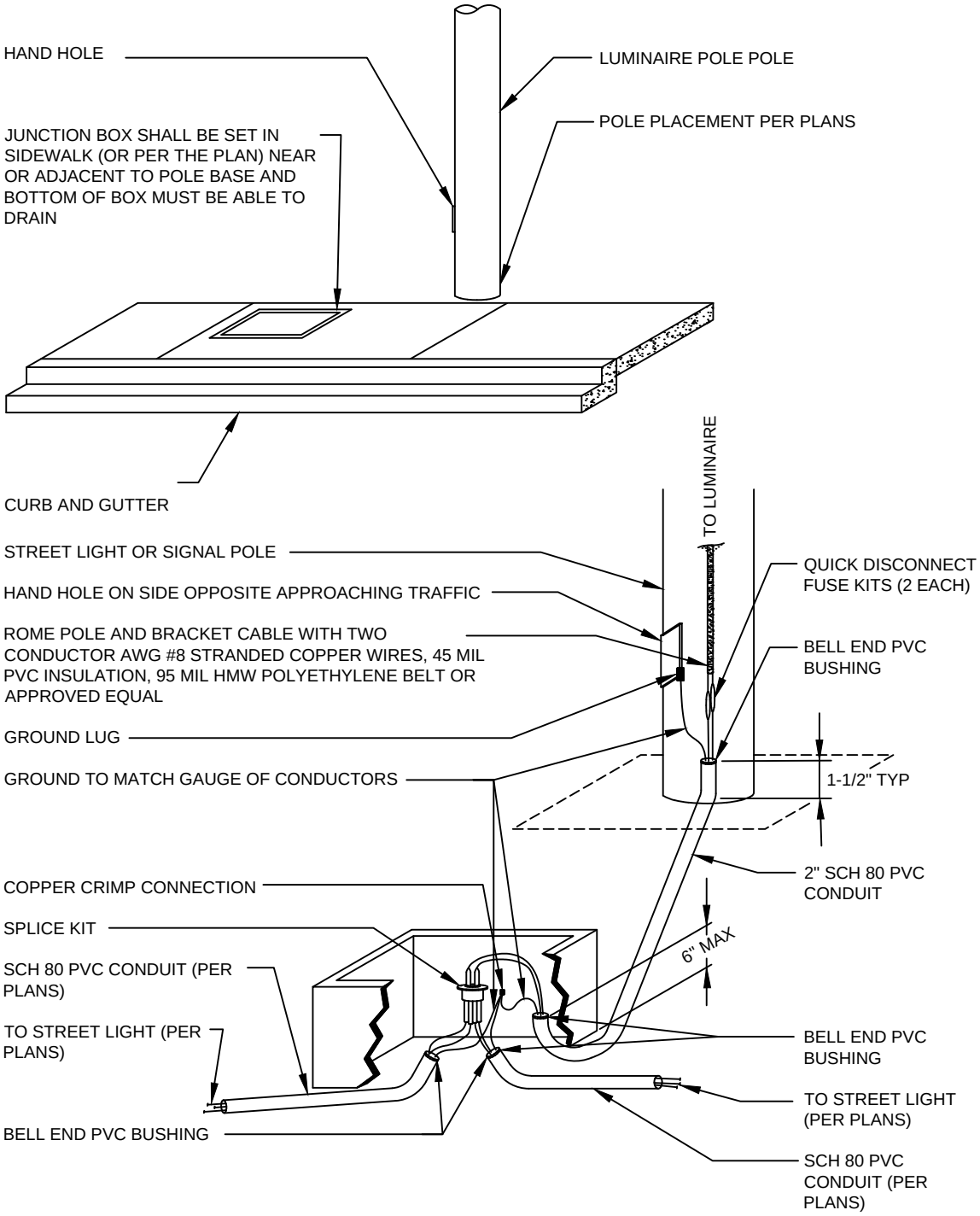
NOT TO SCALE

City of Tukwila

SPREAD FOOTING LUMINAIRE FOUNDATION

SIDEWALK APPLICATION

SHEET:	**RS-27**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



NOTES:

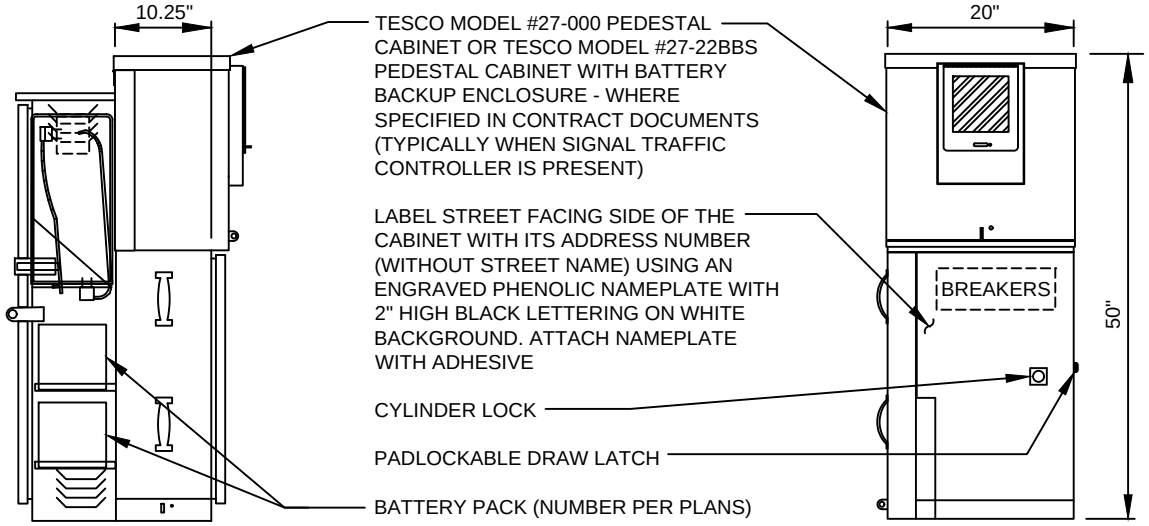
1. JUNCTION BOXES SHALL BE INSTALLED PER WSDOT STANDARD PLANS J-40.10 AND J-40.30.
2. JUNCTION BOX GROUNDING SHALL BE INSTALLED PER WSDOT STANDARD PLAN J-60.5.
3. J-BOX LID TO BE WELDED SHUT AFTER FINAL INSPECTION WITH TWO 1" LONG WELDS AT OPPOSITE CORNERS.
4. EXCEPT AS NOTED, ALL WIRING METHODS SHALL CONFORM TO THE NATIONAL ELECTRICAL CODE (NEC) AND APPLICABLE SECTIONS OF THE WSDOT STANDARD SPECIFICATIONS. ALUMINUM CONDUCTORS SHALL NOT BE ALLOWED.

NOT TO SCALE

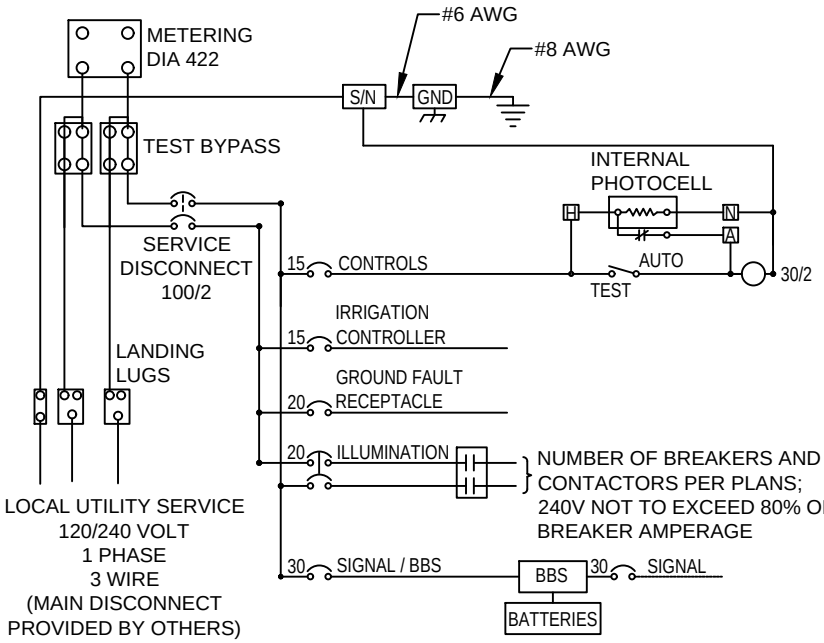
City of Tukwila

UNIFORM LUMINAIRE WIRING

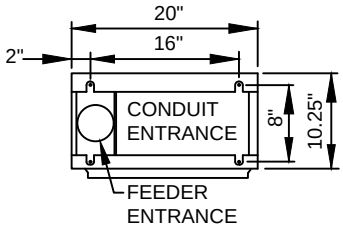
SHEET:	**RS-28**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



LEFT SIDE **FRONT VIEW**



WIRING DIAGRAM



BASE PLAN

NOTES:

1. METER BASE: 200A, BYPASS TYPE, 5 JAW (5TH JAW @ 9:00), SINGLE PHASE, 3-WIRE.
2. BREAKERS: 200A MAIN BREAKER, SEE PLANS FOR COMPLETE BREAKER SCHEDULE.
3. CONTACTORS: LIGHTING RATED, 30A, 2-POLE, 120 VAC COIL.
4. TERMINAL BLOCK: FOR FIELD WIRE CONNECTION TO REMOTE PHOTOCELL.
5. PHOTOCELL BYPASS SWITCH: 20A, 277 VAC, 3-WAY SWITCH.
6. CABINET: NEMA 3R PAD MOUNT, RAIN-TIGHT, EXTERIOR 1/8" ALUMINUM AND INTERIOR 14GA COLD ROLLED STEEL ELECTRICALLY WELDED AND REINFORCED, SCREENED AND GASKETED VENTS. ALL NUTS, BOLTS AND SCREWS SHALL BE STAINLESS STEEL. NUTS BOLTS AND SCREWS SHALL NOT BE VISIBLE FROM OUTSIDE OF ENCLOSURE. ENCLOSURE SHALL BE FACTORY WIRED AND CONFORM TO REQUIRED NEMA STANDARDS AND SHALL BEAR A UL 508A LABEL.
7. DOORS: HEAVY DUTY WELDED HINGES (LIFT-OFF TYPE), STAINLESS STEEL VAULT HANDLES, PADLOCKABLE METER DOOR, BEST CX LOCK ON DISTRIBUTION DOOR, POLISHED WIRE GLASS WINDOW, CLOSED CELL NEPRENE GASKET AND CARD HOLDER.
8. FINISH: BARE ALUMINUM (MILL FINISH) OUTSIDE AND WHITE INSIDE.
9. FOUNDATION: PER WSDOT STANDARD PLAN J-10.10 (FOR ELECTRICAL SERVICE CABINET OR A COMBINATION ELECTRICAL SERVICE / TRAFFIC SIGNAL CONTROLLER CABINET). PLACE SILICONE SEAL BETWEEN BOTTOM OF CABINET AND FOUNDATION.

NOT TO SCALE

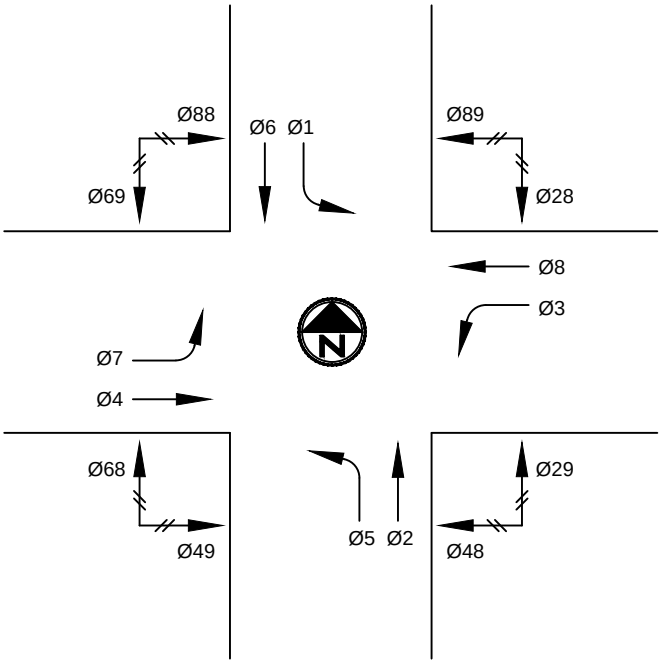
City of Tukwila

ELECTRICAL SERVICE CABINET

SHEET: **RS-29**

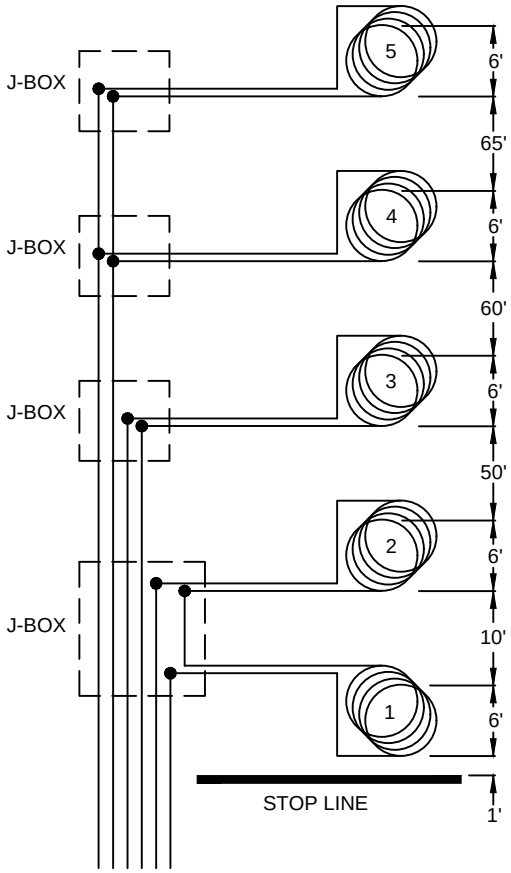
LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI



TYPICAL INTERSECTION MOVEMENTS

(PHASE 2 IS ALWAYS NORTHBOUND THRU DIRECTION)



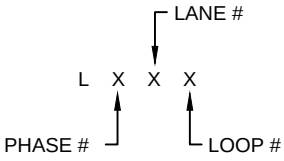
DETECTOR LEAD-INS

1, 2 - STOP BAR DETECTORS
3 - COUNT DETECTOR
4, 5 - ADVANCED DETECTORS (WHERE REQ'D)

LOOP SCHEMATIC

NOTES:

1. PRIOR TO DESIGN, THE PREFERENCE FOR VIDEO OR INDUCTION LOOP DETECTION SHALL BE DETERMINED BY THE CITY ENGINEER.
2. VEHICLE INDUCTION LOOP DETECTORS SHALL BE INSTALLED PER WSDOT STANDARD PLANS J-50.05, J-50.12 AND J-50.15, EXCEPT LOOP SPACINGS SHALL BE PER LOOP SCHEMATIC ABOVE. ALL LOOPS SHALL BE CIRCULAR.
3. LOOPS SHALL BE CENTERED IN THE LANES. LOOP LOCATIONS SHALL BE PRE-APPROVED BY THE ENGINEER IN THE FIELD, PRIOR TO SAWCUTTING.
4. LOOPS SHALL BE INSTALLED IN THE FINAL LIFT OF ASPHALT.
5. LOOP TESTING SHALL BE PERFORMED PER WSDOT STANDARD SPECIFICATIONS, SECTION 8-20.3(14)D, IN THE PRESENCE OF THE ENGINEER.
6. JUNCTION BOXES SHALL BE INSTALLED PER WSDOT STANDARD PLANS J-40.10 AND J-40.30.
7. JUNCTION BOX GROUNDING SHALL BE INSTALLED PER WSDOT STANDARD PLAN J-60.5.
8. BONDING AND GROUNDING WIRES SHALL BE INSTALLED AS DESCRIBED IN WSDOT STANDARD SPECIFICATIONS AND THE NATIONAL ELECTRIC CODE FOR ANY NEW METALLIC JUNCTION BOXES AND ANY MODIFIED EXISTING JUNCTION BOXES. JUNCTION BOX LIDS AND FRAMES SHALL BE GROUNDED SO THAT THE GROUND WILL NOT BREAK WHEN THE LID IS REMOVED AND LAID ON THE GROUND NEXT TO THE JUNCTION BOX. JUNCTION BOX SHALL BE CONSIDERED "MODIFIED" IF NEW CONDUITS AND/OR CURRENT-CARRYING CONDUCTORS ARE INSTALLED, INCLUDING LOW-VOLTAGE CONDUCTORS.



LOOP NUMBER MARKING DETAIL

NOT TO SCALE

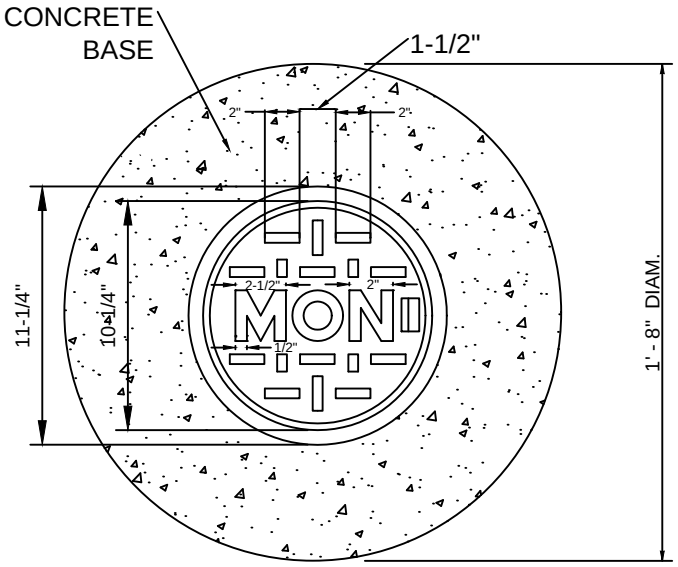
City of Tukwila

TYPICAL LOOP DETECTION LAYOUT

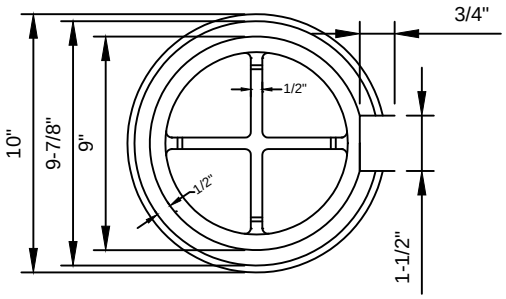
SHEET: RS-30

LAST REVISION: APRIL 2019

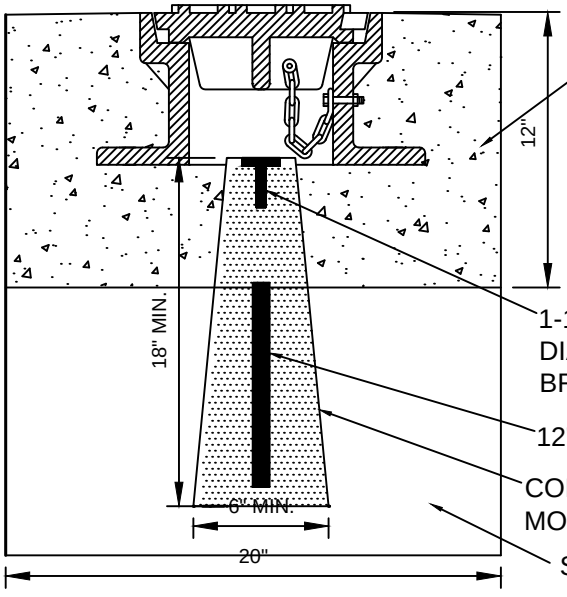
APPROVAL: H. PONNEKANTI



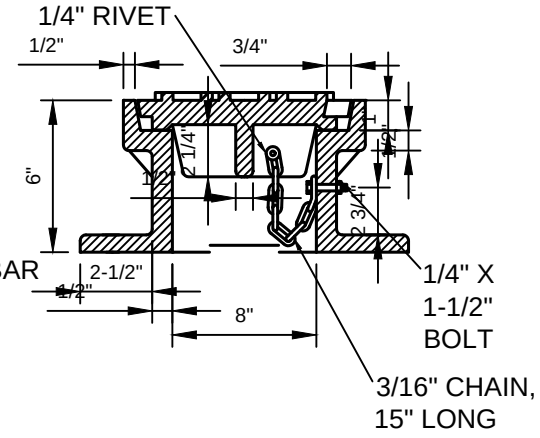
PLAN - FRAME & COVER



BOTTOM VIEW OF COVER



SECTION - INSTALLATION



SECTION - FRAME AND COVER

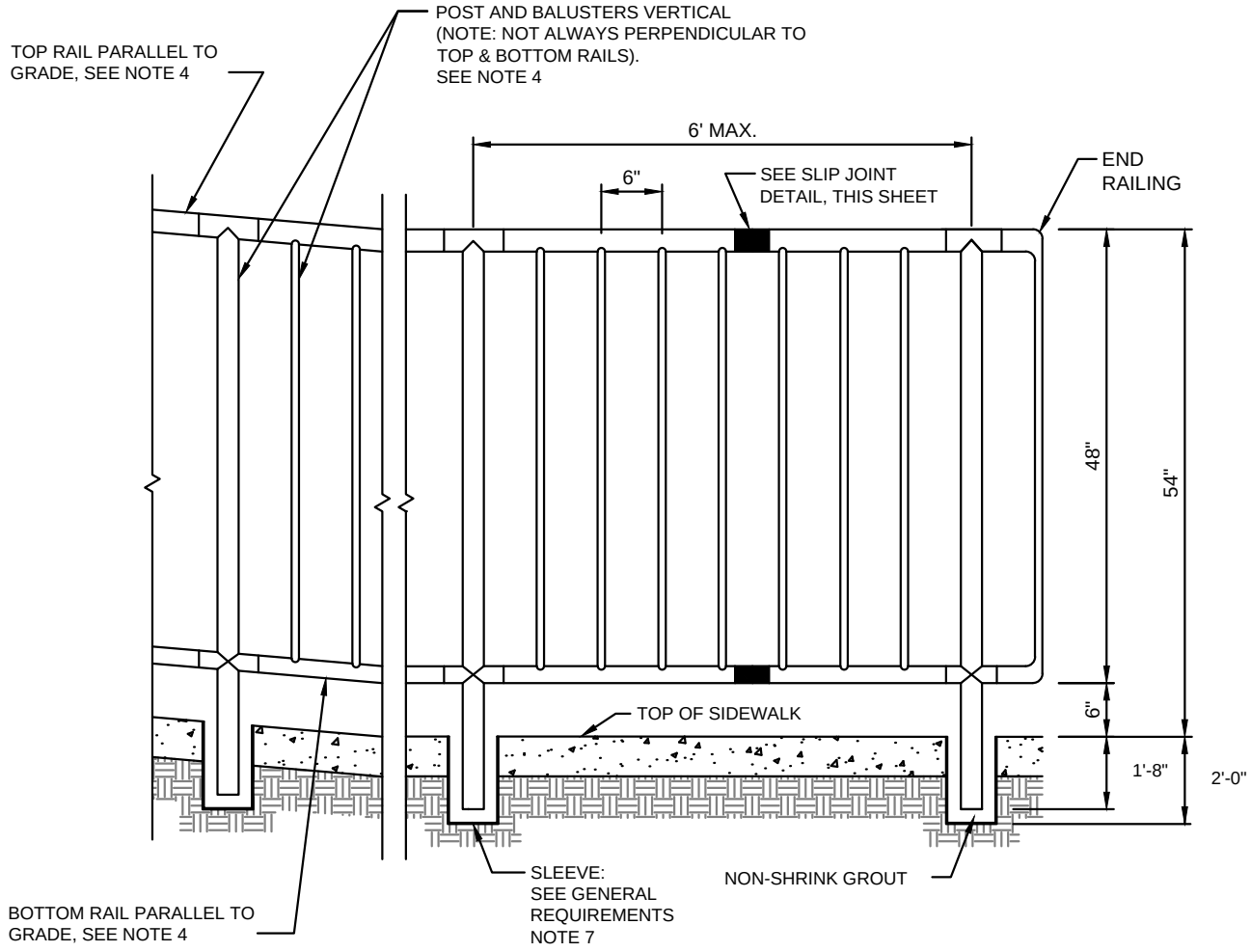
NOTES:

1. MACHINE BEARING FACES OF COVER AND CASE TO INSURE POSITIVE FIT.
2. CASTINGS SHALL BE GRAY IRON, A.S.T.M. DESIGNATION A-48, CLASS 40, AND SHALL CONFORM FURTHER TO APPLICABLE SECTION OF THESE SPECIFICATIONS.
3. MONUMENTS ARE REQUIRED AT STREET INTERSECTIONS AND MUST BE SET BY A SURVEYOR LICENSED TO PRACTICE AS SUCH BY THE STATE OF WASHINGTON.

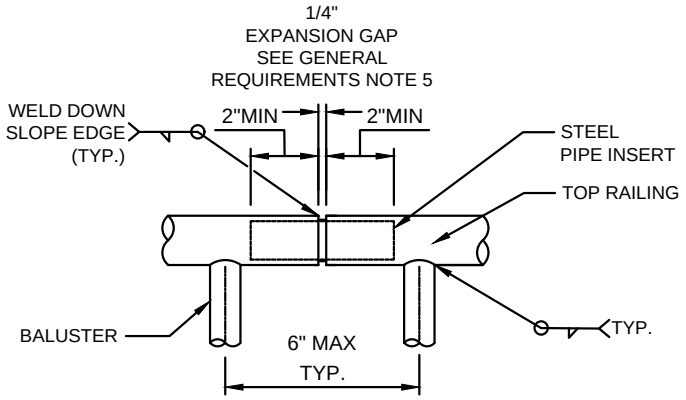
NOT TO SCALE

City of Tukwila

STREET MONUMENT	
W/ FRAME & COVER	
SHEET:	**RS-32**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



METAL SAFETY RAILING DETAIL



SLIP JOINT DETAIL

MATERIAL DIMENSIONS

PANEL HEIGHT	48"
TOP RAIL/POST	2½" NOM.
BOTTOM RAIL	2" NOM.
BALUSTER	⅞"Ø BAR

NOTES REFERENCED ON THIS SHEET ARE LOCATED ON SHEET 2 OF 2.

NOT TO SCALE

City of Tukwila

METAL SAFETY RAILING

SHEET: RS-35 (1 OF 2)

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI

METAL SAFETY RAILING NOTES:

MATERIAL REQUIREMENTS:

1. GALVANIZED STEEL OR ALUMINUM RAILING MAY BE USED.

GENERAL REQUIREMENTS:

1. SHOP DRAWINGS OF RAILING SHALL BE SUBMITTED FOR APPROVAL SHOWING COMPLETE DIMENSIONS AND DETAILS OF FABRICATION AND INCLUDING AN ERECTION DIAGRAM. MATERIALS BEING USED SHALL BE SPECIFIED IN THE SHOP DRAWINGS.
2. PIPE RAILING, PIPE BALUSTERS AND PIPE RAILING SPLICES SHALL BE ADEQUATELY WRAPPED TO ENSURE SURFACE PROTECTION DURING HANDLING AND TRANSPORTATION TO THE JOB SITE.
3. CUTTING SHALL BE DONE BY SAWING OR MILLING AND ALL CUTS SHALL BE TRUE AND SMOOTH. FLAME CUTTING WILL NOT BE PERMITTED.
4. TOP AND BOTTOM RAILS SHALL BE PARALLEL TO GRADE AND ALL POSTS AND BALUSTERS SHALL BE VERTICAL (NOTE: NOT ALWAYS PERPENDICULAR TO TOP AND BOTTOM RAILS).
5. PLACE EXPANSION GAP AT EVERY OTHER PANEL.
6. ONLY USE PANEL HEIGHT OF 36 INCHES AFTER APPROVAL OF THE TRAFFIC ENGINEER.
7. SLEEVES SHALL BE 6" SCHEDULE 40 PVC PIPE. IF RAILING IS TO BE INSTALLED IN EXISTING SIDEWALK, HOLES SHALL BE CORE DRILLED 2 INCHES LARGER THAN THE OUTSIDE DIAMETER OF THE POST, AND NO LESS THAN 6" FROM THE EDGE OF CONCRETE.
8. AVOID PLACING SAFETY RAIL IN SIGHT LINES.

STEEL RAILING REQUIREMENTS:

1. POST AND RAIL MATERIAL SHALL BE SCHEDULE 40 STEEL PIPE CONFORMING TO ASTM A 53, GRADE B. BALUSTERS SHALL BE SOLID STEEL BARS CONFORMING TO AASHTO M 183.
2. SPOT WELDING IS NOT ALLOWED. ALL WELDS SHALL ENCOMPASS THE ENTIRE JOINT.
3. SAFETY RAILING WILL BE HOT DIPPED GALVANIZED AFTER FABRICATION.
4. ANY FIELD CUTTING OR WELDING AREAS SHALL BE GROUND SMOOTH AND COATED WITH AT LEAST 2 COATS OF COLD GALVANIZED PAINT

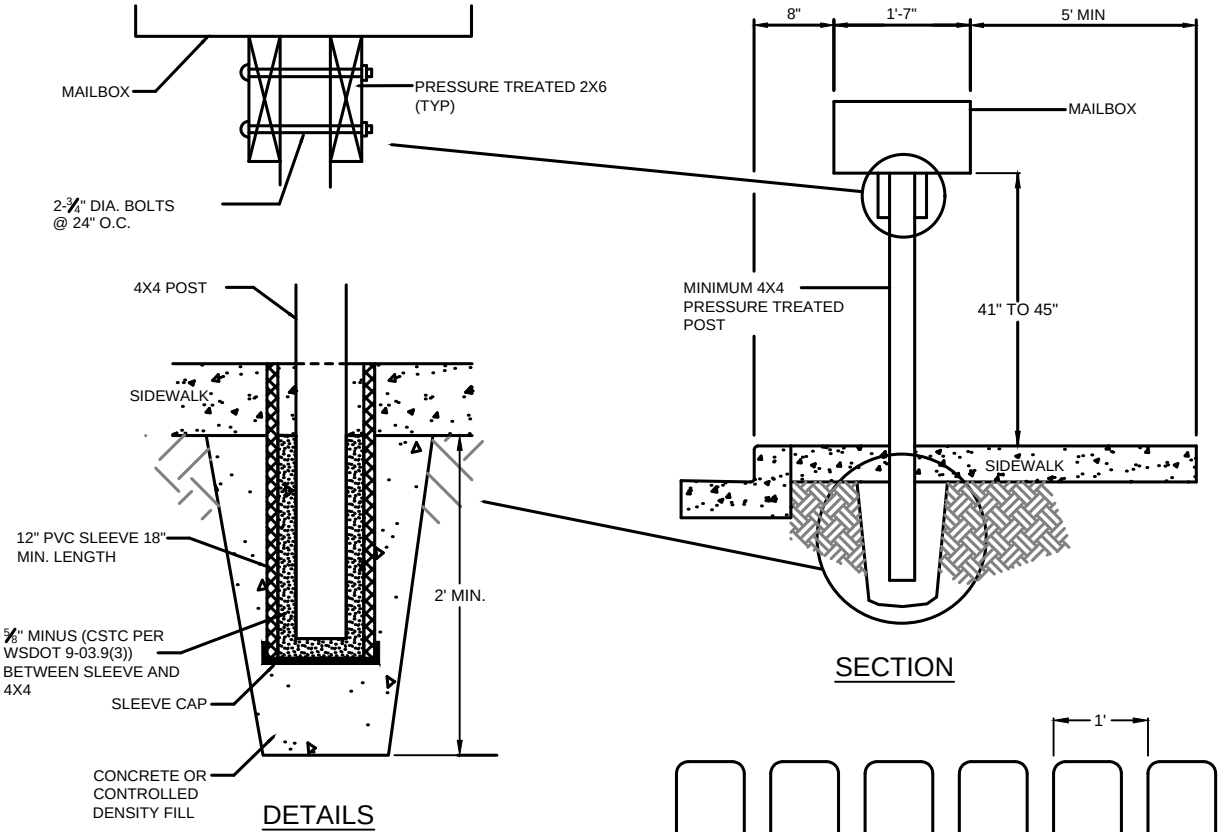
ALUMINUM RAILING REQUIREMENTS:

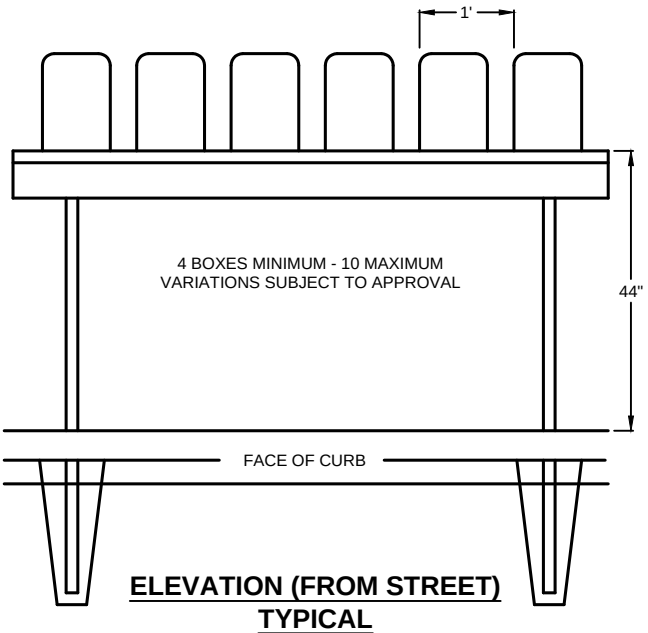
1. RAILING SHALL BE CV PIPE RAIL OR APPROVED EQUIVALENT. INSTALLATION PER MANUFACTURER'S RECOMMENDATIONS. BALUSTERS SHALL BE SOLID ALUMINUM FULL WELDED IN PLACE.
2. ALL ALUMINUM PARTS SHALL BE GIVEN A CLEAR ANODIC COATING AT LEAST 0.0006 INCH THICK AND BE HOT WATER SEALED AND SHALL HAVE A UNIFORM FINISH.
3. PIPE RAILING AND PIPE RAILING SPLICES MAY BE HEATED TO NOT MORE THAN 400'F FOR A PERIOD NOT TO EXCEED 30 MINUTES TO FACILITATE FORMING OR BENDING.
4. WELDING OF ALUMINUM SHALL BE IN ACCORDANCE WITH THE LATEST AASHTO STANDARD SPECIFICATION FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS.
5. RAILS, POSTS AND FORMED ELBOWS SHALL BE A.S.T.M. B— 241 OR B— 429 ALLOW 6063— T6 SCHEDULE 40 (STD PIPE). BRACKETS, END CAPS AND OTHER FITTINGS SHALL BE A.S.T.M. 6063— T5. SPLICES AND REINFORCING SLEEVES SHALL BE DRAWN ALUMINUM TUBING 6063— T832. SLEEVE I.D. SHALL BE 1" GREATER THAN POST O.D.

NOT TO SCALE

City of Tukwila

METAL SAFETY RAILING	
NOTES	
SHEET:	**RS-35 (2 OF 2)**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	





ELEVATION (FROM STREET)
TYPICAL

NOTES:

1. MAILBOX MUST BE TYPE "APPROVED BY THE POSTMASTER GENERAL" WITH A UNIFORM BOX STYLE AND METHOD OF ADDRESS IDENTIFICATION PER EACH STANDARD.
2. LOCATION IS SUBJECT TO APPROVAL BY THE CITY FOR PROTECTION OF VIEWS AND ACCESS AND IS TO BE SHOWN ON THE STREET IMPROVEMENT PLANS.
3. THIS SKETCH DEPICTS A MINIMUM STRUCTURAL AND DIMENSIONAL STANDARD. INNOVATIVE DESIGNS MEETING THESE MINIMUMS MAY BE ACCEPTED.

NOT TO SCALE

City of Tukwila

MAILBOX INSTALLATION

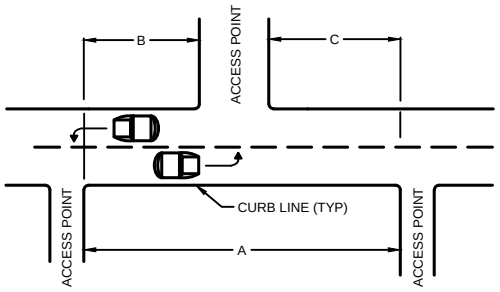
SHEET: **RS-36**

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI

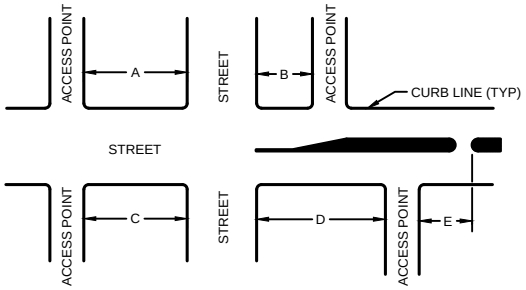
MINIMUM ACCESS POINT SPACING WHEN DIRECTLY OPPOSING DRIVEWAYS ARE NOT POSSIBLE

STREET SPEED[2] (MPH)	DIMENSIONS		
	A[3]	B[4]	C[4]
25	105	105	105
30	125	125	125
35	150	150	150
40	185	185	185
45	230	230	230



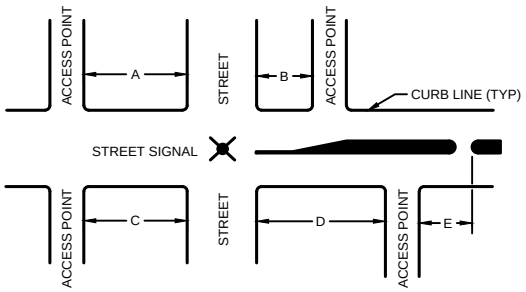
MINIMUM CORNER CLEARANCES FOR STOP SIGN INTERSECTION CONTROL (FEET)

DIM	OPERATION SPEED			
	30	35	40	45
A	115	135	150	180
B	85	105	120	140
C	115	135	160	180
D	115	135	160	180
E	105/0	135/0	160/0	180/0



MINIMUM CORNER CLEARANCES FOR SIGNALIZED INTERSECTION CONTROL (FEET)

DIM	OPERATION SPEED			
	30	35	40	45
A	230	275	320	365
B	115	135	160	180
C	230	275	320	365
D	230	275	320	365
E	115/0	135/0	160/0	180/0



NOTES:

1. ACCESS POINT SPACING ONLY FOR PUBLIC STREETS. THIS SHALL BE A GUIDELINE FOR PRIVATE STREETS.
2. REFERS TO POSTED SPEED OR OPERATING SPEED, WHICHEVER IS GREATEST.
3. BETWEEN THE NEAREST EDGES OF TWO-WAY ACCESS POINTS. DISTANCES BETWEEN ADJACENT, ONE-WAY ACCESS POINTS (WITH THE INBOUND ACCESS UPSTREAM) CAN BE ONE-HALF THE DISTANCES.
4. ACCESS POINTS DIRECTLY OPPOSITE FROM EACH OTHER WHEN POSSIBLE. WHERE IT IS NOT POSSIBLE, THESE DIMENSIONS WILL APPLY.
5. WHERE ACCESS POINTS ARE TO BE SIGNALIZED, A MINIMUM SPACING OF 600 FEET TO ANY OTHER SIGNALIZED INTERSECTION SHOULD BE MAINTAINED.
6. ACCESS POINT NEAR STOP OR SIGNAL CONTROLLED INTERSECTIONS SHOULD BE CHECKED TO DETERMINE WHETHER STOPPING QUEUES WILL BLOCK THE ACCESS POINT.
7. IN CASES WHERE ACCESS SPACING IS NOT ATTAINABLE BECAUSE EXISTING FRONTAGES ARE NARROW OR HAVE PHYSICAL CONSTRAINTS, ACCESS POINTS SHOULD BE LOCATED AS CLOSE TO THE TABULATED VALUES SHOWN ABOVE AS POSSIBLE. THE CITY ENGINEER SHALL BASE ALL SUCH DECISIONS ON MAINTAINING NEEDED CORRIDOR CAPACITY AND SAFETY.

NOT TO SCALE

City of Tukwila

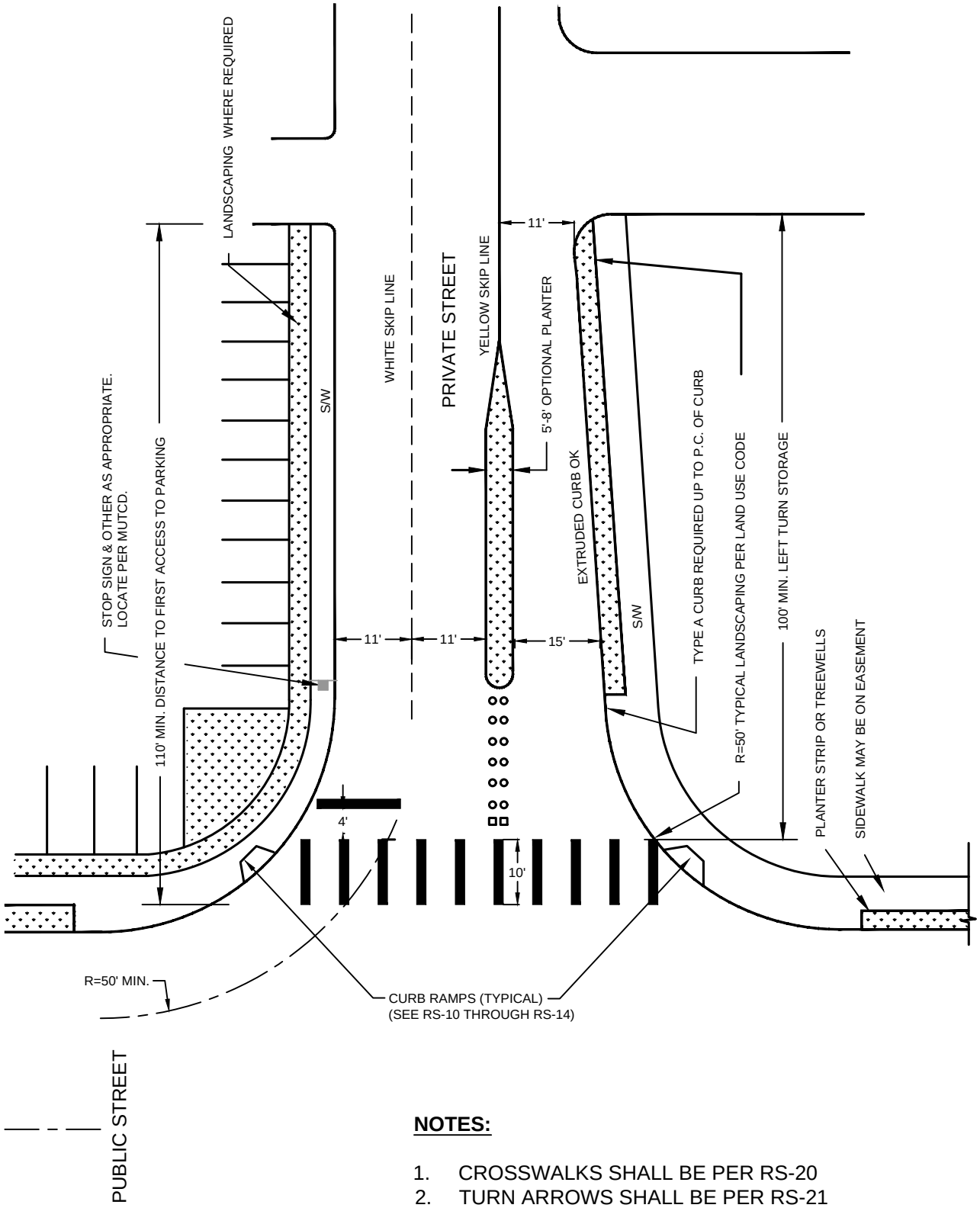
MIC DRIVEWAY DESIGN & LOCATION

ACCESS SPACING & CORNER CLEARANCES

SHEET: RS-37

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI



NOTES:

1. CROSSWALKS SHALL BE PER RS-20
2. TURN ARROWS SHALL BE PER RS-21

NOT TO SCALE

City of Tukwila

STREET OPENING

PRIVATE/COMMERCIAL

SHEET:	**RS-38**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

City of Tukwila

WORK ZONE PLAN

LOW VOLUME ROAD - CENTERLINE WORK

SHEET: RS-39

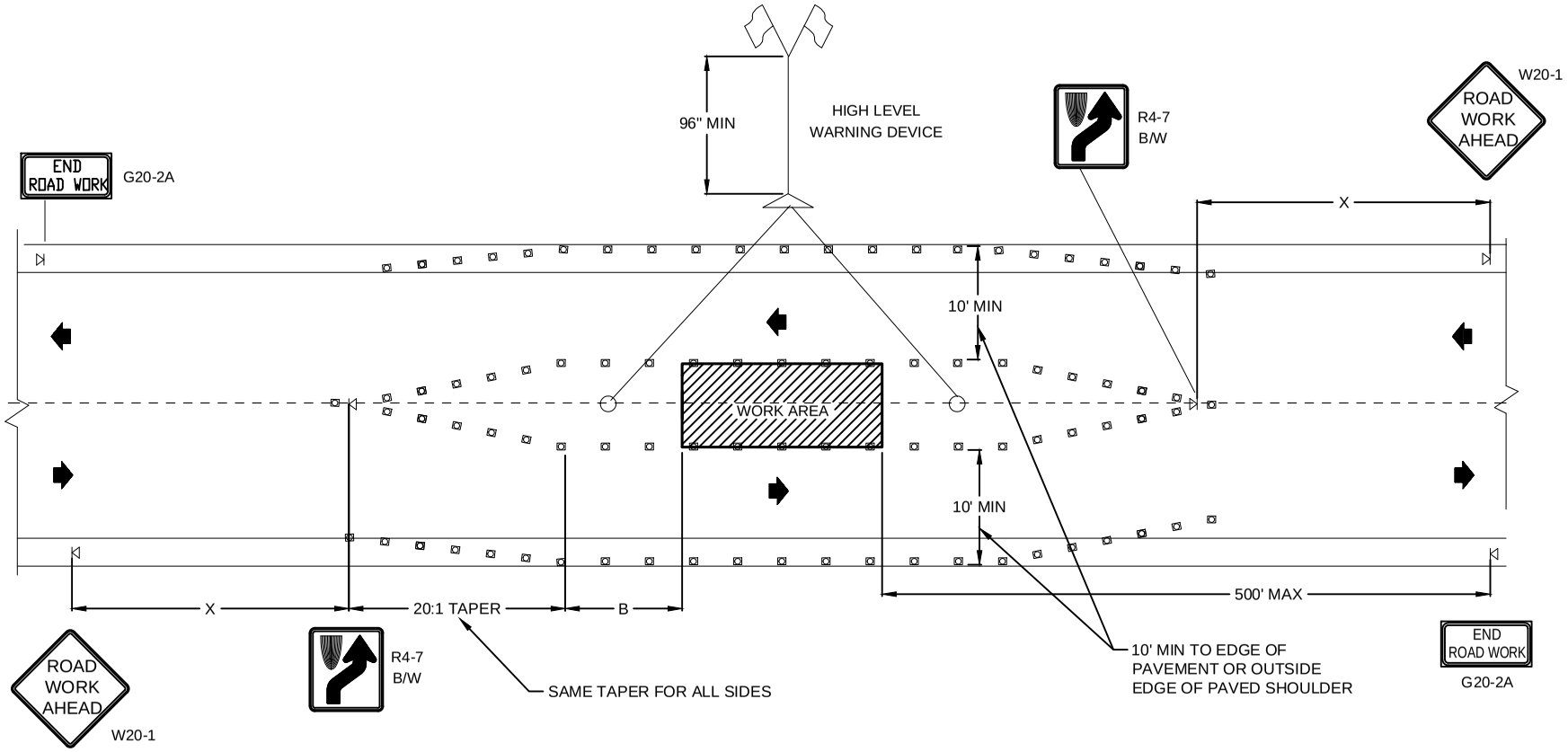
LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI

SIGN SPACING = X (FEET)		
ARTERIALS	35/40 MPH	350'+-
RESIDENTIAL AREAS & BUSINESS DISTRICTS	25/30 MPH	200'+-
ALL SIGNS ARE BLACK ON ORANGE UNLESS OTHERWISE DESIGNATED.		

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
35/45	30	60
25/30	20	40

BUFFER DATA						
BUFFER SPACE = B						
SPEED (MPH)	25	30	35	40	45	
LENGTH (FEET)	55	85	120	170	220	



NOT TO SCALE

LEGEND

SIGN LOCATION - TRIPOD MOUNT

TEMPORARY TRAFFIC CONTROL DEVICES

City of Tukwila

WORK ZONE PLAN

LOW VOLUME ROAD - SURVEYING

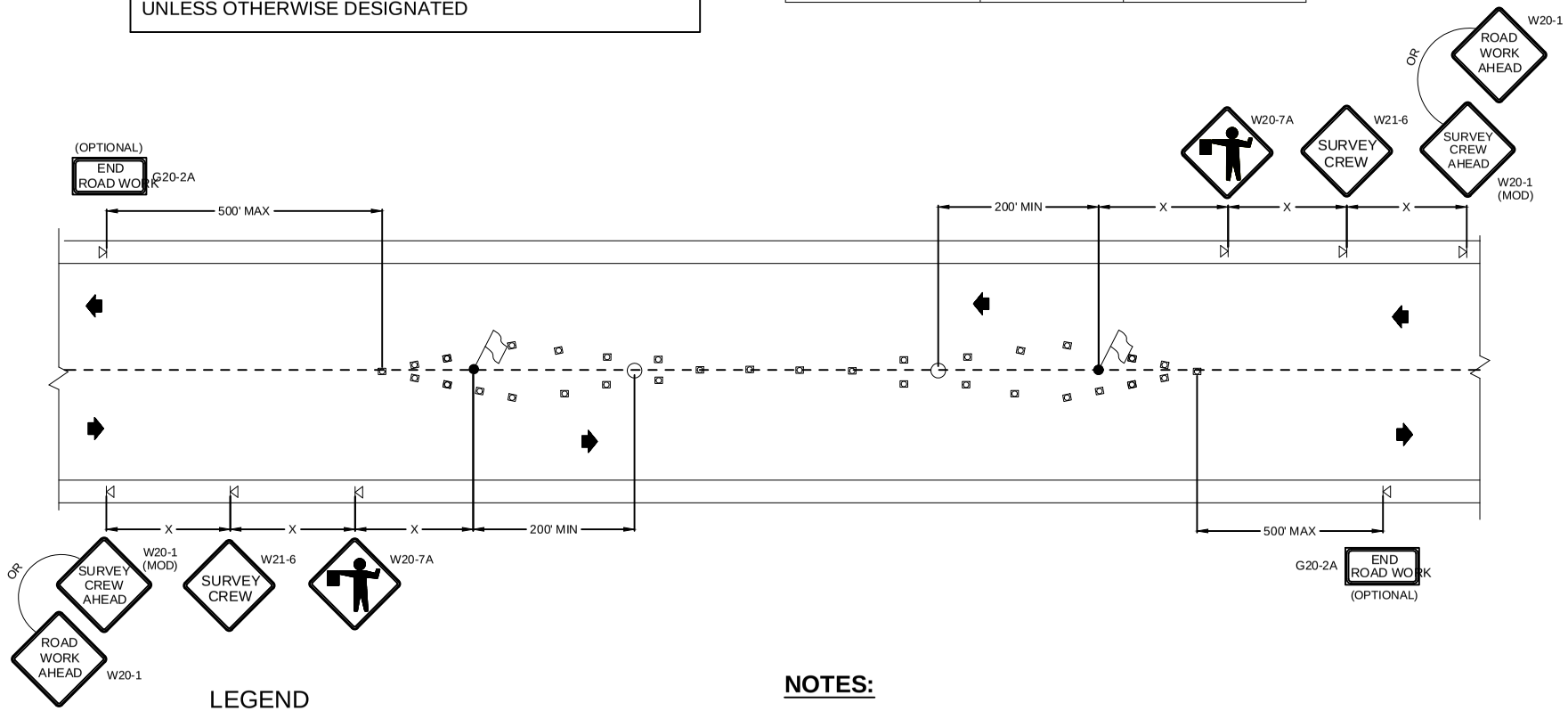
SHEET: RS-40

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI

SIGN SPACING = X (FEET)		
ARTERIALS	35/40 MPH	350'+-
RESIDENTIAL AREAS & BUSINESS DISTRICTS	25/30 MPH	200'+-
ALL SIGNS ARE BLACK ON ORANGE UNLESS OTHERWISE DESIGNATED		

CHANNELIZING DEVICE SPACING (FEET)		
MPH	TAPER	TANGENT
35/45	30	60
25/30	20	40



LEGEND

- SIGN LOCATION - TRIPOD MOUNT
- TEMPORARY TRAFFIC CONTROL DEVICES
- FLAGGING STATION
- SURVEYOR

NOTES:

1. FOR USE WITH SPEEDS OF 45 MPH AND UNDER.
2. (3) ADVANCED WARNING SIGNS ARE REQUIRED FOR FLAGGING OPERATIONS. (L&I REQUIREMENTS)

NOT TO SCALE

SECTION 9.1 GENERAL UTILITY DETAILS

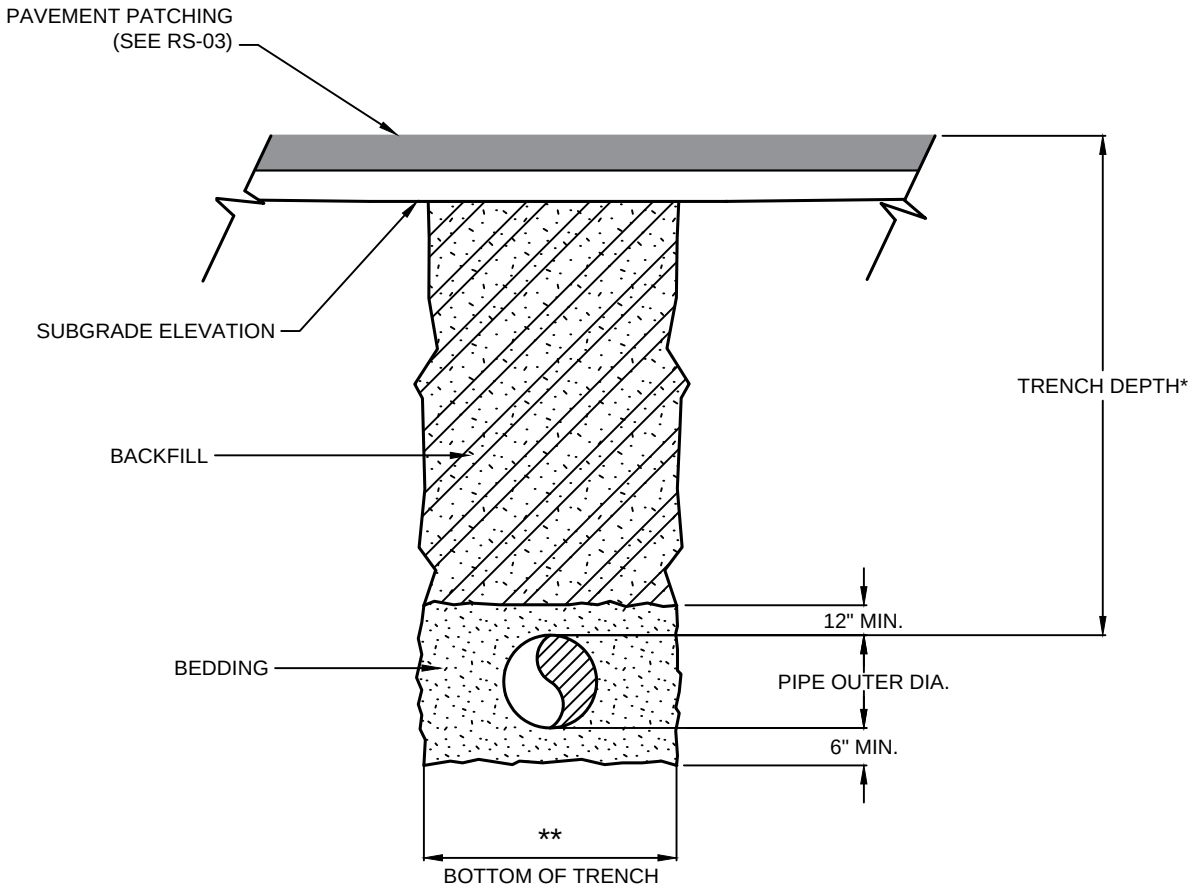
G-1 Trench Section

G-2 Utility Adjustment

G-3 Markerball Placement Plan View

G-4 Markerball Placement Section View

G-5 Utility Trench – Separation and Crossing



* **TRENCH DEPTHS**

DRAINAGE SYSTEM:

DIP: 18" MIN

PLASTIC PIPE: 24" MIN

WATER SYSTEM: 3' MIN, 6' MAX

SEWER SYSTEM: 18" MIN BELOW BOTTOM OF WATERMAIN

** **TRENCH WIDTHS**

DRAIN AND UNDERDRAIN: INSIDE DIAM + 12"

PIPES 15" AND SMALLER: INSIDE DIAM + 30"

PIPES 18" AND LARGER: (INSIDE DIAM * 1.5) + 18"

NOTE:

1. FOR PUBLICLY OWNED UTILITIES BACKFILL COMPACTION SHALL ACHIEVE 95% MAXIMUM DENSITY IN ROADWAYS AND 85% MAXIMUM DENSITY IN NON-TRAFFIC AREAS.
2. ALL BEDDING SHALL BE 5/8" MINUS CRUSHED ROCK (CSTC PER WSDOT 9-03.9(3)) COMPACTED TO 90% MAXIMUM DENSITY.
3. REFER TO RS-03 FOR PAVEMENT PATCHING.
4. PAVED AREAS: BACKFILL WITH 5/8" MINUS CRUSHED ROCK (CSTC PER WSDOT 9-03.9(3)).
5. UNPAVED AREAS: BACKFILL WITH NATIVE MATERIAL APPROVED BY THE ENGINEER OR CRUSHED ROCK PER WSDOT 9-03.9.
6. SEPARATION LESS THAN 18 INCHES SHALL BE APPROVED BY THE ENGINEER. 6 INCHES OF ETHAFOAM PAD SHALL BE INSTALLED BETWEEN UTILITIES.

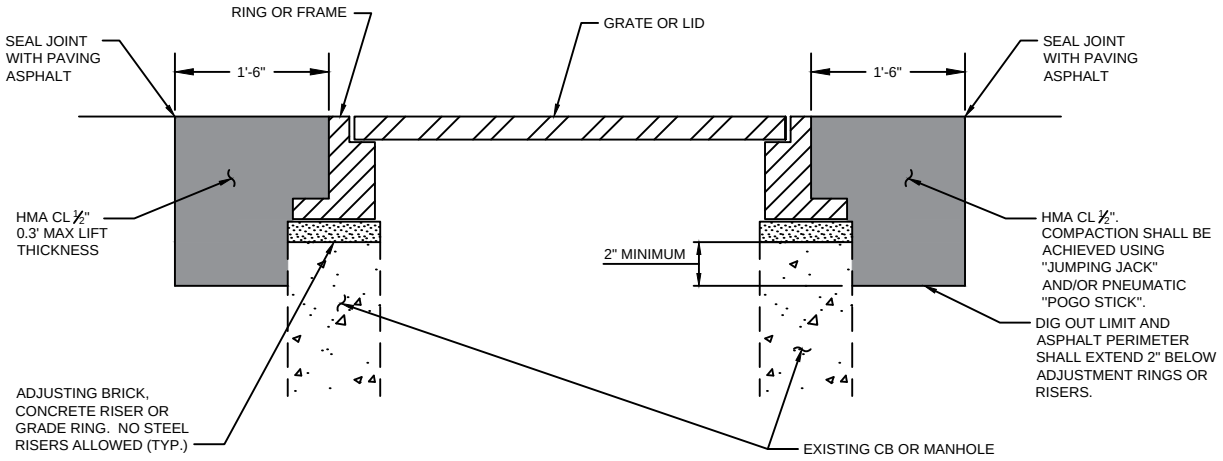
NOT TO SCALE

City of Tukwila

UTILITY TRENCH

BEDDING AND BACKFILL

SHEET:	**G-1**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



SECTION DETAIL THROUGH STRUCTURE

NOTE:

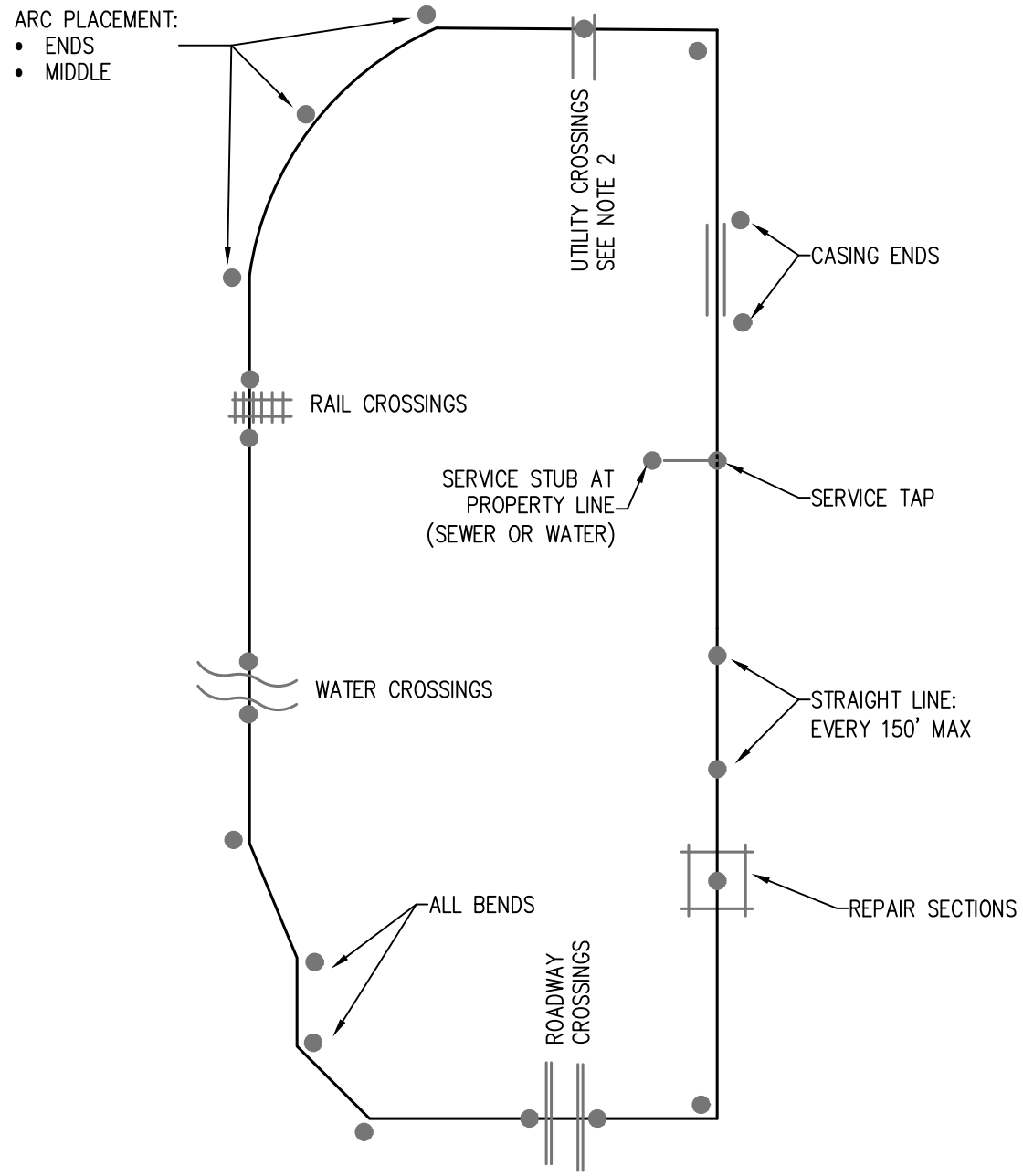
1. COMPACTION METHODS SHALL BE USED UNTIL MATERIAL REACHES A FIRM AND UNYIELDING CONDITION
2. UNPAVED AREAS: BACKFILL WITH NATIVE MATERIAL APPROVED BY THE ENGINEER OR CRUSHED ROCK PER WSDOT 9-03.9.

NOT TO SCALE

City of Tukwila

UTILITY ADJUSTMENT

SHEET:	**G-2**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



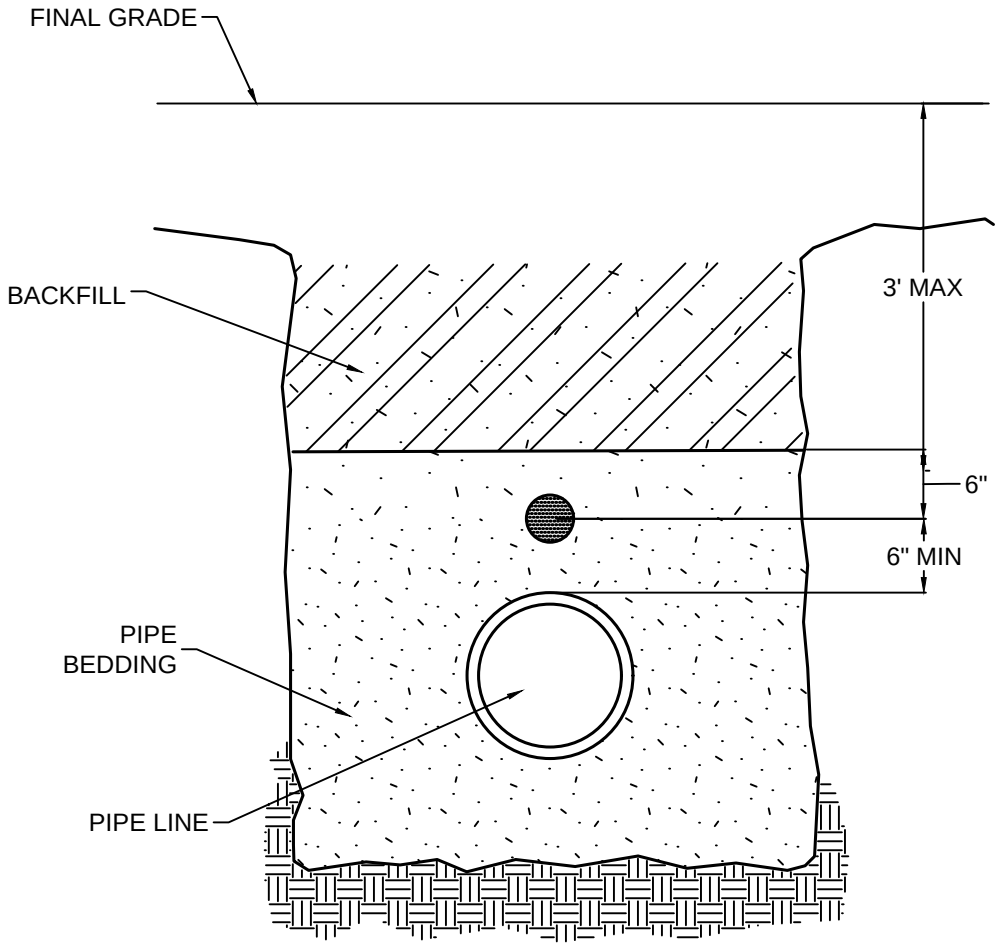
NOTES:

1. REFER TO SECTION 7.2.6 OF THE CITY OF TUKWILA INFRASTRUCTURE CONSTRUCTION AND DESIGN STANDARDS.
2. MARKER BALL SHALL BE PLACED WHERE THE NEW UTILITY LINE CROSSES UNDER A POWER, COMMUNICATION, GAS, FIBER OPTIC, DRAINAGE, SEWER, OR OTHER WATERLINE WITH 6" OR LESS SEPARATION.
3. FILL OUT MARKER BALL PLACEMENT LOG. TABLE CAN BE FOUND IN APPENDIX G OF THE CITY OF TUKWILA INFRASTRUCTURE CONSTRUCTION AND DESIGN STANDARDS.
4. SEE G-4 FOR VERTICAL PLACEMENT OF MARKERBALL.
5. FOR SIDE SEWER: PROVIDE MARKER BALL MODEL 1434 AT PROPERTY LINE IF NO CLEANOUT IS INSTALLED.

NOT TO SCALE

City of Tukwila

MARKERBALL PLACEMENT	
PLAN VIEW	
SHEET:	**G-3**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



NOTES:

1. FOLLOW MANUFACTURER'S GUIDLINES FOR PROGRAMMING THE MARKERBALLS AFTER THE MARKERBALL HAS BEEN INSTALLED.
2. INSTALL MARKERBALL A MINIMUM 6 INCHES BELOW BOTTOM OF PAVEMENT.

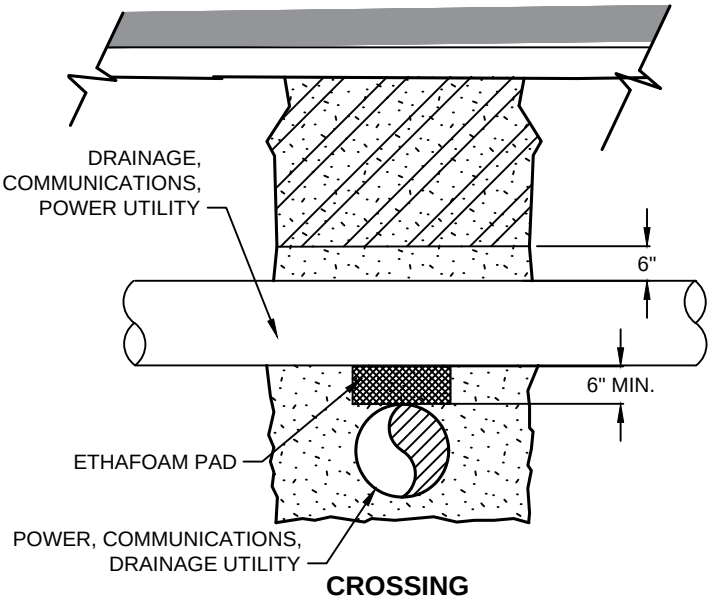
NOT TO SCALE

City of Tukwila

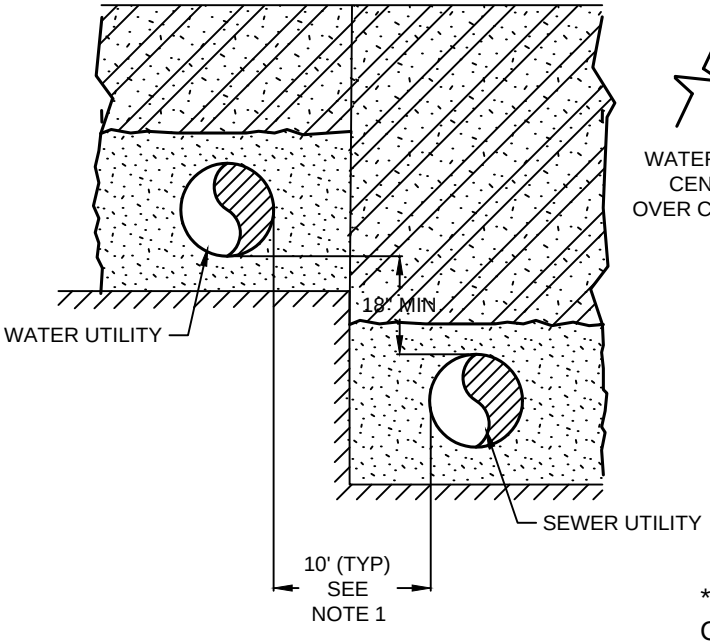
MARKERBALL PLACEMENT

SECTION VIEW

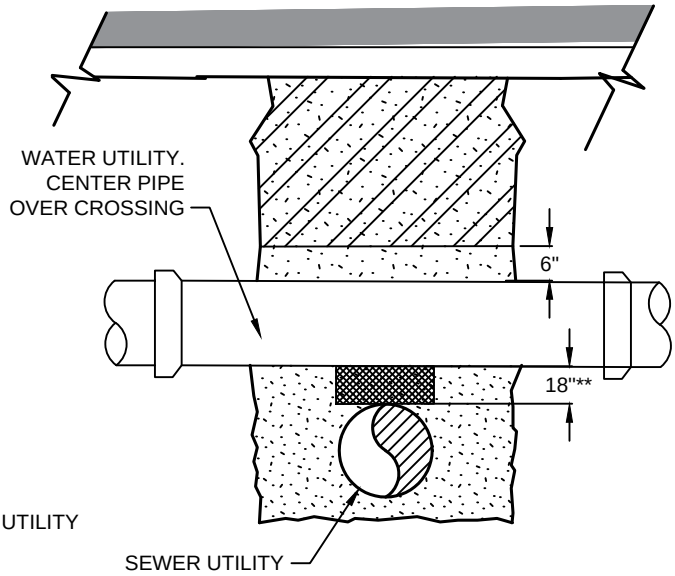
SHEET:	G-4
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



CROSSING
OTHER UTILITY



PARALLEL
WATER & SEWER



**IN NO CASE WILL WATER BE ALLOWED TO CROSS SEWER AT LESS THAN 18" SEPARATION WITHOUT ADDITIONAL ISOLATION MEASURES. (WATER MUST PASS OVER SEWER)

CROSSING
WATER & SEWER

NOTE:

1. REFER TO G-1 FOR BACKFILL AND BEDDING STANDARDS.
2. A MINIMUM OF 5' SHALL BE APPROVED BY THE ENGINEER. REFER TO CHAPTERS 7 AND 8 OF THE CITY OF TUKWILA INFRASTRUCTURE DESIGN AND CONSTRUCTION STANDARDS.
3. VERTICAL SEPARATION LESS THAN 12 INCHES SHALL BE APPROVED BY THE ENGINEER.
4. WHERE 12" VERTICAL SEPARATION IS NOT ACHIEVABLE, 6" OF ETHAFOAM PAD SHALL BE INSTALLED BETWEEN UTILITIES.

NOT TO SCALE

City of Tukwila

UTILITY TRENCH

SEPARATION AND CROSSING

SHEET:	G-5
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

SECTION 9.2 SURFACE WATER STANDARD DETAILS

DS-01 Catch Basin – Type 1 (WSDOT STD PLAN B-5.20-02)

DS-01 Catch Basin – Type 1L (WSDOT STD PLAN B-5.40-02)

DS-03 Catch Basin – Type 2 (WSDOT STD PLAN B-10.20-02)

DS-04 Catch Basin – Yard Drain PVC (WSDOT STD PLAN B-10.70-00)

DS-05 Catch Basin – Solid Metal Cover (WSDOT STD PLAN B-30.20-04)

DS-06 Rectangular Frame (Reversible) (WSDOT STD PLAN B-30.10-03)

DS-07 Circular Grate (WSDOT STD PLAN B-30.80-01)

DS-08 Curb Inlet

DS-09 Concrete Inlet (WSDOT STD PLAN B-25.60-02)

DS-10 Combination Inlet (WSDOT STD PLAN B-25.20-02)

DS-11 Rectangular Vaned Grate (WSDOT STD PLAN B-30.30-03)

DS-12 Rectangular Bi-Directional Vaned Grate (WSDOT STD PLAN B-30.40-03)

DS-13 Coupling Bands for Corrugated Metal Pipe (WSDOT STD PLAN B-60.40-03)

DS-14 Connection Details for Dissimilar Culvert Pipe (WSDOT STD PLAN B-60.20-01)

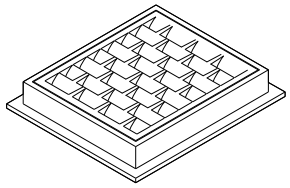
DS-15 Not In Use

DS-16 Storm Manhole – 24" Frame with Cover (City owned facility)

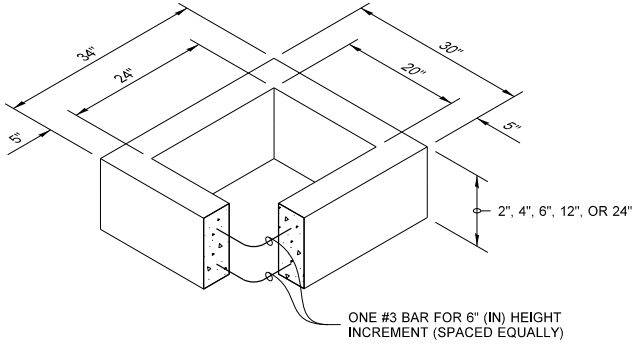
DS-17 Manhole – Polypropylene Safety Step

DS-18 Manhole - Ladder

DRAWN BY: LISA CYFORD



FRAME AND VANED GRATE



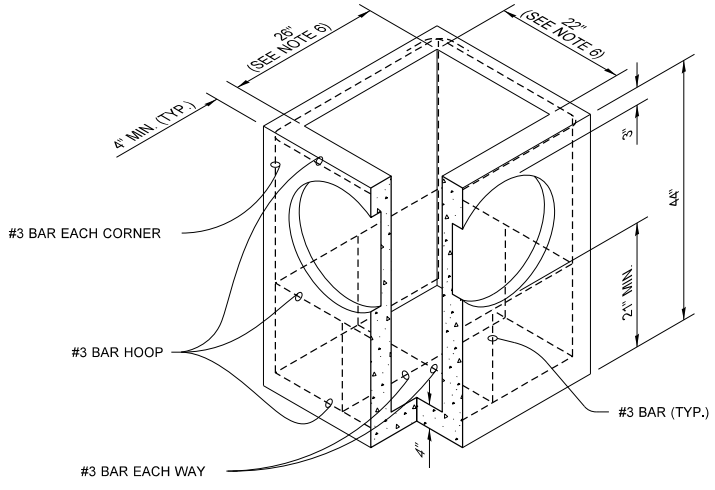
RECTANGULAR ADJUSTMENT SECTION

PIPE ALLOWANCES	
PIPE MATERIAL	**MAXIMUM INSIDE DIAMETER (INCHES)**
REINFORCED OR PLAIN CONCRETE	12"
ALL METAL PIPE	15"
CPSSP * **(STD. SPEC. SECT. 9-05.20)**	12"
SOLID WALL PVC **(STD. SPEC. SECT. 9-05.12(1))**	15"
PROFILE WALL PVC **(STD. SPEC. SECT. 9-05.12(2))**	15"

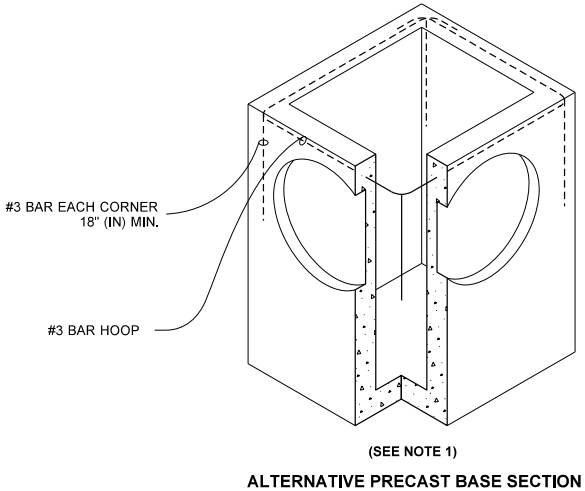
* CORRUGATED POLYETHYLENE STORM SEWER PIPE

NOTES

1. As acceptable alternatives to the rebar shown in the **PRECAST BASE SECTION**, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot shall be used with the minimum required rebar shown in the ALTERNATIVE **PRECAST BASE SECTION**. Wire mesh shall not be placed in the knockouts.
2. The knockout diameter shall not be greater than 20" (in). Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with **Standard Specification Section 9-04.3**.
3. The maximum depth from the finished grade to the lowest pipe invert shall be 5' (ft).
4. The frame and grate may be installed with the flange down, or integrally cast into the adjustment section with flange up.
5. The Precast Base Section may have a rounded floor, and the walls may be sloped at a rate of 1 : 24 or steeper.
6. The opening shall be measured at the top of the **Precast Base Section**.
7. All pickup holes shall be grouted full after the basin has been placed.



PRECAST BASE SECTION



(SEE NOTE 1)

ALTERNATIVE PRECAST BASE SECTION

DS-01

JULIE HEILMAN
STATE OF WASHINGTON
41819
REGISTERED
PROFESSIONAL ENGINEER

CATCH BASIN TYPE 1

STANDARD PLAN B-5.20-02

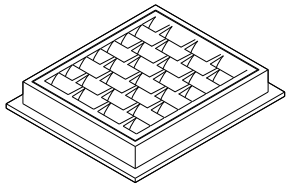
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

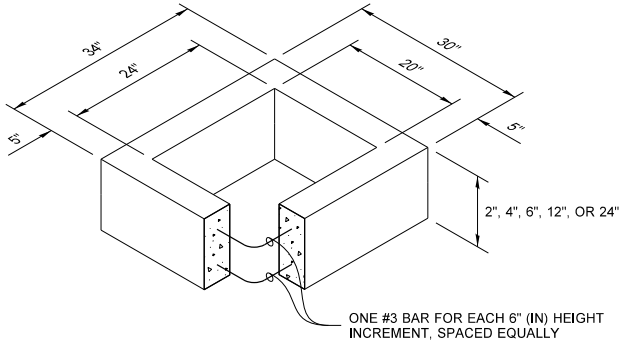
STATE DESIGN ENGINEER

Washington State Department of Transportation

DRAWN BY: LISA CYFORD



FRAME AND VANED GRATE



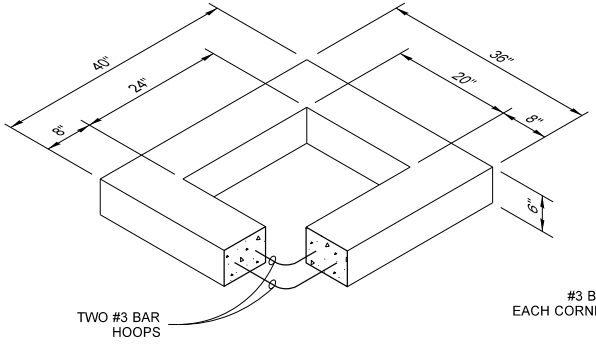
RECTANGULAR ADJUSTMENT SECTION

PIPE ALLOWANCES	
PIPE MATERIAL	**MAXIMUM INSIDE DIAMETER (INCHES)**
REINFORCED OR PLAIN CONCRETE	18"
ALL METAL PIPE	21"
CPSSP * **(STD. SPEC. SECT. 9-05.20)**	18"
SOLID WALL PVC **(STD. SPEC. SECT. 9-05.12(1))**	21"
PROFILE WALL PVC **(STD. SPEC. SECT. 9-05.12(2))**	21"

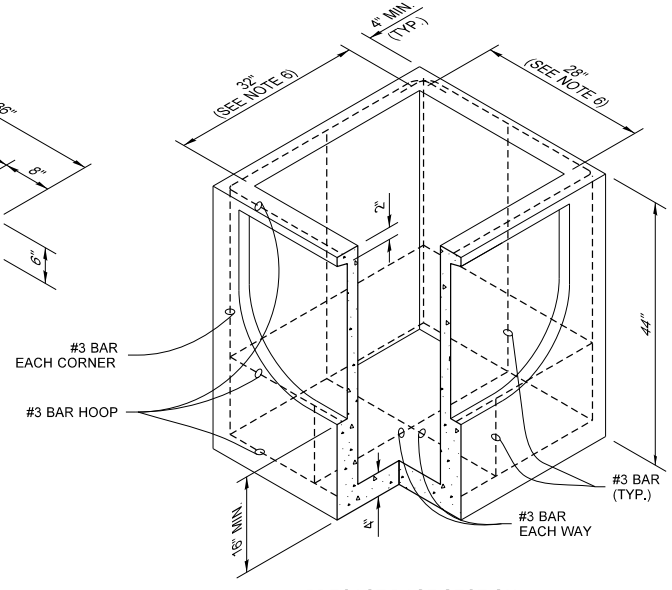
* CORRUGATED POLYETHYLENE STORM SEWER PIPE

NOTES

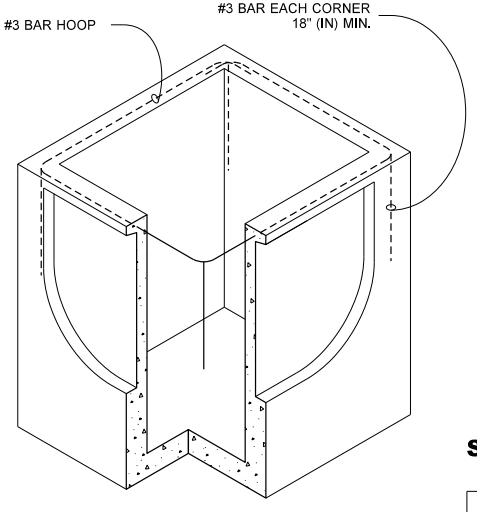
1. As acceptable alternatives to the rebar shown in the **PRECAST BASE SECTION**, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot, shall be used with the minimum required rebar shown in the ALTERNATIVE **PRECAST BASE SECTION**. Wire mesh shall not be placed in the knockouts.
2. The knockout shall not be greater than 26" (in), in any direction. Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with **Standard Specification Section 9-04.3**.
3. The maximum depth from the finished grade to the lowest pipe invert shall be 5' (ft).
4. The frame and grate may be installed with the flange down or integrally cast into the adjustment section with flange up.
5. The Precast Base Section may have a rounded floor, and the walls may be sloped at a rate of 1 : 24 or steeper.
6. The opening shall be measured at the top of the Precast Base Section.
7. All pickup holes shall be grouted full after the basin has been placed.



REDUCING SECTION



PRECAST BASE SECTION



(SEE NOTE 1)

ALTERNATIVE PRECAST BASE SECTION

DS-02

JULIE HEILMAN STATE OF WASHINGTON 41819 REGISTERED PROFESSIONAL ENGINEER

CATCH BASIN TYPE 1L

STANDARD PLAN B-5.40-02

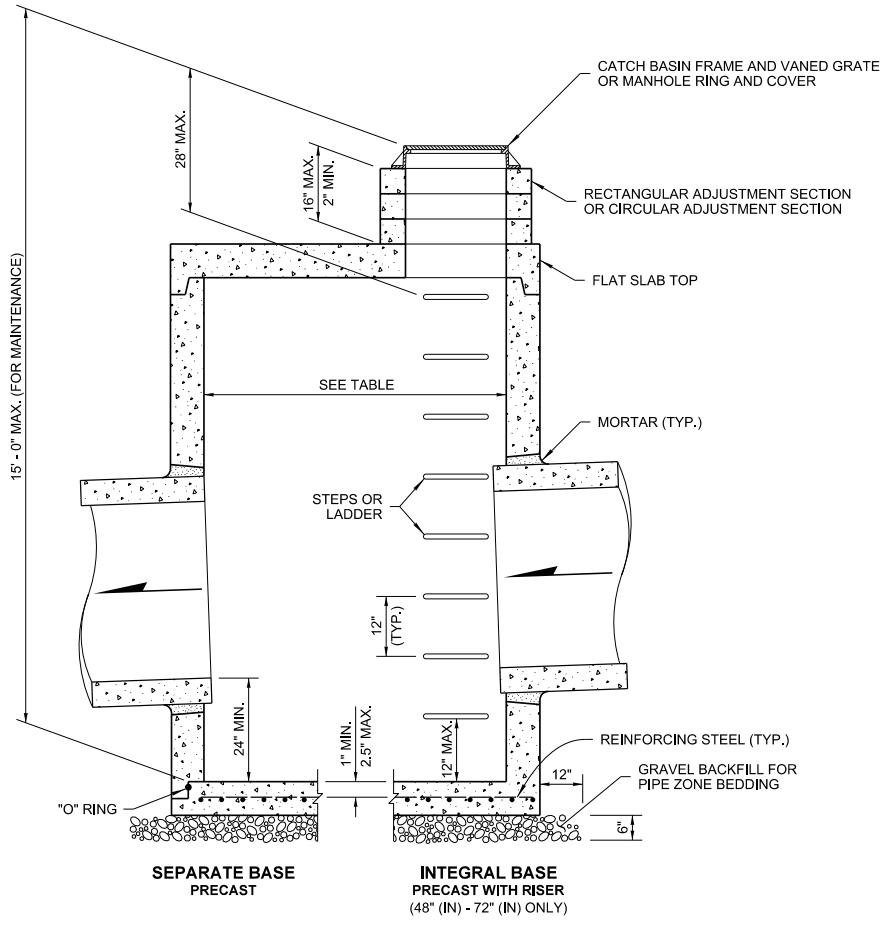
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

Washington State Department of Transportation

DRAWN BY: FERN LIDDELL



NOTES

1. No steps are required when height is 4' or less.
2. The bottom of the precast catch basin may be sloped to facilitate cleaning.
3. The rectangular frame and grate may be installed with the flange up or down. The frame may be cast into the adjustment section.
4. Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with **Standard Specification Section 9-04.3.**

CATCH BASIN DIMENSIONS

CATCH BASIN DIAMETER	MIN. WALL THICKNESS	MIN. BASE THICKNESS	MAXIMUM KNOCKOUT SIZE	MINIMUM DISTANCE BETWEEN KNOCKOUTS
48"	4"	6"	36"	8"
54"	4.5"	8"	42"	8"
60"	5"	8"	48"	8"
72"	6"	8"	60"	12"
84"	8"	12"	72"	12"
96"	8"	12"	84"	12"
120"	10"	12"	96"	12"
144"	12"	12"	108"	12"

PIPE ALLOWANCES

CATCH BASIN DIAMETER	PIPE MATERIAL WITH MAXIMUM INSIDE DIAMETER				
	CONCRETE	ALL METAL	CPSSP ① PP ④	SOLID WALL PVC ②	PROFILE WALL PVC ③
48"	24"	30"	24"	30"	30"
54"	30"	36"	30"	36"	36"
60"	36"	42"	36"	42"	42"
72"	42"	54"	42"	48"	48"
84"	54"	60"	54"	48"	48"
96"	60"	72"	60"	48"	48"
120"	66"	84"	60"	48"	48"
144"	78"	96"	60"	48"	48"

① Corrugated Polyethylene Storm Sewer Pipe **(See Standard Specification Section 9-05.20)**
② **(See Standard Specification Section 9-05.12(1))**
③ **(See Standard Specification Section 9-05.12(2))**
④ Polypropylene Pipe **(See Standard Specification Section 9-05.24)**

DS-03

JULIE HEILMAN
STATE OF WASHINGTON
41819
REGISTERED
PROFESSIONAL ENGINEER

CATCH BASIN TYPE 2

STANDARD PLAN B-10.20-02

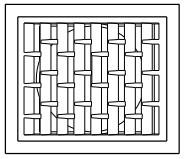
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

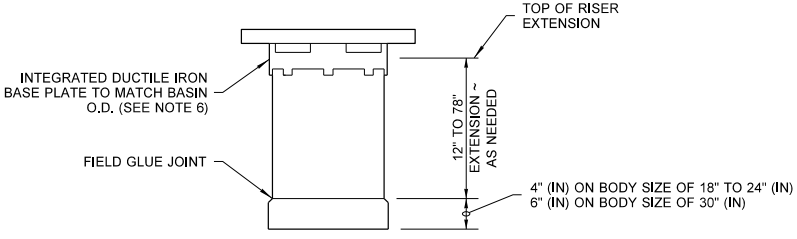
Washington State Department of Transportation

DRAWN BY: FERN LIDDELL

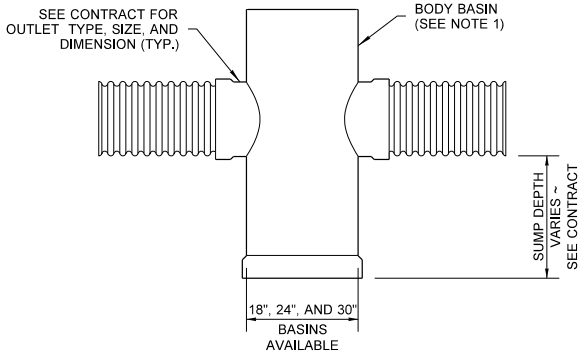


PLAN VIEW

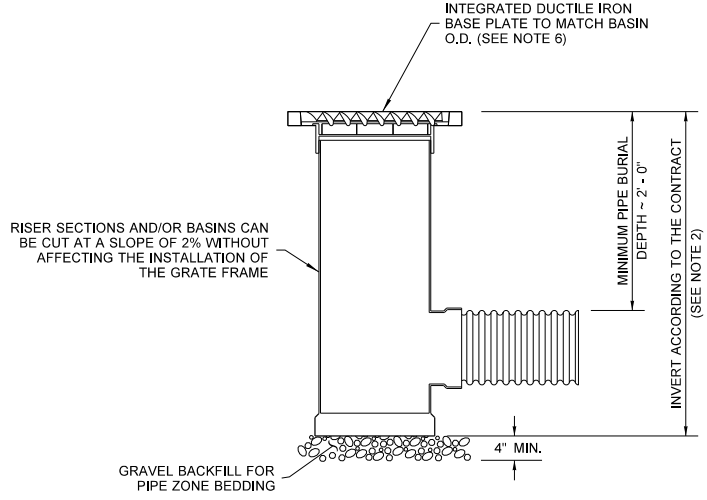
FRAME AND VANED GRATE



RISER EXTENSION



BASIN BODY



ELEVATION VIEW

NOTES

1. Drain basin to be custom manufactured according to plan details. Risers are needed for basins over 84" (in) due to shipping restrictions. The maximum depth from finished grade to the lowest invert shall be 8' (ft).
2. Drainage connections shall utilize flexable elastometric seals conforming to **ASTM F477** and shall meet the requirements of **ASTM D3212**.
3. Risers can be trimmed down to 3" (in) extension without interfering with the installation of the frame.
4. These structures can be used for Type 1, Type 1L, and Type 2 structures. usage for the Type 2 structures shall be limited to pipe size use only.
5. Basins shall be manufactured from PVC pipe stock meeting the requirements of **ASTM D1784**, cell classification **12454**.
6. Ductile iron castings for PVC catch basins shall conform to the requirements of **ASTM A536**, **grade 70-50-05**, and shall meet the proof load testing requirements of **AASHTO M 306**.
7. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC × 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.

DS-04

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CATCH BASIN - PVC

STANDARD PLAN B-10.70-00

SHEET 1 OF 1 SHEET

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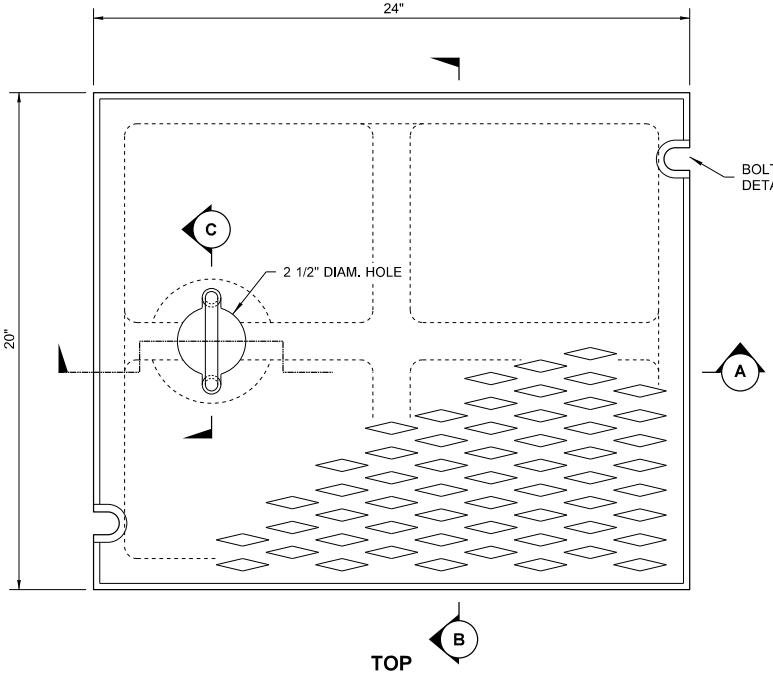
Washington State Department of Transportation

DRAWN BY: FERN LIDDELL



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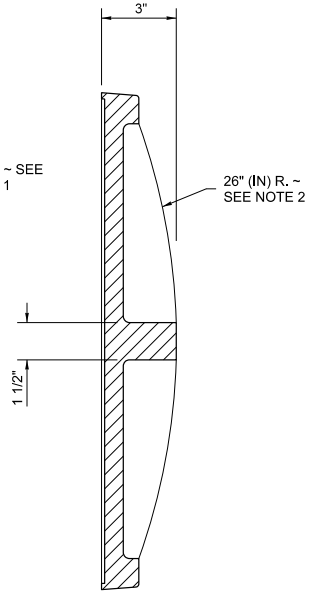
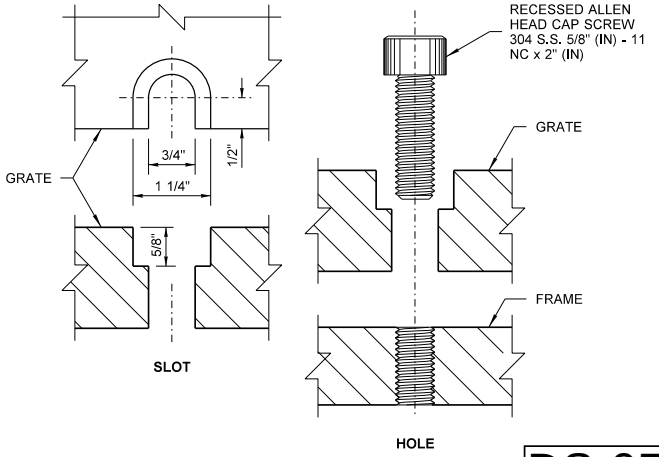


SECTION (B)

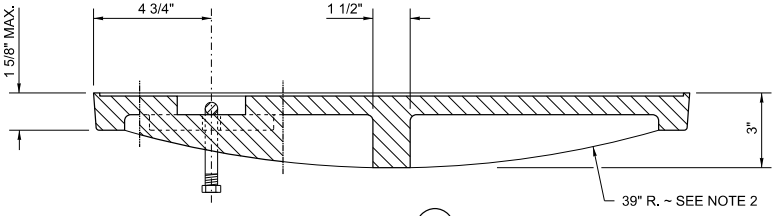
NOTES

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC × 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.
2. Alternative reinforcing designs are acceptable in lieu of the rib design.
3. Refer to **Standard Specification Section 9-05.15** and **9-05.15(2)** for additional requirements.
4. For frame details, see **Standard Plan B-30.10.**

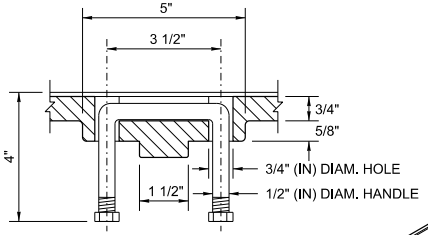


BOLT-DOWN DETAILS
SEE NOTE 1

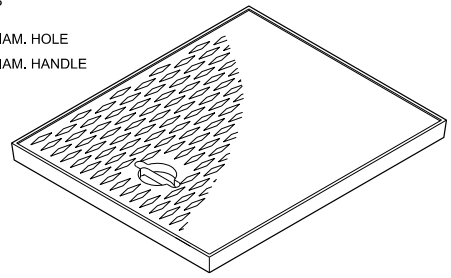
DS-05



SECTION (A)



SECTION (C)



ISOMETRIC

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RECTANGULAR SOLID METAL COVER

STANDARD PLAN B-30.20-04

SHEET 1 OF 1 SHEET

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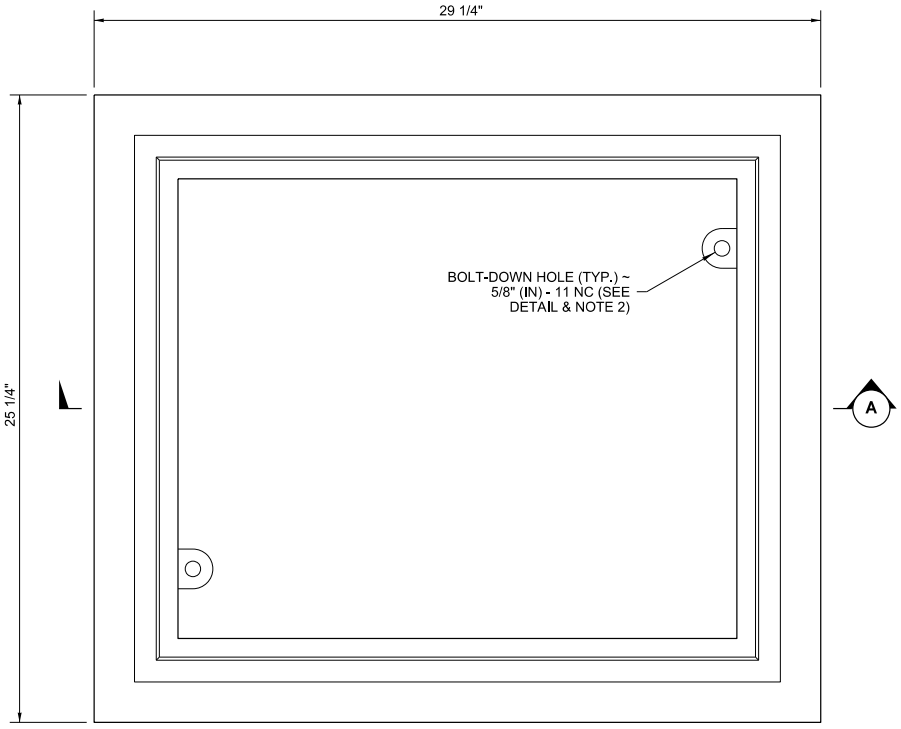
STATE DESIGN ENGINEER

Washington State Department of Transportation



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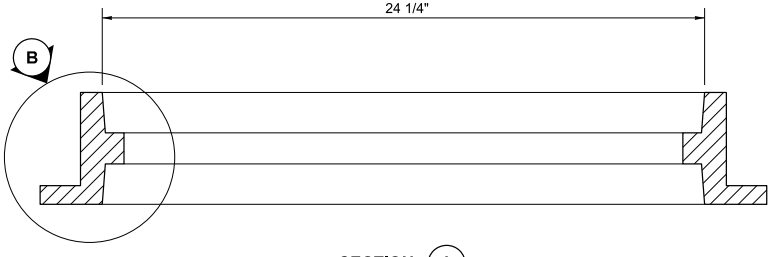
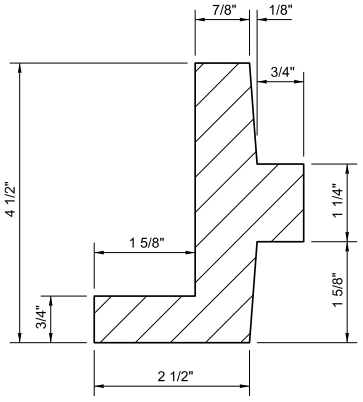


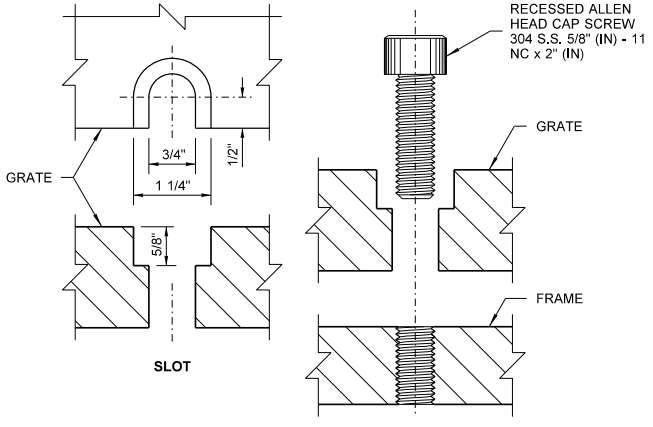
SECTION (A)



DETAIL (B)

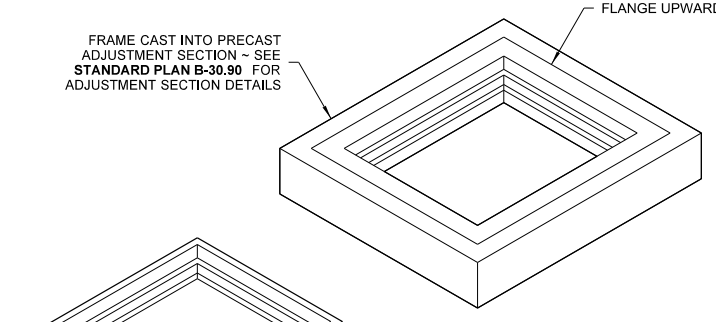
NOTES

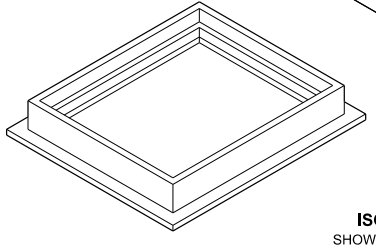
1. This frame is designed to accommodate 20" (in) × 24" (in) grates or covers as shown on **Standard Plans B-30.20, B-30.30, B-30.40,** and **B-30.50.**
2. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC × 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.
3. Refer to **Standard Specification Section 9-05.15** and **9-05.15(2)** for additional requirements.



BOLT-DOWN DETAILS
SEE NOTE 2

DS-06





ISOMETRIC VIEW
SHOWING THE VARIATIONS

RECTANGULAR FRAME (REVERSIBLE)

STANDARD PLAN B-30.10-03

SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

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Washington State Department of Transportation

DRAWN BY: FERN LIDDELL

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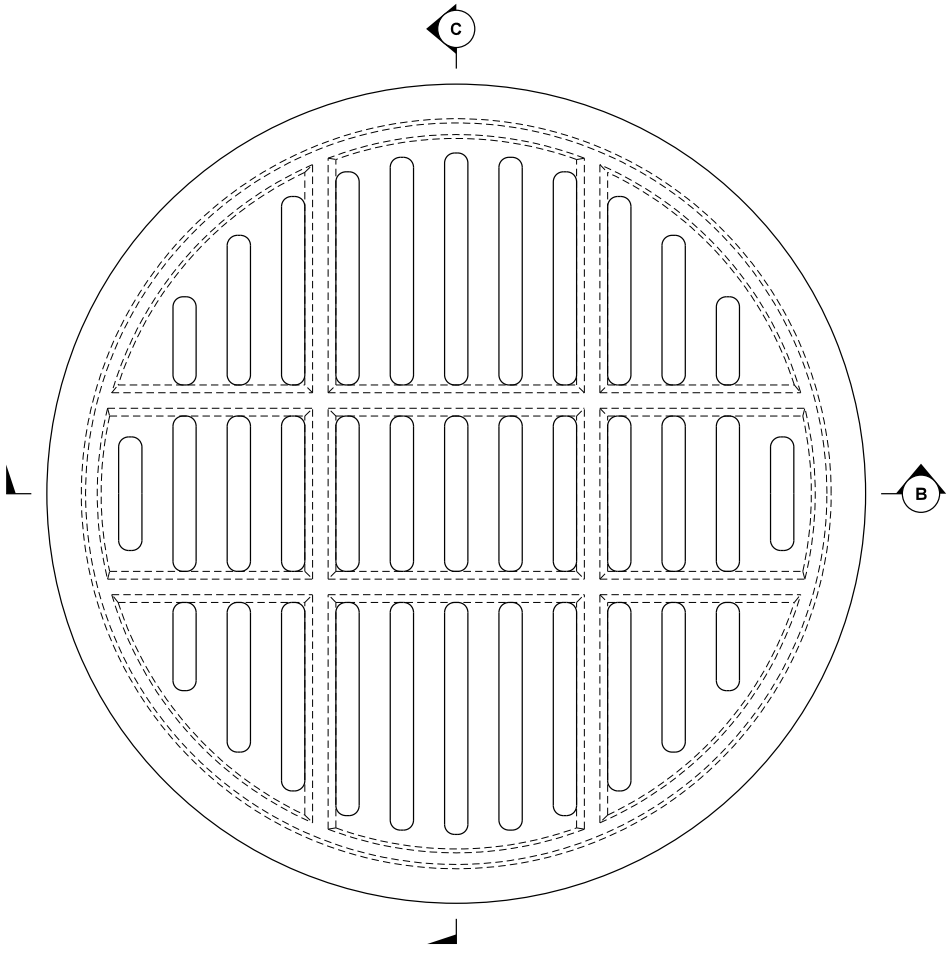
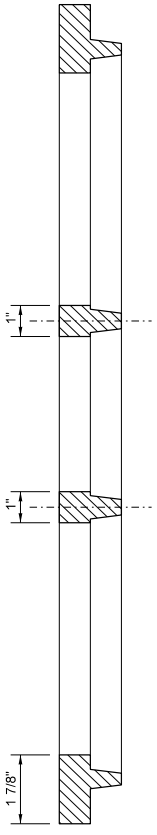
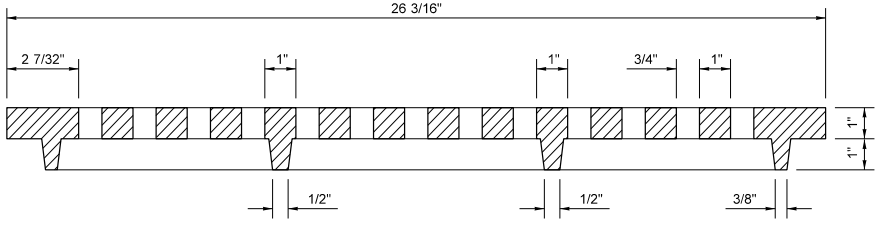




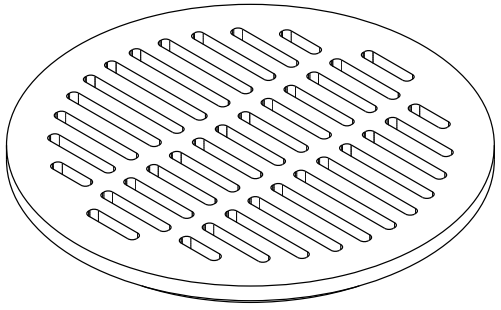
SECTION C



SECTION B

NOTES

1. For use with Circular Frames (rings) detailed in **Standard Plan B-30.70**.
2. Slotted Manhole Covers are intended for use with Drywells only. See **Standard Plans B-20.20** and **B-20.60**.
3. See **Standard Specification Section 9-05.15** for additional requirements.



ISOMETRIC VIEW

DS-07

JULIE HEILMAN
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PROFESSIONAL ENGINEER

CIRCULAR GRATE

STANDARD PLAN B-30.80-01

SHEET 1 OF 1 SHEET

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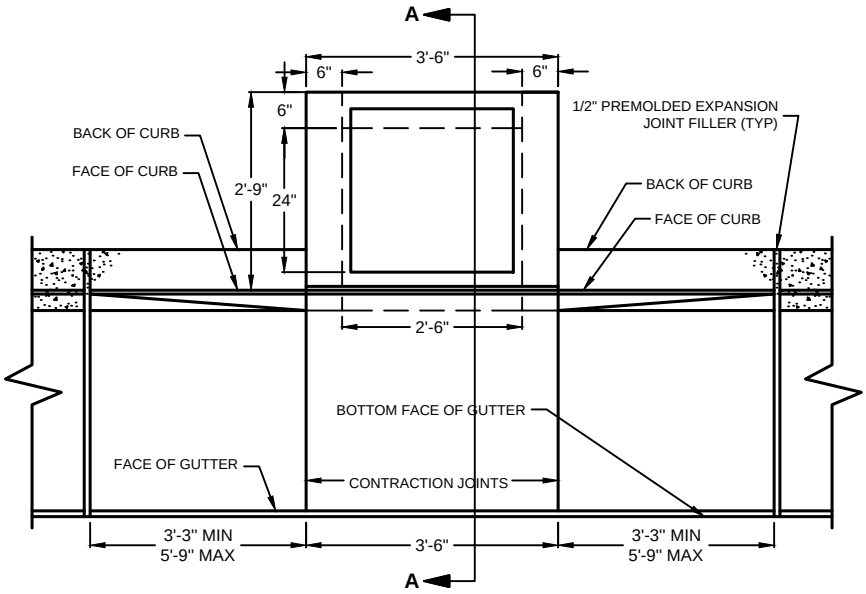
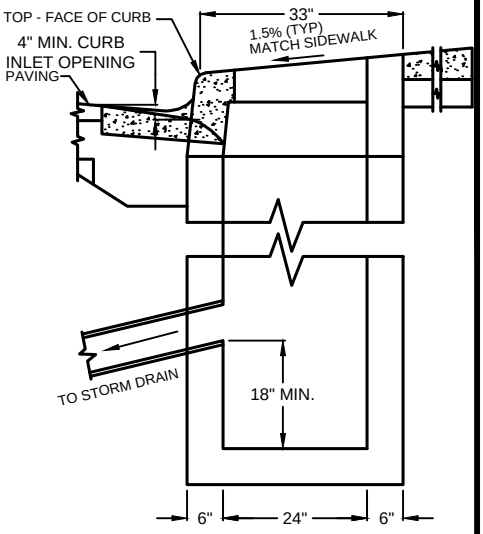
STATE DESIGN ENGINEER

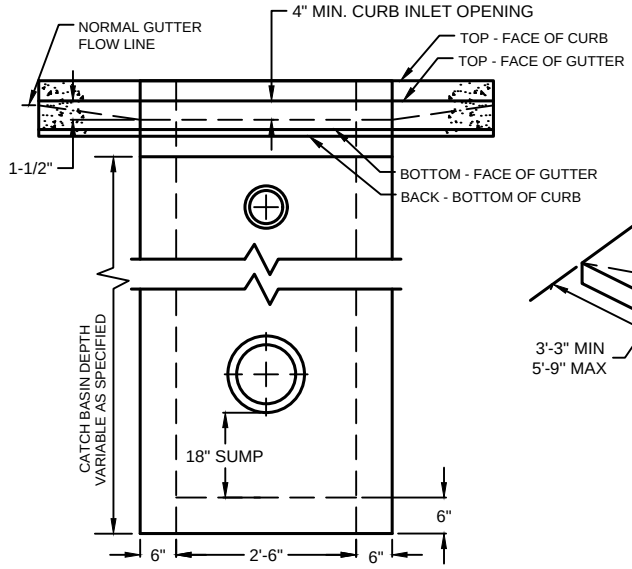
Washington State Department of Transportation



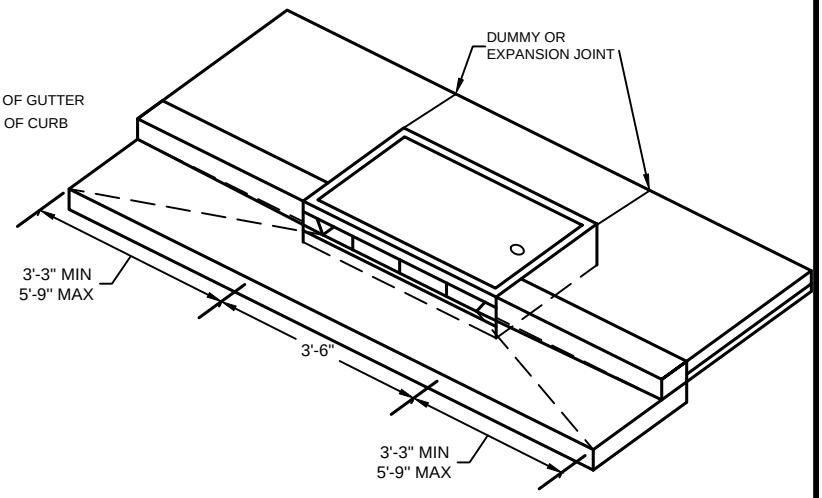
PLAN VIEW



SECTION A-A



FRONT VIEW



PERSPECTIVE VIEW SHOWING DEPRESSED GUTTER AT CURB INLET

NOTES:

1. USE FOR GRADES GREATER THAN 10% WITH PREAPPROVAL BY THE DIRECTOR.
2. ALL FABRICATED METAL PARTS SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION.
3. CONCRETE SHALL ATTAIN A MIN. COMPRESSIVE STRENGTH OF 4000 PSI IN 28 DAYS.
4. INSTALL STEPS WHEN DISTANCE FROM TOP OF GRATE TO FLOWLINE OF PIPE IS GREATER THAN 3.5 FEET.
5. PRECAST CURB INLET IS PATTERNED AFTER WALT'S CONCRETE SPRINGFIELD, OR CONCRETE CURB INLET PAT. NO. 4000953.

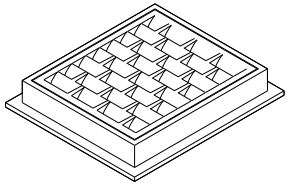
NOT TO SCALE

City of Tukwila

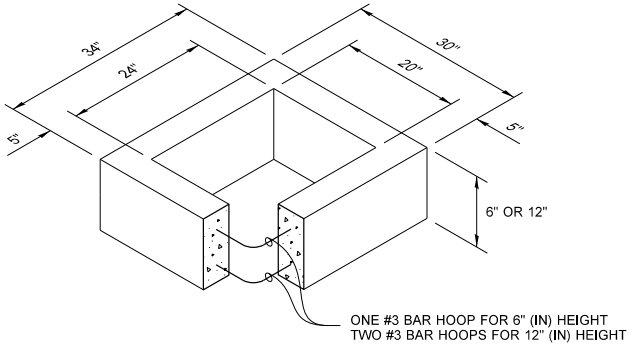
CURB INLET

SHEET:	**DS-08**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

DRAWN BY: MARK SUJKA



FRAME AND VANED GRATE



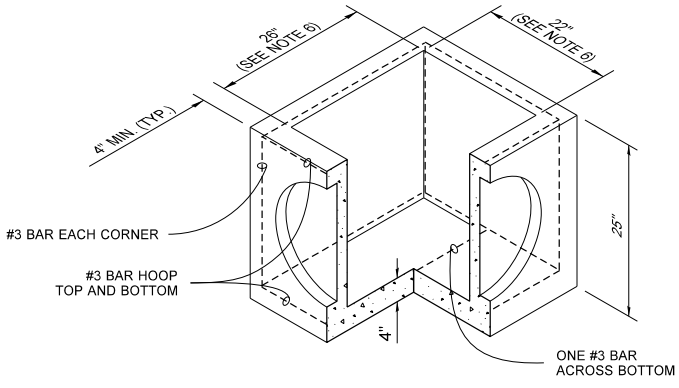
RECTANGULAR ADJUSTMENT SECTION

PIPE ALLOWANCES	
PIPE MATERIAL	MAXIMUM INSIDE DIAMETER (INCHES)
REINFORCED OR PLAIN CONCRETE	12"
ALL METAL PIPE	15"
CPSSP * (STD. SPEC. SECT. 9-05.20)	12"
POLYPROPYLENE (STD. SPEC. SECT. 9-05.24)	12"
SOLID WALL PVC (STD. SPEC. SECT. 9-05.12(1))	15"
PROFILE WALL PVC (STD. SPEC. SECT. 9-05.12(2))	15"

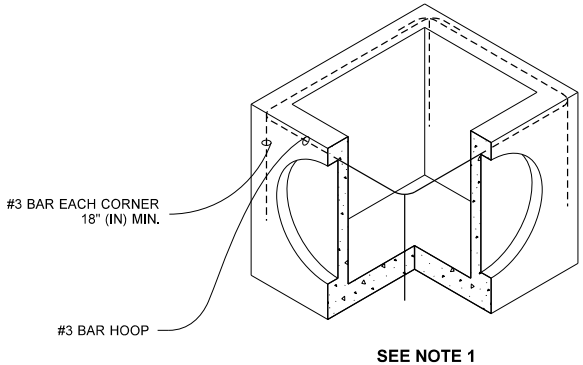
* CORRUGATED POLYETHYLENE STORM SEWER PIPE

NOTES

1. As acceptable alternatives to the rebar shown in the **PRECAST BASE SECTION**, fibers (placed according to the Standard Specifications), or wire mesh having a minimum area of 0.12 square inches per foot shall be used with the minimum required rebar shown in the **ALTERNATIVE PRECAST BASE SECTION**. Wire mesh shall not be placed in the knockouts.
2. The knockout diameter shall not be greater than 18" (in) . Knockouts shall have a wall thickness of 2" (in) minimum to 2.5" (in) maximum. Provide a 1.5" (in) minimum gap between the knockout wall and the outside of the pipe. After the pipe is installed, fill the gap with joint mortar in accordance with **Standard Specification Section 9-04.3**.
3. The maximum depth from the finished grade to the lowest pipe invert shall be 5' (ft).
4. The frame and grate may be installed with the flange up or down. The frame may be cast into the adjustment section.
5. The Precast Base Section may have a rounded floor, and the walls may be sloped at a rate of 1 : 24 or steeper.
6. The opening shall be measured at the top of the precast base section.
7. All pickup holes shall be grouted full after the inlet has been placed.



PRECAST BASE SECTION



SEE NOTE 1

ALTERNATIVE PRECAST BASE SECTION

DS-09

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CONCRETE INLET

STANDARD PLAN B-25.60-02

SHEET 1 OF 1 SHEET

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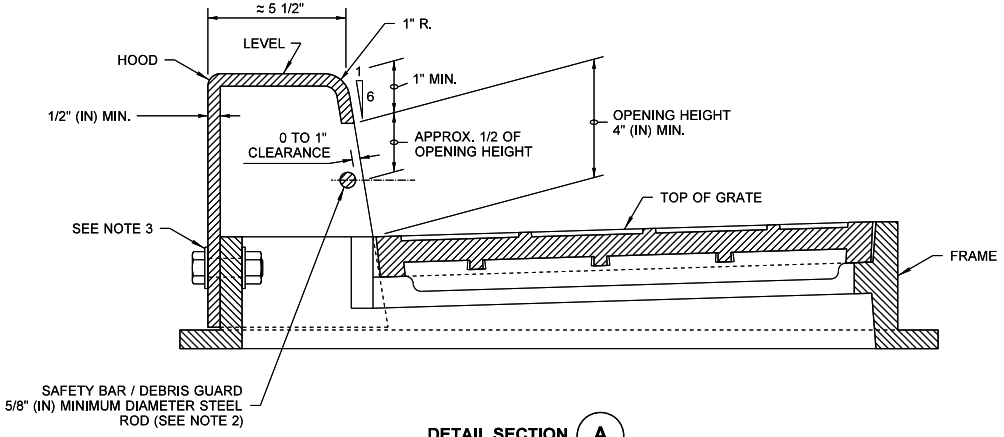
STATE DESIGN ENGINEER

Washington State Department of Transportation

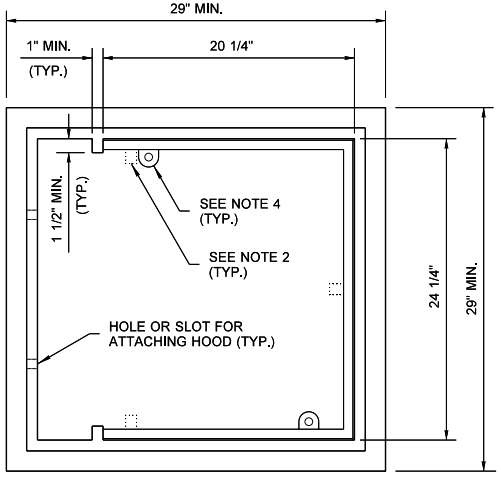
DRAWN BY: FERN LIDDELL



DETAIL SECTION A

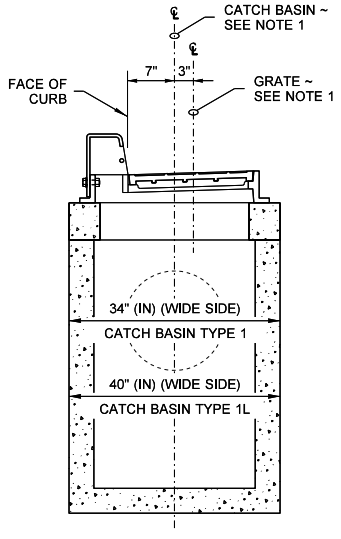
NOTES

1. This inlet requires the precast catch basin unit to be rotated 90 degrees so that the narrow side is parallel to the curb line. When calculating offsets from curb to centerline (CL) of the precast catch basin, please note that the CL of the grate is not the CL of the precast catch basin. See **Section A.**
2. The dimensions of the frame and hood may vary slightly among different manufacturers. The Frame may have cast features intended to support a debris guard. Hood units may be mounted inside or outside of the frame. The methods for fastening the safety bar / debris guard rod to the hood may vary. The hood may include casting lugs. The top of the hood may be cast with a pattern.
3. Attach the hood to the frame with two 3/4" (in) × 2" (in) hex head bolts, nuts, and oversize washers. The washers shall have diameters adequate to ensure full bearing across the slots.
4. Bolt-down capability is required on all frames, grates and covers, unless specified otherwise in the Contract. Provide two holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC × 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer. See **BOLT-DOWN DETAIL**, **Standard Plan B-30.10.**
5. Only ductile iron Vaned Grates shall be used. See **Standard Plans B-30.30 and B-30.40** for grate details. Refer to **Standard Specification Section 9-05.15(2)** for additional requirements.
6. This plan is intended to show the installation details of a manufactured product. This plan is not intended to show the specific details necessary to fabricate the castings depicted in this drawing.

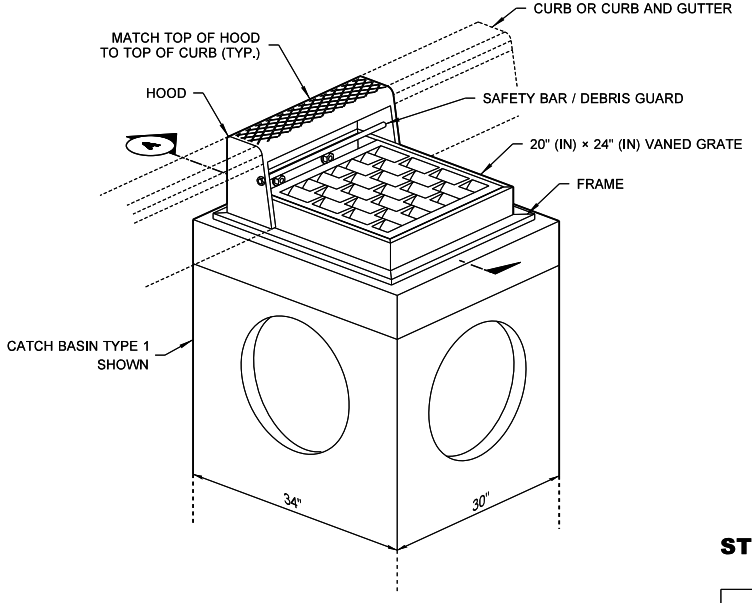


TOP VIEW

FRAME DETAIL



SECTION A



ISOMETRIC VIEW

COMBINATION INLET
FRAME, HOOD, AND VANED GRATE

DS-10

JULIE HEILMAN
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COMBINATION INLET

STANDARD PLAN B-25.20-02

SHEET 1 OF 1 SHEET

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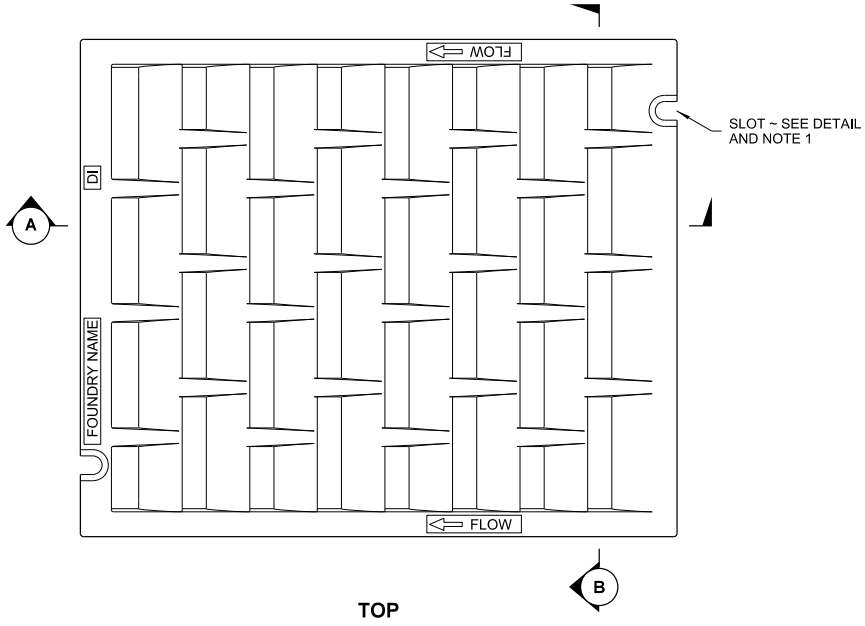

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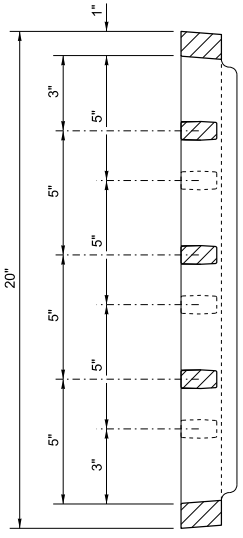
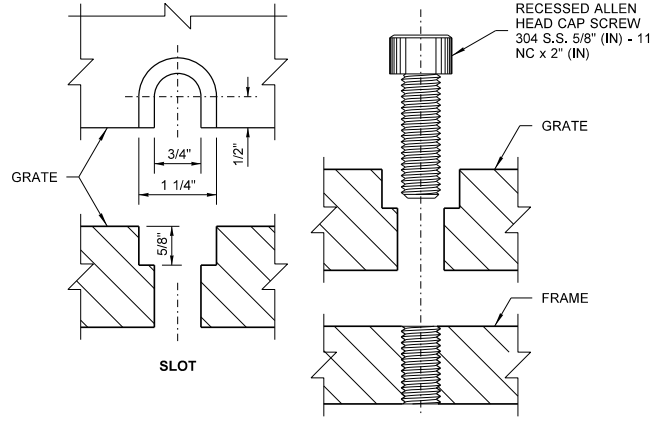


SECTION (B)

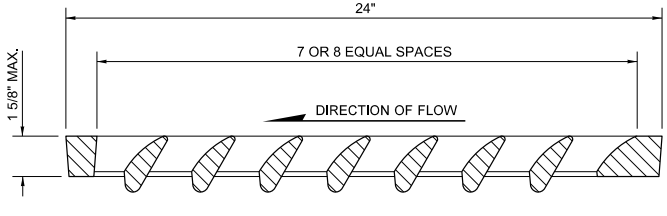
NOTES

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC × 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.
2. Refer to **Standard Specification Section 9-05.15** and **9-05.15(2)** for additional requirements.
3. For frame details, see **Standard Plan B-30.10**.

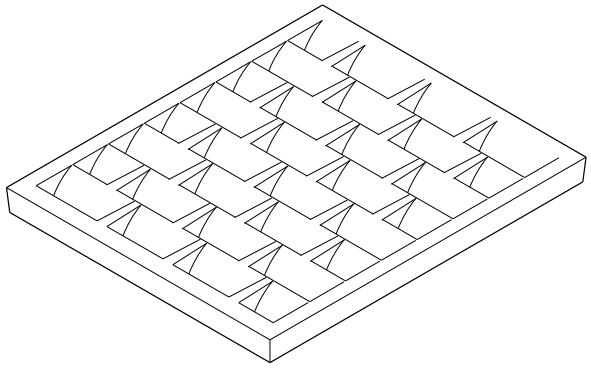


BOLT-DOWN DETAILS
SEE NOTE 1

DS-11



SECTION (A)



ISOMETRIC

DRAWN BY: FERN LIDDELL

JULIE HEILMAN
STATE OF WASHINGTON
41819
REGISTERED
PROFESSIONAL ENGINEER

RECTANGULAR VANED GRATE

STANDARD PLAN B-30.30-03

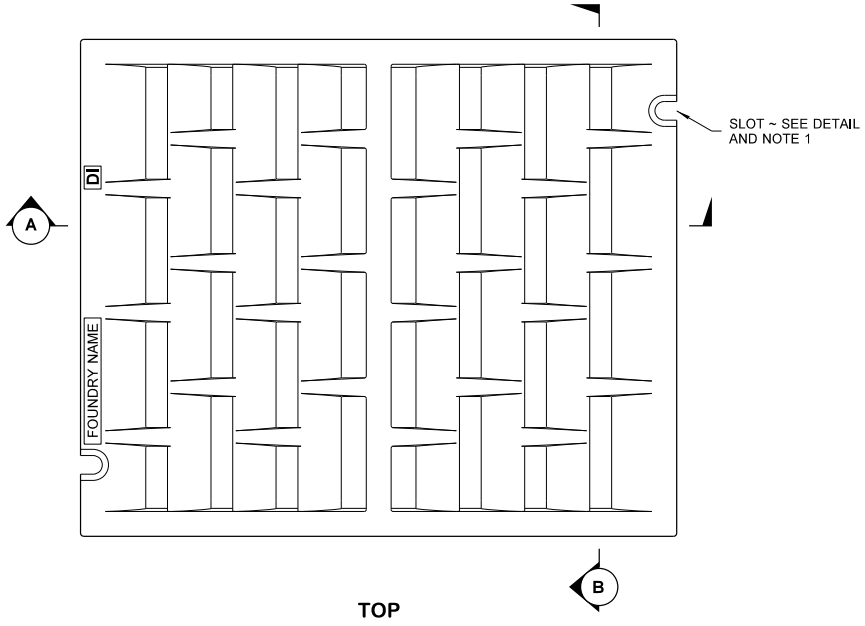
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

Washington State Department of Transportation

DRAWN BY: FERN LIDDELL



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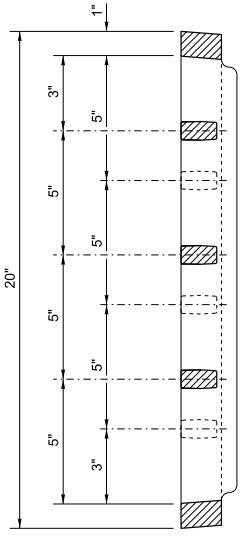
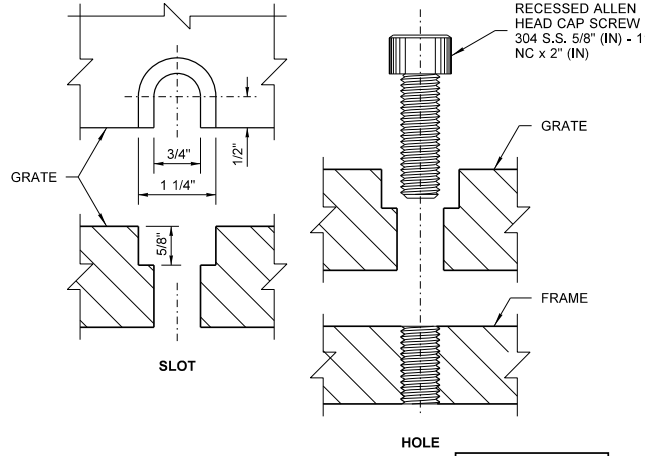


SECTION (B)

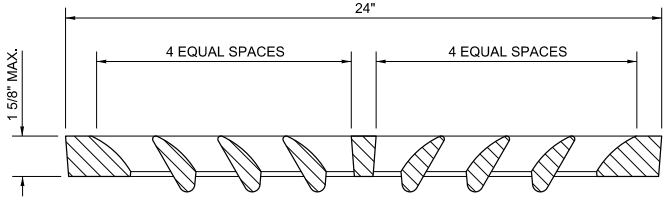
NOTES

1. Bolt-down capability is required on all frames, grates, and covers, unless specified otherwise in the Contract. Provide 2 holes in the frame that are vertically aligned with the grate or cover slots. The frame shall accept the 304 Stainless Steel (S.S.) 5/8" (in) - 11 NC × 2" (in) allen head cap screw by being tapped, or other approved mechanism. Location of bolt-down holes varies by manufacturer.
2. Refer to **Standard Specification Section 9-05.15,** and **9-05.15(2)** for additional requirements.
3. For frame details, see **Standard Plan B-30.10.**

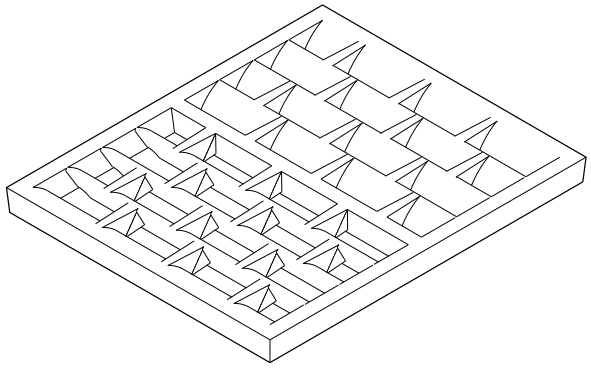


BOLT-DOWN DETAILS
SEE NOTE 1

DS-12



SECTION (A)



ISOMETRIC

JULIE HEILMAN
STATE OF WASHINGTON
41819
REGISTERED
PROFESSIONAL ENGINEER

RECTANGULAR BI-DIRECTIONAL VANED GRATE

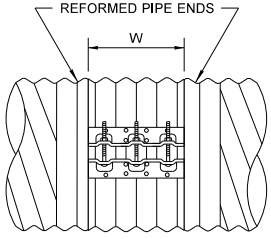
STANDARD PLAN B-30.40-03

SHEET 1 OF 1 SHEET

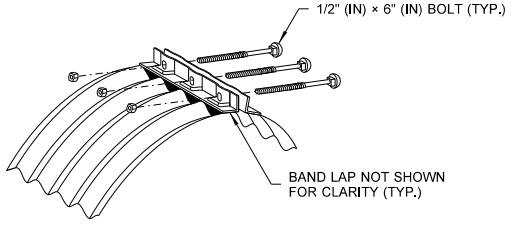
APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

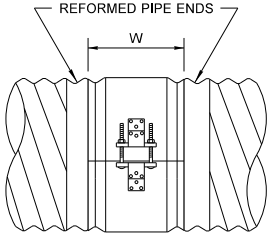
Washington State Department of Transportation



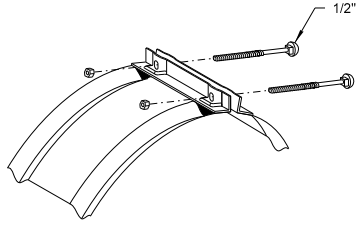
TYPE D
ANNULAR CORRUGATED BAND



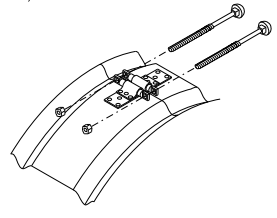
TYPE D
BAND ANGLE CONNECTOR DETAIL



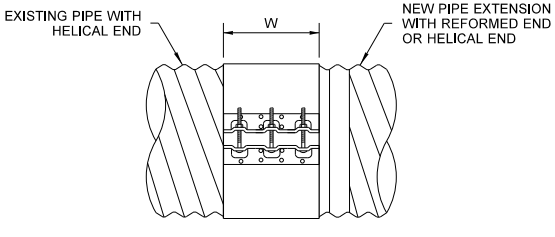
TYPE F
SEMI-CORRUGATED BAND



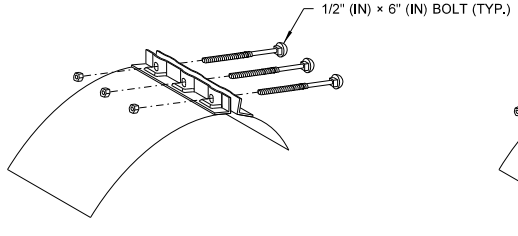
TYPE F
BAND ANGLE CONNECTOR DETAIL



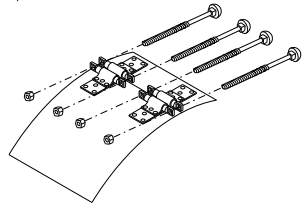
TYPE F
BAR & STRAP CONNECTOR DETAIL



TYPE K
FLAT BAND OR DIMPLE BAND
(FOR PIPE EXTENSIONS ONLY)



TYPE K
BAND ANGLE CONNECTOR DETAIL



TYPE K
DOUBLE BAR & STRAP CONNECTOR DETAIL

COUPLING BAND DIMENSION TABLE
(ALL DIMENSIONS ARE IN INCHES)

BAND TYPE		CORRUGATION PITCH × DEPTH	PIPE DIAM.	MIN. W	GASKET TYPE
STEEL	D	2 2/3 × 1/2 OR 3 × 1 REFORMED TO 2 2/3 × 1/2	12 ~ 84	12	SLEEVE
		3 × 1 REFORMED TO 2 2/3 × 1/2	90 ~ 144	24	SLEEVE
	F	2 2/3 × 1/2 OR 3 × 1 REFORMED TO 2 2/3 × 1/2	12 ~ 84	10 1/2	SLEEVE OR O-RING
	K	2 2/3 × 1/2	12 ~ 48	12	SLEEVE
			54 ~ 84	24	
		* 3 × 1	54 ~ 144	24	
ALUMINUM	D	2 2/3 × 1/2	12 ~ 72	12	SLEEVE
		3 × 1 REFORMED TO 2 2/3 × 1/2	36 ~ 60	12	
			66 ~ 108	24	
	F	2 2/3 x 1/2	12 ~ 48	10 1/2	SLEEVE OR O-RING
	K	2 2/3 x 1/2	12 ~ 48	12	SLEEVE
			54 ~ 84	24	
		* 3 × 1	54 ~ 96	24	

* PIPE ARCH ONLY

DS-13

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COUPLING BANDS FOR CORRUGATED METAL PIPE

STANDARD PLAN B-60.40-01

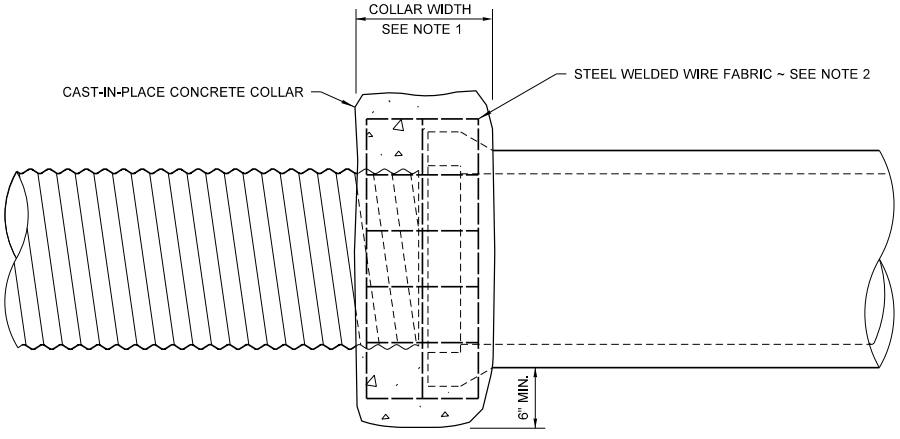
SHEET 1 OF 1 SHEET

APPROVED FOR PUBLICATION

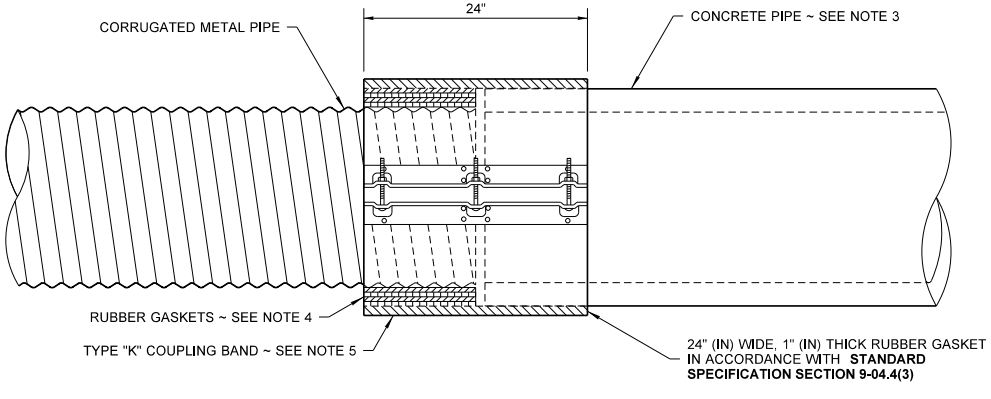
STATE DESIGN ENGINEER

Washington State Department of Transportation

DRAWN BY: FERN LIDDELL



CONCRETE COLLAR OPTION



COUPLING BAND OPTION

NOTES

1. The Concrete Collar width shall be one half of the outside pipe diameter of the largest pipe. The minimum Concrete Collar width shall be 12" (in). Concrete Collars may be used with all pipe materials and diameters. The Concrete Collar option shall only be used to extend existing pipes. Concrete shall be Commercial Concrete in accordance with **Standard Specification Section 6-02.3(2).**

2. Steel Welded Wire Fabric shall be in accordance with **Standard Specification Section 9-07.7**. Install two wraps for size 6 × 6 W1.4 × W1.4 (10 Gage) Steel Welded Wire Fabric or one wrap for any of the following sizes:

   6 × 6 W2.1 × W2.1 (8 Gage)
   6 × 6 W2.9 × W2.9 (6 Gage)
   4 × 4 W2.9 × W2.9 (6 Gage)
   4 × 4 W4.0 × W4.0 (4 Gage)

   Provide 1 1/2" min. covering over wire fabric.

3. When a Coupling Band connection requires attachment to the bell end of a concrete pipe, the bell end of the pipe shall be removed before the connection is installed.

4. Increase the outside diameter of the metal pipe to match the outside diameter of the concrete pipe by installing 12" (in) wide rubber gaskets, thickness as required (Coupling Band only). The rubber gaskets shall be in accordance with **Standard Specification Section 9-04.4(3).**

5. Use a flat Type K Coupling Band. Type K Coupling Bands with dimples are not allowed for the installation detail shown. The Coupling Band option shall only be used for extending existing pipes that have an inside diameter of 36" (in) or less.

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CONNECTION DETAILS FOR DISSIMILAR CULVERT PIPE

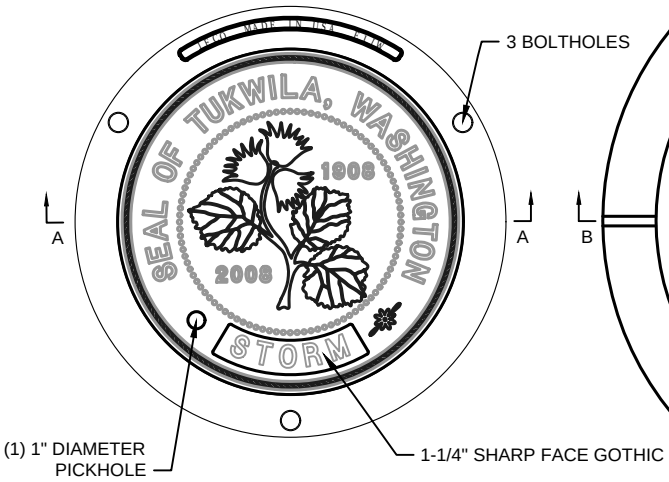
STANDARD PLAN B-60.20-01

SHEET 1 OF 1 SHEET

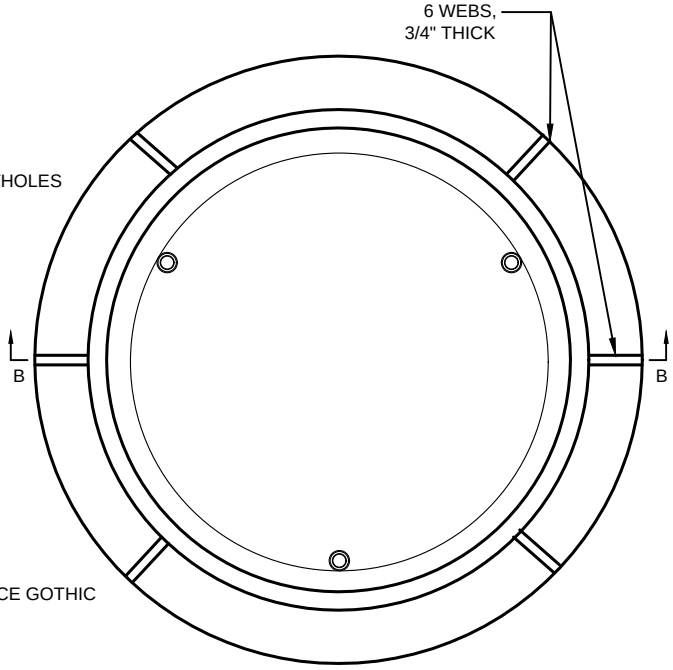
APPROVED FOR PUBLICATION

STATE DESIGN ENGINEER

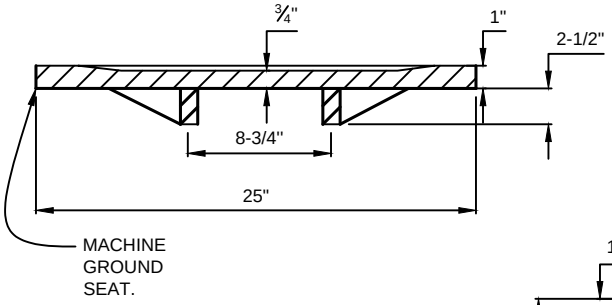
Washington State Department of Transportation



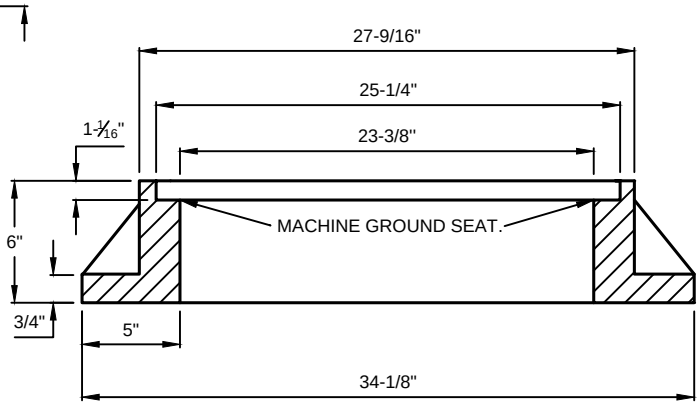
COVER PLAN



FRAME PLAN



SECTION A-A
GRAY IRON LOCKING COVER



SECTION B-B
GRAY IRON FRAME

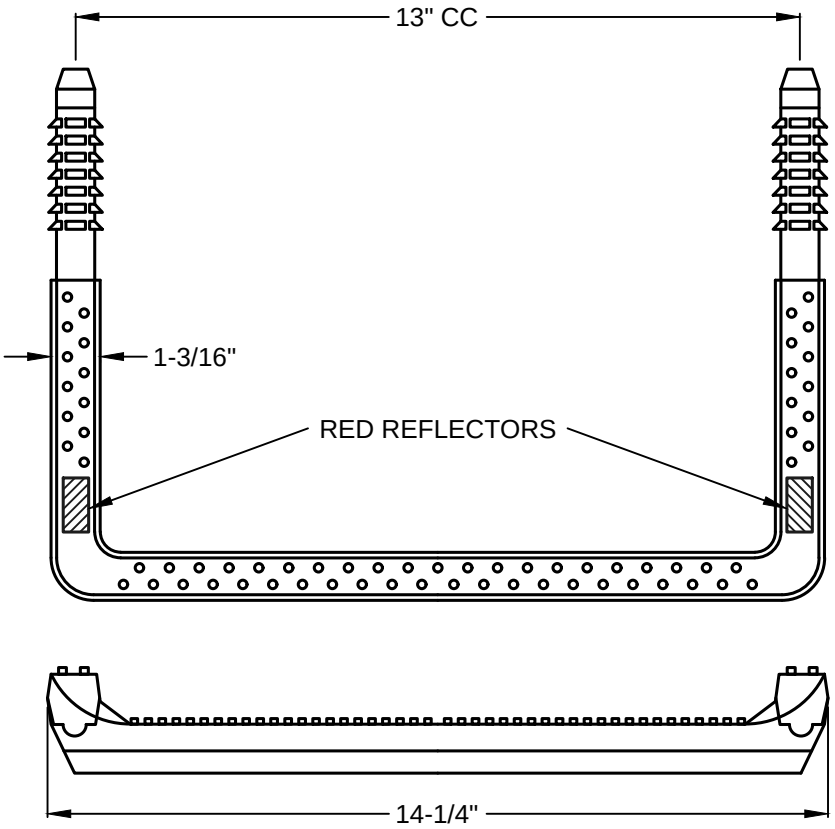
NOTES:

1. FRAME TO BE GROUTED
2. EJIW CATALOG NUMBER 3715Z(PT) 3717C1(PT) ASSEMBLY, WITH THE SEAL OF TUKWILA, AND LEGENDS 1908, 2008, AND STORM.
3. NON-LOCKING PRODUCT NO. 00371785A01
3. PRODUCT NO. 00371783A01 (LOCKING)
4. INSTALL SO THAT BOLT HOLES ALIGN WITH CENTER OF LADDER.

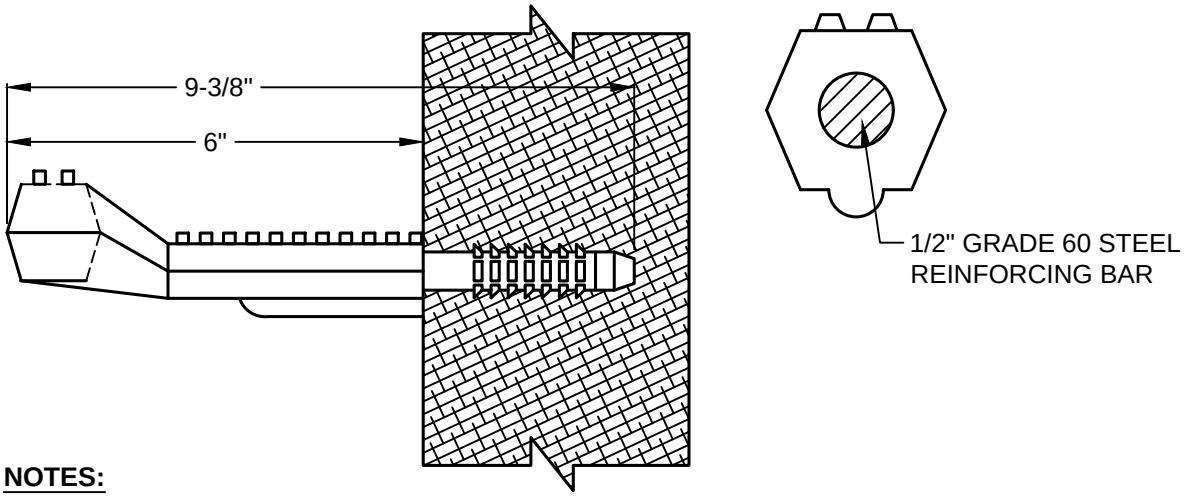
NOT TO SCALE

City of Tukwila

STORM MANHOLE	
24" FRAME WITH COVER (CITY OWNED FACILITY)	
SHEET: DS-16	
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



PLAN



CUT OUT

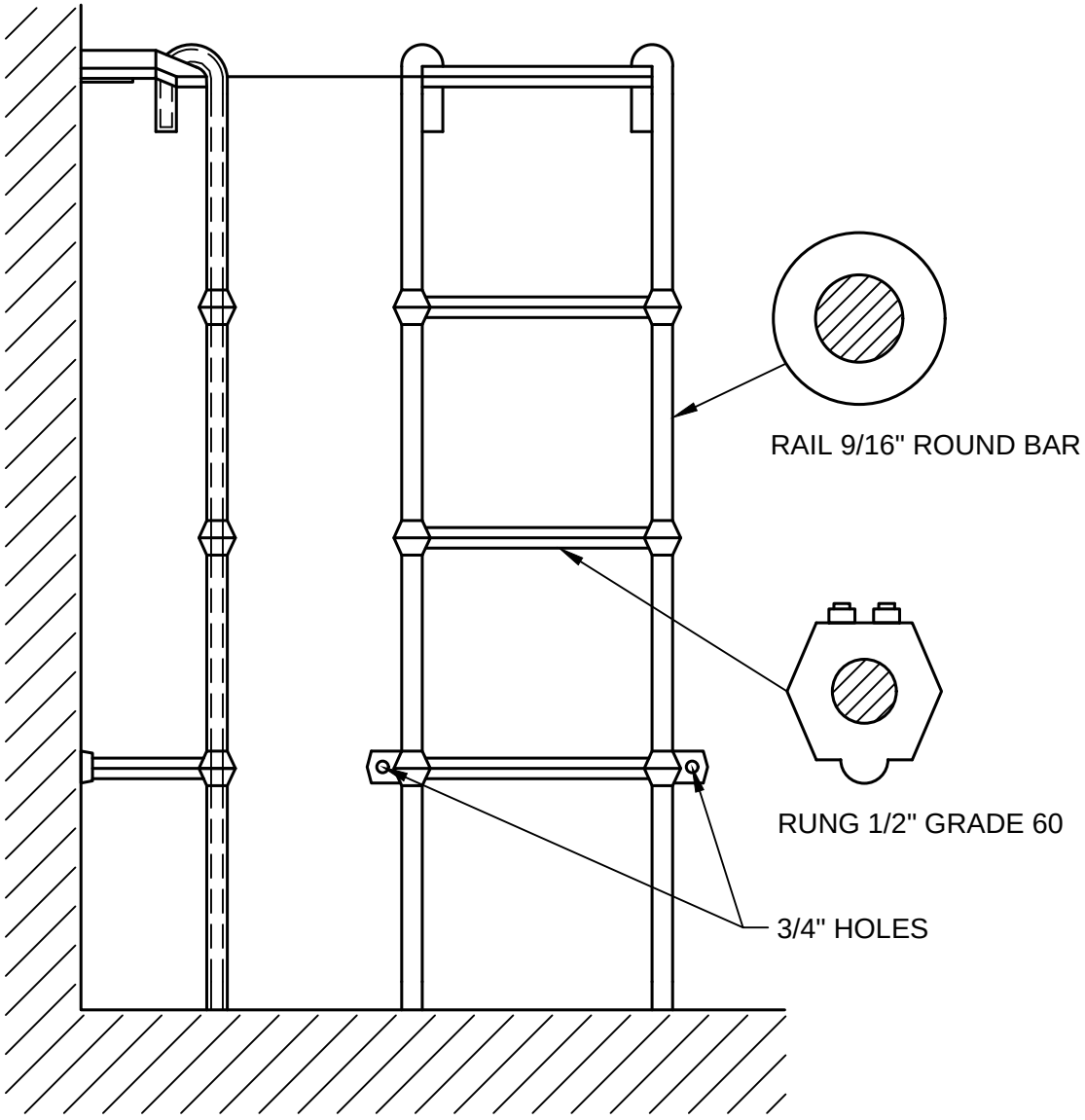
NOTES:

1. LANE P-14938 OR APPROVED EQUAL.

NOT TO SCALE

City of Tukwila

MANHOLE	
POLYPROPYLENE SAFETY STEP	
SHEET: DS-17	
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



POLYPROPYLENE HANGING LADDER

NOTES:

1. LANE POLYPROPYLENE LADDER
2. POLYPROPYLENE ASTM D4101
3. 1/2" GRADE 60 REINFORCING BAR A615
4. 9/16" COLD DRAWN BAR C1018
5. 3/8" DIA. BOLT 316-SS, 3-1/2" LONG
6. 316-SS TYP AT LADDER MOUNTS
7. REFER TO SS-13 FOR STEP DETAIL

NOT TO SCALE

City of Tukwila

MANHOLE	
LADDER	
SHEET:	**DS-18**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

SECTION 9.3 WATER SUPPLY STANDARD DETAILS

WS-01 Meter – ¾", 1'', 1-1/2'', & 2''

WS-02 Meter – 1-1/2" and 2" Meter Setter

WS-03 Not In Use

WS-04 Meter - 3" and 6"

WS-05 Not In Use

WS-06 Water Main – Valve Box Operating Nut Extension

WS-07 Water Main – Air and Vacuum Release (Non-Traffic Areas)

WS-08 Not In Use

WS-09 Water Main - Blow Off Assembly

WS-10 Blocking (Horizontal) (3 SHEETS)

WS-11 Not In Use

WS-12 Not In Use

WS-13 Fire Hydrant – Assembly and Setting

WS-14 Fire Hydrant – Guard Post

WS-15 Cross Connection Control (2 Sheets)

WS-16 Not In Use

WS-17 Not In Use

WS-18 Not In Use

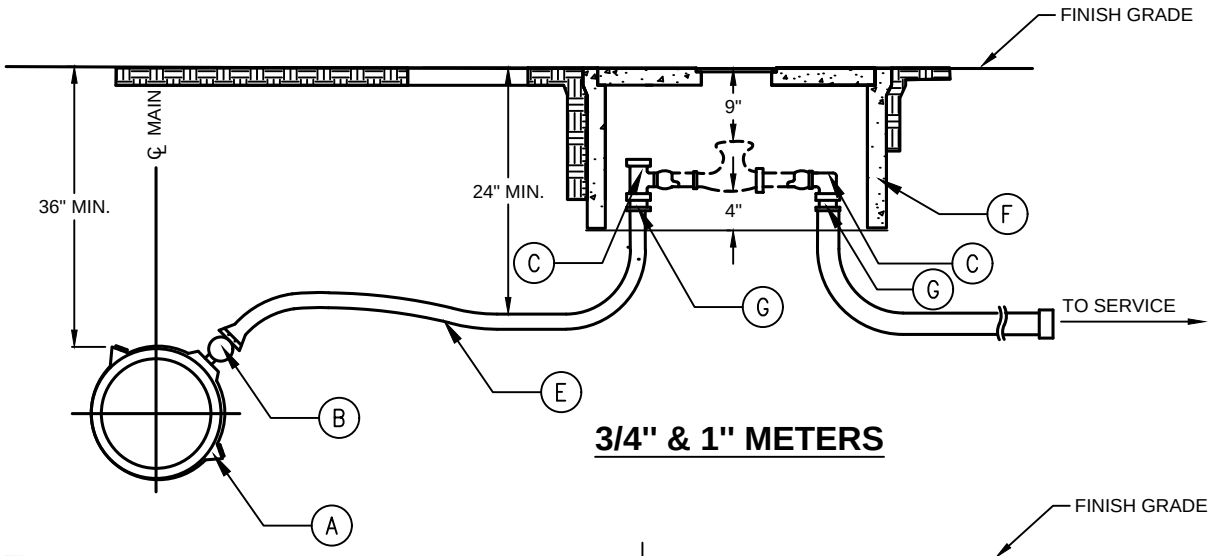
WS-19 Not In Use

WS-20 Not In Use

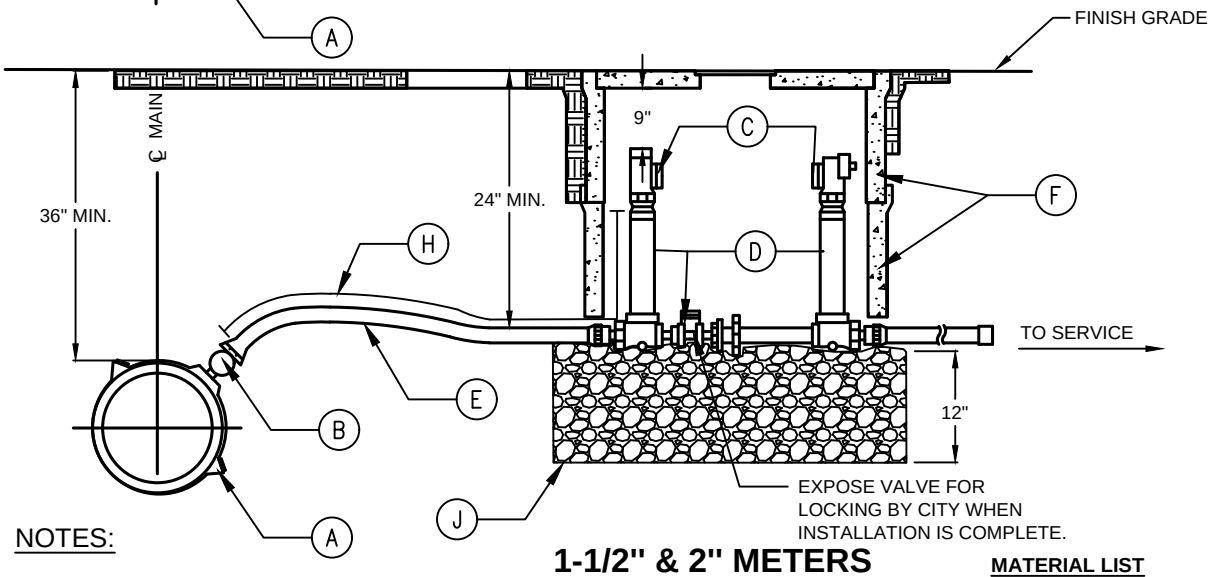
WS-21 Reduced Pressure Backflow Assembly Installation (2 Sheets)

WS-22 Irrigation System (City Owned): Double Check Valve Assembly (2 Sheets)

WS-23 2'' & Smaller Double Check Valve for Private Use



3/4" & 1" METERS



1-1/2" & 2" METERS

NOTES:

1. FOR PARTS LIST REFER TO CHAPTER 7.1 - TUKWILA INFRASTRUCTURE DESIGN AND CONSTRUCTION STANDARDS.
2. SERVICE LINE SHALL BE PERPENDICULAR TO THE WATERMAIN UNLESS OTHERWISE APPROVED BY THE ENGINEER.
3. ENGINEER SHALL PROVIDE PRESSURE AND FLOW CALCULATIONS WHEN A SINGLE METER IS SERVING BOTH DOMESTIC SERVICE AND A FIRE SUPPRESSION SYSTEM.
4. NO METER BOXES IN SIDEWALKS AND DRIVEWAYS WHERE POSSIBLE. WHERE METERS CANNOT BE PROTECTED FROM TRAFFIC, A TRAFFIC RATED ENCLOSURE IS REQUIRED. METER BOXES IN PEDESTRIAN PATHS WITHIN THE RIGHT OF WAY ARE REQUIRED TO HAVE AN ADA COMPLIANT LID.
5. METER BOX AND SETTER (IF APPLICABLE) SHALL BE SUPPLIED BY PERMITTEE.
6. METER SUPPLIED AND INSTALLED BY CITY OF TUKWILA UPON APPROVED PERMIT AND FINAL SERVICE INSPECTION.
7. POSITION SERVICE PIPING TO CENTER METER BELOW INSPECTION LID AND PROVIDE ADEQUATE CLEARANCE BETWEEN SERVICE PIPING AND METER BOX TO ALLOW REPLACEMENT, TESTING, AND BYPASS OF METER.
8. BRASS FITTINGS SHALL BE LEAD FREE.
9. THE LID OF A METER BOX INSTALLED IN A PEDESTRIAN PATH SHALL HAVE A SKID RESISTANT LID PER ADA REQUIREMENTS.

MATERIAL LIST

A	TAPPING SADDLE
B	CORPORATION STOP
C	ANGLE STOP OR TAIL PIECE
D	METER SETTER. SEE WS-02.
E	SERVICE PIPE
F	METER BOX
G	COMPRESSION FITTINGS OR COUPLINGS AS REQUIRED
H	TRACER TAPE OR WIRE FOR POLYETHYLENE PIPE (IS USED)
J	GRAVEL BACKFILL FOR DRAINS PER WSDOT 9-03.12(4).

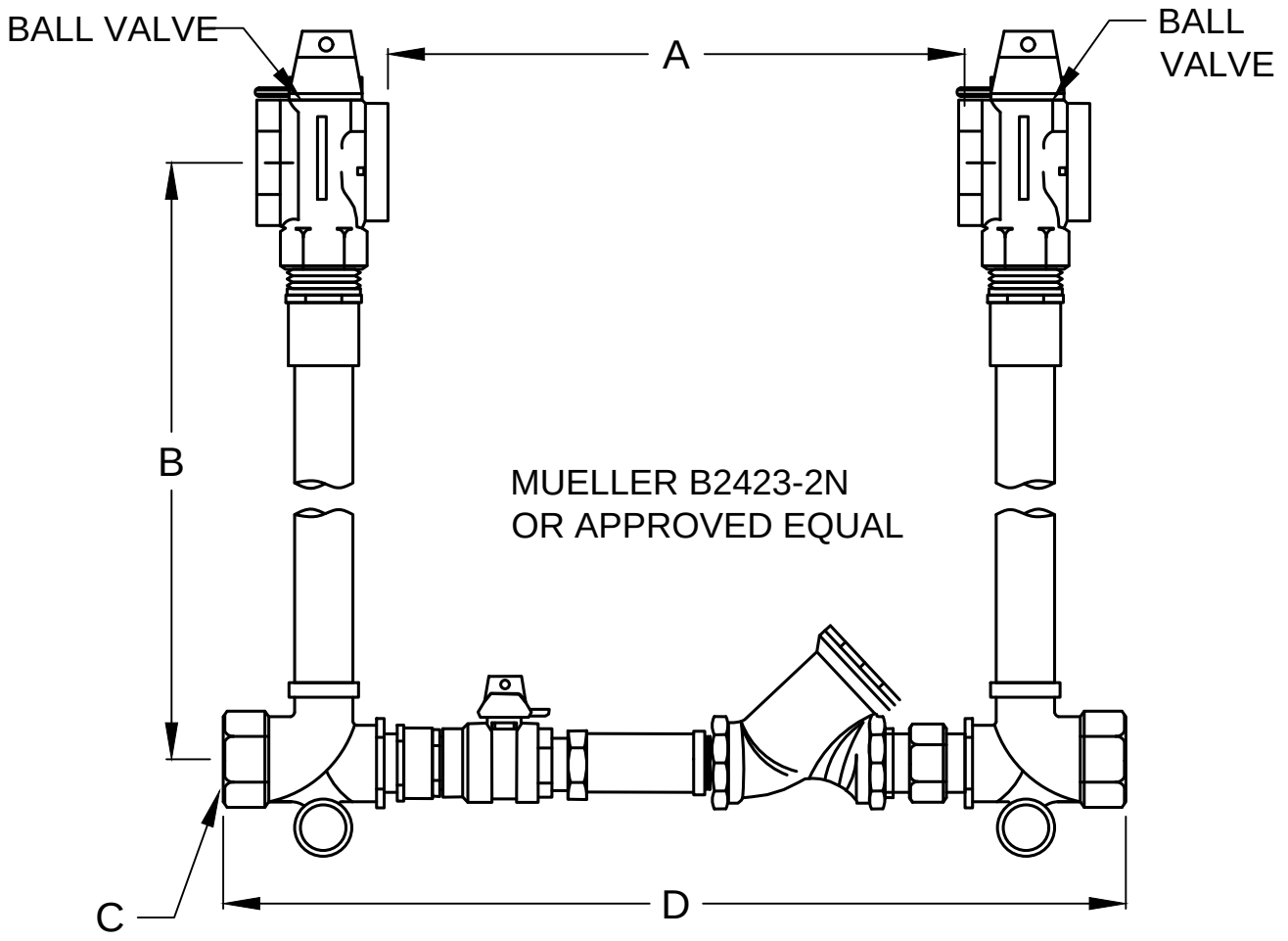
NOT TO SCALE

City of Tukwila

METER

3/4", 1", 1-1/2", & 2"

SHEET:	**WS-01**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



DIMENSIONS

METER SIZE	**1-1/2"**	**2"**
Dimension A	13.25"	17.25"
Dimension B - Riser Height	15", 18", 21", 24", 27"	15", 18", 21", 24", 27"
Dimension C - Nominal pipe size of inlet and outlet	1-1/2"	2"
Dimension D	21.50"	26.63"

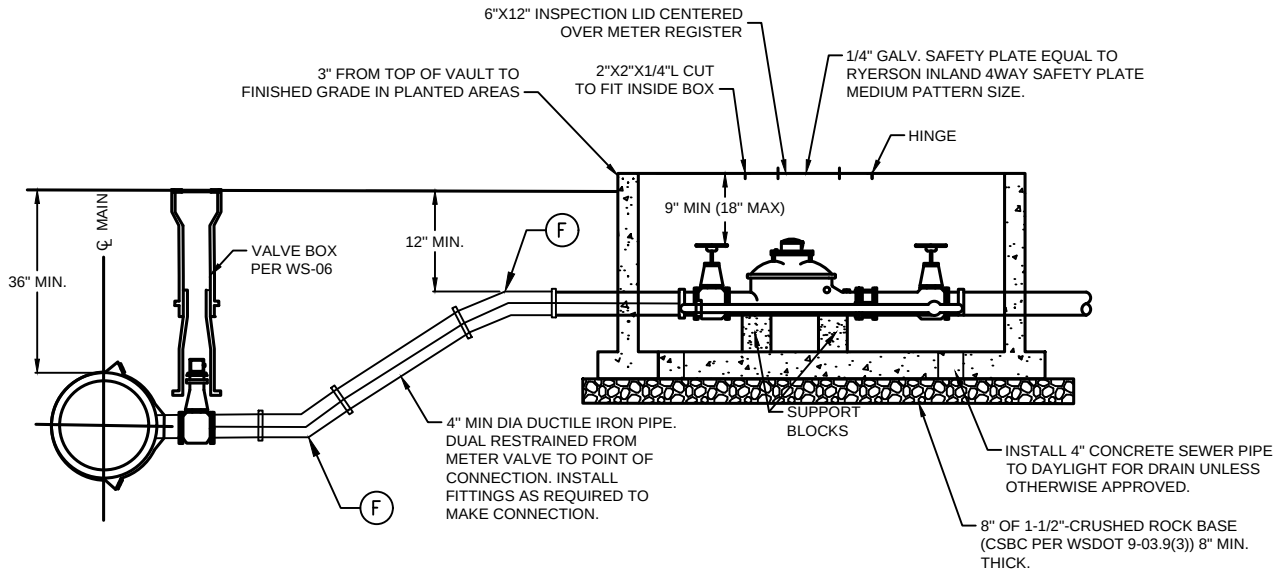
NOTES:

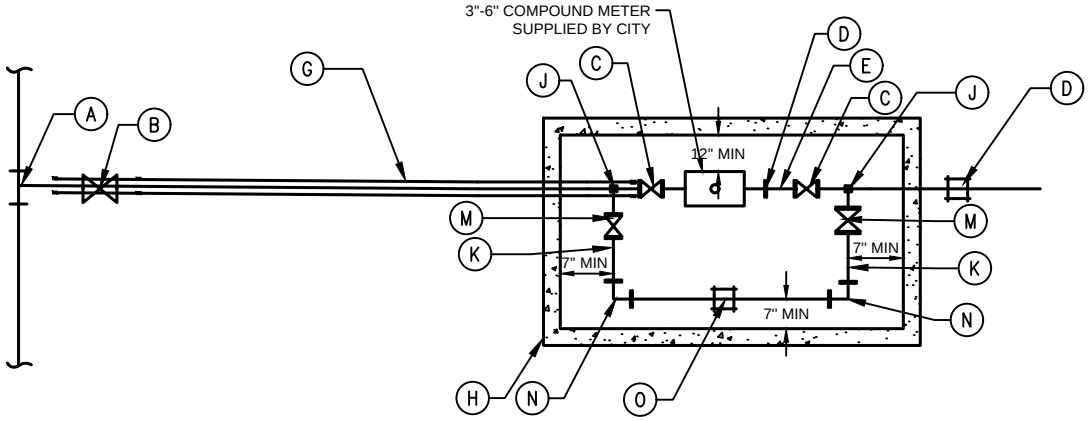
1. COMPOUND METER SUPPLIED AND SET BY THE CITY. 2" SINGLE REGISTER METER REQUIRES PRE-APPROVAL.
2. BYPASS WILL BE LOCKED OFF BY CONSTRUCTION INSPECTOR WHEN METER SPREADER IS INSTALLED.

NOT TO SCALE

City of Tukwila

METER	
1-1/2" AND 2" METER SETTER	
SHEET:	**WS-02**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	





MATERIAL LIST

- A TAPPING TEE
- B GATE VALVE
- C METER VALVE
- D FLANGE COUPLING ADAPTER
- E CL 52 DIP FLANGED BY PLAIN END SPOOL
- F CONCRETE THRUST BLOCKS PER WS-10
- G STEEL TIE RODS AND ROMAC DUCTILE LUGS
- H METER VAULT: 444-LA (3" & 4") 644-LA FOR 6"
- J DOUBLE STRAP SERVICE SADDLE WITH 2" IPS TAP
- K 2" BRASS NIPPLE
- M 2" BALL VALVE
- N 90° BRASS ELBOW
- O 2" COMPRESSION COUPLER

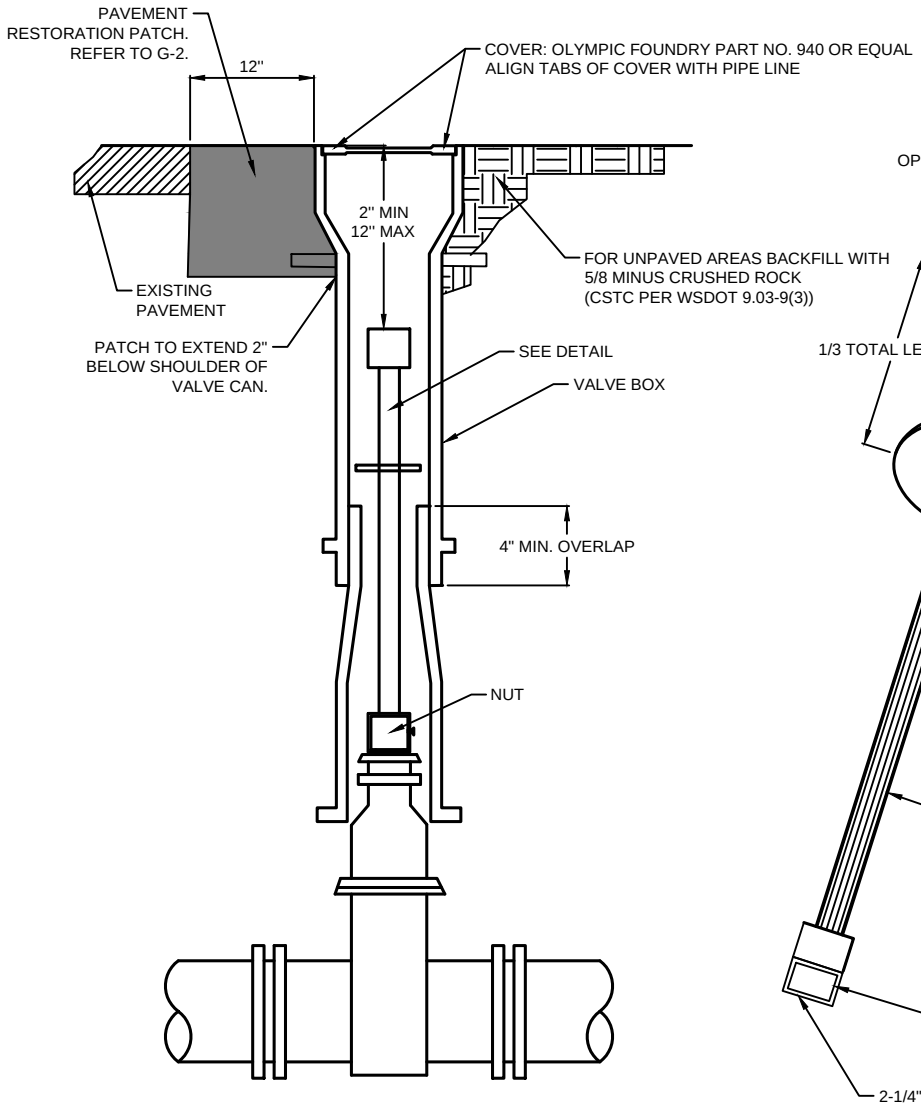
NOTES:

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. BRASS FITTINGS 2" AND LESS SHALL BE LEAD FREE.
6. THE LID OF A VAULT INSTALLED IN A PEDESTRIAN PATH SHALL HAVE A SKID RESISTANT LID PER ADA REQUIREMENTS.

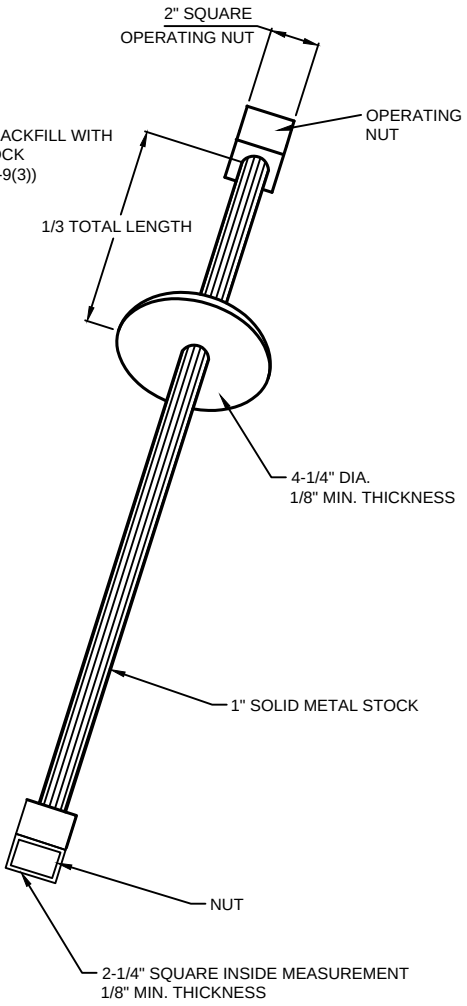
NOT TO SCALE

City of Tukwila

METER	
3" TO 6"	
SHEET:	**WS-04**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



ASSEMBLY



DETAIL

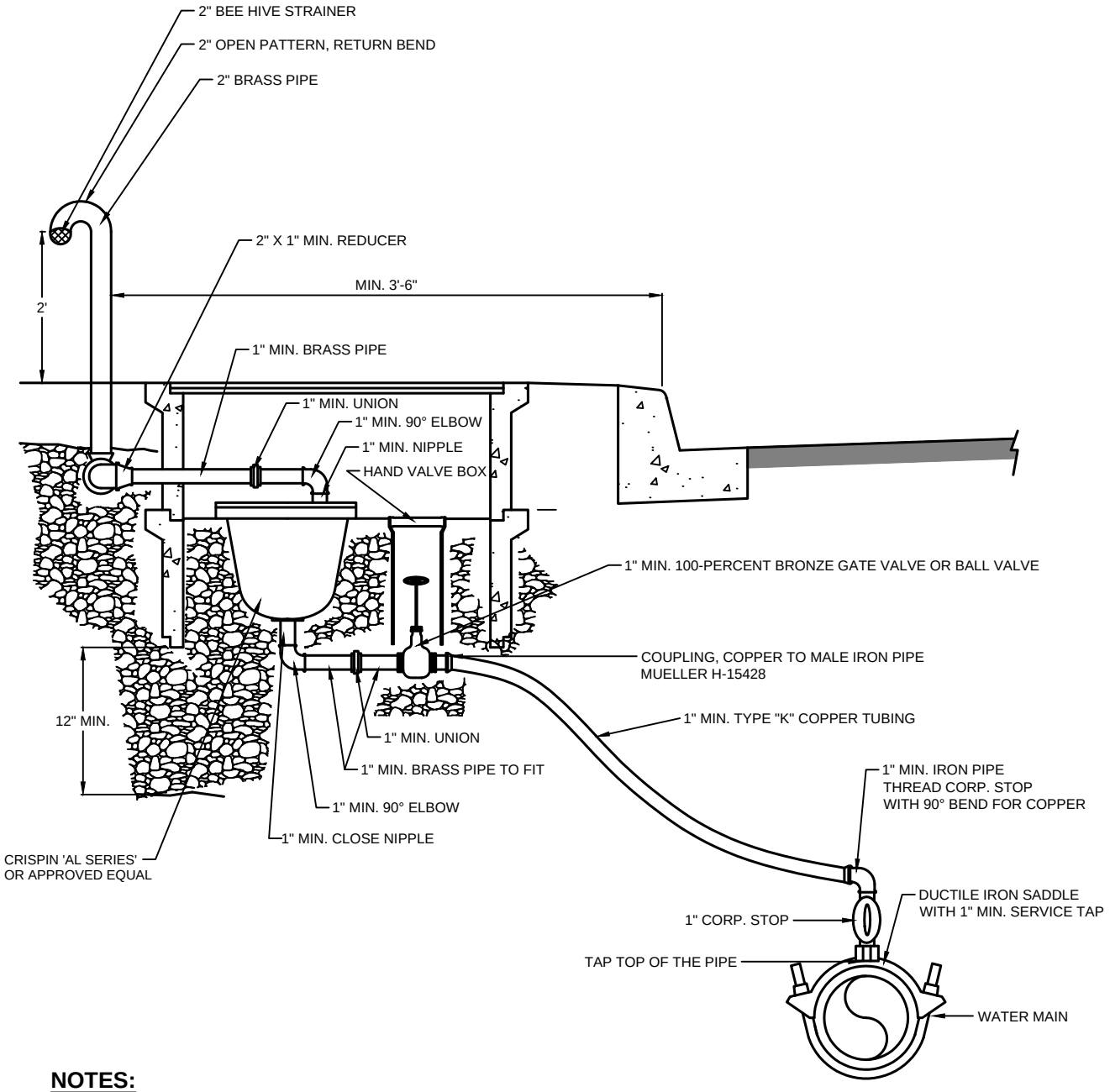
NOTES:

1. TWO PIECE CAST IRON VALVE BOX WITH STANDARD 24" BASE AND 18" TOP WITH 4" OVERLAP, OLYMPIC VALVE BOX OR EQUAL LIDS SHALL HAVE TAPS ALIGNED WITH PIPE LINE.
2. VALVE BOX COVER SHALL BE LABELED "WATER".
3. EXTENSIONS ARE REQUIRED WHEN THE VALVE NUT IS MORE THAN 5 FEET BELOW FINISHED GRADE.
4. ONLY ONE EXTENSION, MINIMUM OF 4 FEET LONG, TO BE USED PER VALVE.
5. ALL EXTENSIONS ARE TO BE MADE OF STEEL AND PAINTED WITH TWO COATS OF METAL PAINT. NO FIELD-FABRICATED EXTENSIONS.

NOT TO SCALE

City of Tukwila

WATER MAIN	
VALVE BOX WITH OPERATING NUT EXTENSION	
SHEET: WS-06	
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



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 GRAVEL BACKFILL FOR DRAINS (WSDOT 9-03.12(4))
3. INSTALL 10' MIN. DISTANCE FROM ANY VEHICULAR ACCESS OR PROTECT WITH BOLLARDS PER DIMENSIONS PROVIDED IN WS-14.
4. REFER TO CHAPTER 7 OF THE STANDARDS.
5. BRASS FITTINGS SHALL BE LEAD FREE.
6. THE LID OF A METER BOX INSTALLED IN A PEDESTRIAN PATH SHALL HAVE A SKID RESISTANT LID PER ADA REQUIREMENTS.

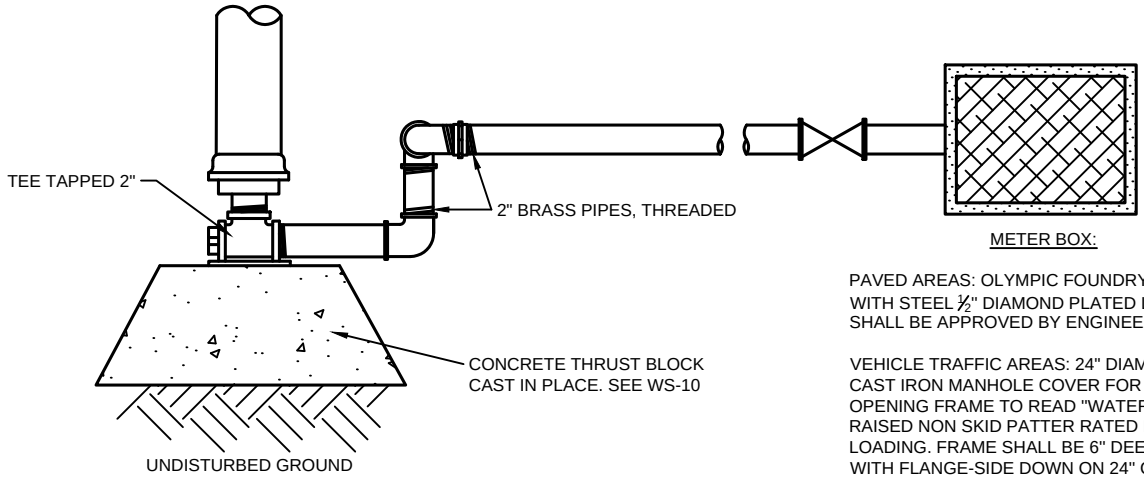
NOT TO SCALE

City of Tukwila

WATER MAIN

AIR AND VACUUM RELEASE (NON-TRAFFIC AREAS)

SHEET:	**WS-07**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



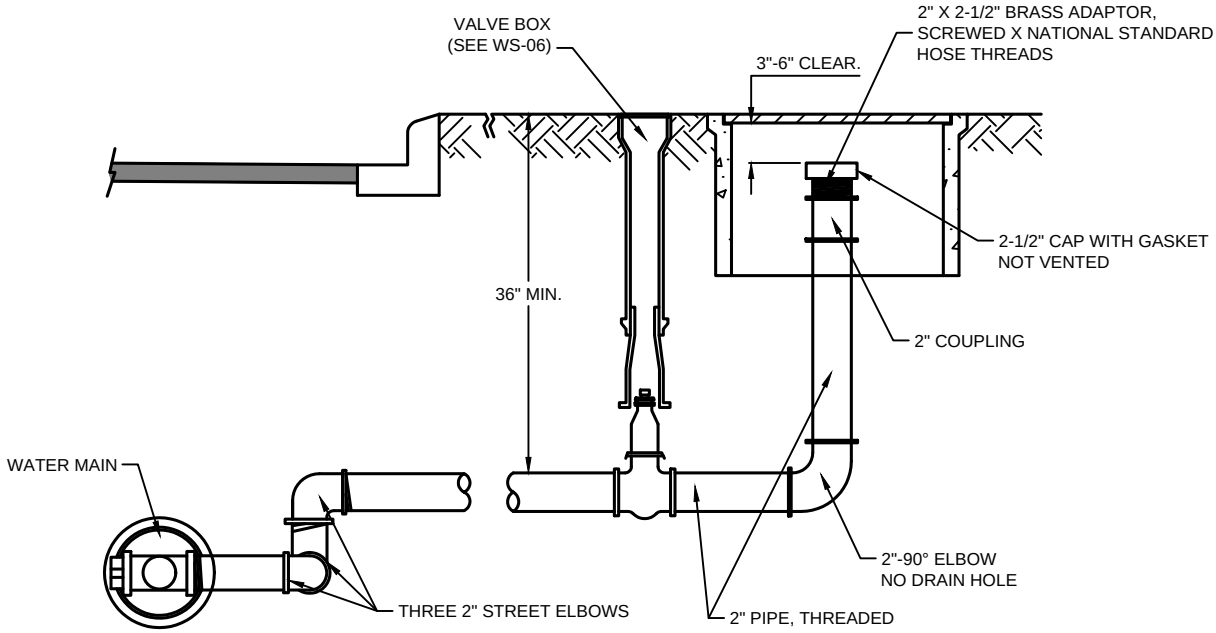
METER BOX:

PAVED AREAS: OLYMPIC FOUNDRY SM-30 WITH STEEL ½" DIAMOND PLATED LID. USE SHALL BE APPROVED BY ENGINEER.

VEHICLE TRAFFIC AREAS: 24" DIAMETER CAST IRON MANHOLE COVER FOR 24" OPENING FRAME TO READ "WATER", WITH RAISED NON SKID PATTER RATED FOR HS-20 LOADING. FRAME SHALL BE 6" DEEP, SET WITH FLANGE-SIDE DOWN ON 24" CONCRETE DONUTS. (TOTAL DEPTH OF 12")

UNPAVED AREAS: CARSON 1730 WITH D.I. LID

PLAN VIEW



ELEVATION VIEW

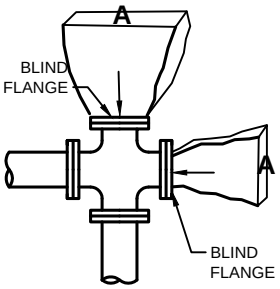
NOTES:

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. REFER TO CHAPTER 7 OF THESE STANDARDS.
4. REFER TO WS-10 FOR BLOCKING, WS-06 FOR VALVE BOX.
5. BRASS FITTINGS SHALL BE LEAD FREE.
6. THE LID OF A METER BOX INSTALLED IN A PEDESTRIAN PATH SHALL HAVE A SKID RESISTANT LID PER ADA REQUIREMENTS.

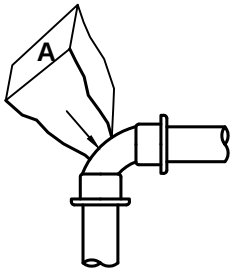
NOT TO SCALE

City of Tukwila

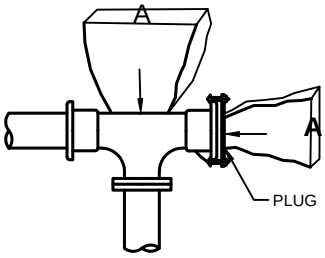
WATER MAIN	
BLOW-OFF ASSEMBLY	
SHEET:	**WS-09**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



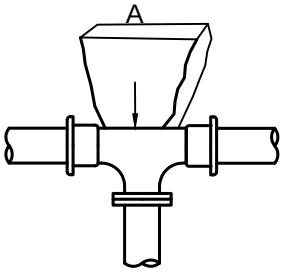
CAPPED CROSS



90° BEND



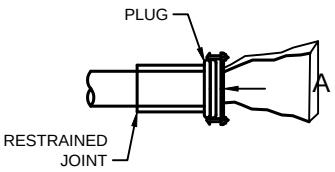
TEE W/ PLUG



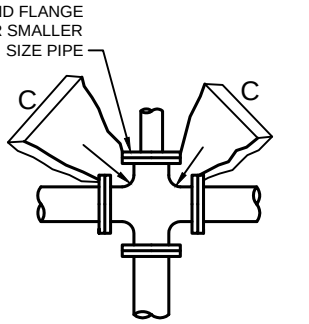
TEE W/O PLUG

THRUST BLOCKING SIZE
(SF AREA MEASURED AGAINST NATIVE SOIL)

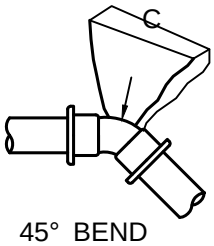
PIPE SIZE DIA	A (ft^2)	C (ft^2)	D (ft^2)	E (ft^2)
4"	4	2	1	1
6"	10	5	3	1
8"	18	10	5	2
10"	28	15	8	4
12"	40	22	11	6
14"	55	30	15	8
16"	71	39	20	10
18"	90	49	25	13
20"	111	60	31	15
22"	135	73	37	19
24"	160	87	44	22
28"	218	118	60	30
30"	251	136	69	35
36"	361	195	100	50
42"	491	266	135	68
48"	641	347	177	89



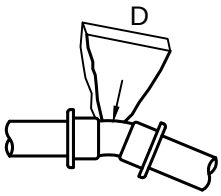
DEAD END



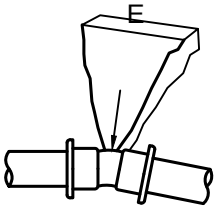
UNEQUAL CROSS



45° BEND



22-1/2° BEND



11-1/4° BEND

= THRUST DIRECTION

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. SEE TABLE THIS SHEET FOR TYPE AND SAFE BEARING LOAD.
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.
7. REFER TO CHAPTER 7 OF THESE STANDARDS.

SOIL TYPE	SAFE BEARING LAOD (PSF)
MUCK, PEAT, ETC	0
SOFT CLAY	1,000
SAND	2,000
SAND AND GRAVEL	3,000
SAND & GRAVEL CEMENTED WITH CLAY	4,000
HARD SHALE	10,000
*VALUES BASED ON WSDOT STD PLAN B-90.40-01	

NOT TO SCALE

City of Tukwila

BLOCKING (HORIZONTAL)

CONCRETE

SHEET: WS-10 (1 OF 3)

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI

City of Tukwila

BLOCKING

CONCRETE

SHEET: WS-10 (2 OF 3)

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI

-THRUST BLOCKING SIZE
-ASSUMING 1000PSF SOIL PRESSURE
-DESIGN PRESSURE 250 PSI

PIPE SIZE DIA	PIPE AREA SQ FT	PRESSURE (PSI)	HEAD (FT)	A 90° LOAD (LB)	A 90° AREA (SF)	C 45° LOAD (LD)	C 45° AREA (SF)	D 22.5° LOAD (LD)	D 22.5° AREA (SF)	E 11.25° LOAD (LD)	E 11.25° 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

*FOR OTHER SOIL (BEARING) PRESSURE CONDITIONS, ADJUST BLOCK SIZING ACCORDINGLY.

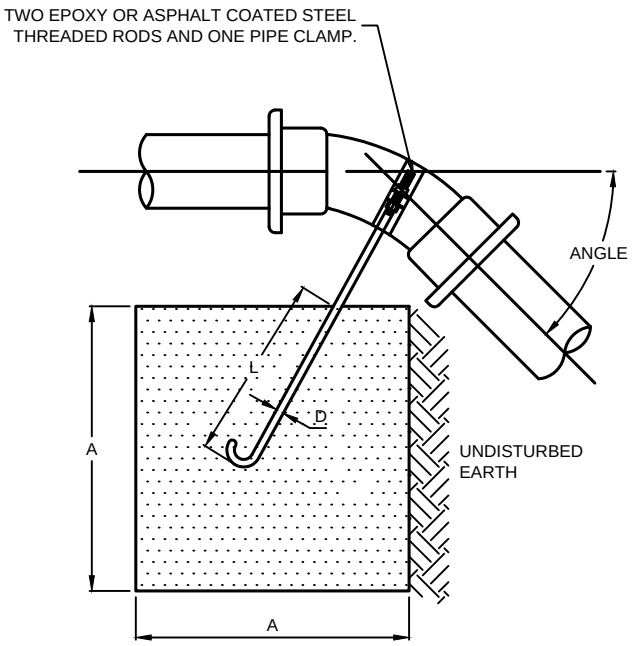
NOT TO SCALE

VERTICAL BLOCKING FOR 11 1/4°, 22 1/2°, 30° BENDS MINIMUM DIMENSIONS

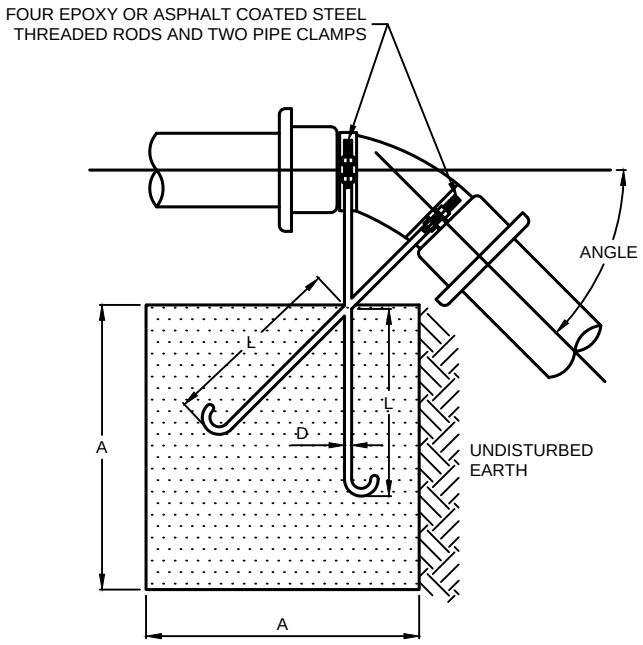
PIPE SIZE (INCHES)	V.B. (DEGREES)	CU. FT.	A (FEET)	D (INCHES)	L (FEET)
4	11 1/4	8	2.0	3/4	1.5
	22 1/2	11	2.2	3/4	2.0
	30	17	2.6	3/4	2.0
6	11 1/4	11	2.2	3/4	2.0
	22 1/2	25	2.9	3/4	2.0
	30	41	3.5	3/4	2.0
8	11 1/4	16	2.5	3/4	2.0
	22 1/2	47	3.6	3/4	2.0
	30	70	4.1	3/4	2.5
10-12	11 1/4	32	3.2	3/4	2.0
	22 1/2	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	11/4	4.0
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 45° BENDS

4	45	30	3.1	3/4	2.0
6		68	4.1	3/4	2.0
8		123	5.0	3/4	2.0
12		232	6.1	3/4	2.5
16		478	7.8	1 1/8	4.0
20		560	8.2	1 1/4	4.0
24		820	9.4	1 3/8	4.5



- VERTICAL BLOCKING FOR CONDITIONS IN SHADED AREA



- VERTICAL BLOCKING FOR CONDITIONS IN UNSHADED AREA

NOT TO SCALE

City of Tukwila

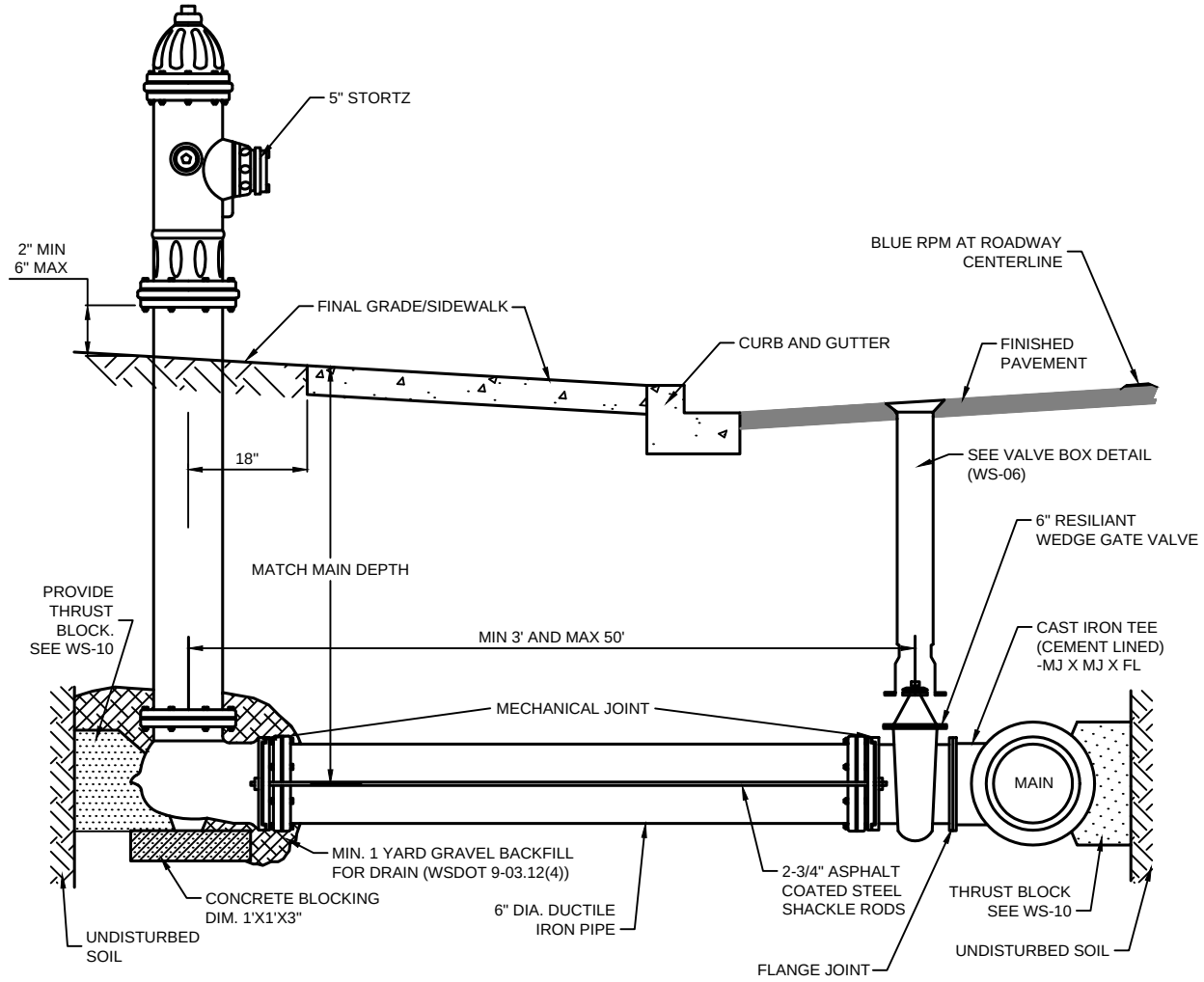
BLOCKING (VERTICAL)

CONCRETE

SHEET: **WS-10 (3 OF 3)**

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI



NOTES:

1. REFER TO CHAPTER 7 OF THESE STANDARDS.
2. HYDRANTS EQUAL TO MUELLER SUPER CENTURION #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.
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

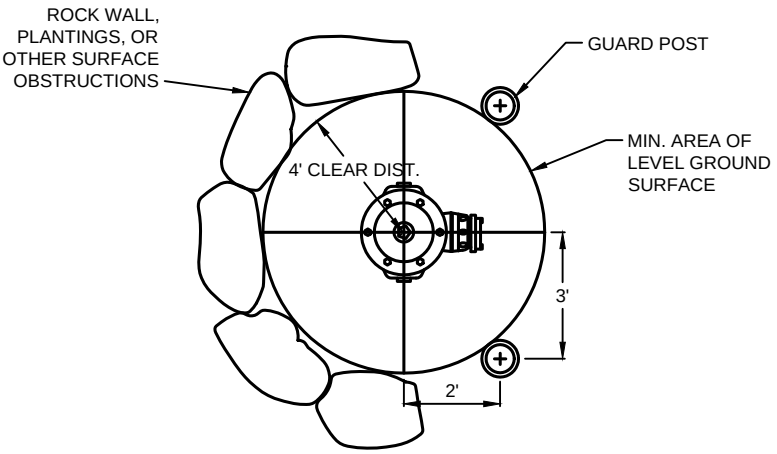
FIRE HYDRANT

ASSEMBLY AND SETTING

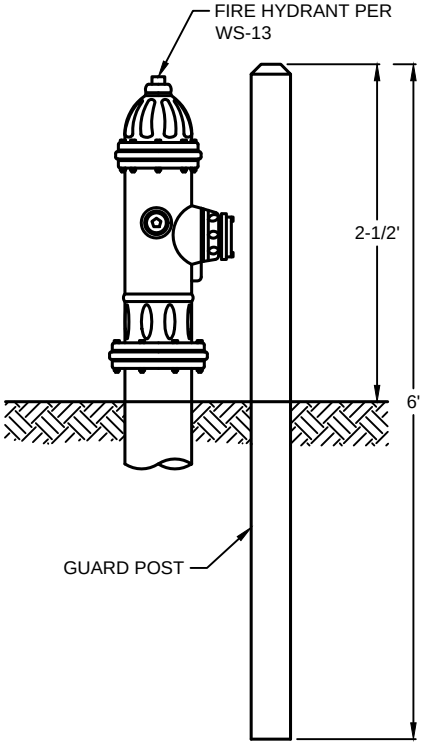
SHEET: WS-13

LAST REVISION: APRIL 2019

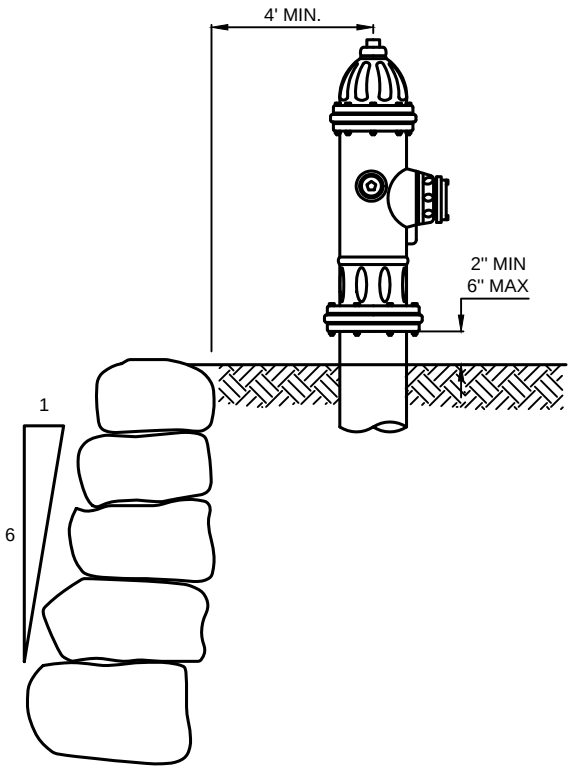
APPROVAL: H. PONNEKANTI



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 ON POSTS SHALL BE FARWEST CASE YELLOW #3472.

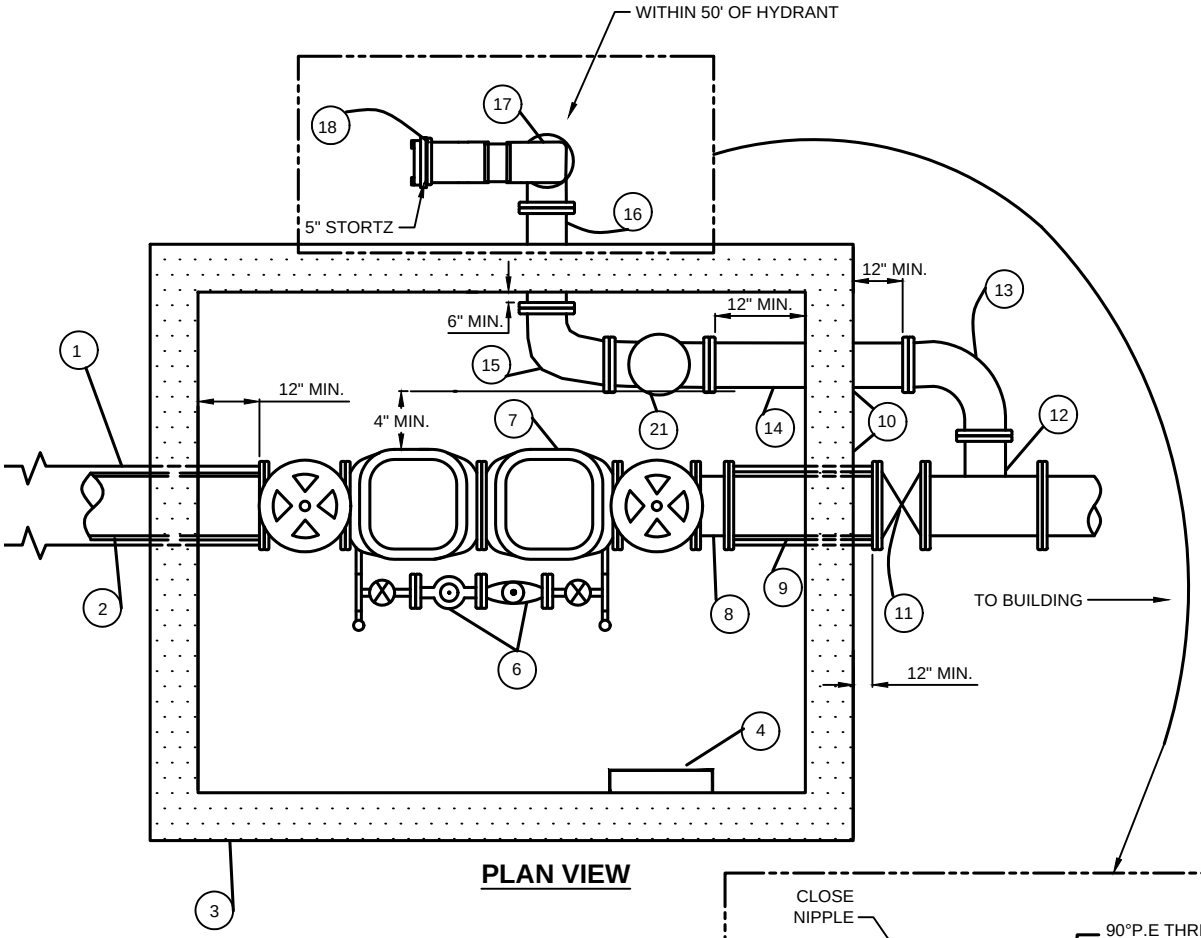
NOT TO SCALE

City of Tukwila

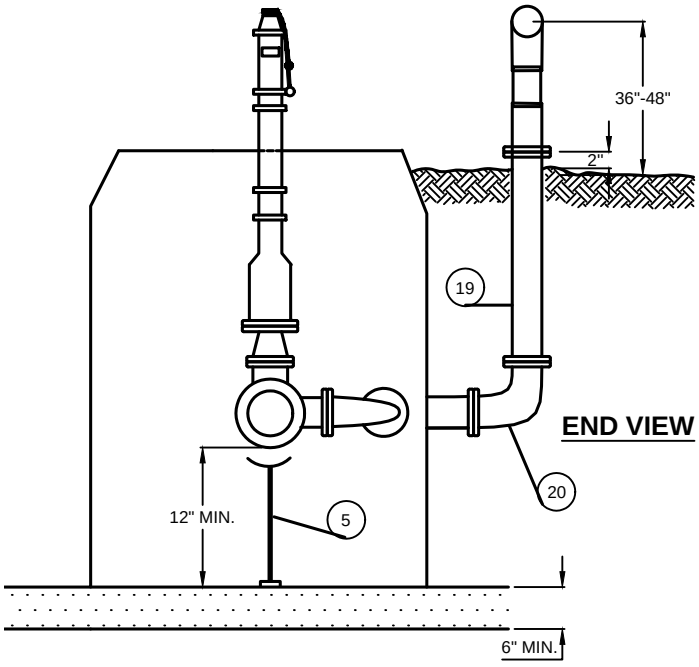
FIRE HYDRANT

GUARD POST

SHEET:	**WS-14**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

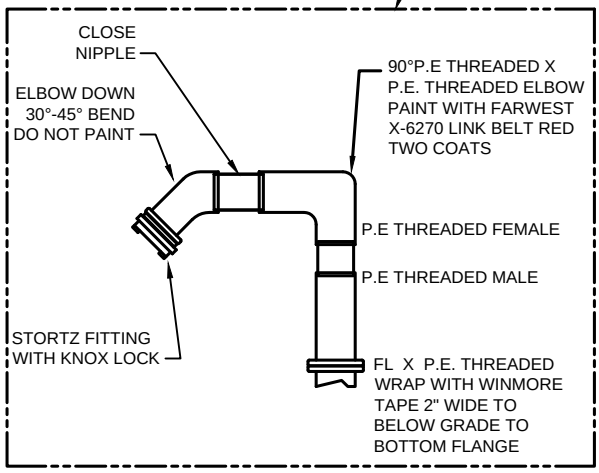


PLAN VIEW



END VIEW

COMPACTED FOUNDATION GRAVEL UNDER VAULT



SIDE VIEW

NOTES:

1. DESIGN FOR 4" THRU 10" DDCV.

NOT TO SCALE

City of Tukwila

CROSS CONNECTION CONTROL

DETECTOR DOUBLE CHECK VALVE & VAULT

SHEET:	**WS-15 1 OF 2**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

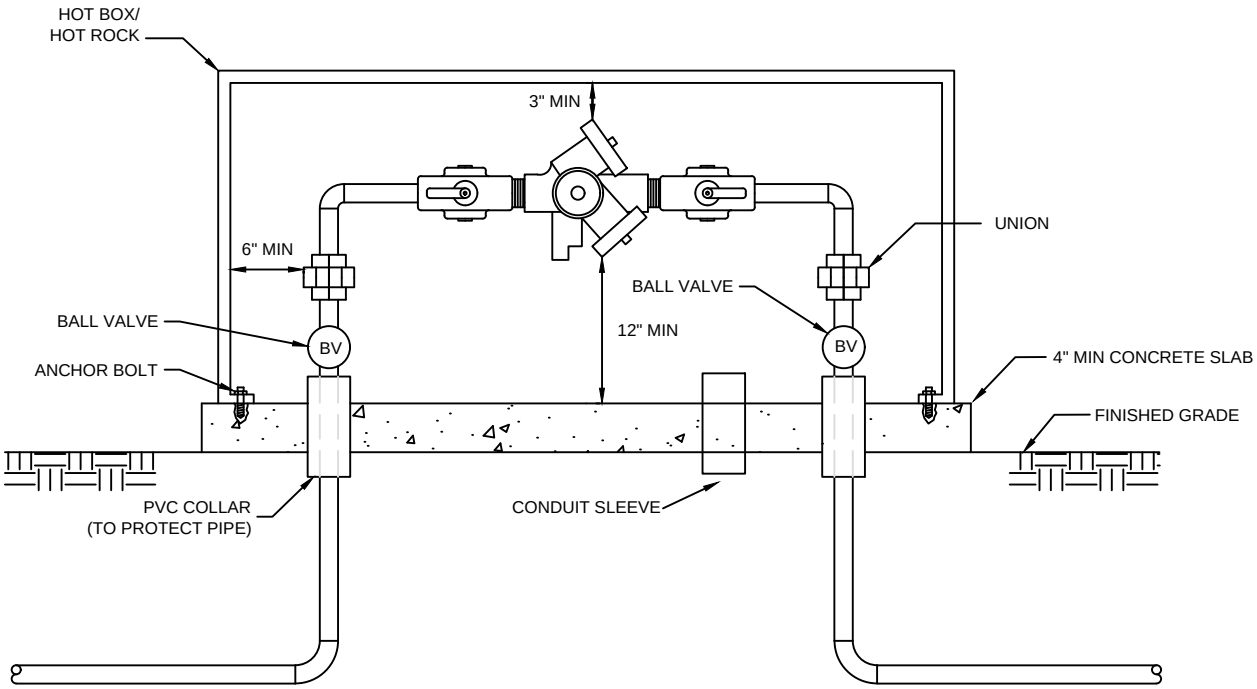
MATERIAL LISTING:

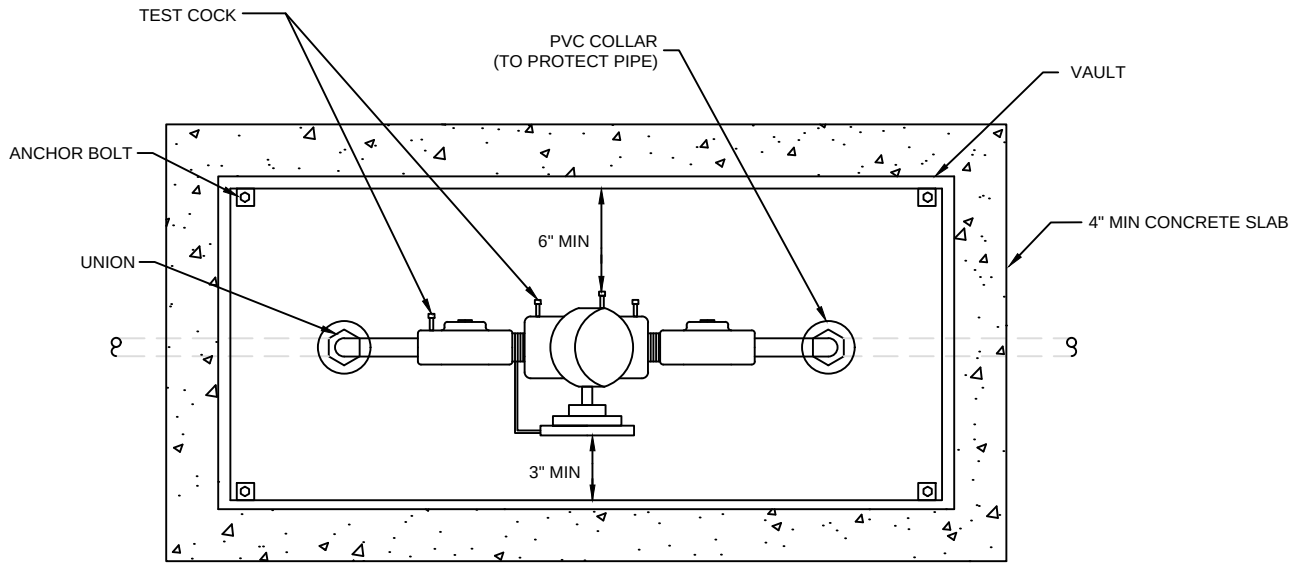
1. 3/4" SHACKLE RODS WITH STAR BOLTS AND ASPHALT EMULSION COATING.
2. 4" MIN. D.I. CLASS 52 PIPE.
3. PRECAST CONCRETE VAULT WITH HINGED STEEL PLATE COVER, DIMENSION TO VARY WITH SIZE OF ASSEMBLY.
4. O.S.H.A. APPROVED LADDER IF OVER 30" DEEP.
5. PIPE SUPPORT STAND IN LOCATED INSIDE OF VAULT UNDER EACH 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 DEG BEND.
14. 4" OR 6" D.I. CLASS 52 PIPE FL*FL.
15. 4" OR 6" 90 DEG BEND FL.
16. 4" OR 6" D.I. CLASS 52 PIPE, FL*FL.
17. 4" OR 6" 90 DEG BEND, FL.
18. UL LISTED 5" STORTZ CONNECTION WITH KNOX LOCK WITH 30 DEG OR 45 DEG ELBOW.
19. 6" D.I. CLASS 52 PIPE LENGTH AS REQUIRED FLANGE * THREADED P.E.
20. 6" 90 DEG 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 ON WSDOH APPROVED LIST.
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 WITH KNOX LOCK AND TWO 30 DEG OR 45 DEG 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





NOT TO SCALE

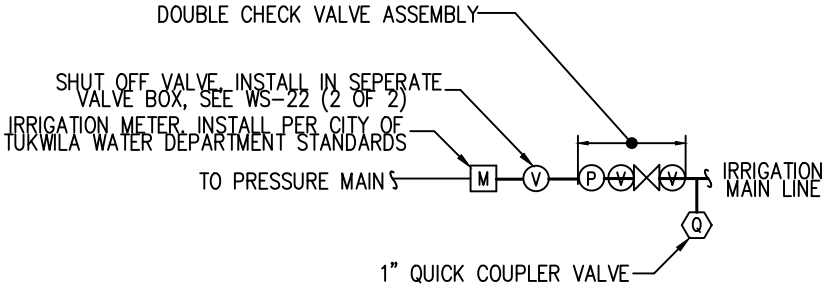
City of Tukwila	**2" AND SMALLER REDUCED PRESSURE BACKFLOW ASSEMBLY INSTALLATION**
	SHEET: **WS-21 (1 OF 2)**
	LAST REVISION: APRIL 2019
	APPROVAL: H. PONNEKANTI

NOTES;

1. THE RPBA SHALL BE SELECTED FROM WSDOH APPROVED LIST.
2. THE RPBA 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.
3. AN RPBA SHALL NOT BE INSTALLED IN A PIT BELOW GROUND LEVEL.
4. THE FREEZE PROTECTION ENCLOSURE FOR THE RPBA 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.
5. 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.
6. RPBA MUST BE PROTECTED FROM FREEZING.
7. AN RPBA 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.
8. WHEN THE RPBA 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 OF 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.
9. A PVC COLLAR SHALL BE INSTALLED BETWEEN THE PIPE AND CONCRETE SLAB.
10. A UNION SHALL BE INSTALLED ON THE RISERS TO AID IN REMOVAL OF THE ASSEMBLY.
11. BALL VALVES WILL BE INSTALLED ON THE RISERS TO AID IN THE TESTING AND MAINTENANCE OF THE ASSEMBLY.
12. ALL BRASS FITTINGS SHALL BE LEAD FREE.

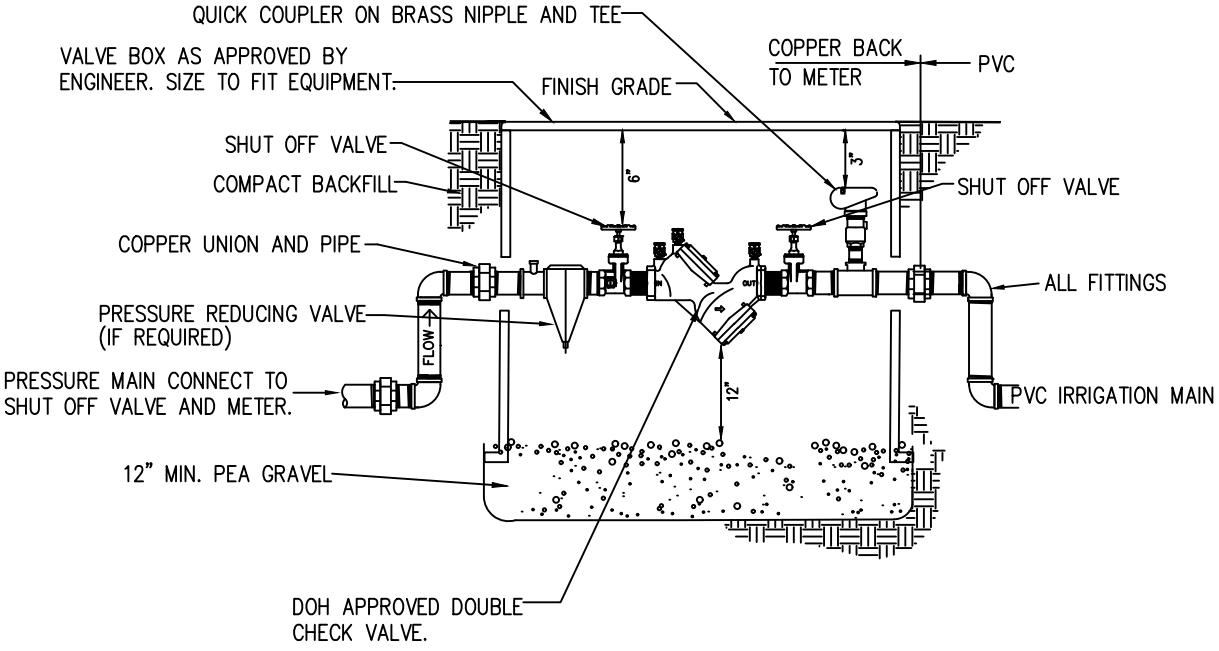
NOT TO SCALE

City of Tukwila	**2" AND SMALLER REDUCED PRESSURE BACKFLOW ASSEMBLY INSTALLATION**
	SHEET: **WS-21 (2 OF 2)**
	LAST REVISION: APRIL 2019
	APPROVAL: H. PONNEKANTI



NOTE:
CONNECTION TO PRESSURE MAIN SHALL NOT BE MADE UNTIL IRRIGATION MAIN LINE IS PRESSURE TESTED. SEE INSTALLATION DETAIL THIS SHEET.

TYPICAL POINT OF CONNECTION ASSEMBLY
NTS



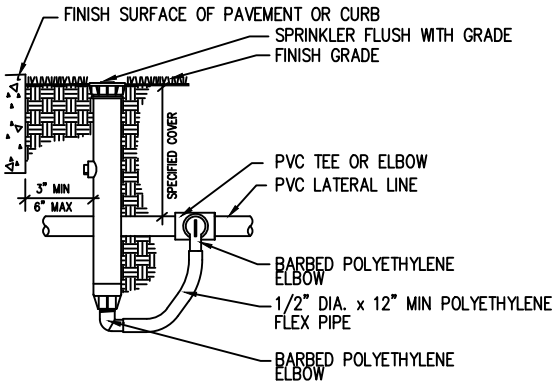
DETAIL DOUBLE CHECK VALVE ASSEMBLY
NTS

NOTES;

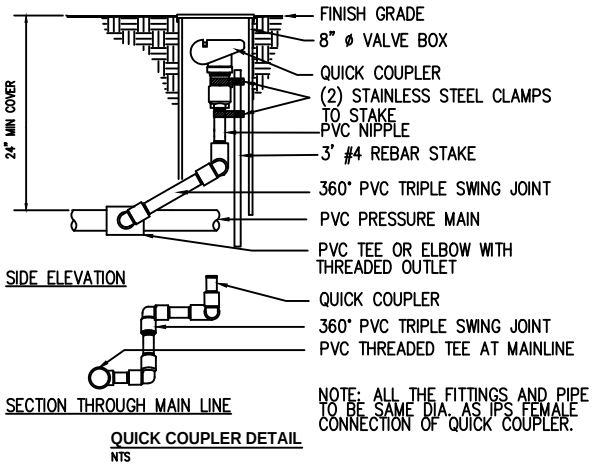
1. ALL INSTALLATIONS MUST MEET MINIMUM STANDARDS OF THE UNIFORM PLUMBING CODE AND WSDOH APPROVED INSTALLATIONS LIST.
2. TESTING IS REQUIRED BY A WSDOH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY THE OWNER.

NOT TO SCALE

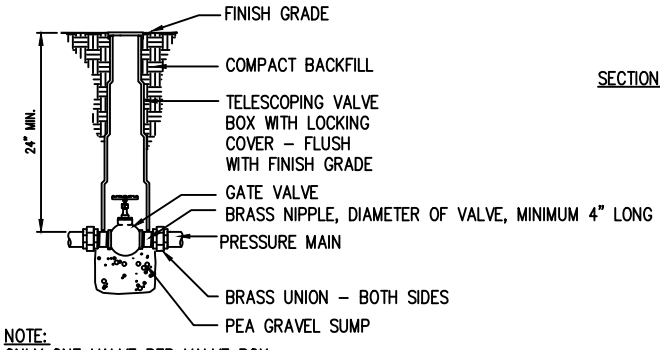
City of Tukwila	**IRRIGATION SYSTEM (CITY OWNED)**
	DOUBLE CHECK VALVE ASSEMBLY
	SHEET: WS-22 (1 0F2)
	LAST REVISION: APRIL 2019
	APPROVAL: H. PONNEKANTI



TYPICAL FLEXIBLE RISER
NTS



QUICK COUPLER DETAIL
NTS



NOTE:
ONLY ONE VALVE PER VALVE BOX.
SEAL ALL THREADED JOINTS WITH TEFLON TAPE ON MALE THREADS ONLY

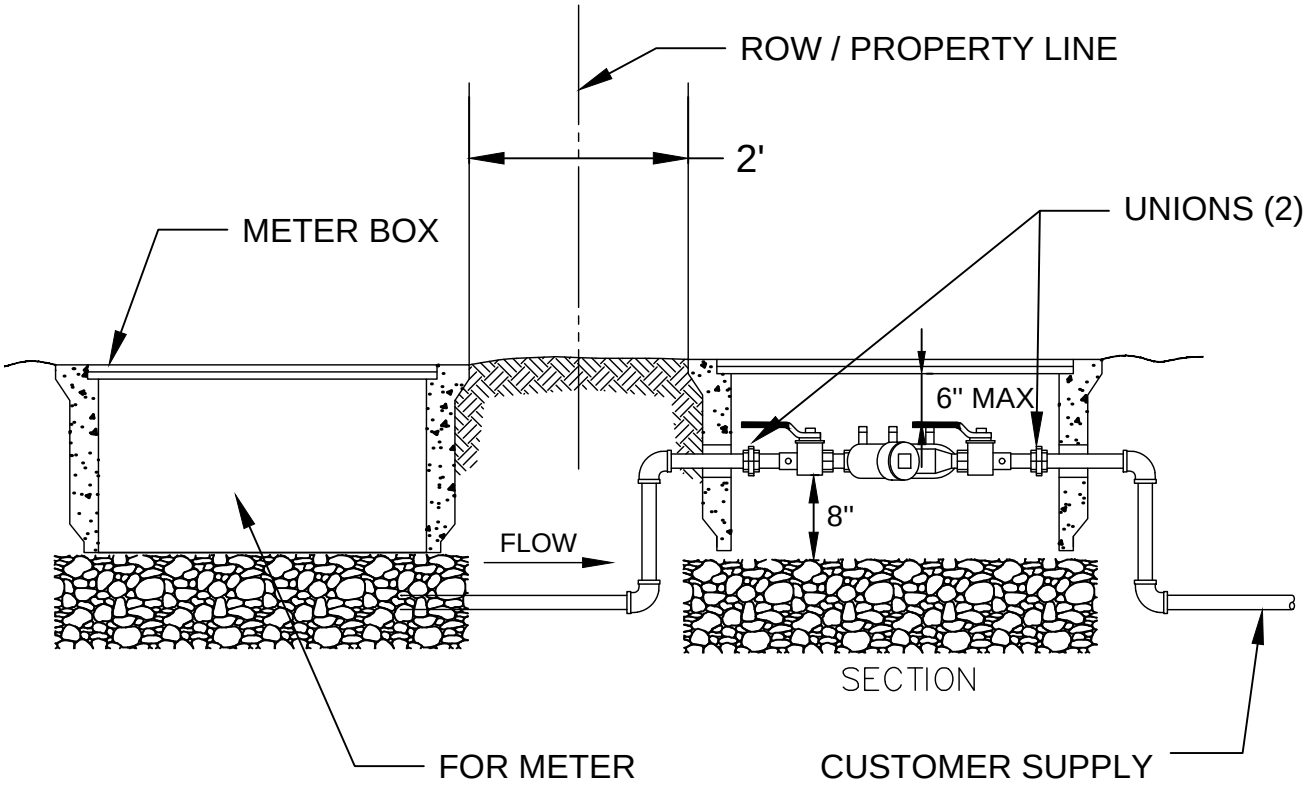
MANUAL SHUT OFF VALVE
NTS

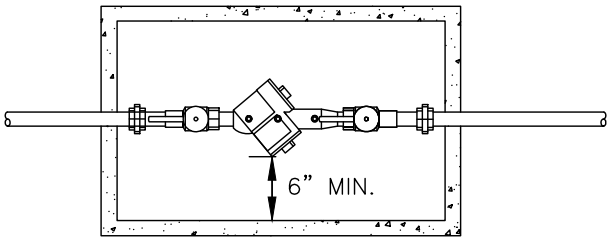
NOTES;

1. ALL INSTALLATIONS MUST MEET MINIMUM STANDARDS OF THE UNIFORM PLUMBING CODE AND WSDOH APPROVED INSTALLATIONS LIST.

NOT TO SCALE

City of Tukwila	**IRRIGATION SYSTEM (CITY OWNED)**
	SYSTEM COMPONETS
	SHEET: **WS-22 (2 OF2)**
	LAST REVISION: APRIL 2019
	APPROVAL: H. PONNEKANTI





PLAN

NOTES:

1. DCVA MUST BE SELECTED FROM WSDOH APPROVED INSTALLATIONS LIST, MUST BE TESTED UPON INSTALLATION BY A WSDOH CERTIFIED BACKFLOW ASSEMBLY TESTER, AND MUST BE TESTED ANNUALLY THEREAFTER BY THE OWNER.
2. THE BACKFLOW ASSEMBLY BOX/ENCLOSURE WILL BE SET AT THE SAME GRADE AS THE METER BOX UNLESS OTHERWISE APPROVED BY THE ENGINEER.
3. ADDITIONAL ROOM MAY BE REQUIRED FOR TESTING AND MAINTENANCE.
4. WHEN TEST COCKS ARE FACING SIDEWAYS THERE MUST BE A MIN. OF 6" CLEARANCE FROM THE SIDE OF THE VAULT.
5. TEST COCKS MUST BE PLUGGED.
6. FOR VEHICLE TRAVEL AREA, USE TRAFFIC RATED BOX AS APPROVED BY THE ENGINEER.

NOT TO SCALE

City of Tukwila

2" & SMALLER DOUBLE CHECK VALVE

DCVA FOR PRIVATE USE

SHEET:	**WS-23**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

SECTION 9.4 SANITARY SEWER STANDARD DETAILS

SS-01 Not In Use

SS-02 Sanitary Side Sewer - Residential

SS-03 Sanitary Side Sewer – Clean Out

SS-04 Manhole - 48" and 54"

SS-05 Manhole - 48" and 54" (shallow)

SS-06 Manhole – 72" (Type 1A4 and 1B4)

SS-07 Manhole – 72" and 96" (shallow)

SS-08 Manhole – Access and Channelization

SS-09 Manhole – Inside Drop

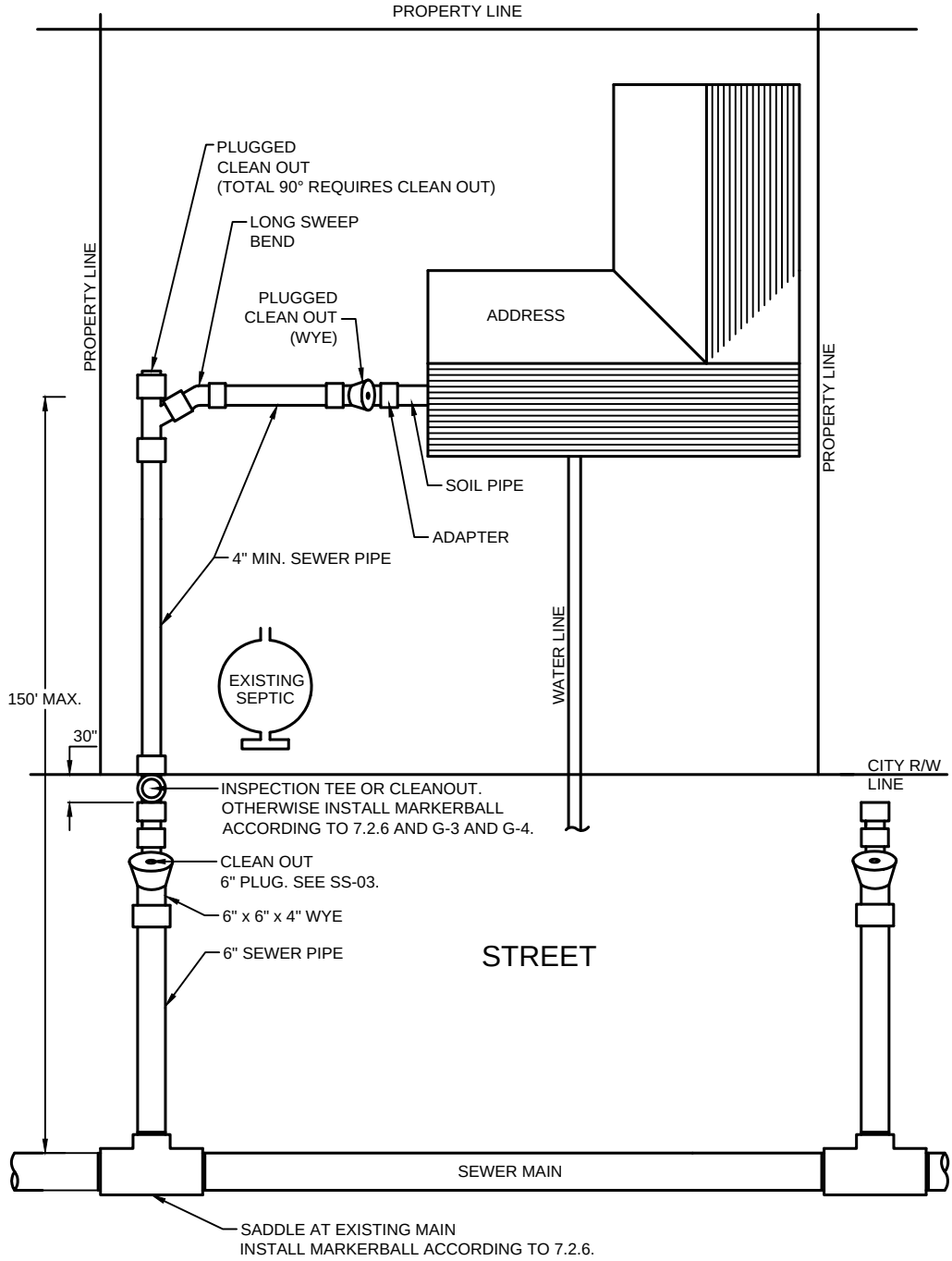
SS-10 Manhole – Drop Connection

SS-11 Manhole – 24" Frame with Cover

SS-12 Manhole – Hanging Ladder

SS-13 Manhole – Polypropylene Safety Step

SS-14 Grease Interceptor – Single Vault with Double Baffle



NOTES:

1. MATERIALS AND INSTALLATION CHAPTER 8 OF THESE STANDARDS.
2. DECOMMISSION SEPTIC TANK PER CHAPTER 8 OF THESE STANDARDS AND KING COUNTY HEALTH DEPARTMENT.
3. WATER AND SEWER LINE SEPARATION 10' HORIZONTALLY. IF WATER AND SEWER LINES CROSS, SEWER SHALL BE AT LEAST 18" BELOW THE WATER LINE.
4. STANDARDS FOR SEWER MAIN APPLY TO CONNECTIONS LONGER THAN 150' FROM THE MAIN. SEE CHAPTER 8.

NOT TO SCALE

City of Tukwila

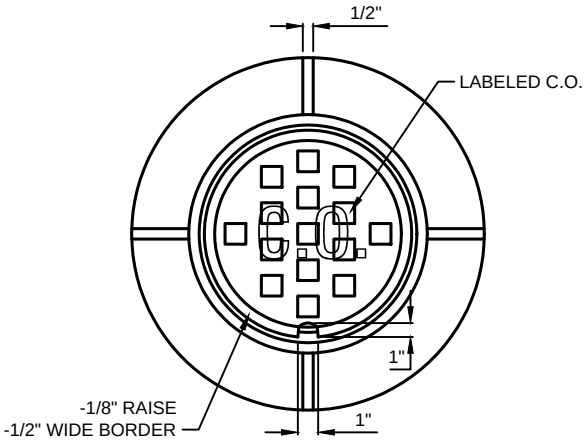
SANITARY SIDE SEWER

RESIDENTIAL

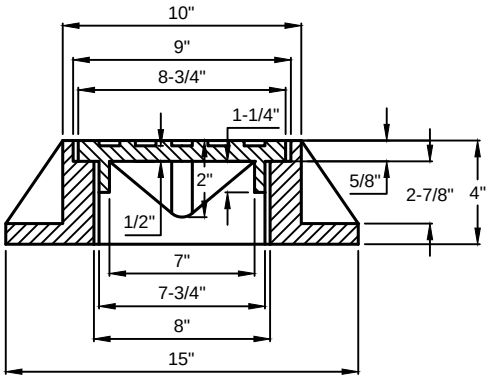
SHEET: SS-02

LAST REVISION: APRIL 2019

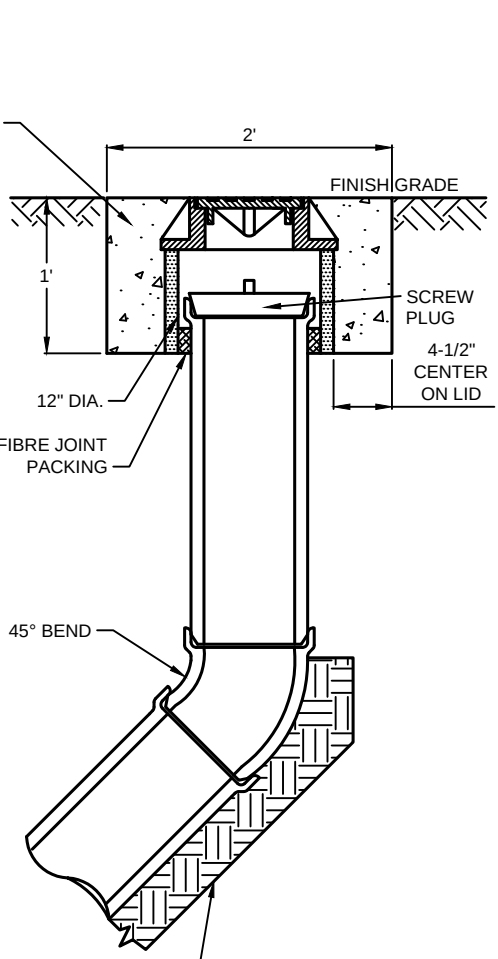
APPROVAL: H. PONNEKANTI



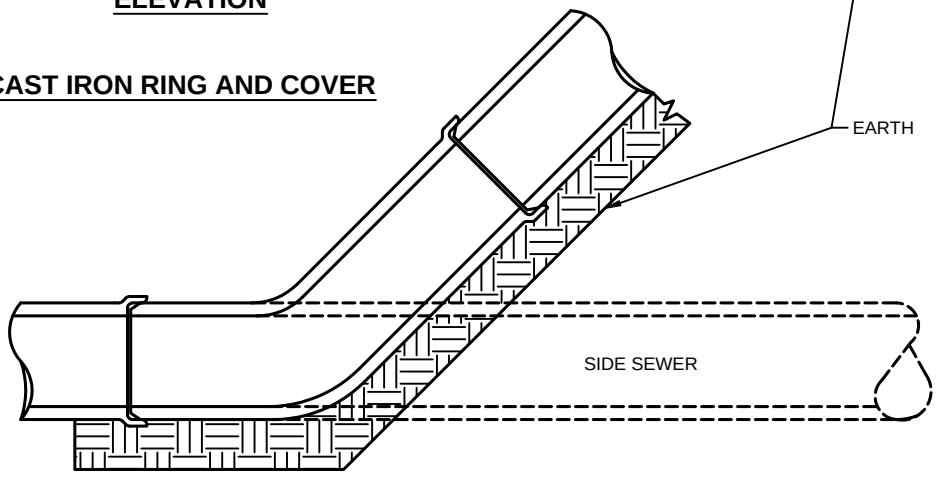
PLAN VIEW



ELEVATION

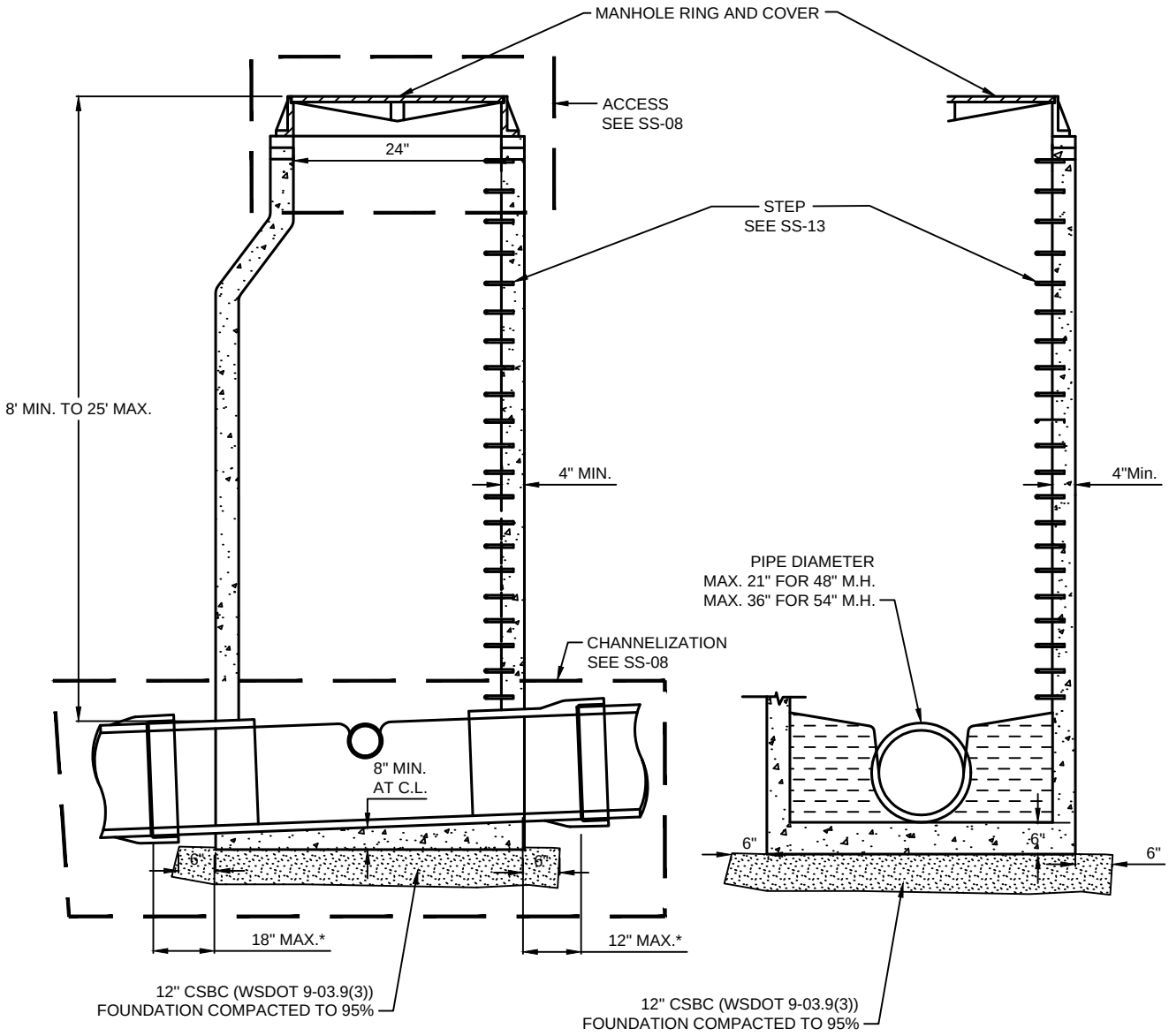


CAST IRON RING AND COVER



NOT TO SCALE

City of Tukwila	**SANITARY SIDE SEWER**
	CLEAN-OUT
SHEET:	**SS-03**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



NOTES:

1. MAX. PIPE DIAMETER MAY BE LIMITED BY PIPE CONFIGURATION OR AS DETERMINED BY ENGINEER.
2. RUBBER GASKET AND GROUT AT ALL JOINTS IN MANHOLE SECITONS.
3. GROUT ALL LIFTING EYE HOLES.
4. SEE SS-13 FOR STEP DETAIL OR SS-12 FOR LADDER DETAILS.
5. INSTALL PER CHAPTER 8 OF THESE STANDARDS.

* APPLIES TO 24" OR SMALLER DIAMETER PIPES.

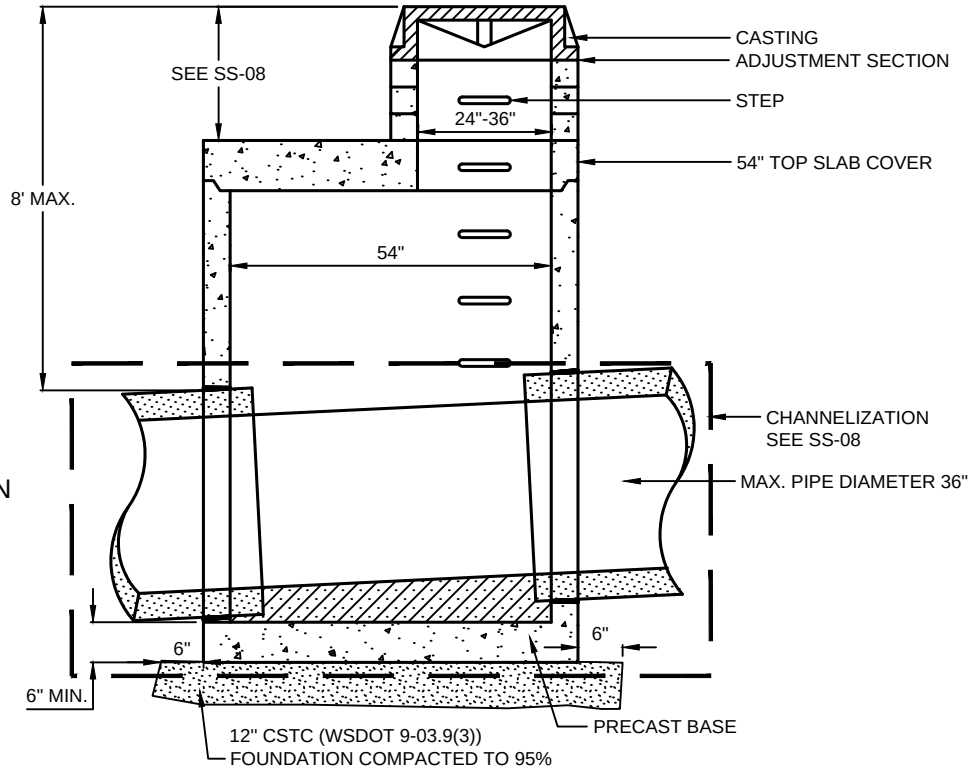
NOT TO SCALE

City of Tukwila

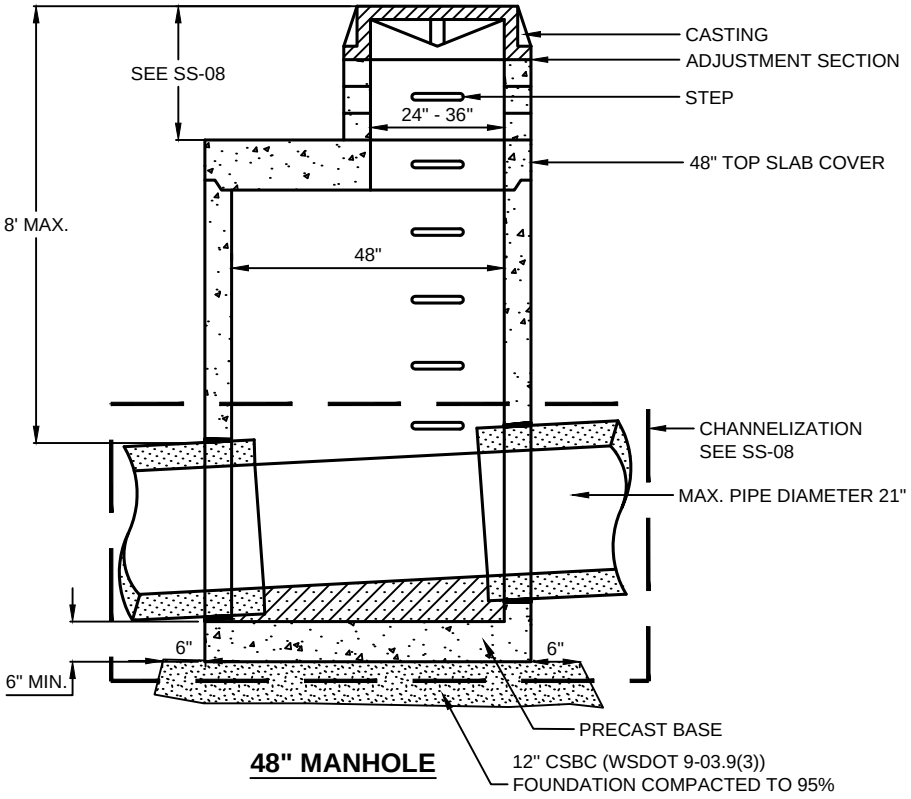
MANHOLE	
48" AND 54"	
SHEET:	**SS-04**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

NOTES:

1. 36" ACCESS OPENING REQUIRED WHEN INVERT ELEVATION TO RIM IS LESS THAN 4'. EJIW PRODUCT NO. 41600540A01 OR APPROVED EQUAL.
2. MAX. PIPE DIAMETER MAY BE LIMITED BY PIPE CONFIGURATION.
3. RUBBER GASKET AND GROUT ALL JOINTS IN MANHOLE SECTIONS.
4. SEE SS-13 FOR STEP DETAIL OR SS-12 FOR LADDER DETAILS.
5. SEE SS-11 FOR CASTING.
6. INSTALL PER CHAPTER 8 OF THESE STANDARDS.



54" MANHOLE



48" MANHOLE

NOT TO SCALE

City of Tukwila

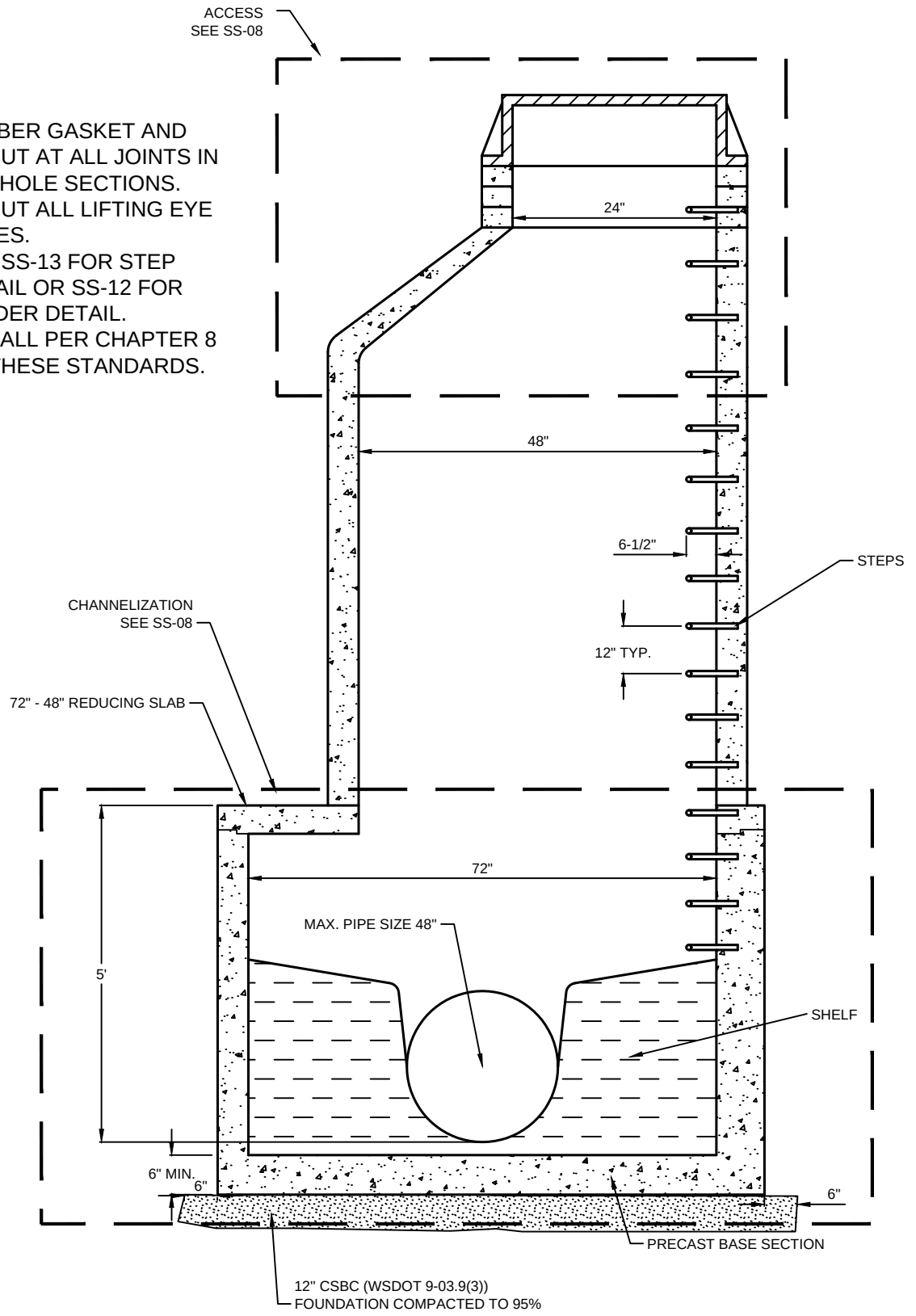
MANHOLE

48" AND 54" (SHALLOW)

SHEET:	SS-05
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

NOTES:

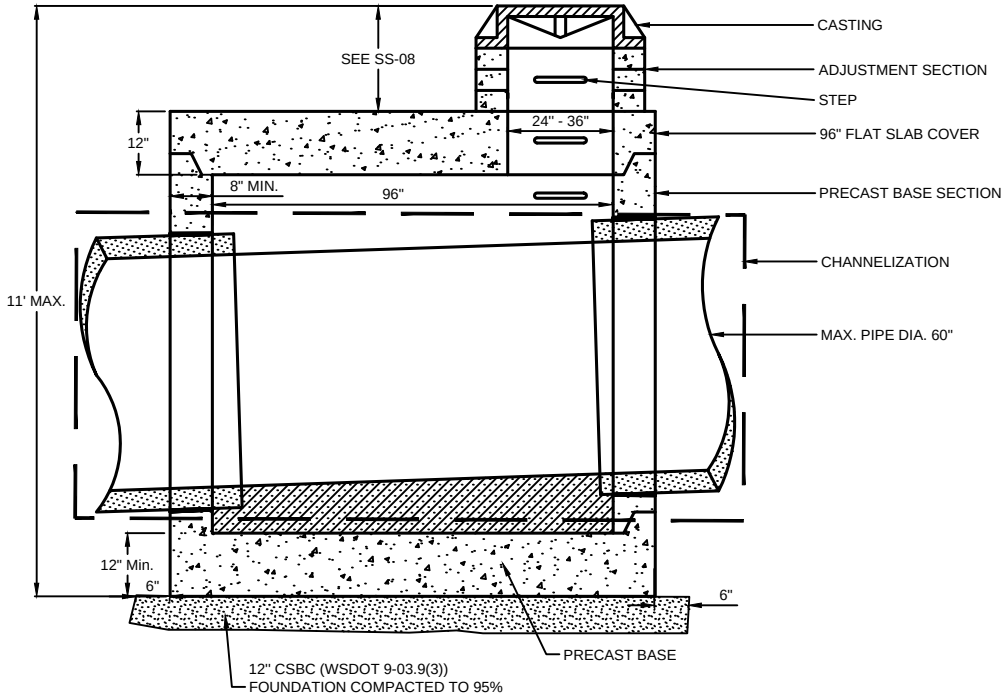
1. RUBBER GASKET AND GROUT AT ALL JOINTS IN MANHOLE SECTIONS.
2. GROUT ALL LIFTING EYE HOLES.
3. SEE SS-13 FOR STEP DETAIL OR SS-12 FOR LADDER DETAIL.
4. INSTALL PER CHAPTER 8 OF THESE STANDARDS.



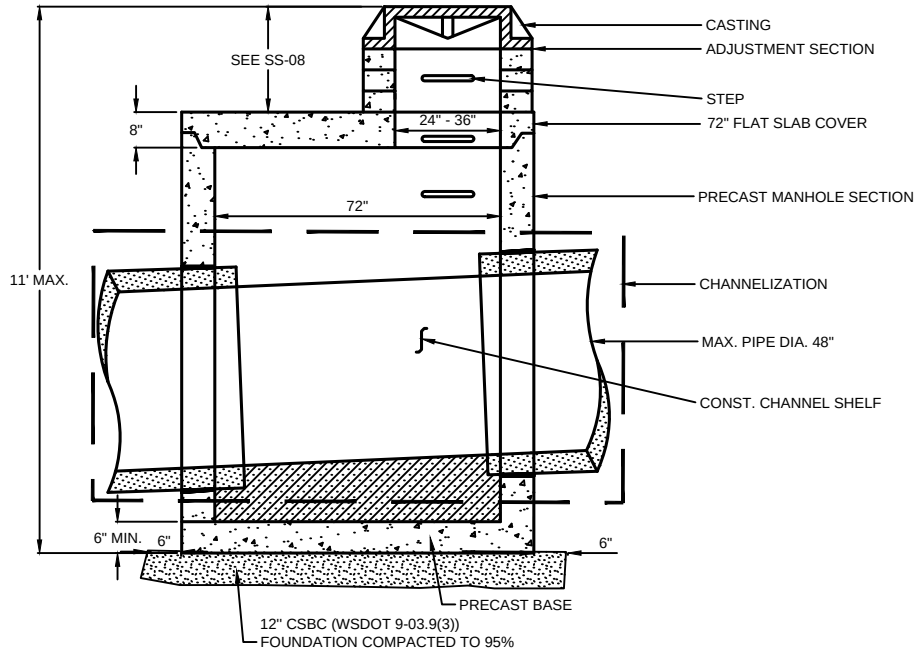
NOT TO SCALE

City of Tukwila

MANHOLE	
72"	
SHEET: SS-06	
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



96" MANHOLE



72" MANHOLE

NOTES:

1. LOCATE ACCESS OVER CHANNEL.
2. MAX. PIPE DIAMETER MAY BE LIMITED BY PIPE CONFIGURATION OR AS DETERMINED BY ENGINEER.
3. RUBBER GASKET AND GROUT AT ALL JOINTS IN MANHOLE SECTIONS.
4. GROUT ALL LIFTING EYE HOLES.
5. SEE SS-12 AND SS-13 FOR LADDER AND STEP DETAIL.
6. INSTALL PER CHAPTER 8 OF THESE STANDARDS.

NOT TO SCALE

City of Tukwila

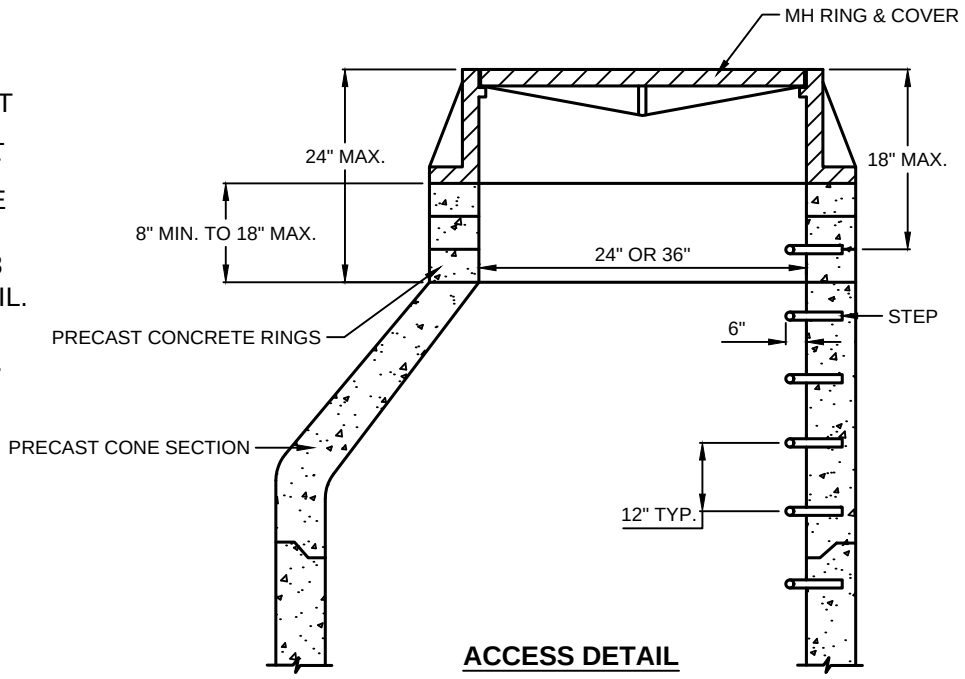
MANHOLE

72" AND 96" (SHALLOW)

SHEET:	**SS-07**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

NOTES:

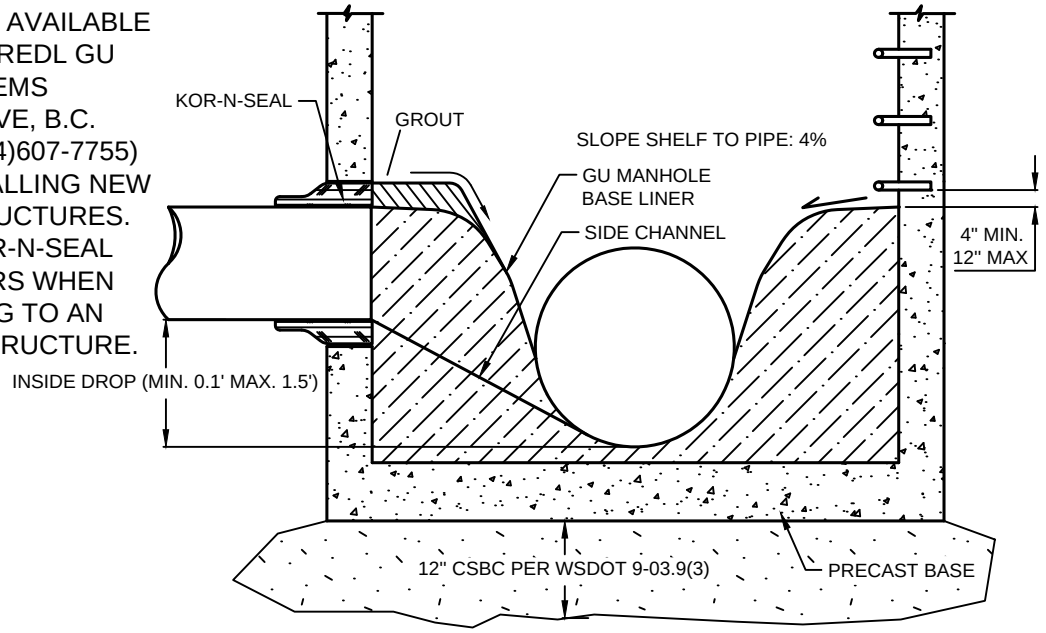
1. RUBBER GASKET & GROUT AT ALL JOINTS. GROUT ALL LIFTING EYE HOLES.
2. REFER TO SS-13 FOR STEP DETAIL.
3. SEE SS-12 FOR LADDER DETAIL.



ACCESS DETAIL

NOTES:

1. INSTALL GU MANHOLE BASE LINER, AVAILABLE THROUGH PREDL GU LINER SYSTEMS (ALDERGROVE, B.C. CANADA (604)607-7755) WHEN INSTALLING NEW SEWER STRUCTURES.
2. INSTALL KOR-N-SEAL CONNECTORS WHEN CONNECTING TO AN EXISTING STRUCTURE.



CHANNELIZATION

NOT TO SCALE

City of Tukwila

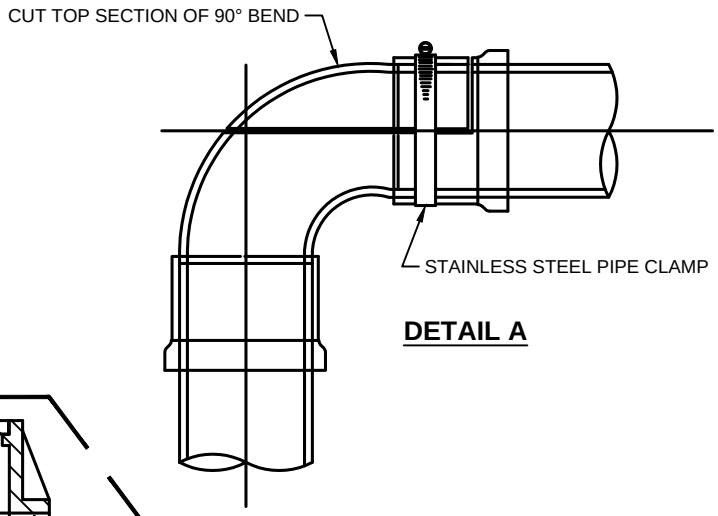
MANHOLE

ACCESS AND CHANNELIZATION

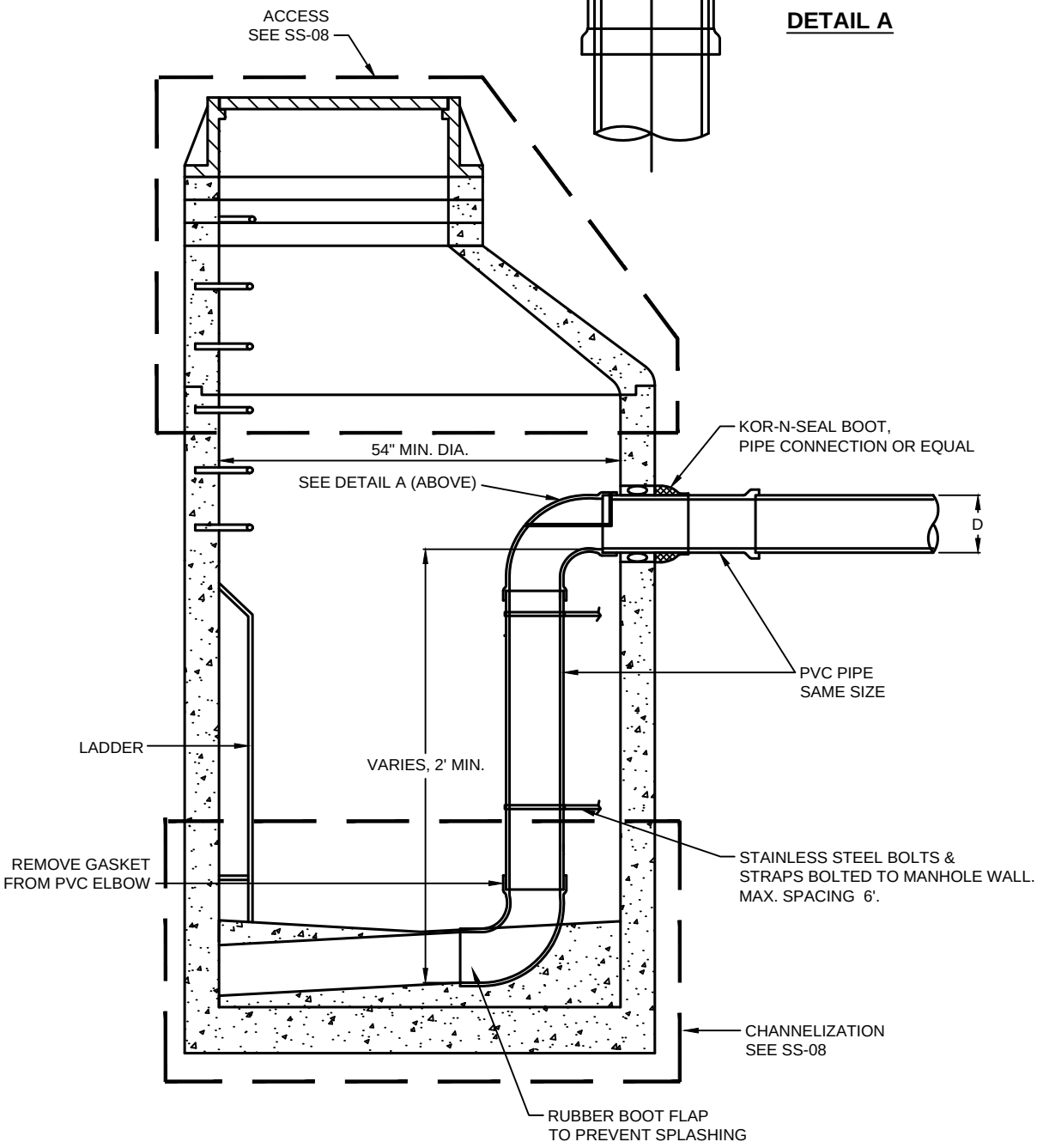
SHEET:	SS-08
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

NOTES:

1. INSIDE DROPS REQUIRES DIRECTOR'S APPROVAL.
2. USE INSIDE DROP ONLY ON PVC SYSTEM.
3. SEE SS-12 FOR LADDER DETAILS.
4. SEE SS-13 FOR STEP DETAILS.



DETAIL A



NOT TO SCALE

City of Tukwila

MANHOLE

INSIDE DROP

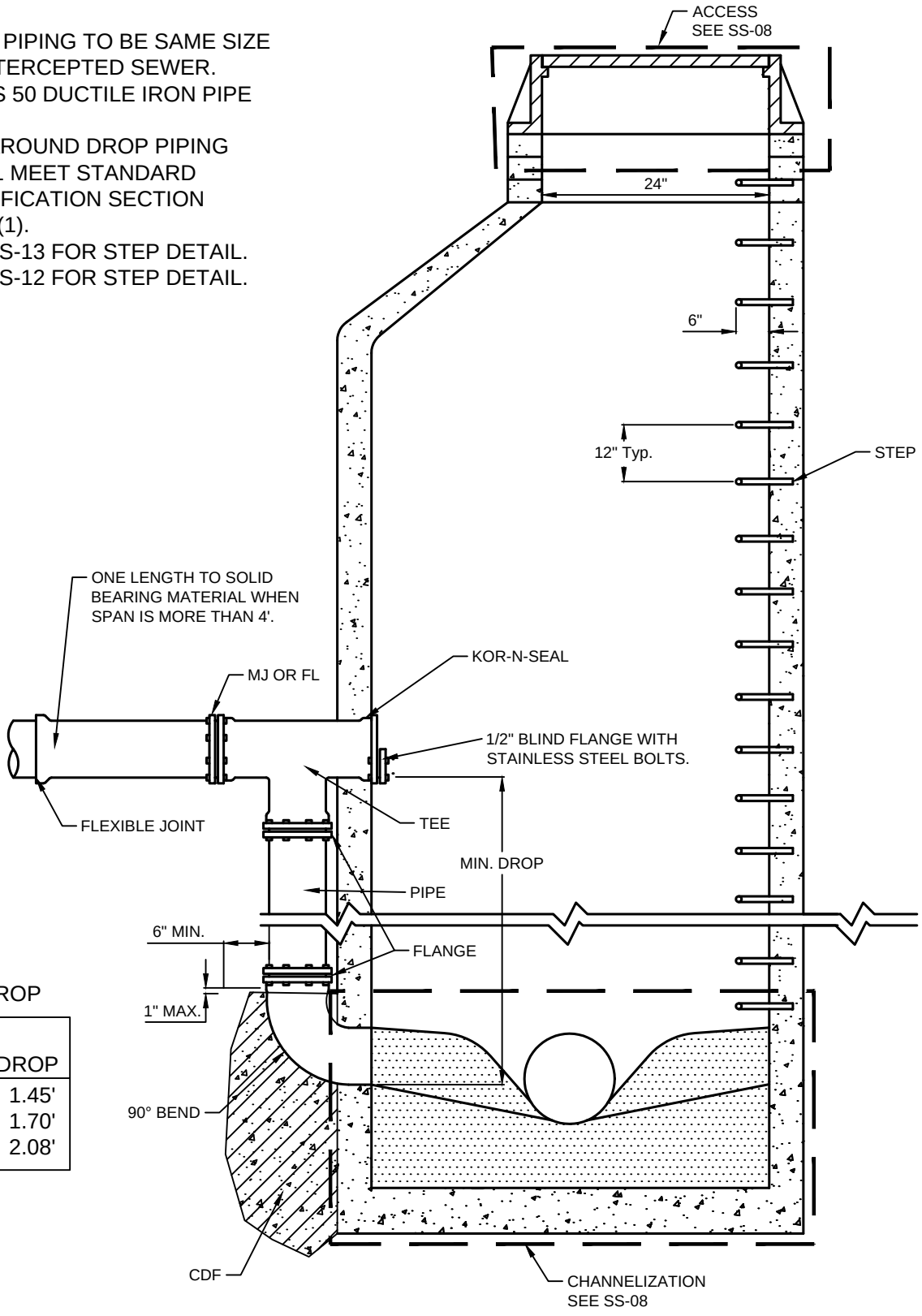
SHEET: SS-09

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI

NOTES:

1. DROP PIPING TO BE SAME SIZE AS INTERCEPTED SEWER.
2. CLASS 50 DUCTILE IRON PIPE ONLY.
3. CDF AROUND DROP PIPING SHALL MEET STANDARD SPECIFICATION SECTION 2-09.3(1).
4. SEE SS-13 FOR STEP DETAIL.
5. SEE SS-12 FOR STEP DETAIL.



MIN DROP

PIPE SIZE	DROP
8"	1.45'
10"	1.70'
12"	2.08'

NOT TO SCALE

City of Tukwila

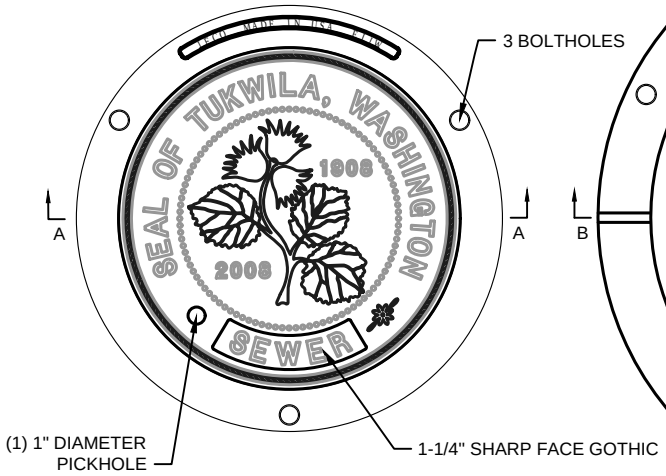
MANHOLE

DROP CONNECTION

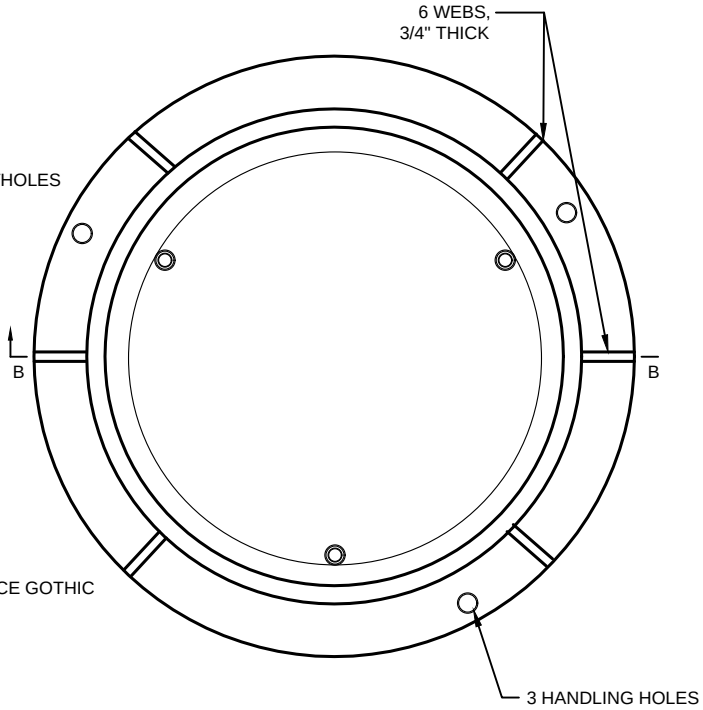
SHEET: SS-10

LAST REVISION: APRIL 2019

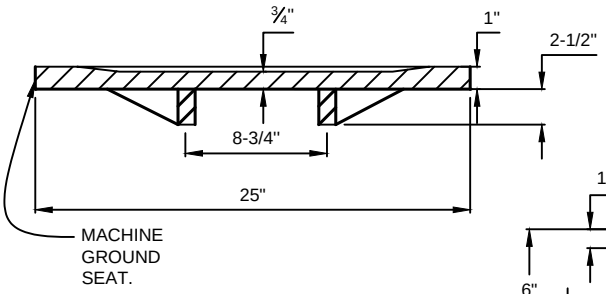
APPROVAL: H. PONNEKANTI



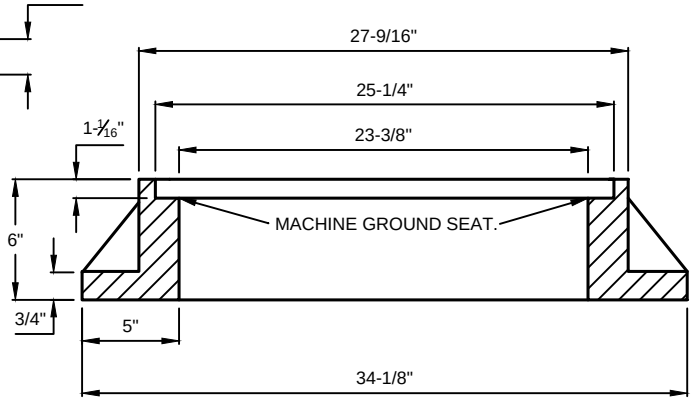
COVER PLAN



FRAME PLAN



SECTION A-A
GRAY IRON LOCKING COVER



SECTION B-B
GRAY IRON FRAME

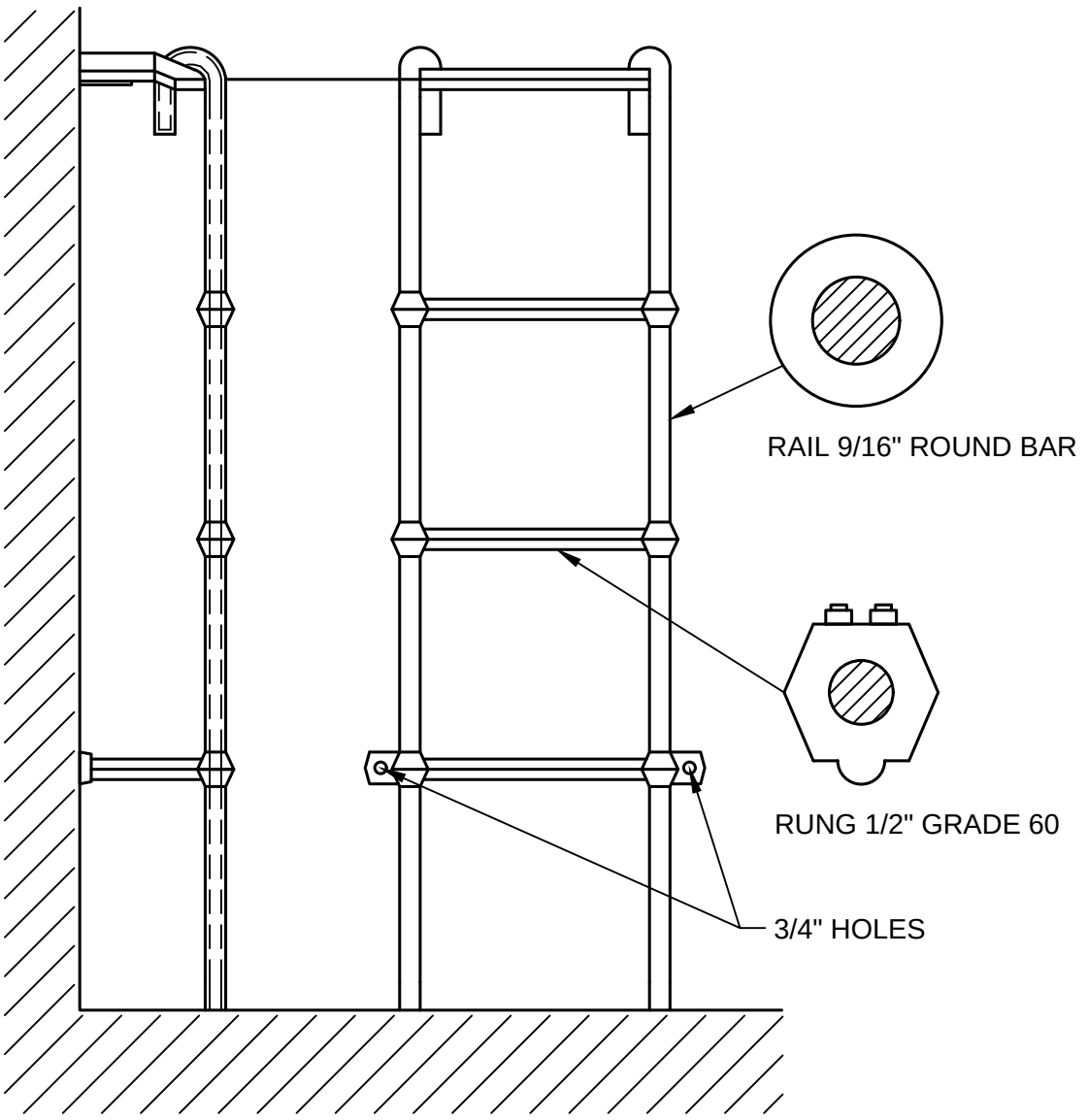
NOTES:

1. FRAME TO BE GROUTED
2. EJIW CATALOG NUMBER 3715Z(PT) 3717C1(PT) ASSEMBLY, WITH THE SEAL OF TUKWILA, AND LEGENDS 1908, 2008, AND SEWER.
4. NON-LOCKING PRODUCT NO. 00371786A01
5. PRODUCT NO. 00371784A01 (LOCKING)
6. INSTALL SO THAT BOLT HOLES ALIGN WITH CENTER OF LADDER.

NOT TO SCALE

City of Tukwila

SEWER MANHOLE	
24" FRAME WITH COVER	
SHEET:	**SS-11**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



POLYPROPYLENE HANGING LADDER

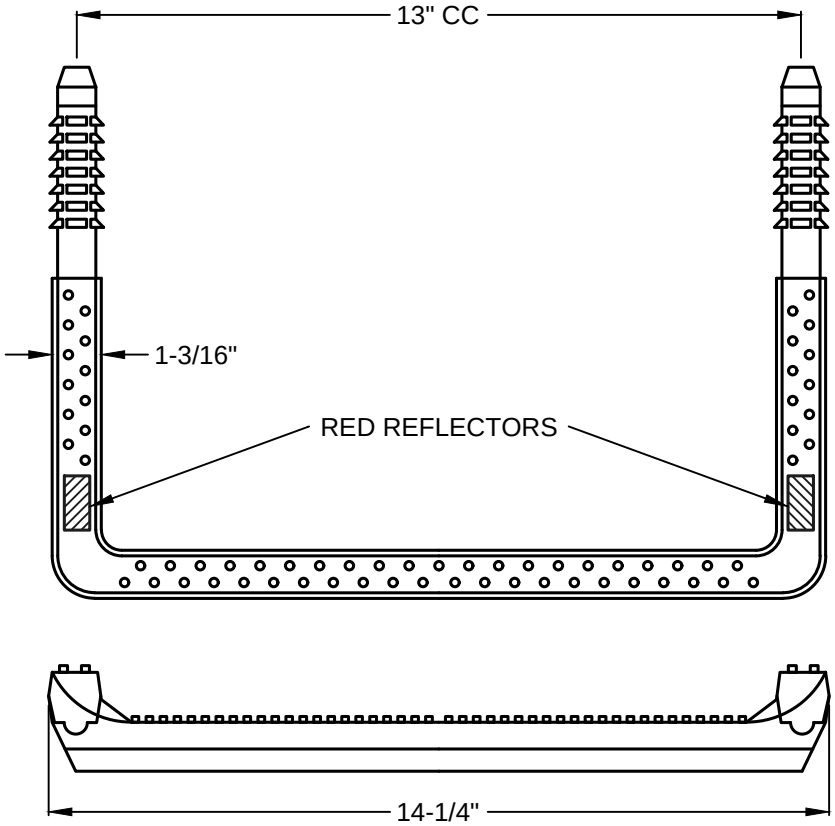
NOTES:

1. LANE POLYPROPYLENE LADDER
2. POLYPROPYLENE ASTM D4101
3. 1/2" GRADE 60 REINFORCING BAR A615
4. 9/16" COLD DRAWN BAR C1018
5. 3/8" DIA. BOLT 316-SS, 3-1/2" LONG
6. 316-SS TYP AT LADDER MOUNTS
7. REFER TO SS-13 FOR STEP DETAIL

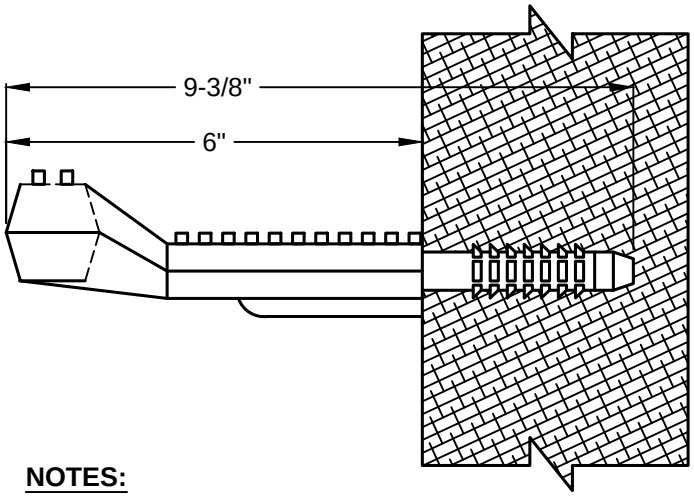
NOT TO SCALE

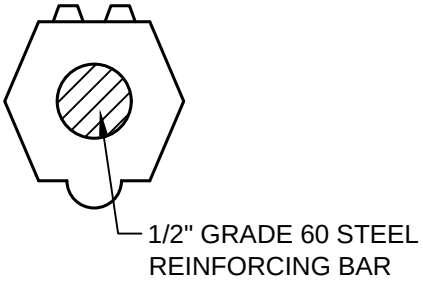
City of Tukwila

MANHOLE	
HANGING LADDER	
SHEET:	**SS-12**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



PLAN





CUT OUT

NOTES:

1. LANE P-14938 OR APPROVED EQUAL.

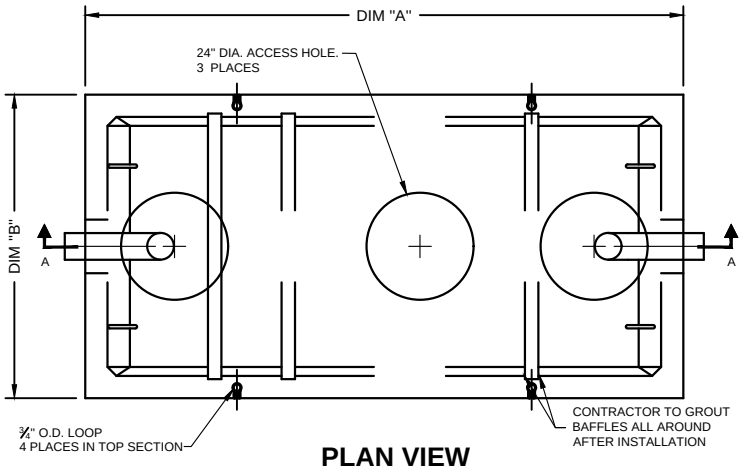
NOT TO SCALE

City of Tukwila

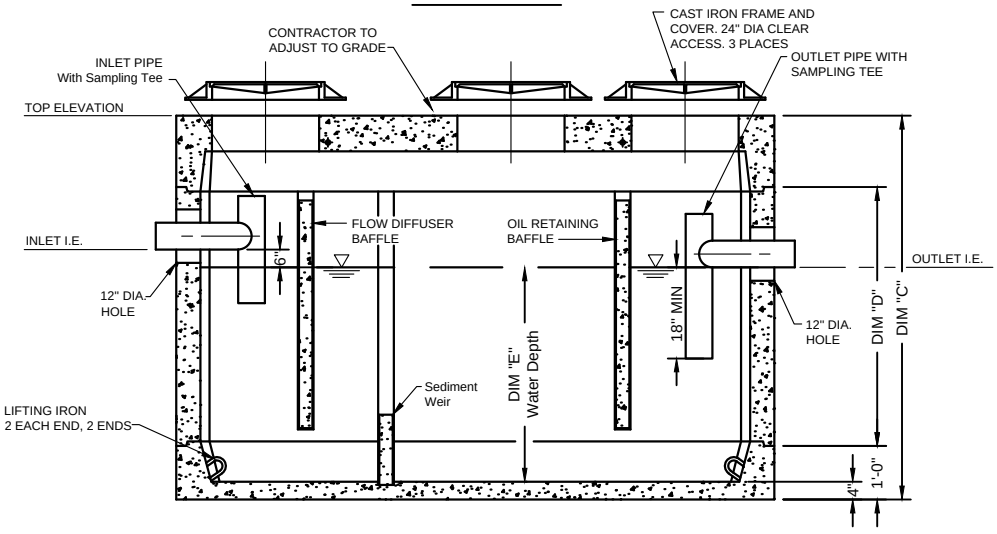
MANHOLE

POLYPROPYLENE SAFETY STEP

SHEET:	SS-13
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	



PLAN VIEW



SECTION A-A

NOTES:

1. REFER TO CHAPTER 8 OF THESE STANDARDS.
2. CONCRETE: 28 DAY COMPRESSIVE STRENGTH f'c = 4500 PSI
3. REBAR: ASTM A-615 GRADE 60.
4. MESH: ASTM A-185 GRADE 65.
5. DESIGN: ACI-318-83 BUIILDING CODE
6. ASTM C-857 "MINIMUM STRUCTURAL DESIGN LOADING FOR MONOLITHIC OR SECTIONAL PRECAST CONCRETE WATER AND WASTEWATER STRUCTURES".
7. LOADS: H-20 TRUCK WHEEL WITH 30% IMPACT PER AASHTO.
8. FILL WITH CLEAN WATER PRIOR TO START UP OF SYSTEM.
9. CONTRACTOR TO SUPPLY & INSTALL ALL PIPING & SAMPLING TEES.
10. ONLY GRAY WATER, EXCEPT DISHWASHERS. BLACK WATER SHALL BE CARRIED BY SEPARATE SIDE SEWER.

SIZING CHART

DESIGN FORMULA: Number Of Meals Per Peak Hours X Waste Flow Rate X Retention Time X Storage Factor = Capacity In Gallons

GALLON CAPACITY	1000	1250	1500	1750	2000	2500	2750	3000	4000	5000	6000
OLDCASTLE MODEL #	4484-SA	4484-SA	5106-SA	5106-SA	612-SA	612-SA	712-SA	712-SA	712-SA	814-SA	818-SA
DIM "A"	9'-0"	9'-0"	11'-2"	11'-2"	12'-8"	12'-8"	12'-8"	13'-1"	13'-1"	19'-11"	19'-11"
DIM "B"	5'-0"	5'-0"	5'-8"	5'-8"	6'-8"	6'-8"	6'-8"	8'-0"	8'-0"	9'-11"	9'-11"
DIM "C"	7'-2"	7'-2"	7'-2"	7'-2"	8'-0"	8'-0"	8'-0"	8'-7"	8'-7"	8'-11"	10'-5"
DIM "D"	4'-2"	5'-2"	4'-4"	4'-11"	4'-7"	5'-6"	6'-0"	5'-0"	6'-6"	6'-2"	7'-2"
WATER DEPTH DIM "E"	3'-10"	4'-10"	4'-0"	4'-7"	3'-10"	4'-9"	5'-3"	4'-7"	6'-1"	4'-9"	5'-9"

NOT TO SCALE

City of Tukwila

GREASE INTERCEPTOR

SINGLE VAULT WITH DOUBLE BAFFLE

SHEET: SS-14

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI

SECTION 9.5 LID STANDARD DETAILS

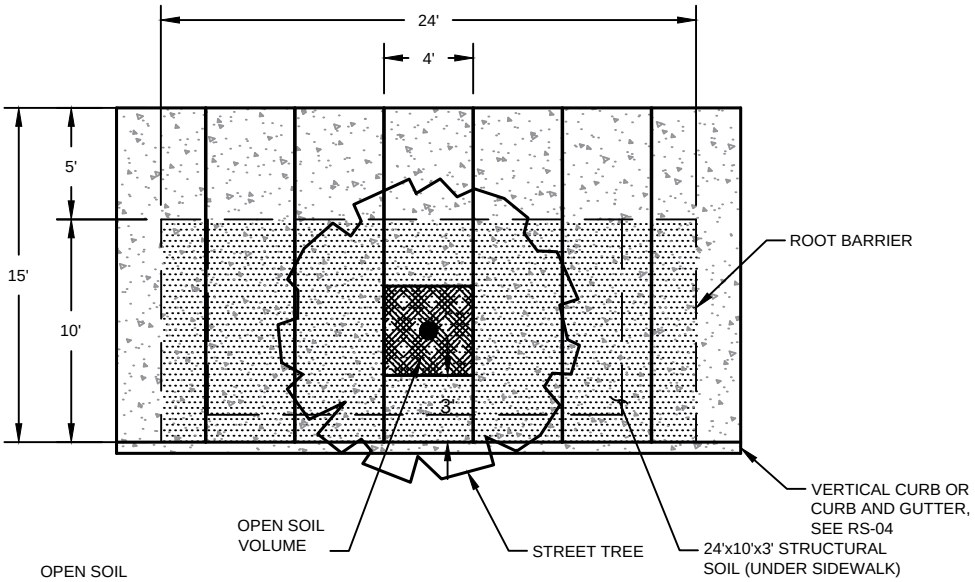
LID-1 Tree Pit Volume

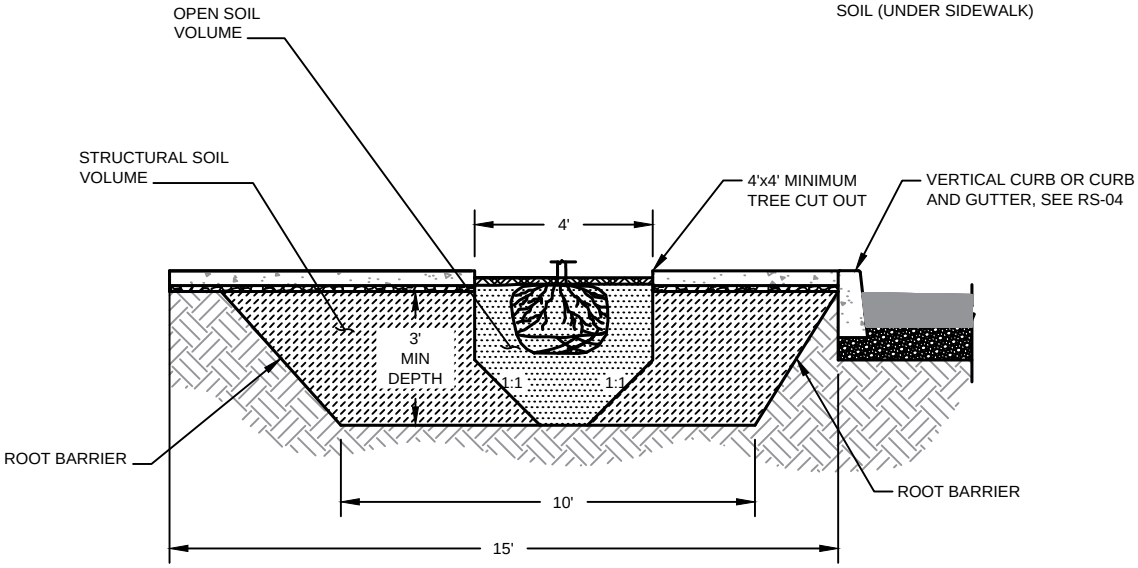
LID-2 Curb Cut Inlet

LID-3 Curb Cut Outlet

LID-4 Reverse Slope Sidewalk

LID-5 Residential Driveway - Ribbon





TOTAL SOIL VOLUME CALCULATION FOR TYPICAL STREET TREE:

OPEN SOIL VOLUME = 4'x4'x3' = 48 CF
STRUCTURAL SOIL VOLUME = 24'x10' x3' - OPEN SOIL VOLUME= 672 CF
TOTAL SOIL VOLUME = 720 CF (MINIMUM REQUIRED)

NOT TO SCALE

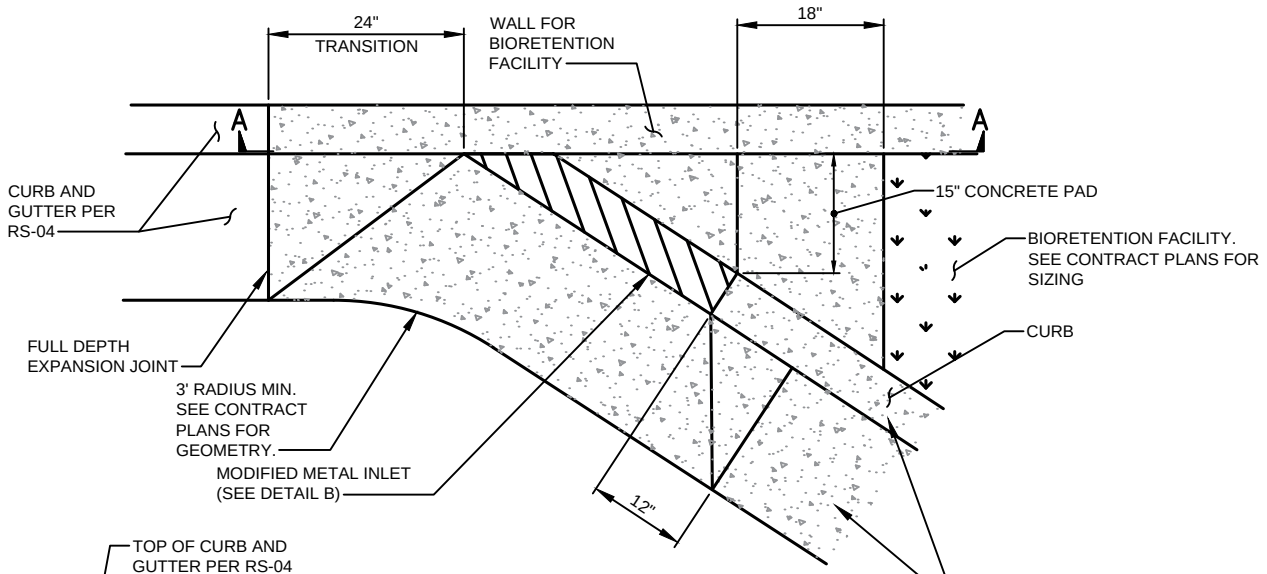
City of Tukwila

TREE PIT VOLUME

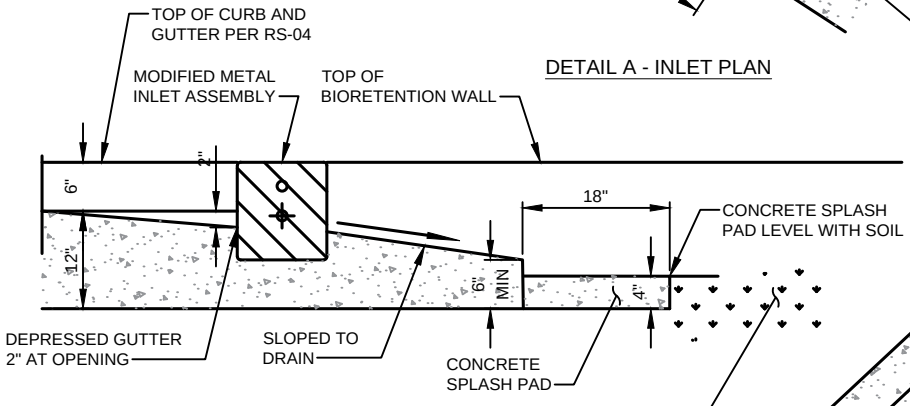
SHEET: LID - 1

LAST REVISION: APRIL 2019

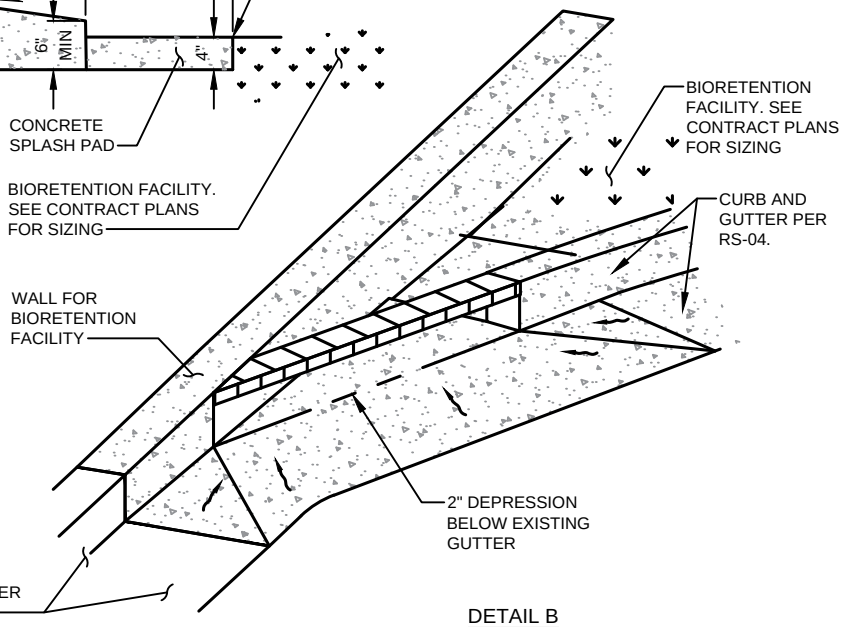
APPROVAL: H. PONNEKANTI



DETAIL A - INLET PLAN



SECTION A-A



DETAIL B
INLET TO BIORETENTION CURB EXTENSION

NOTES:

1. ADDITIONAL CONCRETE INLETS, CAN BE ADDED IF NECESSARY (PREFERABLY IMMEDIATELY DOWNSTREAM OF EACH CHECK DAM TO MINIMIZE POTENTIAL BACKFLOW).
2. SAWCUT BEYOND FACILITY AND TRANSITION EXISTING CURB TO NEW CURB AND GUTTER AT 1" PER FOOT AS NECESSARY.
3. INLET MAY BE MODIFIED TO MAXIMIZE FLOW ENTRY TO STORMWATER FACILITY.
4. MODIFY INLET AND OUTLET DESIGN AS NEEDED FOR SITE.
5. ENSURE OUTLET NOTCH ELEVATION IS 2" BELOW LOWEST INLETS AND SIDEWALK NOTCHES.
6. CONCRETE SPLASH PAD REQUIRED AT ALL INLETS.

NOT TO SCALE

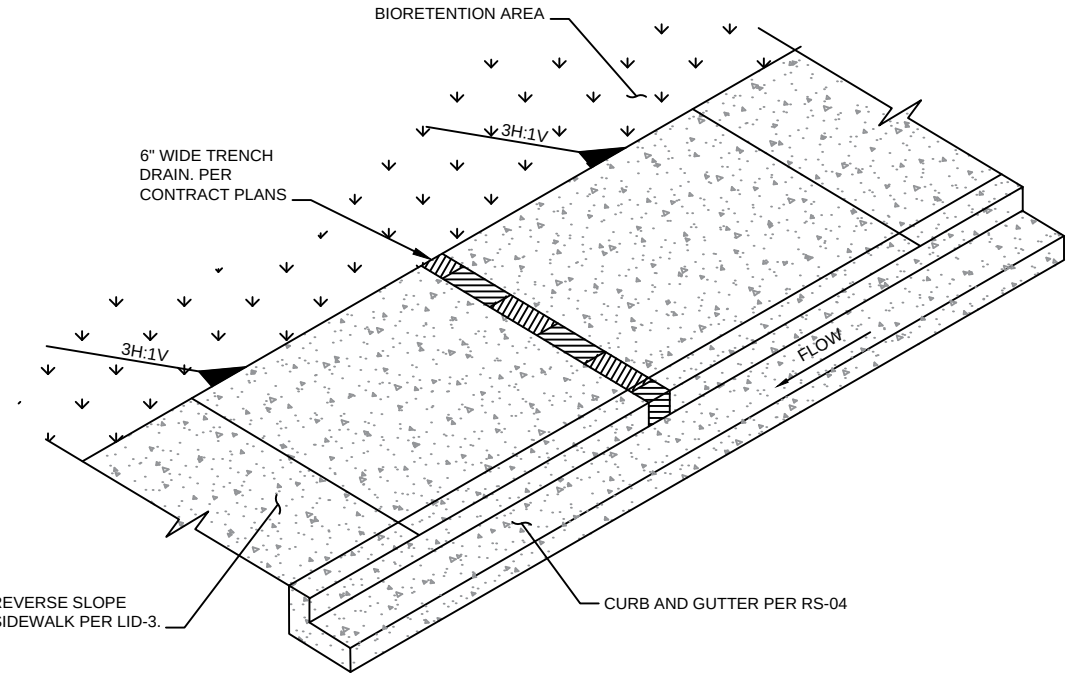
City of Tukwila

CURB CUT INLET

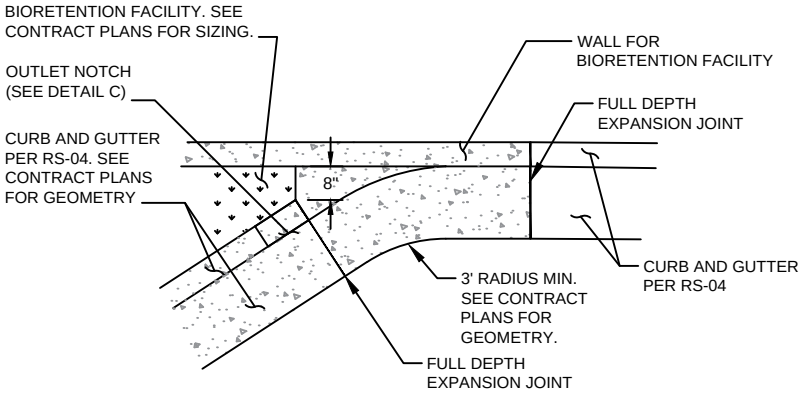
SHEET: LID - 2

LAST REVISION: APRIL 2019

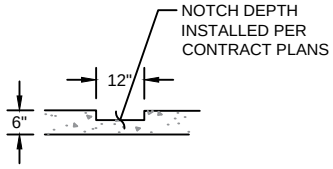
APPROVAL: H. PONNEKANTI



DETAIL A - BIORETENTION TRENCH DRAIN DETAIL



DETAIL B - OUTLET FROM BIORETENTION CURB EXTENSION



DETAIL C - OUTLET NOTCH SECTION VIEW

NOTES:

1. TO MATCH TO EXISTING SIDEWALK, SAWCUT BEYOND FACILITY AND TRANSITION EXISTING CURB TO NEW CURB AND GUTTER PER CONTRACT GEOMETRY.
2. MODIFY INLET AND OUTLET DESIGN AS NEEDED FOR SITE.
3. ENSURE OUTLET NOTCH ELEVATION IS 2" BELOW LOWEST INLETS AND SIDEWALK NOTCHES.

NOT TO SCALE

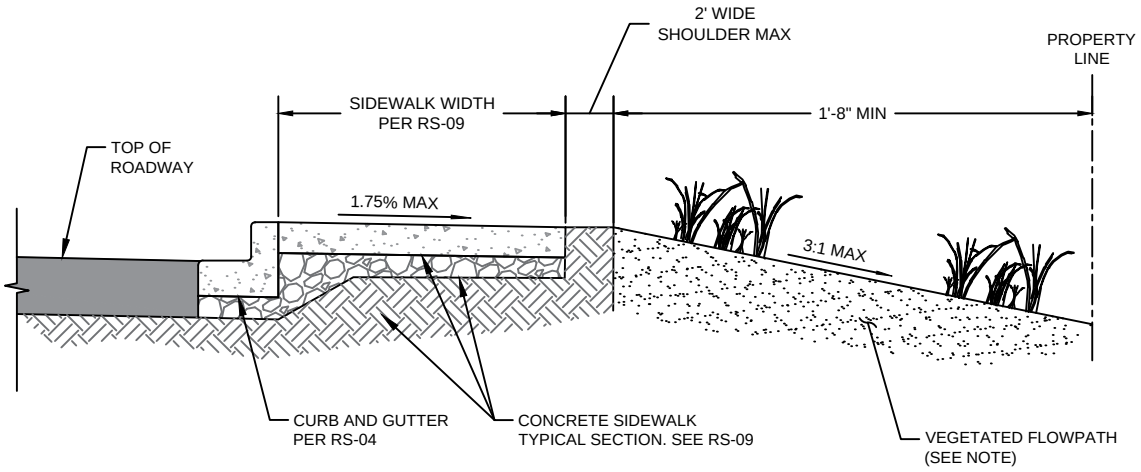
City of Tukwila

CURB CUT OUTLET

SHEET: LID - 3

LAST REVISION: APRIL 2019

APPROVAL: H. PONNEKANTI



NOTES:

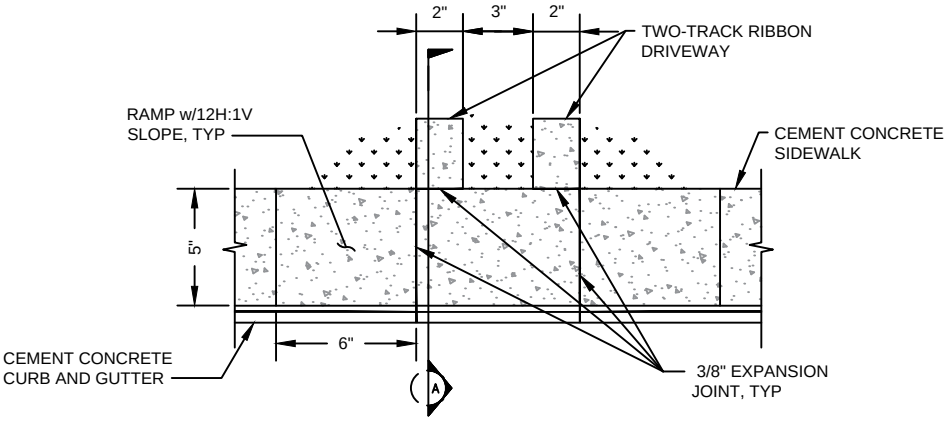
1. THE EDGE OF THE SIDEWALK AND THE GROUND ADJACENT TO OR IMMEDIATELY BELOW THE EDGE MUST BE EITHER LEVEL OR SLOPED SUCH THAT THE DIRECTION OF SHEET FLOW IS PERPENDICULAR TO THE EDGE OR NO MORE THAN 45 DEGREES FROM PERPENDICULAR.
2. A "VEGETATED FLOWPATH SEGMENT" OF AT LEAST 10 FEET IN LENGTH MUST BE AVAILABLE ALONG THE FLOWPATH THAT RUNOFF WOULD FOLLOW UPON DISCHARGE FROM THE SIDEWALK. VEGETATED FLOW PATH MUST MEET CRITERIA OF 2016 KING COUNTY SWDM C.2.41.
3. SIDEWALK LONGITUDINAL SLOPE SHALL BE 10% MAXIMUM.

NOT TO SCALE

City of Tukwila

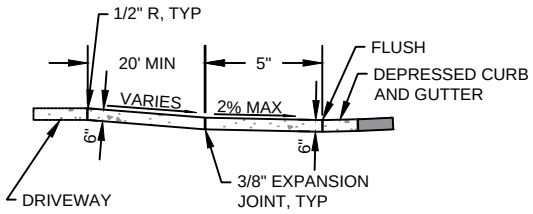
REVERSE SLOPE SIDEWALK

SHEET:	**LID - 4**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

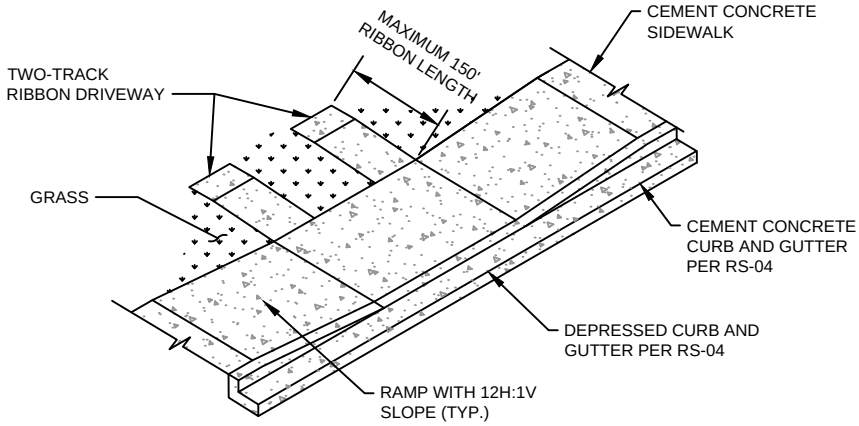


PLAN VIEW

CEMENT CONCRETE DRIVEWAY RIBBON ENTRANCE



SECTION A



RIBBON - ISOMETRIC VIEW

NOTES:

1. THIS ALTERNATE SHOULD BE USED ONLY AFTER STUDYING CLOSENESS OF DRIVEWAYS, DRAINAGE, TOPOGRAPHY, DRIVEWAY GRADES, ETC.
2. CONCRETE SHALL BE CLASS 4000.
3. INSPECTION REQUIRED BEFORE PLACING CONCRETE. AT LEAST 24 HOUR NOTICE MUST BE GIVEN TO TUKWILA PUBLIC WORKS DEPARTMENT.
4. ALL DRIVEWAY APRONS SHALL BE A MINIMUM OF 6" THICK.
5. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH APWA/WSDOT PLANS AND SPECIFICATIONS OR AS DIRECTED BY THE CITY OF TUKWILA.
6. AN ASPHALT APRON MAY BE USED WITHIN THE ROW IN AREAS WHERE NO CURB EXISTS.
7. REMOVAL OF EXISTING CONCRETE CURB, GUTTER OR SIDEWALK SHALL BE SAW CUT TO THE NEXT CONSTRUCTION JOINT.

NOT TO SCALE

City of Tukwila

RESIDENTIAL DRIVEWAY - RIBBON

SHEET:	**LID - 5**
LAST REVISION: APRIL 2019	
APPROVAL: H. PONNEKANTI	

APPENDIX A DEFINITIONS

DEFINITIONS AND ACRONYMS

These definitions are for use with these Standards. Unless specifically defined below, words or phrases used in this ordinance shall be interpreted to give them the meaning they have in common usage and to give this ordinance its most reasonable application.

AASHTO - American Association of State Highway and Transportation Officials.

ACCESS - means the safe, adequate, and usable ingress/egress (entrance/exit) to a property or use.

ACTUAL ELEVATION - means the elevation in relationship to mean sea level.

ADVERSE IMPACT - means any deleterious effect on waters or wetlands, including their quality, quantity, surface area, species composition, aesthetics or usefulness for human or natural uses which are or may potentially be harmful or injurious to human health, welfare, safety or property, to biological productivity, diversity, or stability or which unreasonably interferes with the enjoyment of life or property, including outdoor recreation.

AGRICULTURAL LAND MANAGEMENT PRACTICES - means those methods and procedures used in the cultivation of land in order to further crop production and conservation of related soil and water resources.

AIA - American Institute of Architecture.

ANNUAL AVERAGE DAILY TRAFFIC (AADT) - means daily traffic that is averaged over one calendar year.

APPLICANT - means any person, governmental agency, or other entity that executes the necessary forms to procure official approval of a project or a permit to carry out construction of a project.

STANDARD SPECIFICATIONS - means the current edition of the standard specifications for municipal public works construction prepared by the Washington State Chapter of the American Public Works Association and the Washington State Department of Transportation, as adopted by the City of Tukwila.

ASTM - American Standards for Testing Materials.

AVERAGE DAILY TRAFFIC (ADT) - means the average number of vehicles passing a specified point during a 24-hour period.

AWWA - American Water Works Association.

BACKFLOW - means a flow of water or other liquids, gases or solids from any source back into the customer's plumbing system or the water purveyor's distribution system.

BACKFLOW PREVENTION DEVICE - means a device, approved by the State Department of Health and by the American Water Works Association, used to counteract back pressure or prevent back-siphoning into the distribution system of a public water supply.

BASE FLOOD ELEVATION - means the flood having a one-percent chance of being equaled or exceeded in any given year. Also referred to as the 100-year flood.

BASEMENT - means any area of the building having its floor subgrade (below ground) on all sides.

BEST AVAILABLE INFORMATION - means in the absence of official flood insurance rate map data, the City can use data from federal, state, or other sources provided this data has either been generated using technically defensible methods or is based on reasonable historical analysis and experience.

BIORETENTION – means a stormwater best management practice consisting of a shallow landscaped depression designed to temporarily store and promote infiltration of stormwater runoff. Bioretenetion may take the form of a cell, swale or planter.

BOLLARD - means a post used to prevent vehicle access.

BOND/SURETY - means a surety bond, cash deposit, escrow account, any assignment of funds, irrevocable letter of credit, or other means acceptable to the Director to guarantee acceptable performance, execution, and completion of the work, in accordance with the project's approved plans and in accordance with all applicable governmental requirements.

CBD - Central Business District.

CDF - Controlled density fill.

CFR -Code of Federal Regulations.

CITY - means the City of Tukwila or the City Council of Tukwila.

CLEARING - means the removal of vegetation from a site by physical, mechanical, chemical, or other means. This does not mean landscape maintenance or pruning consistent with accepted horticultural practices that do not impair the health or survival of trees and vegetation.

COMPREHENSIVE PLAN - means a plan adopted by the City Council to guide the physical growth and improvement of the City and urban growth management area, including any future amendments and revision.

CONVEYANCE SYSTEM - means natural and man-made drainage features that collect, contain, and convey surface water. Natural drainage features include swales, streams, rivers, lakes, and wetlands. Man-made features include gutters, ditches, pipes, and detention/retention facilities.

CRITICAL DRAINAGE AREA - means any drainage basin having erosion, flooding or water quality issues as documented in the Comprehensive Surface Water Management Plan or drainage basin studies.

CRITICAL FACILITY - means any structure for which even a slight chance of flooding is too great, such as schools, nursing homes, hospitals, police, fire and emergency response installations, and installations which produce, use, or store hazardous materials or hazardous waste.

CROSS-CONNECTION - means any physical arrangement whereby a public water supply is connected, directly or indirectly, with any other water supply system, sewer, drain, conduit, pool, storage reservoir, plumbing fixture, or other device which contains or may contain contaminated water, sewage, or other wastes or liquids of unknown or unsafe quality, which may be capable of imparting contamination to a public water supply.

DEDICATION - means the deliberate appropriating of land by an owner(s) for any general and public uses, reserving to themselves no other rights than such as are compatible with the full exercise and enjoyment of the public uses to which the property is to be devoted. The intent to dedicate will be evidenced presentation of a deed.

DETENTION STRUCTURE - means a permanent structure designed to store runoff and discharge storage at controlled rates.

DEVELOP LAND - means to change the runoff characteristics of a parcel of land.

DEVELOPER - means the applicant for a development permit, their successors, and/or assignees.

DEVELOPER AGREEMENT - means an agreement between the City and the Developer, which contains work descriptions, estimated costs, responsibilities for the work performance and an expiration date.

DEVELOPER REIMBURSEMENT AGREEMENT - means an agreement between the City and a developer, who installed public improvements. The agreement provides for reimbursement of a fair prorated share by any real estate owners who have not contributed to the original cost of such facilities, and who subsequently connect to, or use the improvement.

DEVELOPMENT - means any man-made change of improved or unimproved real estate,; the construction, reconstruction, conversion, structural alteration, relocation, or enlargement of any structure; any mining, excavation, landfill, clearing, or land disturbance; or any use or extension of the use of land.

DIRECTOR - means the Director of the Public Works Department or designee, including the City Engineer and City inspectors.

DNR - Department of Natural Resources.

DOE - State Department of Ecology.

DOH - State Department of Health.

EASEMENT - means interest in land which does not include any rights of possession. A right of one owner of land to make lawful and beneficial use of the land of another created by an express or implied agreement.

ELEVATED BUILDING - means for flood insurance purposes, a non-basement building which has its lowest elevated floor raised above ground level by foundation walls, shear walls, post, piers, pilings, or columns.

ENGINEER, GEOTECHNICAL - means a practicing, professional civil engineer registered with the State of Washington, who has knowledge and practice of geotechnical engineering.

ENGINEER, PROFESSIONAL - means an engineer, registered in Washington State.

ENGINEER, SOILS - means Geotechnical Engineer.

ENGINEERING GEOLOGIST - means a geologist certified by the State as experienced and knowledgeable in engineering geology.

ENGINEERING GEOLOGY - means the application of geologic knowledge in the investigation and evaluation of naturally occurring rock and soil for use in the design of civil works.

ENGINEERING, GEOTECHNICAL - means the application of soil mechanics in the investigation, evaluation, and design of civil works involving the use of earth materials and the inspection or testing of the construction thereof.

ESC - Erosion prevention and sediment control.

FBFM - Flood boundary/floodway map.

FEMA - Federal Emergency Management Agency.

FIRE MAIN - means a water line, at least 6 inch diameter, serving fire hydrants or fire protection systems.

FIRM - Flood Insurance Rate Map.

FLOOD INSURANCE RATE MAP (FIRM) - means the official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the City.

FLOOD INSURANCE STUDY - means the official report and documents provided by the Federal Insurance Administration that includes flood profiles, the flood boundary-floodway map, and the water surface elevation of the base flood.

FLOOD OR FLOODING - means a general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters, and/or the unusual and rapid accumulation of runoff of surface waters from any source.

FLOOD PLAIN - means any land area susceptible to flooding from any source.

FLOOD PRONE - means any land area susceptible to flooding, not shown on FIRMs, designated as flood-prone by the Director, using best available information.

FLOOD PROOFING - means any combination of structural and non-structural additions, changes, or adjustments to nonresidential structures, which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures, or their contents. For flood proofed nonresidential buildings, FEMA bases flood insurance premiums on rates that are one foot below the flood-proofed level. For example, a building flood proofed to the base flood level will be rated as one foot below that level.

FLOOD ZONE - means any area designated as special flood hazard or flood prone, or any area within the shoreline per Tukwila Municipal Code.

FLOODWAY - means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot.

FLOW ATTENUATION - means detaining or retaining runoff to reduce the peak discharge.

FRONTAGE IMPROVEMENTS - means all of the street pavement, curb, gutter, sidewalk, transit bus shelters, bus pullouts, storm drainage, water and sewer utilities, power and communications cable undergrounding, street trees and street lighting, located within any public right-of-way abutting the property boundary of a development.

FZCP - Flood Zone Control Permit.

GRADING - means any act by which soil is cleared, stripped, stockpiled, excavated, scarified, filled, or any combination thereof.

HALF STREET - means a street constructed utilizing at least half the regular width of the right-of-way and permitted as an interim facility pending construction of the other half.

HDPE - high-density polyethylene.

HEALTH OFFICER - means the Director of the South King County Department of Public Health or the duly authorized representative.

HIGH USE SITE - means a commercial or industrial site that (1) has an expected average daily traffic (ADT) count equal to or greater than 100 vehicles per 1,000 square feet of gross building area, (2) is subject to petroleum storage or transfer in excess of 1,500 gallon per year, not including delivered heating oil, or (3) is subject to use, storage, or maintenance of a fleet of 25 or more diesel vehicles that are over 10 tons net weight (trucks, buses, trains, heavy equipment). Also included is any road intersection with a measured ADT count of 25,000 vehicles or more on the main roadway and 15,000 vehicles or more on any intersecting roadway, excluding projects proposing primarily pedestrian or bicycle use improvements.

IMPERVIOUS SURFACE - means any surface that cannot be effectively and easily penetrated by water; a hard surface that either prevents or restricts the entry of water into the soil mantle or causes water to run off the surface in greater quantities or at an increased flow rate compared to natural conditions prior to development. Impervious surfaces include roof tops, paved areas, gravel roads, packed earthen surfaces, oiled surfaces, and macadam. Open, uncovered flood control, or water quality facilities are not considered impervious surfaces.

IMPROVEMENTS - means any improvement to public, real, or personal property, including but not limited to, installation of streets, roads, pedestrian/bike facilities, streetlights; landscape features; sewer and waterlines; bridge structures; storm drainage facilities; and traffic control devices.

INFILTRATION - means the passage or movement of water into the soil subsurface.

INTERCEPTOR - means a sewer that receives flow from a number of main or trunk sewers, force mains, etc.

KCSWDM - the adopted King County Surface Water Design Manual.

LEVEE - means a man-made structure, designed and constructed in accordance with sound engineering practices to contain, control, or divert water flow for protection from flooding.

LEVEL III CERTIFICATION - means a National Institute For Certification in Engineering Technologies, fire protection engineering technology certificate of competency, to design and install fire protection systems including underground backflow prevention devices and associated thrust blocking.

LOCAL IMPROVEMENT - means a public improvement provided to a specific area benefiting that area and usually paid for by a special assessment for the benefit of property owners.

LOWEST FLOOR (flood control definition) - means the lowest floor of the lowest enclosed area (including basement). If an unfinished or flood resistant enclosure is used solely for vehicle parking, building access, or storage, if this enclosure is in an area other than a basement, and if this enclosure is built so that the structure meets the applicable non-elevation design requirements for nonresidential construction, the enclosure is not considered the structure's lowest floor.

Low Impact Development (LID) – Means a stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation and transpiration by emphasizing conservation use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design.

MANUFACTURED HOME (flood control definition) - means a structure, transportable in one or more sections, built on a permanent chassis and designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle."

MANUFACTURED HOME PARK OR SUBDIVISION (flood control definition) - means a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

MANUFACTURED HOME PARK OR SUBDIVISION, EXISTING - means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before 1981, the effective date of the Tukwila's original floodplain management regulations.

MANUFACTURED HOME PARK OR SUBDIVISION, EXPANSION TO AN EXISTING - means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed, including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads.

MEAN SEA LEVEL (flood control definition) - means the National Geodetic Vertical Datum (NGVD) of 1929 to which the base flood elevations shown on the Flood Insurance Rate Map are referenced.

METER - means a water measuring device approved by the Director.

METER, DEDUCT - means a meter for water supply that does not discharge to the public sewer. The Permittee provides, owns, installs, and maintains the meter. This meter is installed downstream of a permanent water meter. An example is landscape irrigation.

METER, PERMANENT - means meter for domestic water supply of all new or reestablished services when sewer discharge rates are calculated based on water usage. Each individual building requires a separate water main tap. The Permittee pays for a City-provided water meter.

METER, TEMPORARY - means a water meter rented from the City for use of public water, on a short term basis, where a metered supply does not already exist. The Permittee rents the meter from the City. Examples include dust suppression during construction or water supply during hydroseeding.

METER, WATER ONLY - Required for a separate service from the main that will not discharge to the public sewer. The Permittee pays for a City-provided water meter.

MIC - MANUFACTURING/INDUSTRIAL CENTER – This area is defined by Tukwila zoning codes and can be referenced through zoning maps available on the City's website or TMC 18.36 (MIC/L) and 18.38 (MIC/H).

MULTIFAMILY - means, in reference to development, the construction of a building or buildings to house two or more families living independently of each other.

MUTCD - Manual on Uniform Traffic Control Devices.

NAD - means North American Datum, horizontal, of 1983/1991.

NAVD - means North American Vertical Datum.

NEW CONSTRUCTION (flood control definition) - means structures for which the "start of construction" commenced on or after 1981, the effective date of Tukwila's original floodplain management regulations.

NEW MANUFACTURED HOME PARK OR SUBDIVISION - means a manufactured home park or subdivision for which the construction of facilities, including streets, utilities, concrete pads, is completed on or after 1988, the effective date of Tukwila's original floodplain management regulations.

NFIP - National Flood Insurance Program.

NGVD - National Geodetic Vertical Datum of 1929.

NICET - National Institute for Certification in Engineering Fundamentals.

NPDES - National Pollutant Discharge Elimination System.

OSHA - Occupational Safety and Health Administration.

PERFORMANCE GUARANTEE - means a financial guarantee in a form acceptable to the City Attorney, ensuring all improvements, facilities, or work will be completed in compliance with regulations, and approved plans and specifications.

PERMEABLE PAVEMENT – means a pervious concrete, porous asphalt, permeable pavers lor other forms of pervious or porous paving material intended to allow passage of water through the pavement section. It often includes an aggregate base that provides structural support and acts as a stormwater reservoir.

PERMITTEE - means any person, governmental agency, or other entity that is performing, or plans to perform, permitted work within the City.

PLANS - means the plans, profiles, cross sections, elevations, details, and supplementary specifications, signed by a licensed professional engineer and approved by the Director, showing the location, character, dimensions, and details of the work to be performed.

POLLUTION - means contamination or other alteration of the physical, chemical, or biological properties of waters of the state that will or is likely to create a nuisance or render waters harmful, detrimental, or injurious 1) to public health, safety, or welfare, or 2) to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or 3) to livestock, wild animals, birds, fish, or other aquatic life. Contamination includes discharge of any liquid, gas, or solid, radioactive or other substance. Alteration includes temperature, taste, color, turbidity, or odor.

PROJECT - means activity encompassing all phases of the work to be performed and is synonymous to the term "improvement" or "work."

PW - means Public Works Department.

RECREATIONAL VEHICLE - means a vehicle which is:

Built on a single chassis;

400 square feet or less when measured at the largest horizontal projections;

Designed to be self-propelled or permanently towable by a light duty truck; and,

Designed primarily for use as temporary living quarters for recreational, camping, travel, or seasonal use.

REDEVELOPMENT PROJECT - means a project that adds, replaces, or alters exterior impervious surface on a site that already has 35% or impervious surface.

RETENTION STRUCTURE - means a permanent structure that provides for the storage of runoff by means of a permanent pool of water.

RIGHT-OF-WAY - means (1) a strip of land acquired by reservation, dedication, forced dedication, prescription, or condemnation and intended to be occupied by a road, crosswalk, railroad, electric transmission lines, oil or gas pipeline, water line, sanitary sewer, storm sewer, or other similar public accesses or public uses; and (2) the right of one to pass over the property of another.

ROAD - means street.

RPPA – Reduced pressure principle assembly (formerly Reduced Pressure Backflow Assembly).

SAO - Sensitive Areas Overlay.

SEDIMENT - means soils or other materials transported or deposited by the action of wind, water, ice, or gravity.

SENSITIVE AREA - means wetland, watercourse, landslide hazard area, or abandoned coal mine as designated or defined by the City's Sensitive Areas Ordinance.

SENSITIVE AREA, CLASS 2 - means an area where landslide potential is moderate, including areas sloping between 20% and 40%, and which are underlain by relatively permeable soils.

SENSITIVE AREA, CLASS 3 - means an area where landslide potential is high, including areas sloping between 20% and 40%, and which are underlain by relatively impermeable soils or by bedrock, and which also include all areas sloping more steeply than 40%.

SENSITIVE AREA, CLASS 4 - means areas, where landslide potential is very high, which include sloping areas with mapable zones of groundwater seepage, and which also include existing mapable landslide deposits regardless of slope.

SEPA - State Environmental Policy Act.

SEWER, LATERAL - means the portion of the sewer line extending from the City's main to the building, having no other common sewers discharging into it. A lateral sewer is operated and maintained by the property owner. Sometimes called a side sewer.

SEWER, MAIN or TRUNK - means a sewer that receives flow from one or more mains.

SEWER, MAIN EXTENSION - means the portion of the sewer line extending for more than 150 feet from the City's main. Lateral sewer connections are made to the sewer main extension.

SEWER, PRIVATE - means that portion of the system located on private property where no easements are granted to the City. Private sewers include gravity laterals, building sewers, and sewer collection systems internal to developments; such as, apartment complexes, condominiums, townhouses, shopping centers, commercial office parks, mobile home parks, etc. A private sewer includes the portion of the lateral between the property line and sewer main. Maintenance of a private sewer will be the responsibility of the property owner(s).

SEWER, PUBLIC - means that portion of the system located within rights-of-way or easements (excluding laterals) and is operated and maintained by the City.

SEWER, STUB - means sewer, lateral.

SHALLOW FLOODING AREA - means a designated AO, or AH zone on the Flood Insurance Rate Map (FIRM). The base flood depths range from one to three feet; a clearly defined channel does not exist; the path of flooding is unpredictable and indeterminate; and, velocity flow may be evident. AO is characterized as sheet flow and AH indicates ponding.

SIDEWALK - a paved, surfaced, or leveled area, paralleling and usually separated from the street and normally used as a pedestrian walkway.

SITE - means any tract, lot, or parcel of land, or combination of tracts, lots, or parcels of land which are in one ownership, or are contiguous and in diverse ownership, where development is to be performed as a part of a unit, subdivision, or project.

SITE PLAN - means the development plan for one or more lots on which is shown the existing and proposed conditions of the lot, topography, vegetation, drainage, flood plains, walkways; means of ingress and egress; circulation; utility services; structures and buildings; signs and lighting; berms, buffers, and screening devices; surrounding development; and any other information that reasonably may be required in order that an informed decision can be made by the reviewing authority.

SPECIAL FLOOD HAZARD AREA - means the land in the flood plain subject to a one- percent or greater chance of flooding in any given year. Also called the 100-year flood elevation or the base flood elevation. These areas are designated on Flood Insurance Rate Maps (FIRMs) using the letters A or V. Special flood hazard areas include flood prone areas designated by the City.

STABILIZATION - means the prevention of soil movement by any various vegetative and/or structural means.

STANDARDS - means the City of Tukwila Development Guidelines and Design and Construction Standards.

START OF CONSTRUCTION - includes, for flood insurance purposes, substantial improvement, and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, placement or other improvement occurred within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading

and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

STORM DRAINAGE PLAN - means a set of drawings and documents submitted as a prerequisite to obtaining a development permit. The plan contains all of the information and specifications pertaining to surface water management onsite and offsite.

STREET, ARTERIAL - means a street that connects access streets to higher classifications.

STREET, CUL-DE-SAC - means a street with a single common ingress and egress and with a circular turnaround at the end.

STREET FRONTAGE - means either the area between any lot lines that intersect, and the area of a lot that directly abuts the boundary of a public or private street right-of-way.

STREET, PRIVATE - means a street, built to City standards, but is not owned, nor maintained by the City. A private street is a street the City or other governmental entity has not accepted for ownership or maintenance. This does not include private access road as defined in the Subdivision code.

STREET, PUBLIC - means a public right-of-way, usually containing improved facilities for transportation and utilities. A public street is a publicly owned and maintained street that serves more than four lots or is longer than 200 feet.

STRUCTURE (flood control definition) - means, for flood plain management, a manufactured home or a walled and roofed building, including a gas or liquid storage tank, that is principally above ground. Structure, for insurance purposes, means a manufactured home, or a walled and roofed building, except a gas or liquid storage tank, that is principally above ground. (CFR 59.1)

SUBSTANTIAL DAMAGE - means damage of any origin sustained by a structure whereby the cost of restoring the structure to it's before damaged

condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

SUBSTANTIAL IMPROVEMENT (flood control definition) - means any repair, reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the assessed value of the structure either:

Before the improvement or repair is started, or

Before damage occurred, if the structure is being restored.

For the purposes of this definition, "substantial improvement" occurs when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure.

"Substantial improvement" does not include:

Any improvement of a structure to comply with existing state or local health, sanitary, or safety code specifications which is solely necessary to assure safe living conditions, nor

Any alteration of a structure listed on the national Registry of Historic Places or a state inventory of historic places.

SURVEYOR - means any Washington State licensed professional land surveyor.

TMC - Tukwila Municipal Code.

TRAFFIC IMPACT ANALYSIS - means a report analyzing anticipated roadway conditions with and without proposed development, including an analysis of mitigation measure and a calculation of fair share financial contributions.

TUKWILA URBAN CENTER – The TUC is defined by Tukwila zoning codes and can be referenced through zoning maps available on the City's website or TMC 18.28. The specific area map is defined by code but can generally be described as that area bounded by I-405 on the north, S180th on the south, I-5 to the West and the UP/BNSF railroad tracks to the east (just east of West Valley Highway).

TYPICAL - means the guidelines that shall be followed unless the Director approves a variation.

UTILITY - means a company providing public service including, but not limited to, gas, oil, electric power, street lighting, telephone, telegraph, water, sanitary sewer, storm drainage, solid waste, or cable television, whether or not such company is privately owned or owned by a governmental entity.

VACATION - means the process by which public right-of-way becomes private property.

VARIANCE - means a grant of relief by the City for activities that would otherwise be prohibited by the TMC.

WAC - Washington Administrative Code.

WDFW - Washington Department of Fish and Wildlife

WISHA - Washington Industrial Safety and Health Administration.

WSDOT - Washington State Department of Transportation.

ZONE "A" - means a zone on the Flood Insurance Rate Map (FIRM) where flooding is known to occur, but no flood elevation has been determined.

ZONE "AH" - means a zone on the Flood Insurance Rate Map (FIRM) characterized by base flood depths from one to three feet; having no clearly defined channel or having an unpredictable and indeterminate channel, where velocity flow may be evident. AH indicates ponding.

ZONE "AE" - means a zone on the Flood Insurance Rate Map (FIRM) where base flood elevations are determined and are shown on the map.

APPENDIX B STANDARD CONSTRUCTION PLAN NOTES

STANDARD CONSTRUCTION NOTES

Prior to starting construction, contact **ONE-CALL (1-800-424-5555)**, or **811**, for utility locations.

CONTACTS

Project Manager: *Provide Name and Contact Number*

Design Engineer: *Provide Name and Contact Number*

Owner: *Provide Name and Contact Number*

Other: *Provide Name and Contact Number*

GENERAL

1. Locations shown for existing utilities are approximate.
2. At least 48 hours before starting project site work, notify the Utilities Inspector at 206-433-0179.
3. Request a Public Works utility inspection at least 24 hours in advance by calling 206-433-0179. The IVR Inspection line at 206-438-9350 or Online Portal https://permitting.tukwila.gov/
4. The Contractor assumes sole responsibility for worker safety, and damage to structures and improvements resulting from construction operations.
5. The Contractor shall have the permit(s) and conditions, the approved plans, and a current copy of City of Tukwila Development Guidelines and Design and Construction Standards available at the job site.
6. All work shall conform to these approved drawings. Any changes from the approved plans require pre-approval from the owner, the engineer, and the City of Tukwila.
7. All methods and materials shall meet City of Tukwila Development Guidelines and Design and Construction Standards, unless otherwise approved by the Public Works Director.
8. Contractor shall maintain a current set of record drawings on-site.
9. Contractor shall provide record drawings prior to project final approval.
10. Provide traffic control and street maintenance plan for Public Works approval before implementation.

11. All surveying for public facilities shall be done under the direction of a Washington licensed land surveyor. Vertical datum shall be NAVD 1988. Horizontal datum shall be Washington State (grid) Coordinates, North Zone, using NAD 83/91 survey control and tied to any two City of Tukwila Horizontal Control Monuments. For projects within a flood control zone, the Permittee shall provide conversion calculations to NGVD 1929.
12. Replace or relocate all signs damaged or removed due to construction.
13. Retain, replace or restore existing vegetation in rights-of-way, easements, and Access Tracts.

CONSTRUCTION

1. All work performed shall be per approved plans and specifications only. The Permittee is required to maintain a set of approved plans, specifications, and associated permits on the job site. Work shall be performed in accordance with all federal, state, and local laws. Permittee shall apply for a Revision for any work not according to the approved plans.
2. Permittee/Contractor shall arrange a preconstruction conference with the City's Inspector(s) prior to beginning any work.
3. Work in Roadways
   a. All work in roadways shall meet TMC 11 and the following:
   b. Prior to any activity in City right-of-way, the Permittee shall provide the City a traffic control plan for review and approval. The traffic control plan shall include the location, address and description of traffic flow during the work and shall meet MUTCD requirements.
   c. All work requiring lane closures must be by permit only. From the third Thursday in November to the following January 2nd, the Director does not allow lane closures in the Tukwila Urban Center.
   d. Fire, pedestrian, and vehicular access to buildings shall be maintained at all times, except when Permittee has permission from the building owner and the Director to close an access.
   e. All roadways shall be kept free of dirt and debris using street sweepers. Use of water trucks for cleaning roadways requires preapproval from the Director.
   f. Install steel plates over any trench, at any time work is stopped and the trench is left open.

GRADING AND EROSION CONTROL NOTES

1. The erosion prevention and sediment control (ESC) measures on the approved plans are minimum requirements.

2. Before beginning any construction activities, establish the clearing limits, install construction entrance, and install erosion prevention and sediment control measures.
3. Before any ground disturbance occurs, all downstream erosion prevention and sediment control measures (ESC) must be constructed and in operation. Install and maintain all ESC measures according to the ESC plan.
4. ESC measures, including all perimeter controls, shall remain in place until final site construction is completed and permanent stabilization is established.
5. From **May 1 through September 30**, provide temporary and permanent cover measures to protect disturbed areas that will remain unworked for seven days or more.
6. From **October 1 through April 30**, provide temporary and permanent cover measures to protect disturbed areas that will remain unworked for **two days** or more. In addition to cover measures, the Contractor shall:
   a. Protect stockpiles and steep cut and fill slopes if unworked for more than **12 hours**.
   b. Stockpile, on site, enough cover materials to cover all disturbed areas.
   c. By **October 8**, seed all areas that will remain unworked during the wet season (October 1 through April 30). Mulch all seeded areas.
7. Failure to maintain ESC measures in accordance with the approved maintenance schedule may result in the work being performed at the direction of the Director and assessed as a lien against the property where such facilities are located.
8. During the life of the project, the Permittee shall maintain in good condition and promptly repair, restore, or replace all grade surfaces; walls, drains, dams, structures, vegetation, erosion and sediment control measures, and other protective devices in accordance with approved plans.
9. The Permittee shall monitor the downstream drainage features, and shall, with the Director's approval, remove all sediment deposition resulting from project-related work.

10. All work performed shall be per approved plans and specifications only. The Permittee is required to maintain a set of approved plans and specifications and associated permits on the job site. Work shall be performed in accordance with all federal, state, and local laws.
11. As the first order of business, the Permittee shall install erosion prevention and sediment control measures per the ESC and shall install the downstream temporary ESC measures before any site disturbance occurs. Before the temporary measures are removed, install and establish the upstream permanent ESC measures.
12. The Permittee shall at all times protect sensitive areas, their buffers, and adjacent private properties and public rights-of-way or easements from damage during grading operations. The Permittee shall restore, to the standards in effect at the time of the issuance of the permit, sensitive areas, their buffers, and public and private properties and improvements damaged by the Permittee's operations.
13. Permittee shall arrange for and comply with the following:
14. Notify the Public Works Department within 48 hours following installation of ESC measures.
15. Obtain permission in writing from the Public Works Department prior to modifying the ESC plan.
16. Maintain all road drainage systems, storm water drainage systems, control measures and other facilities as identified in the ESC plan.
17. Repair any siltation or erosion damages to adjoining properties and drainage facilities.
18. Inspect according to the approved ESC inspection schedule and make needed repairs immediately.

UTILITY NOTES

1. All trench excavation operations shall meet or exceed all applicable shoring laws for trenches over 4-feet deep. All trench safety systems shall meet WISHA requirements.
2. Power, cable, fiber optics, and telephone lines shall be in a trench with a 5' minimum horizontal separation from other underground utilities.
3. Adjust all manholes, catch basins, and valves to finish grade in public rights-of-way or easements after asphalt paving.

STORM DRAINAGE NOTES

1. All methods and materials shall meet City of Tukwila Development Guidelines and Design and Construction Standards, and the adopted King County Surface Water Design Manual, unless otherwise approved.

2. Mark all storm drain inlets with "Dump No Waste" and either "Drains to Streams", "Drains to Wetlands", or "Drains to Groundwater", as applicable. Install 4 inch raised pavement storm drain markers at all catch basin inlets.
3. Driveway culverts shall be of sufficient length to provide a minimum 3:1 slope from the edge of the driveway to the bottom of the ditch. Culverts shall have beveled end sections that match the side slope.

GEOTECHNICAL NOTE

TO DESIGNER: COMPLETE THE FOLLOWING NOTE or DELETE WHEN NOT APPLICABLE:

I, _____, the architect/structural engineer, reviewed the geotechnical report, titled_____,

prepared by _____and dated _____. I understand the report's recommendations, I explained to the Owner the risks due to slides and I incorporated the recommendations into the design. I established measures to reduce potential risk of injury or damage that might be caused by any earth movement predicted in the report.

Signature _____ Date _____ - __-___

APPENDIX C PLAN REVIEW CHECKLIST FOR COMPLETENESS

TUKWILA PUBLIC WORKS DEPARTMENT

PLAN REVIEW CHECKLIST

*This checklist is provided to aid the Engineer's completeness review before submittal to the City and is **not** intended as a full and complete list of requirements for submittals.*

PROJECT DESCRIPTION

Check All that apply to the Project

☐ Development – Private	☐ Development – Single Family	☐ Public Infrastructure
☐ Public road	☐ Sensitive Area(s)	☐ Flood Zone
Onsite Work Includes:		
☐ Clearing, Grading	☐ Paving	☐ Dead End & Landscape Island
☐ Utility Undergrounding	☐ Driveway	☐ Hammerhead
	☐ Private road	
☐ Infiltration ☐ Retention ☐ Detention ☐ Low Impact Development ☐ Habitat Improvement ☐ Other	☐ Looped Fire line ☐ Water Main Extension ☐ Permanent Meter ☐ Deduct Meter ☐ Water Only Meter ☐ Backflow Prevention ☐ Fire ☐Irrigation ☐Water Service	☐ Sewer Main Extension ☐ Sanitary Side Sewer ☐ Abandon Septic Tank ☐ Grease Interceptor ☐ Cap or Remove Utilities
Work in Right-of-way Includes:		
☐ Existing Access ☐ New Access ☐ Traffic signal ☐ Channelization ☐ Curb/gutter ☐ Sidewalk ☐ Signs ☐ Mailboxes ☐ Cable, conduit or other such ☐ Dead end ☐ Utility Undergrounding	☐ Trench Excavation ☐ Boring ☐ Pavement cut ☐ Pavement repair ☐ Pavement overlay ☐ Landscaping ☐ Water Supply ☐ Sewer ☐ Surface Water ☐ Sewer ☐ Traffic Control ☐ Low Impact Development	

PROJECT SUBMITTALS

Check All That Apply to the Project	Required For Work In Right-of-way
☐ Engineer estimate ☐ Geotechnical Report ☐ Traffic Impact Analysis ☐ Technical Information Report (Storm Drainage) ☐ King County Sewer Use Certificate ☐ Water Availability Certificate ☐ Sewer Availability Certificate ☐ South King County Department of Health approval if there is a septic tank onsite ☐ Proof that the Washington State code and the Uniform Plumbing Code were followed when septic tank abandoned ☐ State of Washington current water right permit for wells ☐ King County Industrial Waste Discharge approval ☐ King County DNR approval for connection to interceptor line ☐ Easement(s) ☐ Maintenance Agreement(s) ☐ Hold Harmless – Sensitive Area ☐ Street lighting calculations ☐ Waivers ☐ Recorded Landscape Island Maintenance Agreement ☐ Low Impact Development ☐ Other	☐ Engineer estimate ☐ Activity Description ☐ Plan ☐ Profile ☐ Cross-section ☐ Traffic control plan ☐ Applicant/Owner information ☐ Owner and Applicant in compliance statement ☐ City of Tukwila business license ☐ Copy of legal authorization ☐ Hold Harmless Agreement – right-of-way ☐ Comprehensive general liability insurance ☐ Business automobile liability insurance ☐ Contractor's pollution liability insurance ☐ Security - corporate surety bond, cash deposit or letter of credit ☐ Maintenance Bond ☐ Low Impact Development ☐ Street and pavement restoration plan

PLANS - ALL PROJECTS

Drafting Standards

- ☐ Engineering Drawings:

  Sheets Max: 24" x 36" Min. 11" X 17"

- ☐ Survey Drawings: Sheets 18" x 24"

- ☐ Minimum text size 1/8"
- ☐ Clean, legible, blue or black line format.
- ☐ Existing features with a small pen or half tones.
- ☐ Proposed features with a larger or bolder line weight.
- ☐ Different line types distinguish different features
- ☐ No photographs, stick-ons, or shading.
- ☐ NAD 83/91, Washington State grid Coordinates, North Zone, tied to any two City of Tukwila Horizontal Control Monuments NAVD 1988 Vertical
- ☐ Conversion calculations to NAVD 1929 for flood zone
- ☐ Engineer scale. **No engineering plans will be accepted with architect's scale.**

  - Site work –

    1" = 40' Horizontal,

    1" = 4' Vertical

  - Public Facility –

    1" = 20' Horizontal,

    1" = 2' Vertical

  - Signal Drawing Sheet - 1" = 10'
  - Illumination - 1" = 30'

- ☐ Title block:

  - Title:
  - Date:
  - Design by:

Plan Elements

- ☐ North arrow on each sheet
- ☐ Labeled Record Drawing
- ☐ Labeled as-built drawing, (minimum text height ¼")
- ☐ "Call ~~1.800.424.5555~~ 411Before You Dig" note on sheets showing excavation activity
- ☐ Engineer stamped, signed, and dated each sheet
- ☐ Project Schedule
- ☐ Applicable City's standard details
- ☐ Applicable City's standard notes
- ☐ Survey monument protection
- ☐ Surveyed corner marker protection
- ☐ Topography - Existing and proposed topography contours for 15 feet outside the property lines. Projects within flood control zones and some storm drainage plans require 1-foot intervals.
- ☐ Easements
- ☐ Clearing limits
- ☐ Construction limits
- ☐ No work zones
- ☐ Sensitive areas
- ☐ Buffers and set-backs
- ☐ Finished floor elevation
- ☐ Building footprints onsite and within 15' of the property lines
- ☐ Rights-of-way dimensioned and labeled
- ☐ Adjacent property lines and addresses
- ☐ Street names with quadrant prefix or suffix
- ☐ Existing and proposed pedestrian and bicycle facilities
- ☐ Existing and proposed utilities and improvements (above and below ground),
- ☐ Trees within or adjacent to the public ways – location and dimension
- ☐ Tree protection

<table>
<tr><th colspan="2">PLANS - ALL PROJECTS</th></tr>
<tr><td>

- Drawn by:
- Checked by:
- Signature Approval block
- Sheet number of total sheets (e.g., 2 of 5)

☐ Revisions and revisions dates
☐ Existing and proposed monuments.
☐ Monuments described using current City of Tukwila coordinates.
☐ Features referenced to monuments

</td><td>

☐ Protection of existing structures, fixtures, and facilities within or adjacent to the public ways

</td></tr>
<tr><th>ESC Plan</th><th>Pollution Prevention Plan</th></tr>
<tr><td>

☐ Stockpile locations
☐ Erosion prevention
☐ Runoff velocities minimized
☐ Sediment retention onsite
☐ Clearing limits
☐ Sensitive area buffers
☐ Temporary stabilization
☐ Perimeter protection
☐ Stabilized traffic areas
☐ Surface water controls
☐ Final stabilization methods
☐ Wet season requirements (October 1 through April 30)
☐ ESC Maintenance
☐ Downstream drainage features monitoring
☐ Removal of sediment deposition resulting from project-related work
☐ Post Construction Plans

</td><td>

Does the plan include BMPs for the following activities?

☐ Dewatering
☐ Paving
☐ Structure construction and painting
☐ Material delivery, use, or storage (soil, pesticides, herbicides, fertilizers, detergent, plaster, petroleum products, acids, lime, paints, solvents, curing compounds)
☐ Solid waste
☐ Hazardous waste
☐ Contaminated soils
☐ Concrete waste
☐ Sanitary/septic waste
☐ Vehicle or equipment cleaning, fueling, or maintenance

</td></tr>
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PLANS - ALL PROJECTS	
Street and Pavement Restoration Plan	**Traffic Control Plan**
☐ Plan and cross section ☐ Meets geotechnical recommendations ☐ Describes materials and thickness ☐ Matches existing conditions ☐ Shows channelization and other pavement markings ☐ Restores vehicle detector loop ☐ Replaces signs, mailboxes ☐ Restores Bike/pedestrian paths ☐ Includes landscape restoration ☐ Cleaning storm drain system ☐ ADA amenities	☐ Property lines ☐ Right-of-way lines ☐ Sidewalks ☐ Street lights ☐ Signs ☐ Mailboxes ☐ Landscaping and trees ☐ Channelization ☐ Cross walks ☐ Bus stops ☐ Accesses ☐ Bike/Pedestrian paths ☐ Traffic control devices ☐ Pedestrian and emergency access to any abutting public school, public building, urban trail, or transit stop

PLANS - ALL PROJECTS

Streets Plan View

- ☐ Spot elevations on curb returns (PC, PT, ▲/2)
- ☐ PI, PC, PT, stationing of horizontal curves
- ☐ Curve information delta, radius, and length for all curves
- ☐ Horizontal angle points and curb return elevations
- ☐ Identify field design situations by notes
- ☐ Match existing features by station with elevation
- ☐ Typical roadway sections and pavement types
- ☐ Pavement markings noted by station and offset
- ☐ Sidewalks
- ☐ Driveway entrances
- ☐ Width, type (AC, PCC) note applicable City standard plan
- ☐ Station at center
- ☐ Sight distance for horizontal and vertical curves, intersections and access points
- ☐ Curb access ramps – per City standard plan
- ☐ Intersection detail
- ☐ Street trees with stations
- ☐ Existing and proposed transit stops and shelters
- ☐ Existing and proposed traffic signs
- ☐ Existing and proposed mail boxes
- ☐ Existing and proposed street lights and vaults
- ☐ Pedestrian and emergency access to any abutting public school, public building, urban trail, or transit stop
- ☐ ADA amenities

Streets Profile View

- ☐ Vertical information PVC, PVI, PVT, AP
- ☐ Show grades in decimal (FT/FT) form with (+ and -) slope
- ☐ Super elevated roadway segments
- ☐ Detail (length of transition in, length of full super, length of transition out)
- ☐ New and existing centerline profile
- ☐ Pavement cross section supported by pavement design
- ☐ New gutter edge of pavement profile*****
- ☐ Existing edge of pavement profile*****

*****Not required for new standard street section construction. Required for Retrofit and Variable Gutter

Street Ends

- ☐ Cul-de-sac
- ☐ Landscape island at dead end
- ☐ Hammerhead
- ☐ Barricade temporary dead-end
- ☐ Property lines and addresses

PLANS - ALL PROJECTS	
Surface Water	
Plan View ☐ Utility crossings ☐ Station and offset at each manhole catch basin ☐ Manholes/catch basins numbered sequentially ☐ Manholes/catch basin type designation ☐ Manholes/catch basin rim elevation ☐ Flow direction (with arrow on pipe) ☐ Pipe material, sizes and lengths ☐ Stormwater detention facility (pond dimensions with elevations) ☐ Stormwater treatment facility (dimensions with elevations) ☐ Control structure with orifice size and elevation ☐ Emergency overflow location and elevation ☐ Design high water elevation ☐ Outfall locations and treatment	**Profile View** ☐ Elevations of each utility at utility crossings ☐ Station and offset at each manhole/catch basin ☐ Invert elevations on manholes/catch basins showing direction of flow ☐ Manhole/catch basin type designation ☐ Rim elevation ☐ Pipe materials and sizes ☐ Length of pipe (shown in L.F.) center structure to center structure ☐ Grades shown (decimal from FT./FT.) ☐ Stormwater detention facility ☐ Stormwater treatment facility ☐ Control structure ☐ Outfall locations and elevations

PLANS - ALL PROJECTS	
Water Supply	**Sanitary Sewer**
Plan View ☐ Elevations of each utility at utility crossings ☐ Show fixtures with stations ☐ Fire hydrants ☐ Blow-off (at dead end of line) ☐ Vacuum and air release valves ☐ Tees, crosses, elbows, adapters, and valves, meter station and offset ☐ Size of pipe ☐ Type and brand of fixtures ☐ Length of water main in L.F. between fixtures ☐ Distance from sanitary or storm sewer ☐ Meters located in ROW at property line ☐ Meters grouped **Profile View** ☐ Elevations of each utility at utility crossings ☐ Show fixtures with stations and elevations ☐ Show valves and stations and elevations ☐ Size and material of water main ☐ Length of water main in L.F. ☐ Grades	**Plan View** ☐ Elevations of each utility at utility crossings ☐ Station and offset shown at each proposed manhole ☐ Manholes numbered sequentially ☐ Manhole type designation ☐ Flow direction (with arrow on pipe) ☐ Invert elevations ☐ Distance from water lines ☐ Pipe material and sizes ☐ Length of pipe from center of manhole to center of manhole ☐ Depth at property line ☐ Station for sewer laterals at property line ☐ Stub (s) for laterals ☐ On as-builts, laterals will be related to property corners measured along the right-of-way line ☐ Force main and appurtenances with station and offset **Profile View** ☐ Elevations of each utility at utility crossings ☐ Station and offset shown at each manhole ☐ Manholes numbered sequentially ☐ Invert elevation showing direction, in and out ☐ Rim elevation ☐ Grades shown (decimal form FT./FT.) ☐ Type of pipe ☐ Size of pipe ☐ Length of pipe from center of manhole to center of manhole (in L.F.) ☐ Existing utilities crossings ☐ Force main and appurtenances with stations and offsets

PLANS - ALL PROJECTS

EVELOPMENT – Private Property

Plans

- ☐ Design meets City's *Development Guidelines and Design and Construction Manual*
- ☐ All applicable requirements under the previous checklists
- ☐ Cut and fill volumes
- ☐ Impervious surface calculation – existing and proposed
- ☐ Access provided to easement(s) or right(s)-of-way
- ☐ Access width at property line is 25' to 35'
- ☐ Access aligned with accesses opposite
- ☐ Access sight distance shown

Profile

- ☐ Location, route, and configuration of all facilities to be located underground, including the line and grade proposed for the burial at all points along the route that are within the public ways
- ☐ Location of all existing underground utilities, conduits, ducts, pipes, mains, and installations that are within the public ways along the underground route proposed by the applicant
- ☐ Cross section showing pavement and subgrade, existing and proposed utilities
- ☐ Trench cross-section(s) showing materials, depth, coverage and utilities

Utilities

- ☐ Location and route of all facilities to be installed on existing utility poles
- ☐ Proposed above ground utilities
- ☐ Location, route, and configuration of all facilities to be located underground, including the line and grade proposed for the burial
- ☐ Existing underground utilities, conduits, ducts, pipes, mains, and installations that are within the public right of ways
- ☐ Proposed underground utilities, conduits, ducts, pipes, mains, and installations

Streets

- ☐ Frontage improvements in right-of-way
- ☐ Access – 25' to 35' at right-of-way
- ☐ Meets private road standards
- ☐ Meets public road standards

Surface Water

- ☐ Meets Technical Information Report
- ☐ Meets geotechnical report recommendations
- ☐ Meets applicable requirements under the "Surface Water – All Projects" checklist

Sewer

- ☐ All applicable requirements under the "Sewer – All Projects" checklist
- ☐ Minimum 6" lateral
- ☐ Sewer clean-out and test –tee at property line
- ☐ Sewer clean-out at building
- ☐ Grease interceptor, 6" lines, and reference to related plumbing sheets

Water

- ☐ All applicable requirements under the "Water Supply – All Projects" checklist
- ☐ Water meter(s) in right-of-way at the property line
- ☐ Looped water system
- ☐ Backflow assembly on water supply, include protection from freezing
- ☐ Backflow assembly on fire line, make, model, location

PLANS - ALL PROJECTS	
	☐ Backflow protection on irrigation line, make, model, location

DEVELOPMENT – Single Family Residence

The City may accept non-engineered plans for single-lot, single-family residence. The City requires engineered plans for all public infrastructure, work in the right-of-way, all surface water other than Small Site Drainage Review (KCSWDM), and development in a sensitive area.

DEVELOPMENT – Single Family Residence	
Submittals	**Plans**
☐ Water Availability Certificate ☐ Sewer Availability Certificate ☐ Utility/Grading/Drainage Plan(s) ☐ Erosion Prevention and Sediment Control Plan ☐ Feasibility Evaluation per King County Surface Water Design Manual ☐ Geotechnical Report ☐ King County Department of Health approval if there is a septic tank onsite ☐ Proof that the Washington State code and the Uniform Plumbing Code were followed when septic tank abandoned ☐ State of Washington current water right permit for wells	☐ Drafting standards ☐ Plan elements ☐ Scale (usually 1"=20' horizontal) ☐ Existing and proposed contours at 2' intervals ☐ Easements - Width, location, purpose - existing and proposed ☐ Property lines and dimensions ☐ 100-year flood plain delineation ☐ Shoreline limits ☐ Sensitive areas and associated buffers ☐ Footprints of all existing and proposed structures ☐ Structures outside the property boundaries and within 15' of the property lines ☐ Retaining walls, rockeries and other structures of that sort, existing and proposed ☐ Surface and subsurface utility locations, including power poles, light poles, underground cable ☐ Sensitive areas, water courses, lakes, wetlands, etc. within ¼ mile downstream of the property boundaries ☐ Cross sections for trenches, drainage pits, trench drains, etc. ☐ Fill material description and quantity ☐ Proposed location of stockpiles and material description ☐ Pavement cross-section showing subgrade depth, surfacing material depth, and material descriptions for subgrade and surface ☐ Locations, specifications and cross-sections of temporary erosion control ☐ Permanent stabilization of exposed ground ☐ Abandon or remove existing utilities – capped at the main

DEVELOPMENT – Single Family Residence	
Access	**Surface Water**
☐ One access ☐ 10' to 20' wide at right-of-way ☐ Turning radii at property line is 5' ☐ Maximum 15% grade ☐ Paved connection from access to right-of-way pavement ☐ Driveway paved from property line onto property for at least 20' ☐ Access provided to easement(s) or right(s)-of-way	☐ Existing and proposed onsite drainage ☐ Roof downspout controls ☐ Locations, materials, sizes, slopes, and lengths for proposed storm drainage ☐ Pipes with slopes over 15% must be anchored
Water	**Sewer**
☐ Location of wells within 100' of the site ☐ Abandoned wells ☐ Existing water meter and lines, locations, sizes ☐ Water meter reused ☐ Water connection reused ☐ Abandoned water capped at the main ☐ Size and location of the water main (minimum 8") ☐ Correct stub location ☐ Engineered plans for water main extension ☐ Nearest fire hydrant location ☐ 1" pipe for sprinkled house ☐ Pipe locations, sizes, and materials ☐ Water meter size ☐ Water meter located at property line within City ROW ☐ Water meter located on property – easement to City ☐ Meter in access has reinforced box ☐ Water and sewer lines 10' horizontal separation ☐ Water line at least 18" above sanitary sewer line	☐ Existing septic tank location ☐ Abandon septic system ☐ Existing lateral ☐ Existing connection reused ☐ Abandoned pipes capped at main ☐ Size and location of the water main ☐ Correct stub location ☐ Engineered plans for sewer main extension ☐ Lateral location, size (minimum 4"), and materials ☐ Lateral length 150' or shorter ☐ Lateral length greater than 150 – sewer main extension and manhole ☐ Slope 2% to 50% ☐ Anchored pipes on slopes over 15% ☐ Pipe 5' or more from building, except at entrance to building ☐ One foot cover ☐ Clean out at building ☐ Clean outs at 100' intervals – property line to building ☐ Test tee at property line ☐ Water and sewer lines 10' horizontal separation ☐ Water line at least 18" above sanitary sewer line ☐ Sewer line sleeved

APPENDIX D REVISION REQUEST FORM

PUBLIC WORKS DEPARTMENT

DEVELOPMENT GUIDELINES

AND

DESIGN AND CONSTRUCTION STANDARDS

REVISION REQUEST FORM

DATE		MANUAL VERSION	

DESCRIBE REQUESTED REVISION:

Include Chapter, page number, section heading, reason, and, when applicable, supporting documentation. Attach supporting information.

YOUR NAME	
ADDRESS	
BUSINESS OR FIRM	

PHONE		E-MAIL	
FAX		OTHER	

APPENDIX E PREFERRED BIORETENTION PLANTS

Large Street Trees

Large Street Trees - Name	**Zone**		**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Acer freemanii var. 'Autumn Blaze' Autumn Blaze Maple	2	3	50'	40'	20'-40'	6'	*Fast-growing; dense, oval crown; excellent autumn colors*
Acer nigrum var. 'Green Column' Green Column Sugar Maple	2	3	65'	25'	12'-25'	6'	*Similar to A. saccharum, but more resistant to heat and drought*
Acer rubrum Red Maple	2	3	60'	40'	20'-40'	6'	*Red twigs and branchlets; does not tolerate excessive pollution*
Acer pseudoplatanus Sycamore Maple	2	3	40'	40'	20'-40'	6'	*Autumn color dependent on variant; moderate growth rate*
Acer saccharum var. 'Bonfire' Bonfire Sugar Maple	2	3	50'	40'	20'-40'	6'	*Fast growing; stout branches form a dense canopy*
Acer saccharum 'Commemoration' Commemoration Sugar Maple	2	3	50'	35'	17'-35'	6'	*Fast growing; stout branches form a dense canopy*
Acer saccharum 'Green Mountain' Mountain Sugar Maple	2	3	45'	35'	17'-35'	6'	*Fast growing; stout branches form a dense canopy; tolerant of heat and drought*

Large Street Trees - Name	**Zone**			**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Aesculus x carnea var. 'Briotti' Red Horse-chestnut		2	3	40′	30′	15′-30′	6′	*Crimson spring-time blossoms; rounded crown with dark green leaves; mature trees cast dense shade*
Alnus rubra Red Alder	1	2	3	45'-50'	20'-30′	10′-30′	6'	*Attractive light gray bark; dark green leaves with rust-colored underside; most common alder of the Pacific Northwest*
Cercidiphyllum japonicum Katsura		2	3	40′	25′	12′-25′	6′	*Pyramidal in shape; heart shaped leaves; to enhance fall color, water less in the late summer months; leaves smell like brown sugar in the fall*
Fraxinus americana Autumn Applause Ash		2	3	80'	50'	25′-50′	6'	*Fast-growing; useful as a shade tree; oval-shaped crown*
Fraxinus latifolia Oregon Ash		2	3	60'	35′	17′-35′	6'	*Tolerant of wet conditions*
Fraxinus pennsylvanica 'Patmore' Patmore Ash			3	30′-50'	30′-50'	15′-30′	6'	*Compact, oval crown; dense; strong resistance to disease and pests*
Fraxinus pennsylvanica 'Urbanite' Urbanite Ash			3	30'-50'	30'-50'	15′-50′	6'	*Pyramidal in shape; dense*
Gingko biloba 'Princeton Sentry' Princeton Sentry Gingko		2	3	35′-50'	15'-20'	8′-20′	6'	*Pollution and heat tolerant; pyramidal in shape; autumn leaves fall to form a beautiful groundcover blanket*

Large Street Trees - Name	**Zone**			**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Gingko biloba 'Magyar' Magyar Gingko		2	3	50′	25′	12′-25′	6'	*Pollution and heat tolerant; upright and narrow in shape; autumn leaves fall to form a beautiful groundcover blanket*
Gleditsia triacanthos inermis Honeylocust		2	3	70′	25′-35′	12′-35′ (varies)	8′	*Thornless variety; green, fernlike leaves; tolerant of acidic soils, salt, drought, cold, heat, wind, and pollution*
Liriodendron tulipifera Tulip Tree			3	60′-80'	40′	20′-40′	8'	*Fast-growing; straight trunk with pyramidal crown; thrives in rich, well-drained soil*
Liquidambar styraciflua var. 'Rotundiloba' Fruitless Gum Tree	1	2		60′	30′	15′-30′		*Aggressive root structure that requires a large planting strip; mixed autumn color of purple, yellow and red; resistant to oak root fungus*
Nyssa sylvatica Tupelo		2	3	30′-50'	15′-25'	8′-25′ (varies)	6'	*Crooked branches with a reddish bark; produces excellent shade; tolerant of poor draining soils*
Quercus coccinea Scarlet Oak			3	60′-80'	40′-60'	20′-60′ (varies)	6'	*Pyramidal when young, but round when mature; gray-brown bark*
Quercus frainetto Italian Oak			3	100′	70′	35′-70′	6'	*Fast-growing; dark gray bark; glossy deep green leaves; symmetrical*
Quercus garryana Oregon Oak			3	40'-90'	30'-60'	15′-60′ (varies)	8'	*Gray, scaly bark; leathery and glossy green leaves*
Quercus imbricaria Shingle Oak			3	50′	40′	20′-40′ (varies)	6′	*Grows roughly 1′ per year; gray brown bark; lance-shaped leaves*

Large Street Trees - Name	**Zone**			**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Quercus macrocarpa Bur Oak			3	60′-75′	30′-40′	15′-40′ (varies)		*Flaky, grayish brown bark; acorns have a fringed cap*
Quercus phellos Willow Oak			3	50′-90′	30′-50′	15′-50′ (varies)		*Pyramidal in shape; smooth gray bark*
Quercus robur English Oak			3	50′-60′	30′	15′-30′		*No significant fall color; fast growing tree; short trunk with wide, sprawling crown*
Quercus rubra Red Oak		2	3	60'-75'	50'	25′-50′	8'	*Fast-growing; round canopy; requires fertile soil and regular moisture*
Quercus velutina Black Oak			3	50′	45′	22′-45′		*Tolerant of many soils; acorns have a fringed cap; black bark in maturity that produces a yellow dye*
Tilia americana var. 'Redmond' Redmond Linden		2		40′-60′	20′-25′	10′-25′ (varies)		*Straight-trunked tree with a narrow crown*
Tilia cordata 'Degroot' Degroot Littleleaf Linden		2		30'-50'	15'-30'	8′-30′ (varies)	5'	*Very tolerant of urban conditions; excellent shade tree when given room to grow*
Tilia cordata 'Chancole' Chancelor Linden		2		30'-50'	15'-30'	8′-30′ (varies)	6'	*Very tolerant of urban conditions; excellent shade tree when given room to grow*

Large Street Trees - Name	**Zone**			**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Tilia tomentosa var. 'Sashazam' Satin Shadow Silver Linden		2		40'-50'	20'-30'	10'-30' (varies)		*Light green leaves that are silvery on the underside; tolerant of heat and drought*
Tilia petiolaris Pendant Silver Linden		2	3	70'	40'	20'-40'		*Weeping branches; dark green leaves have a fuzzy underside that give the tree a silvery appearance in the wind*
Zelkova serrata 'Greenvase' Green Vase Zelkova			3	45'	40'	20'-40'	6'	*Attractive bark; tolerant of drought and wind; good shade tree; vase-shaped*
Zelkova serrata 'Village Green' Village Green Zelkova			3	45'	40'	20'-40'	6'	*Attractive bark; tolerant of drought and wind; good shade tree; vase-*shaped

Medium Street Trees

Medium Street Trees - Name	**Zone**			**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Acer campestre Hedge Maple		2	3	30'	30'	15'-30'	5'	*Dense, rounded crown; many cultivars of similar growth; grows well in the Pacific Northwest*
Acer truncatum x A. platanoides 'Warrens Red' Pacific Sunset Maple		2	3	30'-35'	25'	12'-25'	5'	*Fast-growing; tolerant of heat and drought; dark green, glossy leaves*

Medium Street Trees - Name	**Zone**		**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Betula albosinensis var. septentrionalis Chinese Red Birch	2	3	40'	35'	18'-35'	5'	*Flaking orange to orange-brown bark*
Betula papyfera Paper Birch	2	3	50'-60'	25'	12'-25'	6'	*Attractive, creamy-white bark*
Carpinus caroliniana American Hornbeam	2	3	25'	25'	12'-25'	5'	*Attractive, smooth blue-gray bark; can be single or multi-trunked*
Cladrastis kentukea Yellow wood	2		30'-50'	30'-50'	15'-50' (varies)		*Gray bark; beautiful fall color; deep rooting, so it is possible to plant beneath the tree*
Cornus controversa 'June Snow' Giant Dogwood	2	3	40'-60'	40'-60'	20'-60' (varies)	5'	*Fast-growing; picturesque branches; full sun is necessary for best bloom*
Cornus florida x nuttallii Eddie's White Wonder Dogwood	2	3	30'	20'	10'-20'	5'	*Clusters of tiny flowers in mid-spring*
Corylus cornuta Beaked Hazelnut	2	3	20'	10'	5'-10'	5'	*Vase-like shape; needs adequate space to grow; catkins add winter interest*

Medium Street Trees - Name	**Zone**			**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Crataegus crus-galli var. 'Inermis' Thornless Cockspur Hawthorne			3	20'-30'	20'-35'	10'-35' (varies)	5'	*Smooth, glossy green leaves; clusters of white flowers in the spring months; tiny fruits attractive to bees and birds*
Crataegus x lavalii Lavalle Hawthorne			3	25'	20'	10'-20'	5'	*Dark green leathery leaves; clusters of red fruits add winter color*
Fagus sylvatica var. 'Dawyck' Beech Tree		2	3	35'	8'	4'-8'		*Cone-like shape; smooth gray bark; roots near the surface, which inhibits lawn or plant growth*
Gingko biloba 'Autumn Gold' Autumn Gold Gingko		2	3	35'-50'	15'-20'	8'-20' (varies)	6'	*Pollution and heat tolerant; pyramidal in shape; autumn leaves fall to form a beautiful groundcover blanket*
Halesia monticola Mountain Silverbell		2		60'	40'	20'-40'		*Bell-shaped flowers; attractive when planted with rhododendrons*
Magnolia grandiflora var. 'Victoria' Southern Magnolia		2	3	20'	15'	8'-15'		*Evergreen; broad, dark green leaves; large white, fragrant flowers; unpredictable in form*

Medium Street Trees - Name	**Zone**		**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Magnolia x kewensis var. 'Wada's Memory' Wada's Memory Magnolia	2	3	30'	20'	10'-20'		*Deciduous; new leaves are copper in color; casts dense shade*
Oxydendrum arboretum Sourwood	2	3	15'-30'	20'	10'-20'	5'	*Pyramidal shape; fragrant summer flowers; requires well-drained soils*
Prunus cerasifera var. 'Krauter Vesuvius' Cherry Plum	2	3	20'	20'	10'-20'	5'	*Dense, upright crown; blooms best and retains purple-leafed color in full sun; tolerant of moist well-drained soils*
Pyrus calleryana Ornamental Pear		3	50'	50'	25'-50'		*Horizontal branching pattern; fall color depends on variant*
Quercus ilex Holly Oak	2	3	30' - 60'	30' - 60'	15'-60' (varies)		*Evergreen; dense, rounded crown; tolerant of salt air; susceptible to sudden oak death*
Rhamnus purshiana Cascara	2	3	20'-40'	10'-30'	5'-30' (varies)	5'	*Smooth gray bark; picturesque branches; dark green leaves*
Sophora japonica 'Regent' Japanese Pagoda Tree		3	45'	40'	20'-40'	6'	*Fast-growing; dark green leaflets; tolerant of urban conditions; great shade tree*

Medium Street Trees - Name	**Zone**		**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Sorbus aucuparis 'Mitchred' Cardinal Royal Mountain Ash	2	3	20'-40'	15'-25'	8′-25′ (varies)	5'	*Dense oval-to-round crown*
Sorbus x hybridia Oakleaf Royal Mountain Ash	2	3	20'-30'	20'-30'	10′-30′ (varies)	5'	*Blue-green foliage*
Styrax japonicus Japanese Snowbell	2		30'	30'	15′-30′	5'	*Slender trunk; strong horizontal branches; beautiful flowers warrant it being planted in a highly-visited area*
Ulmus parvifolia 'Emer I' Athena Classic Elm	2		35'	50'	25′-50′	5'	*Fast-growing; long, weeping branches; excellent street tree or screening tree*
Ulmus parvifolia 'Emer II' Allee Elm	2		70'	60'	30′-60′	5'	*Long, weeping branches; excellent street tree or screening tree*

Small Trees

Small Street Trees - Name	**Zone**		**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Acer buergeranum Trident Maple	2	3	20′-25′	20′-25′	10′-25′ (varies)	5′	*Round crown with glossy green leaves; low and spreading growth; stake and prune to make tree branch high*
Acer circinatum Vine Maple	2	3	30'	30'	15′-30′	5'	*Small, nearly symmetrical tree; multiple trunks*

Small Street Trees - Name	**Zone**		**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Acer grandidentum var. 'Schmidt' Rocky Mountain Glow Maple	2	3	20'-25'	15'	8'-15'	5'	*Very hardy tree; tolerant of most soil conditions; oval crown*
Acer ginnala Amur Maple	2	3	25'	25'	12'-25'	5'	*Showy, red-twigged seeds in the summer months*
Acer miyabei var. 'Morton' State Street Maple	2	3	40'	30'	15'-30'	6'	*Fast-growing; attractive autumn color*
Acer palmatum Japanese Maple	2	3	20'	20'	10'-20'	*5'*	*Fast-growing; the most delicate of maple trees; many branches; young spring foliage is red, turning to green in the summer; fall colors vary*
Acer rubrum var. 'Bowhall' Bowhall Maple	2	3	45'	40'	20'-40'	6'	*Fast-growing, tolerates most soils; performs best in native, low-traffic areas*
Acer rubrum var. 'Doric' Doric Maple	2	3	45'	40'	20'-40'	6'	*Fast-growing, tolerates most soils; performs best in native, low-traffic areas*
Acer triflorum Three-Flower Maple	2	3	25'	20'	10'-20'	5'	*Multi-season interest; beautiful autumn color; tan bark*

Small Street Trees - Name		**Zone**		**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Amelanchier grandiflora Autumn Brilliance Serviceberry		2	3	20'	15'	8′-15′	4'	*Strong stems; blue-green foliage; drooping clusters of white flowers*
Betula albosinensis var. 'Septentrionalis' Chinese Red Birch		2	3	40'	35'	18′-35′	5'	*Flaking orange to orange-brown bark*
Cercis canadensis Eastern Redbud		2	3	25′-35′	25′-35′	12′-35′ (varies)	5′	*The fastest growing redbud; horizontally tiered branches; needs adequately drained soils*
Cornus mas Cornelian Cherry Dogwood		2	3	15′-20′	15′-20′	8′-20′ (varies)	5′	*The earliest dogwood to bloom; gray and tan bark provides winter interest*
Cornus rutgersensis var. 'Aurora' Aurora Stellar Dogwood		2	3	20′	25′-30′	12′-30′ (varies)	5′	*Disease resistant hybrid of C. florida and C. kousa; single trunked; beautiful autumn color*
Cornus rutgersensis var. 'Celestial' Celestial Stellar Dogwood		2	3	20′	25′-30′	12′-30′ (varies)	5′	*Disease resistant hybrid of C. florida and C. kousa; single trunked; beautiful autumn color*

Small Street Trees - Name	**Zone**		**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Cornus rutgersensis var. 'Stellar Pink' Stellar Pink Dogwood	2	3	20′	25′-30′	12′-30′ (varies)	5′	*Disease resistant hybrid of C. florida and C. kousa; single trunked; beautiful autumn color*
Cotinus obovatus American Smoke Tree		3	25'	25'	12′-25′	5'	*Unusual and colorful; excellent screening tree; ; blue-green foliage*
Crataegus phaenopyrum Washington Hawthorn		3	25′	20′	10′-20′	5′	*Open limb structure; shiny red winter fruits*
Lagerstoemia hybrids Crape Myrtle		3	10′-30′ (varies)	10′-30′ (varies)	5′-30′ (varies)	5′	*Fall color depends on species, typically yellow, red, or orange; showy summer flowers*
Hamamelis mollis Chinese Witch Hazel	2	3	30′	30′	15′-30′	5′	*Round, dark green leaves; fragrant winter flowers*
Koelreuteria paniculata Goldenrain Tree	2	3	20′-35′	25′-40′	12′-40′ (varies)	5′	*Tolerant of urban conditions; open branches provide shade; spring leaves are purple, maturing to green in the summer*
Magnolia 'Galaxy' Galaxy Magnolia	2	3	25'	25'	12′-25′	5'	*Fast-growing; conical shape; showy flowers*

Small Street Trees - Name	**Zone**		**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Magnolia grandiflora var. 'Little Gem' Dwarf Southern Magnolia	2	3	20'-25'	10'-15'	5'-15' (varies)	5'	*Evergreen; branches to the ground; less hardy than other Magnolia species*
Magnolia x loebneri Loebner Magnolia	2	3	12'-15'	12'-15'	6'-15' (varies)	5'	*Deciduous; blooms appear before leaves in the spring*
Malus var. 'Golden Raindrops' Golden Raindrops Crabapple	2	3	20'	15'	8'-25'	5'	*Disease resistant; tolerant of many soil types; elegant, horizontally spreading limbs*
Malus var. 'Lancelot' Lancelot Crabapple		3	8'	8'	4'-8'	5'	*Beautiful spring-time white flowers; golden fruit in the autumn months*
Parrotia persica Persian Parrotia	2	3	15'-30'	20'	10'-20'	5'	*Smooth gray bark with white patches; colorful tree year-round*
Prunus yedoensis var. 'Akebono' Akebono Flowering Cherry	2	3	25'	25'	12'-25'	6'	*Most common cherry tree in the Pacific Northwest; disease resistant*

Small Street Trees - Name	**Zone**			**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Quercus shumardii Shumard Oak		2	3	40′	35′	18′-35′	6′	*Pyramidal when young, grows to a open crown in maturity; similar in appearance to the Scarlet Oak; tolerates most soil conditions*
Sorbus americana var. 'Dwarfcrown' Red Cascade Mountain Ash		2	3	16′	8′	4′-8′	5′	*Very hardy and tolerant of wet soils; compact growth; orange red fruits*
Styrax obassia Fragrant Snowbell		2		20′-30′	25′	12′-25′	5′	*Oval-to-round crown; flowers in drooping clusters*
Syringa reticulata Japanese Tree Lilac		2		30′	20′	10′-20′		*Can be grown as a shrub or single stemmed tree; useful as a small shade tree; smooth red bark*

Conifers for Special Sites

Conifers for Special Sites - Name	**Zone**			**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Calocedrus decurrens California Incense Cedar			3	75′-90′	15′	8′-15′	10′	*Produces a sweet fragrance in the summer; can grow up to 2′ per year once established*
Cedrus deodara Deodar Cedar		2	3	80′	40′	20′-40′	10′	*Fast growing tree; branches to ground, with bottom branches sweeping upward; many cultivars with a variety of needle colors*

Conifers for Special Sites - Name	**Zone**			**Height**	**Spread**	**On Center Spacing**	**Plant Strip Width**	**Characteristics**
Chamaecyparis nootkatensis Alaskan Yellow Cedar		2	3	80′	25′	12′-25′	10′	*Tiny, scale-like leaves of blue-green; branches to ground in drooping pattern*
Metasequoia glyptostroboides Dawn Redwood			3	90′	60′	30′-60′	8′	*Fast-growing tree; pyramidal in shape with soft, pale green needles and small cones; thrives in well-drained soil*
Picea omorika Serbian Spruce			3	50′-60′	6′-10′	3′-10′ (varies)	6′	*Conical in shape; shiny green needles with white underside; branches to ground; slow-growing*
Taxodium distichum Bald Cypress		2	3	50′-70′	20′-30′	10′-30′ (varies)	8′	*Pyramidal in shape; feathery, delicate foliage; resistant to disease and pests*
Thuja plicata Western Red Cedar			3	50′-100′	25′-60′	12′-60′ (varies)	12′	*Many cultivars; slender, drooping branches with dark green leaves; requires adequate space to grow*
Umbelluaria californica California Bay Laurel	1	2	3	up to 75′	up to100′	50′-100′	12′	*Huge, gumdrop shaped shrub or tree. depending on how it is grown; leaves can be used as a sweet bay substitute in cooking; fruiting in summer months*

Bioretention Plants – Sedges and Rushes

Bioretention Plants – Sedges and Rushes Name	Zone			Height	Spread	On Center Spacing	Characteristics
Carex obnupta Slough sedge	**1**	**2**		12″ - 36″	up to 48″	36″	*Spreads quickly; excellent soil binder*
Carex oshimensis 'Evergold' Variegted Japanese Sedge		**2**	**3**	12″ - 24″	24″ - 36″	28″	*Variegated leaves with white band; great for planting along sidewalk edges*
Carex stipata Sawbeak Sedge	1			24″-36″	24″-36″	28″	*Speads quickly; long, tapered foliage*
Juncus acuminatus Taper-tipped Rush	**1**			6″ - 18″	12″ - 24″	18″	*Red-brown flowers; delicate*
Juncus ensifolius Dagger-lead Rush	**1**			6″ - 15″	6″ - 9″	6″	*Pom-pom like flowers; adds interest to landscape*
Juncus tenuis Slender Rush	**1**	**2**		6″ - 20″	6″ - 30″	22″	*Bright green foliage*
Scirpus acutus Hardstem Bulrush	**1**			10′	6′	4′	*Gray-green to dark green foliage; dense*
Scirpus microcarpus Small-fruited Bulrush	**1**			24″ - 36″	12″ -24″	18″	*Spreads quickly; excellent soil binder*

Bioretention – Ornamental Plants

Bioretention Ornamental Plants Name	Zone			Height	Spread	On Center Spacing	Characteristics
Aster chilensis California Aster		2	3	24″-36″	18″-36″	18″-28″	*Low-growing plant; shear when blooming ceases in the autumn, returns in the spring*
Aquilegia formosa Western Columbine		**2**	**3**	12″-36″	12″-36″	18″-28″	*Excellent in wooland areas; attracts pollinators; tolerant of shallow flooding*
Arctostaphylos uva-ursi Kinnikinnick or Bearberry		**2**	**3**	6″ - 12″	24″ - 36″	18″-28″	*Glossy, leathery leaves; low-growing ground cover; easy-care once established; bell-shaped flowers; red berries*
Asarum caudatum Wild ginger		**2**	**3**	4″-6″	36″	18″-28″	*Glossy leaves that exude the fragrance of ginger when crushed*
Athyrium filix-femina Lady fern	**1**	**2**	**3**	36″-60″	24″	12″-18″	*Fast-growing; tolerant of shallow flooding*
Blechnum spicant Deer fern	**1**	**2**	**3**	12″-36″	24″	12″-18″	*Dark, glossy leaves with a crinkled texture; tolerant of shallow flooding*
Camassia leichtlinii Leichtlin's camass		**2**	**3**	36″-48″	12″-24″	12″-18″	*Linear foliage; flowers range in color from white, cream, blue or purple; excellent fresh-cut flower*
Camassia quamash Common camass		**2**	**3**	18″	12″	6″-9″	*Distinct clusters of flowers make this plant attractive in mass plantings; best when planted in the autumn after weather cools*
Cornus canadensis Bunchberry		**2**	**3**	6″-9″	6″-9″	4.5″-7″	*Performs best in full shade; excellent complement to rhododendrons or ferns*

Bioretention Ornamental Plants Name	Zone			Height	Spread	On Center Spacing	Characteristics
Dicentra formosa Pacific Bleeding Heart		**2**	**3**	12″	24″	12″-18″	*Delicate foliage; distinct spring-time flowers*
Deschampsia cespitosa Tufted hair grass		**2**	**3**	6″ - 12″	24″	12″-18″	*Stunning grassy foliage with creamy white variegation that turns pink in winter; spring-time inflorescence can make plant 4'-tall*
Fragaria chiloensis Beach Strawberry		**2**	**3**	10″	36″	18″-28″	*Forms a lush, compact groundcover; cut back in the early spring to prompt new growth and prevent stem build-up; ornamental berries*
Fragaria vesca Alpine Strawberry		**2**	**3**	10″	36″	18″-28″	*Bears tiny, fragrant (and edible) berries in the summer months; attracts butterflies; likes some afternoon shade*
Festuca idahoensis Idaho Fescue			**3**	24″	24″	12″-18″	*Dense plant; gray-green foliage; excellent when planted alongside sidewalks or used as a groundcover*
Hemerocallis Daylily		**2**	**2**	24″-48″	24″	12″-18″	*Attracts pollinators; flower color dependent on cultivar (pink, red, orange, purple, yellow)*
Heuchera varieties Alumroot		**2**	**3**	24″-36″	18″	9″-14″	*Many cultivars available; dintinct foliage and flower colors of chartreuse, white, and scarlet*
Iris douglasiana Douglas Iris	1	**2**	**3**	24″	24″	12″- 18″	*Clumping foliage; beautiful purple flowers are nice color addition to planting scheme*
Iris tenax Oregon Iris	1	**2**	**3**	18″	12″	6″-9″	*Beautiful blue and purple flowers; nice color addition to any planting scheme*

Bioretention Ornamental Plants Name	Zone			Height	Spread	On Center Spacing	Characteristics
Lillium columbianum Tiger Lily		**2**	**3**	5′-6′	36″	18″-28″	*Produces one to six unscented blooms per stem; attracts butterflies*
Lupinus varieties Lupine			**3**	18″-48″	24″-30″	15″-22″	*Attacts butterflies and caterpillars; many cultivars available*
Nothochelone nemorosa Turtlehead			**3**	up to 40″	up to 40″	20″-30″	*Flowers continuously throughout the summer*
Ophiopogon planiscarpos Black Mondo grass			**3**	12″	12″	6″-9″	*Black foliage makes this an excellent accent when used with brightly flowering plants; maintains color*
Penstemon varieties Pemstemon			**3**	4″-24″ (varies)	12″-24″ (varies)	12″-18″ (Varies)	*Beautiful blue and purple flowers, depending on variant; nice color addition to planting scheme; attracts hummingbirds*
Polystichum munitum Western Sword Fern		**2**	**3**	36″-48″	36″-60″	30″-45″	*Beautiful foliage and size allows this plant to stand out in planting schemes*
Sedum varieties Sedum			**3**	4″-6″ (varies)	8″-12″ (varies)	6″-9″ (varies)	*Spoon-shaped blue-green foliage, depending on variant; trailing stems; excellent as a groundcover*
Sidalcea varieties Checkermallows, Cherckerblooms	1			36″-48″ (varies)	24″-36″ (varies)	18″-28″ (varies)	*Fast-growing; many cultivars are appropriate for biortention cells, including S. hendersonii*

Bioretention Ornamental Plants Name	Zone		Height	Spread	On Center Spacing	Characteristics
Smilacina racemosa *Solomon's Plume*	**2**	**3**	12″-36″	12″-36″	18″-28″	*Creamy spring-time blossoms are followed by yellow-green berries that turn to red; attracts birds; fragrant flowers*
Solidago canadensis *Goldenrod*	**2**	**3**	36″	24″	12″-18″	*Small bright-yellow flowers make a lively addition to any planting scheme; narrow lance-shaped leaves*
Tellima grandiflora *Fringecup*	**2**	**3**	12″	12″	6″-9″	*Foliage maintains appearance throughout the winter*
Tiarella trifoliata *Western Foamflower*	**2**	**3**	12″	12″	6″-9″	*Dense; foliage maintains appearance throughout the winter*
Trillium ovatum *Western Trillium*	**2**	**3**	18″	12″	6″-9″	*Unique flower to add to any planting scheme*
Vancouveria hexandra *Duck's Foot*	**2**	**3**	12″	12″-36″	18″-28″	*Foliage maintains appearance throughout the winter*

Bioretention – Small to Medium Shrubs

Bioretention – Small to Medium Shrubs Name	Zone			Height	Spread	On Center Spacing	Characteristics
Cistus salvifolius 'Prostratus' Sageleaf Rockrose			3	2′	6′	3′-4.5′	*Evergreen; excellent for erosion control on banks; light gray-green leaves*
Cornus sanguinea Bloodtwig Dogwood	**1**	**2**	**3**	6′	6′	3′-4.5′	*Stunning red stems in the winter months; beautiful addition to bioretention cell for winter interest*
Cornus sericea Dogwood	**1**	**2**	**3**	3′-8′	3′-5′	2.5′-4′	*Many cultivars available, including 'Flavimera' and 'Kelseyi'; stunning colored stems in the winter months*
Gaultheria shallon Salal		**2**	**3**	5′	5′	2.5′-4′	*Fast-growing when planted in shaded areas, otherwise difficult to establish*
Holodiscus discolor Cream Bush			3	8′	15′	7.5′-12′	*Attracts pollinators; excellent soil binder*
Mahonia aquifolium Oregon Grape		**2**	**3**	6′-10′	5′	2.5′-4′	*Attracts pollinators; blue and black berries*
Osmanthus burkwoodii Hybrid Sweet Olive		2	3	6′-10′	8′-12′	6′-9′	*Leathery, glossy dark-green foliage; excellent when used as a hedge; tolerant of many soils*
Osmanthus delavayi Sweet Olive			**3**	5′-20′	7′-20′	10′-15′	*Evergreen; dark green leaves with tubular flowers; year-round interest*
Philadelphus lewisii Mock-Orange		2	**3**	5′-10′	5′-10′	5′-7.5′	*Founstain-shaped plant; aromatic flowers*
Physocarpus capitatus Pacific Ninebark	1	2	**3**	5′-10′	5′-10′	5′-7.5′	*Dense clusters of flowers; plamts resemble spirea; rejuvenate old plantings by cutting to ground*

Bioretention – Small to Medium Shrubs Name	Zone			Height	Spread	On Center Spacing	Characteristics
Physocarpos opulifolius Common Ninebark		2	**3**	5′-10′	3′-6′	3′-4.5′	*Dense clusters of flowers; plamts resemble spirea; rejuvenate old plantings by cutting to ground*
Pinus mugo-mugo Dwarf Mugo Pine			**3**	4′	5′	2.5′-4′	*Low-growing; performs well, but variable in growing habit; great as an anchor plant*
Rhododendron varieties Rhododendron		2	**3**	10′ (varies)	10′ (varies)	5′-7.5′ (varies)	*Many cultivars that vary in bloomtime, size, and color; leathery leafed with stunning flowers*
Ribes sanguineum Red-Flowering Currant		2	**3**	5′-12′	10′	5′-7.5′	*Produces drooping clusters of flowers*
Rosa gymnocarpa Baldhip Rose		2	**3**	5′	1′-2′	1′-1.5′	*Fast-growing to 3′; slender; small rose with delicate stems and flowers; stems are bristled*
Rosa pisocarpa Swamp Rose	1	2	**3**	10′	3′-6′	3′-4.5′	*Unique among roses given its preference for wet, almost swampy conditions; stems have thorns*
Rosa nutkana Nootka Rose		2	**3**	6′	4′	2′-3′	*Arching stems with gray-green leaves*
Rubus spectabilis Salmonberry	1	2	**3**	10′	10′	5′-7.5′	*Fast-growing; excellent soil binder*
Salix purpurea Purple Osier	1	2	**3**	15′	15′	7.5′-12′	*Dark green leaves with blue underside; striking purple branches; cut to ground if overgrown*
Sambucus nigra Elderberry	1	2	**3**	8′	8′	4′-6′	*Dramatic accent plant; fragrant white flowers*

Bioretention – Small to Medium Shrubs Name	Zone			Height	Spread	On Center Spacing	Characteristics
Symphoricarpos albus *Snowberry*		2	**3**	6′	6′	3′-4.5′	*Pink spring-time flowers are followed by white berries that last through the winter; great for erosion control*
Thuja plicata 'Whipcord' *Dwarf Red Cedar*		2	**3**	4′	4′	2′-3′	*Unusual and unique planting; cascading branches form a nice mound; bronze winter color*
Vaccinium parvifolium *Red Huckleberry*		2	**3**	4′-12′	6′	3′-4.5′	*Thin branches with cascading habit create a beautfil silhouette*

Bioretention – Large Shrubs and Trees

Bioretention – Large Shrubs and Trees Name	Zone			Height	Spread	Plant Strip Width	On Center Spacing	Characteristics
Acer circinatum Vine Maple		**2**	**3**	30'	30'	5'	15′	*Small, nearly symmetrical tree; multiple trunks*
Alnus rubra Red Alder	**1**	**2**	**3**	45'-50'	20'-30′	6'	15′	*Attractive light gray bark; dark green leaves with rust-colored underside; most common alder of the Pacific Northwest*
Betula papyfera Paper Birch		**2**	**3**	50'-60'	25'	6'	12.5′	*Attractive, creamy-white bark*
Cornus varieties Cherry Tree			**3**	20′ (varies)	20' (varies)	5′	10′ (varies)	*Highly adapatable to environment; many appropriate cultivars available*

Bioretention – Large Shrubs and Trees Name	Zone			Height	Spread	Plant Strip Width	On Center Spacing	Characteristics
Corylus cornuta Beaked Hazlenut		2	**3**	20′	10'	5'	5′	*Vase-like shape; needs adequate space to grow; catkins add winter interest*
Crataegus x lavalii Lavalle Hawthorne			**3**	25'	20'	5'	10′	*Dark green leathery leaves; clusters fof red fruits add winter color*
Fraxinus latifolia Oregon Ash	**1**	**2**		60'	35′	6'	18′	*Tolerant of wet conditions*
Lonicera involucrata Black Twinberry	**1**	**2**		9′	10′		5′	*Attractive to hummingbirds*
Malus fusca Pacific Crabapple	**1**	**2**		10′-30′	10′-30′		15′	*Requires adequate room to grow; fragrant apple blossoms of white or pink; bears fruit*
Myrica californica Pacific Wax Myrtle	**1**	**2**		15′	15′	5′	7.5′	*Many upright trunks; branches are densely covered in foliage; purple nutlets attract birds; useful in screening*
Parrotia persica Persian Parrotia		2	3	15'-30'	20'	5'	10′	*Smooth gray bark with white patches; colorful tree year-round*
Rhamnus purshiana Cascara		**2**	**3**	20'-40'	10'-30'	5'	**15′**	*Smooth gray bark; picturesque branches; dark green leaves*
Salix lucida Pacific Willow		**2**		15′-45′	30**′**		15′	*Useful as a screening plant or windbreaker; aggressive roots are excellent for stablizing banks*

Bioretention – Large Shrubs and Trees Name	Zone			Height	Spread	Plant Strip Width	On Center Spacing	Characteristics
Salix sitchensis Sitka Willow	**1**	**2**		25′	15′		7.5′	*Multi-stemmed; gray-brown bark; useful in screening*
Sambucus caerulea Blue Elderberry		**2**	**3**	10′-30′	8′-20′		10′	*Clusters of summertime blue or black berries follow spring-time flowers*
Thuja plicata Western Red Cedar		2	**3**	50'-100'	25'-60'	12'	30′	*Many cultivars; slender, drooping branches with dark green leaves; requires adequate space to grow*

APPENDIX F MARKERBALL INSTALLATION LOG

MARKER BALL LOG

PROJECT NAME/PERMIT NUMBER :
Submittal Date:

* See Section 7.2.6 and Details G-3 & G-4 for additional information on the data dictionary and placement of marker balls.

10 Digit Marker ID	Approx. Line, Station & Offset	Facility Owner*	Utility Type*	Depth*	Marker Description*	Nominal Size*	Material*	Restraint Type*	Date of Install*	LATITUDE	LONGITUDE	Comments*
						Example						
(Affix ID Bar Code Sticker)	Sta 10+50, 45'LT	City of Tukwila	Water	4.25'	Vertical Bend 22.5 degree	12"	Ductile Iron	Physical	2/14/2019	XXXXXXXXX	YYYYYYYYY	Begin Vertical Bend Up. End of bend 15' south. Blocks at bottom bends and Rods throughout.

WATER DEPARTMENT ROUTINE TASKS

TASK	DAILY	WEEKLY	MONTHLY	YEARLY	OTHER	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
LINE LOCATES	X					X	X	X	X	X	X	X	X	X	X	X	X
INVENTORY CONTROL	X					X	X	X	X	X	X	X	X	X	X	X	X
YEAR-END IVENTORY				X		X											X
RESERVOIR FACILITY CHECK	X					X	X	X	X	X	X	X	X	X	X	X	X
NHPS HZ PUMP/MOTOR RBL					8 YEAR	X											
NHPS PUMP GLAND GREASE			X			X	X	X	X	X	X	X	X	X	X	X	X
NHPS PUMP MOTOR GREASE					6 M	X						X					
NHPS GROUNDS MAINT.			X						X	X	X	X	X	X		X	X
NHPS ROOF DRAINS MAINT.			X													X	X
NHPS RESERVOIR CLEAN					5 YEAR			X									
NHPS CL2 ANALYZER MAINT.					6 M	X						X					
NHPS PUMP BUMP TEST				X		X											
FIRE HYDRANT MAINT.			X			X	X	X	X	X	X	X	X	X	X	X	X
VALVE MAINT.			X			X	X	X	X	X	X	X	X	X	X	X	X
CHECK VALVE REBUILD					5 YEAR	X	X	X	X	X							
CHECK VALVE EXERCISING			X			X	X	X	X	X	X	X	X	X	X	X	X
LEAK DETECTION			X			X	X	X	X	X	X	X	X	X	X	X	X
AIR/VAC MAINT.			X			X	X	X	X	X	X	X	X	X	X	X	X
METER READING			X			X	X	X	X	X	X	X	X	X	X	X	X
REREAD METERS			X			X	X	X	X	X	X	X	X	X	X	X	X
METER ZERO CONSUMPTION			X			X	X	X	X	X	X	X	X	X	X	X	X
NONPAYMENT NOTICES			X			X	X	X	X	X	X	X	X	X	X	X	X
NONPAYMENT SHUT-OFF			X			X	X	X	X	X	X	X	X	X	X	X	X
NONREAD METER SURVEY			X			X	X	X	X	X	X	X	X	X	X	X	X
METER TESTING				X		X	X	X									
METER REPAIR			X			X	X	X	X	X	X	X	X	X	X	X	X
METER REPLACEMENT			X			X	X	X	X	X	X	X	X	X	X	X	X
METER RADIO REPAIR			X			X	X	X	X	X	X	X	X	X	X	X	X
METER SURVEY			X			X	X	X	X	X	X	X	X	X	X	X	X
CROSS CONNECTION			X			X	X	X	X	X	X	X	X	X	X	X	X
DOH ANNUAL SURVEY				X					X								
DOH SANITARY SURVEY					3-5 YRS									X			
AIR/VAC MAINT.				X		X	X	X	X	X	X	X	X	X	X	X	X

WATER DEPARTMENT ROUTINE TASKS

WATER USE EFFICIENCY RPT.				X													
WATER QUALITY MEETING			X			X	X	X	X	X	X	X	X	X	X	X	X
DDP SAMPLING					QTRLY			X			X			X			X
COLIFORM SAMPLING SPU			X			X	X	X	X	X	X	X	X	X	X	X	X
DIST. INVESTIGATIVE SMPLG			X			X	X	X	X	X	X	X	X	X	X	X	X
WATER QUALITY FLUSHING			X				X			X				X			
SUPPLY TAP PRV MAINT.			X			X	X	X	X	X	X	X	X	X	X	X	X
SUPPLY TAP PRV REBUILD					5 YEAR		X	X	X								
ROW EASEMENT CLEARING				X								X					
SERVICE LINE REPLACEMENT			X								X	X	X	X			
C.E.U. TRAINING					3 YEAR	X	X	X	X	X	X	X	X	X	X	X	X
MONTHLY TRAINING/MTGS.			X			X	X	X	X	X	X	X	X	X	X	X	X
SAFETY MEETINGS		X				X	X	X	X	X	X	X	X	X	X	X	X
TIMESHEET/DAILY LOG	X					X	X	X	X	X	X	X	X	X	X	X	X
EQUIPMENT MAINT.	X					X	X	X	X	X	X	X	X	X	X	X	X

Appendix R

DETAILED COSTS

City of Tukwila
Water System Plan
Capital Improvement Plan

Summary	
Distribution Pipeline	$ 5,578,000
Pump Station	$ 1,131,000
Storage	$ 34,705,000
General	$ 43,688,000
TOTAL	**$ 85,102,000**

CIP Prioritization Table

Project Information

Project No.	Project Name	Improvement Type	Pressure Zone	Pipe Length (LF)	Existing Diameter (inches)	Proposed Size (inches)	Units	Project Element	Description	Justification	Maintenance Impact	Comment
Distribution Pipeline												
P-1	Starfire Pipe Project	New Pipe	360 PZ	2000	n/a	8	Inches	8 " Pipe	Install new 8-inch pipe to create loop for pipe on Starfire Way north (across pedestrian bridge) to S 143rd Place.	The proposed project will address fire flow deficiency (1,500 gpm fire flow requirement) on long, dead-end pipe.	Looping pipe may improve water quality on Starfire Way.	
P-2	Southcenter Blvd Pipe Connection	New Pipe	360 PZ	360	n/a	12	Inches	12 " Pipe	Connect small section of 12-inch pipe on Southcenter Blvd from 66th Ave S north to existing pipe.	The proposed project will address fire flow deficiency (4,000 gpm fire flow requirement) in the area. Project will also connect system on Southcenter Blvd.		
P-3	Southcenter Blvd & 65th Avenue S Pipe Upsize	Upsize Pipe	360 PZ	2220	8	12	Inches	12 " Pipe	Upsize 8-inch pipe to 12-inch pipe on Southcenter Blvd from 66th Avenue S to 65th Avenue S and 65th Ave S from Southcenter Blvd to S 151st Street.	The proposed project will address fire flow deficiency (4,000 gpm fire flow requirement) in area. Based on revised remaining useful life analysis, this pipeline is also identified as	Pipeline is at end of useful life based on pipe material and age.	
P-4	S 153rd Street Pipe Upsize	Upsize Pipe	360 PZ	500	8	12	Inches	12 " Pipe	Upsize 8-inch pipe to 12-inch pipe on S 153rd Street from 65th Avenue S eat to end of street.	The proposed project will address fire flow deficiency (4,000 gpm fire flow requirement) on dead-end pipe. Based on revised remaining useful life analysis, this pipeline is also	Pipeline is at end of useful life based on pipe material and age.	
P-5	S 152nd Street Pipe Project	Upsize / New Pipe	400 PZ	1750	n/a, 6	12	Inches	12 " Pipe	Install new 12-inch pipe on S 152nd Place from existing pipe to Sunwood Blvd. Upsize 6-inch cast iron pipeline on S 152nd Street from Macadam Road S east to the end of the pipe near 58th Avenue S.	The proposed project is a looping project and will address fire flow deficiency (4,000 gpm fire flow requirement) on long, dead-end pipe. The existing pipeline is cast iron and is subject to cracking and breaking apart with age. Based on revised remaining useful life analysis, this pipeline is also identified as medium priority for replacement.	Pipeline is at end of useful life based on pipe material and age. Looping pipe may improve water quality on S 152nd Street.	Easement acquisitions will be needed but are not included in CIP cost.
P-6	51st Avenue S Pipe Upsize	Upsize Pipe	465 PZ	1530	8	12	Inches	12 " Pipe	Upsize 8-inch pipe to 12-inch pipe at the following locations: -Connection from SS169 to 51st Ave S. -51st Avenue S from S 112th to S 109th Street.	The proposed project will address future fire flow deficiencies (4,000 gpm fire flow requirement for MFR) in area.		Fire flow requirement should be confirmed before project is implemented. The project may not be required depending on the
P-7	Macadam Road Water Upgrade	New Pipe	360 PZ	4300	n/a	10	Inches	10 " Pipe	Design and construct 4,300 LF of 10-inch pipeline on Macadam Road S from S 144th Street to Southcenter Blvd.	This City-driven project will improve fire flow water quality to the north side of Tukwila Hill.	The new pipeline will eliminate maintenance time for flushing the dead end pipeline while increasing service reliability.	Project is in design phase and construction is expected to be completed in 2022.
Pump Station												
PS-1	North Hill BPS Back-up Power	Pump Station	360 PZ and 465 PZ			300	HP	Pump Station	Add back-up power to North Hill BPS High Pumps and Fire Flow Pumps for pumping reliability.	Project is recommended to provide reliability to North Hill BPS through back-up power.		
Storage												
ST-1 Alt 1A	New Storage Alternative 1A: North Hill Gravel Site w/ BPS to 465 Zone	Storage	System-Wide					Storage	This storage alternative constructs a new tank that will serve as a storage reservoir at the North Hill Gravel Site and fills it using existing supply stations in the 360 service level. A new BPS will also be constructed to serve the 360 service level, namely customers in the 360 PZ and 400 PZ. In addition, a new, separate BPS will be constructed to serve customers in the 465 service level. A pipe crossing of I-5 and the railroad will be required for the 465 service level to utilize this new reservoir. This alternative assumes the pipe crossing of I-5 and the railroad will be constructed near S Boeing Access Rd as shown in project location map.	As shown in the Storage Analysis, each service level in the City's water system has storage deficiencies. The City has different options to build additional storage needs. This project represents one alternative to address storage deficiencies in the 360 and 465 service levels.	New tank, booster pump stations, and pipeline will require ongoing maintenance.	Project G-7 (Planning Pre-Design Alternative Analysis for Project ST-1) should be completed prior to commencing this project.
ST-1 Alt 1B	New Storage Alternative 1B: North Hill Gravel Site w/ Separate 465 Tank	Storage	System-Wide					Storage	This storage alternative constructs two new tanks: one that will serve as a storage reservoir at the North Hill Gravel Site that is filled using existing supply stations in the 360 service level and one that will serve as a storage reservoir at the Beacon Avenue Site that is filled using existing supply stations in the 465 service level. Two new BPSs will also be constructed to serve customers in the respective service levels.	As shown in the Storage Analysis, each service level in the City's water system has storage deficiencies. The City has different options to build additional storage needs. This project represents one alternative to address storage deficiencies in the 360 and 465 service levels.	New tank, booster pump stations, and pipeline will require ongoing maintenance.	Project G-7 (Planning Pre-Design Alternative Analysis for Project ST-1) should be completed prior to commencing this project.
ST-1 Alt 2	New Storage Alternative 2: Beacon Ave Site	Storage	System-Wide					Storage	This storage alternative constructs a new tank that will serve as a storage reservoir at the Beacon Ave Site in the 465 service level and fills it using existing supply stations in the 360 and 465 service levels. In addition, a new BPS will be constructed to serve the 465 service level. A pipe crossing of I-5 and the railroad will be required so the 360 and 465 service levels can share the new storage and so that the supply stations in the 360 service level can fill the tank. This alternative assumes the pipe crossing of I-5 and the railroad will be constructed near S Boeing Access Rd as shown in project location map. A new pressure reducing valve (PRV) will be required to reduce pressure from the BPS down to the 360 service level. New check valves will be required at SS 169 in the 465 service level and the fill line to the tank from the 360 service level.	As shown in the Storage Analysis, each service level in the City's water system has storage deficiencies. The City has different options to build additional storage needs. This project represents one alternative to address storage deficiencies in the 360 and 465 service levels.	New tank, booster pump stations, and pipeline will require ongoing maintenance.	Project G-7 (Planning Pre-Design Alternative Analysis for Project ST-1) should be completed prior to commencing this project.
ST-1 Alt 3	New Storage Alternative 3: Ryan Hill 2 Acre Site	Storage	System-Wide					Storage	This storage alternative constructs a new tank that will serve as a storage reservoir at the Ryan Hill 2 Acre Site in the 465 service level and fills it using existing supply stations in the 360 and 465 service levels. In addition, a new BPS will be constructed to serve the 465 service level. A pipe crossing of I-5 and the railroad will be required so the 360 and 465 service levels can share the new storage and so that the supply stations in the 360 service level can fill the tank. This alternative assumes the pipe crossing of I-5 and the railroad will be constructed from S 116th St on the west side of the railroad to S 114th St on the east side of I-5 as shown in project location map. A new PRV will be required to reduce pressure from the BPS down to the 360 service level. New check valves will be required at SS 169 in the 465 service level and the fill line to the tank from the 360 service level.	As shown in the Storage Analysis, each service level in the City's water system has storage deficiencies. The City has different options to build additional storage needs. This project represents one alternative to address storage deficiencies in the 360 and 465 service levels.	New tank, booster pump stations, and pipeline will require ongoing maintenance.	Project G-7 (Planning Pre-Design Alternative Analysis for Project ST-1) should be completed prior to commencing this project.
ST-2	Transfer Customers in 380 PZ to HWD	Storage	380 PZ					Storage	Storage project ST-1 does not provide storage for the 380 PZ. It is recommended that the City work with Highline Water District (HWD) to transfer customers from the 380 PZ to HWD service.	The Department of Health requires storage be provided for all service levels.	Transferring customers would mean maintenance on pipeline in 380 PZ would be transferred to HWD.	If ST-3 is completed, ST-2 may not be required. No costs are associated with this project.
ST-3	Study for Replacing Pipe Connection to 380 PZ	Storage	380 PZ			1	Study	Storage	The City has a pipe that connects the 380 PZ to the 360 PZ, but it is not currently used because the pipe is not deep enough per WSDOT's requirements for depth below roadway. This project is to increase the depth of the one section of pipe that does not meet WSDOT's requirements so that the 380 PZ can be connected to the 360 PZ.	The Department of Health requires storage be provided for all service levels.	Pipeline under freeway would need to be maintained by the City if it is brought into use.	If ST-2 is completed, ST-3 is not required.
Supply												
S-1	Cascade Contract Update	Supply	System-Wide					Supply	It is recommended that the City work with Cascade to update the management agreement so that contractual flows are sufficient to meet the City's projected maximum day demand while concurrently refilling fire suppression storage. Approximately 1.5 mgd additional supply is needed by 2040 to meet the	Increases to the City's contractual water supply are needed to meet the City's supply criteria.		No costs are associated with this project.
S-2	SS 15 Operational Changes	Supply	360 PZ					Supply	It is recommended that supply operational changes are implemented to use a different lead supply or limit the amount of flow supplied by SS 15 when velocity reaches 8 fps in the future. No infrastructure improvements are recommended to address this deficiency.	Velocity in SS 15 connection to system may reach the City's maximum velocity criteria in the future.	High velocities in pipelines could lead to increased required maintenance.	No costs are associated with this project.
General												
G-1	Pipeline Repair and Replacement Program (High Priority)	General	System-wide	26,590				Program	Project to replace pipes that were identified as "high priority" in the revised version of the 2014 Remaining Useful Life Analysis. (see RUL Summary tab for breakdown of LF by pipe diameter size)	Pipelines are at the end of their useful life based on material and age.	Replacing old pipes may reduce impact on maintenance crews from risk of failure.	
G-2	Pipeline Repair and Replacement Program (Medium Priority)	General	System-wide	88,830				Program	Project to replace pipes that were identified as "medium priority" in the revised version of the 2014 Remaining Useful Life Analysis. (see RUL Summary tab for breakdown of LF by pipe diameter size)	Pipelines are at or approaching the end of their useful life based on material and age.	Replacing old pipes may reduce impact on maintenance crews from risk of failure.	
G-3	Water System Plan	General	System-wide			2	Plans	General	Prepare 10-year and 20-year updates to the City's Comprehensive Water System Plan.	Plan needs to be consistent with the City's Comprehensive Plan and the Department of Health requires the plan to be updated every 10 years.		
G-4	Large Meter Replacement	General	System-wide				Meters	General	This project is to replace three 10-inch meters and seven 8-inch large water meters at the following account locations: 07-0001-000, Westfield Shoppingtown #12286, 2800 Southcenter Mall, 10-inch water meter. 07-0002-000, Westfield Shoppingtown #12286, 2800 Southcenter Mall, 10-inch water meter. 12-0327-000, Boeing Company Store #14-01, 8701 E Marginal Way S, 10-inch water meter. 12-0170-000, Boeing Company Store #13-01, 9800 E Marginal Way S, 8-inch water meter. 12-0190-000, Boeing Company Store #13-01, 9800 E Marginal Way S, 8-inch water meter. 12-0220-000, King County Int'l Airport, 9010 E Marginal Way S, 8-inch water meter. 12-0221-000, King County Int'l Airport, 9010 E Marginal Way S, 8-inch water meter. 12-0350-000, Boeing Company Store #9-05, 9265 E Marginal Way S, 8-inch water meter. 12-0360-000, Boeing Company Store #9-51, 9407 E Marginal Way S, 8-inch water meter. 12-0365-000, Boeing Company Store #9-43, 2630 S 98th St, 8-inch water meter.	Many large water meters have reach their useful life and need to be replaced.	Reduce risk of meter maintenance issues.	Estimated project cost is $100,000 per year for 5 years.
G-5	Highline Intertie Rebuild	General	System-wide			1	Interties	General	Project to rebuild the existing intertie with Highline Water District	Rebuilding the intertie with HWD will help increase the resiliency of the system by providing an additional source of supply to the City's system, which can be used during		
G-6	Interties with WD 125	General	System-wide			2	Interties	General	The existing connections with WD 125 are closed valves. The City and WD 125 have had discussions about putting in official two-way interties at the existing valve locations.	Creating official interties with WD 125 will help increase the resiliency of the system by providing additional sources of supply, which can be used during emergencies.		
G-7	Planning Pre-Design Alternatives Analysis for Project ST-1	General	System-wide			1	Study	Storage	This study will refine the storage alternatives analysis based on available sites for the future storage tank and booster pump stations, as needed. The study also includes performing a more detailed evaluation of trenchless technology after groundwater and boring details are more thoroughly investigated.	A comprehensive alternatives analysis for the new storage is recommended before any design of the new storage facility begins.		Project should be completed before commencing any alternative for project ST-1

Project Type / Project Cost

Project No.	Improvement Yes/No	Capacity Yes/No	Repair & Replacement: Maint List?	Repair & Replacement: Years Remaining	Project Priority	Unit Cost ($/Unit)	Subtotal	Construction Contingency 30%	Total Construction Cost	General Conditions 10%	Contractor Overhead and Profit 15%	ELA 20%	Total Cost
Distribution Pipeline													
P-1	Yes	No	No		5 to 10 years	$ 180	$ 360,000	$ 108,000	$ 468,000	$ 46,800	$ 70,200	$ 93,600	$ 679,000
P-2	Yes	No	No		5 to 10 years	$ 200	$ 72,000	$ 21,600	$ 93,600	$ 9,360	$ 14,040	$ 18,720	$ 136,000
P-3	Yes	No	Yes	Past Due or Reaching Due	0-5 years	$ 200	$ 444,000	$ 133,200	$ 577,200	$ 57,720	$ 86,580	$ 115,440	$ 837,000
P-4	Yes	No	Yes	Past Due or Reaching Due	0-5 years	$ 200	$ 100,000	$ 30,000	$ 130,000	$ 13,000	$ 19,500	$ 26,000	$ 189,000
P-5	Yes	No	Yes	Past Due or Reaching Due	0-5 years		$ 350,000	$ 105,000	$ 455,000	$ 45,500	$ 68,250	$ 91,000	$ 660,000
P-6	Yes	No	No		5 to 10 years	$ 200	$ 306,000	$ 91,800	$ 397,800	$ 39,780	$ 59,670	$ 79,560	$ 577,000
P-7	Yes	No	No		0-5 years								$ 2,500,000
Pump Station													
PS-1	Yes	No	No		10 to 20 years	$ 200,000	$ 600,000	$ 180,000	$ 780,000	$ 78,000	$ 117,000	$ 156,000	$ 1,131,000
Storage													
ST-1 Alt 1A	Yes	Yes			5 to 10 years		$ 22,830,900	$ 6,850,000	$ 29,680,900	$ 2,970,000	$ 4,450,000	$ 5,940,000	$ 43,040,000
ST-1 Alt 1B	Yes	Yes			5 to 10 years		$ 18,370,900	$ 5,510,000	$ 23,880,900	$ 2,390,000	$ 3,580,000	$ 4,780,000	$ 34,630,000
ST-1 Alt 2	Yes	Yes			5 to 10 years		$ 19,452,000	$ 5,840,000	$ 25,292,000	$ 2,530,000	$ 3,790,000	$ 5,060,000	$ 36,670,000
ST-1 Alt 3	Yes	Yes			5 to 10 years		$ 18,457,000	$ 5,540,000	$ 23,997,000	$ 2,400,000	$ 3,600,000	$ 4,800,000	$ 34,800,000
ST-2	Yes				0-5 years								
ST-3	Yes				0-5 years		$ 75,000						$ 75,000
Supply													
S-1		Yes			10 to 20 years								
S-2		Yes			10 to 20 years								
General													
G-1	No	No	Yes	Past Due	Annual		$ 5,358,400	$ 1,607,520	$ 6,965,920	$ 696,592	$ 1,044,888	$ 1,393,184	$ 10,101,000
G-2	No	No	Yes	Past Due or Reaching Due	Annual		$ 16,661,100	$ 4,998,330	$ 21,659,430	$ 2,165,943	$ 3,248,915	$ 4,331,886	$ 31,406,000
G-3	Yes	No	No		Annual	$ 200,000	$ 400,000						$ 400,000
G-4	No	No	Yes		0-5 years		$ 500,000						$ 500,000
G-5	No	No	Yes		10 to 20 years	$ 200,000	$ 200,000	$ 60,000	$ 260,000	$ 26,000	$ 39,000	$ 52,000	$ 377,000
G-6	Yes	No	No		10 to 20 years	$ 200,000	$ 400,000	$ 120,000	$ 520,000	$ 52,000	$ 78,000	$ 104,000	$ 754,000
G-7	Yes	Yes	No		0-5 years		$ 150,000						$ 150,000

Alternative 1A: North Hill Gravel Site w/ BPS to 465 Zone				
Project Element	**Quantity**	**Unit**	**Unit Cost ($/Unit)**	**Subtotal**
Tank and BPS				
North Hill Gravel Site Ground Tank	2,500,000	gallon	$ 3	$ 7,500,000
North Hill Gravel Site BPS	300	HP	$ 10,700	$ 3,210,000
North Hill Pipe (16-inch)	1,100	LF	$ 264	$ 290,400
Beacon Ave BPS	355	HP	$ 10,700	$ 3,798,500
465 PZ Transmission Main Upsize (12-inch)	1,600	LF	$ 220	$ 352,000
Tank and BPS Subtotal				**$ 15,150,900**
Pipe Crossing of I-5 and RR				
Pipe (18-inch)	3,200	LF	$ 275	$ 880,000
54-inch micro-tunnel with casing	1,200	LF	$ 3,000	$ 3,600,000
Micro-tunnel Launch Shaft	1	Each	$ 750,000	$ 750,000
Micro-tunnel Exit Shaft	2	Each	$ 400,000	$ 800,000
36-inch auger bore with casing	600	LF	$ 1,700	$ 1,020,000
Auger bore Launch Shaft	1	Each	$ 375,000	$ 375,000
Auger bore Exist Shaft	1	Each	$ 250,000	$ 250,000
Pipe Crossing of I-5 and RR Subtotal				**$ 7,680,000**
PROJECT SUBTOTAL				**$ 22,830,900**
Construction Contingency			30%	$ 6,850,000
Construction Subtotal				**$ 29,680,900**
General Conditions			10%	$ 2,970,000
Contractor Overhead and Profit			15%	$ 4,450,000
Engineering, Legal, and Administrative (ELA)			20%	$ 5,940,000
CIP TOTAL				**$ 43,040,000**

Alternative 1B: North Hill Gravel Site w/ Separate 465 Tank				
Project Element	**Quantity**	**Unit**	**Unit Cost ($/Unit)**	**Subtotal**
Tank and BPS				
North Hill Gravel Site Tank	2,400,000	gallon	$ 3	$ 7,200,000
North Hill Gravel Site BPS	300	HP	$ 10,700	$ 3,210,000
North Hill Pipe (16-inch)	1,100	LF	$ 264	$ 290,400
Beacon Ave Tank	1,100,000	gallon	$ 3	$ 3,300,000
Beacon Ave BPS	355	HP	$ 10,700	$ 3,798,500
Beacon Ave Pipe (12-inch)	500	LF	$ 220	$ 110,000
465 PZ Transmission Main Upsize (12-inch)	2,100	LF	$ 220	$ 462,000
Tank and BPS Subtotal				**$ 18,370,900**
PROJECT SUBTOTAL				**$ 18,370,900**
Construction Contingency			30%	$ 5,510,000
Construction Subtotal				**$ 23,880,900**
General Conditions			10%	$ 2,390,000
Contractor Overhead and Profit			15%	$ 3,580,000
Engineering, Legal, and Administrative (ELA)			20%	$ 4,780,000
CIP TOTAL				**$ 34,630,000**

Alternative 2: Beacon Ave Site				
Project Element	**Quantity**	**Unit**	**Unit Cost ($/Unit)**	**Subtotal**
Tank and BPS				
Beacon Ave Tank	2,500,000	gallon	$ 3	$ 7,500,000
Beacon Ave BPS	300	HP	$ 10,700	$ 3,210,000
Beacon Ave Pipe (12-inch)	500	LF	$ 220	$ 110,000
PRV or Check Valve	3	Each	$ 200,000	$ 600,000
465 PZ Transmission Main Upsize (12-inch)	1,600	LF	$ 220	$ 352,000
Tank and BPS Subtotal				**$ 11,772,000**
Pipe Crossing of I-5 and RR				
Pipe (18-inch)	3,200	LF	$ 275	$ 880,000
54-inch micro-tunnel with casing	1,200	LF	$ 3,000	$ 3,600,000
Micro-tunnel Launch Shaft	1	Each	$ 750,000	$ 750,000
Micro-tunnel Exit Shaft	2	Each	$ 400,000	$ 800,000
36-inch auger bore with casing	600	LF	$ 1,700	$ 1,020,000
Auger bore Launch Shaft	1	Each	$ 375,000	$ 375,000
Auger bore Exist Shaft	1	Each	$ 250,000	$ 250,000
Pipe Crossing of I-5 and RR Subtotal				**$ 7,680,000**
PROJECT SUBTOTAL				**$ 19,452,000**
Construction Contingency			30%	$ 5,840,000
Construction Subtotal				**$ 25,292,000**
General Conditions			10%	$ 2,530,000
Contractor Overhead and Profit			15%	$ 3,790,000
Engineering, Legal, and Administrative (ELA)			20%	$ 5,060,000
CIP TOTAL				**$ 36,670,000**

Alternative 3: Ryan Hill 2 Acre Site				
Project Element	**Quantity**	**Unit**	**Unit Cost ($/Unit)**	**Subtotal**
Tank and BPS				
Ryan Hill 2 Acre Tank	2,500,000	gallon	$ 3	$ 7,500,000
Ryan Hill 2 Acre BPS	310	HP	$ 10,700	$ 3,317,000
Ryan Hill 2 Acre Pipe (12-inch)	500	LF	$ 220	$ 110,000
PRV or Check Valve	3	Each	$ 200,000	$ 600,000
465 PZ Transmission Main Upsize (12-inch)	2,000	LF	$ 220	$ 440,000
Tank and BPS Subtotal				**$ 11,967,000**
Pipe Crossing of I-5 and RR				
Pipe (18-inch)	1,300	LF	$ 275	$ 357,500
54-inch micro-tunnel with casing	1,300	LF	$ 3,000	$ 3,900,000
Micro-tunnel Launch Shaft	1	Each	$ 750,000	$ 750,000
Micro-tunnel Exit Shaft	1	Each	$ 400,000	$ 400,000
Contingency for long, single micro-tunnel for pipe crossing			20%	$ 1,081,500
Pipe Crossing of I-5 and RR Subtotal				**$ 6,490,000**
PROJECT SUBTOTAL				**$ 18,457,000**
Construction Contingency			30%	$ 5,540,000
Construction Subtotal				**$ 23,997,000**
General Conditions			10%	$ 2,400,000
Contractor Overhead and Profit			15%	$ 3,600,000
Engineering, Legal, and Administrative (ELA)			20%	$ 4,800,000
CIP TOTAL				**$ 34,800,000**

Appendix S

CAPITAL IMPROVEMENT PROGRAM SHEETS

City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: Starfire Pipe Project
Facility Type: Distribution Pipeline
Pressure Zone: 360 PZ
Priority: 5 to 10 years

Project No.: P-1

Go to CIP Summary Table

Project Information:

Description: Install new 8-inch pipe to create loop for pipe on Starfire Way north (across pedestrian bridge) to S 143rd Place.

Justification The proposed project will address fire flow deficiency (1,500 gpm fire flow requirement) on long, dead-end pipe.

Maint. Impact Looping pipe may improve water quality on Starfire Way.

Comment

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
8 " Pipe	2,000	LF	$ 180	$360,000	$ 108,000	$ 468,000	$ 46,800	$ 70,200	$ 93,600	$ 679,000
Total Anticipated Project Cost										$ 679,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

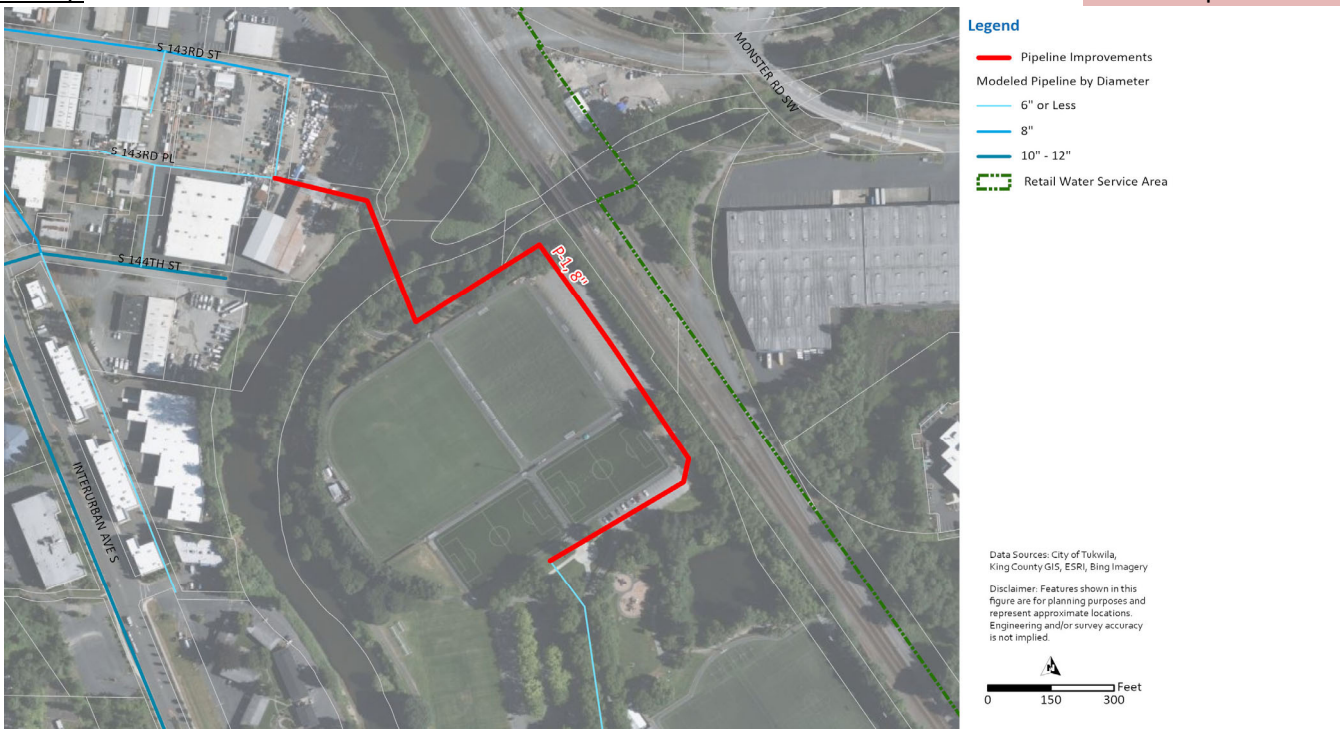
Project Type	Percent	Cost
Improvement:	100%	$ 679,000
Capacity:	0%	$ -
Repair & Replacement:	0%	$ -
Total Anticipated Project Cost	100%	$ 679,000

Project Timing:

Project Element		Timing	Cost
Entire Project		5 to 10 years	$ 679,000
Total Anticipated Project Cost			$ 679,000

Project Location Map:

Go to Maps Tab



City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: Southcenter Blvd Pipe Connection
Facility Type: Distribution Pipeline
Pressure Zone: 360 PZ
Priority: 5 to 10 years

Project No.: P-2

Go to CIP Summary Table

Project Information:

Description: Connect small section of 12-inch pipe on Southcenter Blvd from 66th Ave S north to existing pipe.

Justification The proposed project will address fire flow deficiency (4,000 gpm fire flow requirement) in the area. Project will also connect system on Southcenter Blvd.

Maint. Impact

Comment

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
12 " Pipe	360	LF	$ 200	$ 72,000	$ 21,600	$ 93,600	$ 9,360	$ 14,040	$ 18,720	$ 136,000
Total Anticipated Project Cost										$ 136,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

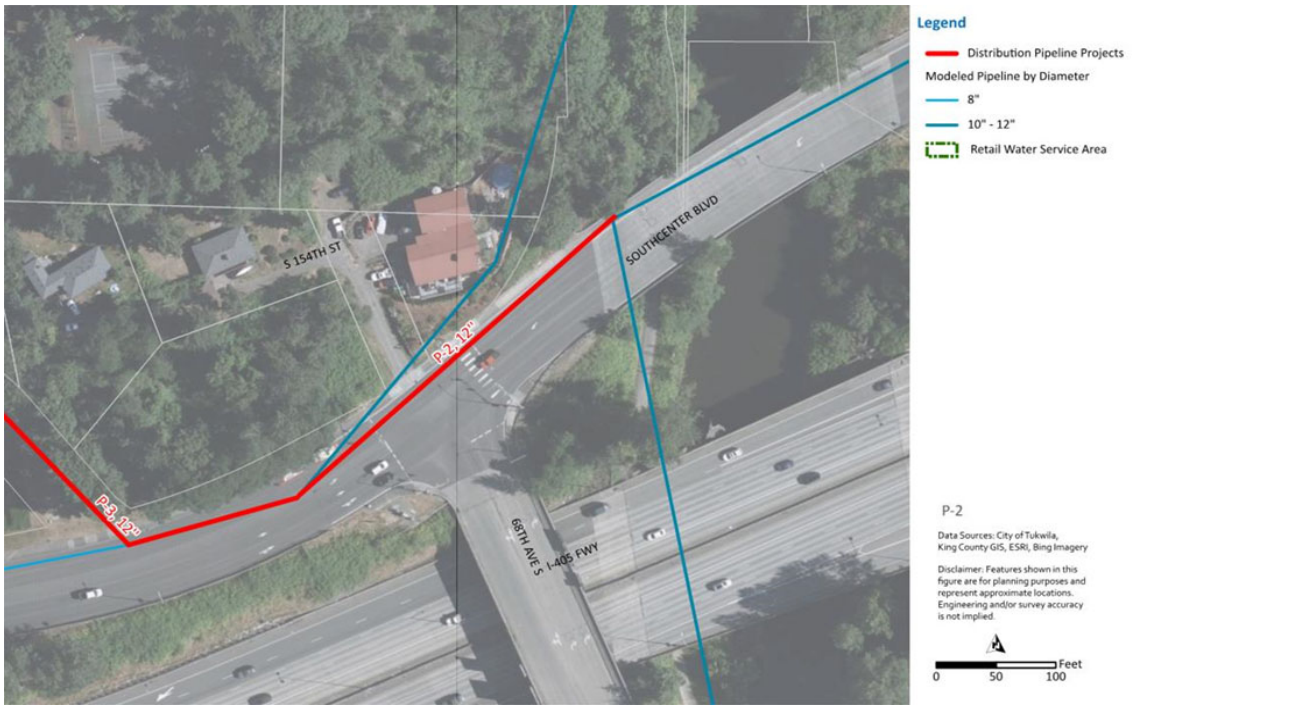
Project Type	Percent	Cost
Improvement:	100%	$ 136,000
Capacity:	0%	$ -
Condition:	0%	$ -
Total Anticipated Project Cost	100%	$ 136,000

Project Timing:

Project Element		Timing	Cost
Entire Project		5 to 10 years	$ 136,000
Total Anticipated Project Cost			$ 136,000

Project Location Map:

Go to Maps Tab



City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: Southcenter Blvd & 65th Avenue S Pipe Upsize
Facility Type: Distribution Pipeline
Pressure Zone: 360 PZ
Priority: 0-5 years

Project No.: P-3

Go to CIP Summary Table

Project Information:

Description: Upsize 8-inch pipe to 12-inch pipe on Southcenter Blvd from 66th Avenue S to 65th Avenue S and 65th Ave S from Southcenter Blvd to S 151st Street.

Justification The proposed project will address fire flow deficiency (4,000 gpm fire flow requirement) in area. Based on revised remaining useful life analysis, this pipeline is also identified as medium priority for replacement.

Maint. Impact Pipeline is at end of useful life based on pipe material and age.

Comment

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
12 " Pipe	2,220	LF	$ 200	$ 444,000	$ 133,200	$ 577,200	$ 57,720	$ 86,580	$ 115,440	$ 837,000
Total Anticipated Project Cost										$ 837,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

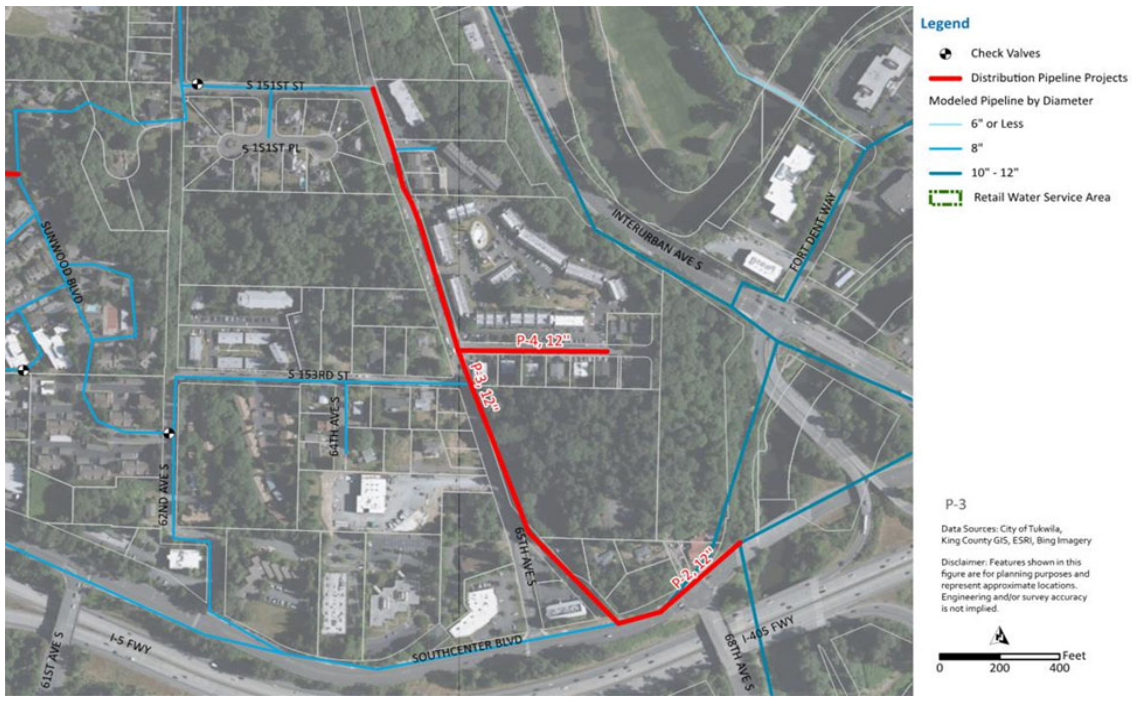
Project Type	Percent	Cost
Improvement:	50%	$ 418,500
Capacity:	0%	$ -
Condition:	50%	$ 418,500
Total Anticipated Project Cost	100%	$ 837,000

Project Timing:

Project Element		Timing	Cost
Entire Project		0-5 years	$ 837,000
Total Anticipated Project Cost			$ 837,000

Project Location Map:

Go to Maps Tab



City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: S 153rd Street Pipe Upsize
Facility Type: Distribution Pipeline
Pressure Zone: 360 PZ
Priority: 0-5 years

Project No.: P-4

Go to CIP Summary Table

Project Information:

Description: Upsize 8-inch pipe to 12-inch pipe on S 153rd Street from 65th Avenue S eat to end of street.

Justification The proposed project will address fire flow deficiency (4,000 gpm fire flow requirement) on dead-end pipe. Based on revised remaining useful life analysis, this pipeline is also identified as medium priority for replacement.

Maint. Impact Pipeline is at end of useful life based on pipe material and age.

Comment

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
12 " Pipe	500	LF	$ 200	$100,000	$ 30,000	$ 130,000	$ 13,000	$ 19,500	$ 26,000	$ 189,000
Total Anticipated Project Cost										$ 189,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	50%	$ 94,500
Capacity:	0%	$ -
Condition:	50%	$ 94,500
Total Anticipated Project Cost	100%	$ 189,000

Project Timing:

Project Element		Timing	Cost
Entire Project		0-5 years	$ 189,000
Total Anticipated Project Cost			$ 189,000

Project Location Map:

Go to Maps Tab

City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: S 152nd Street Pipe Project
Facility Type: Distribution Pipeline
Pressure Zone: 400 PZ
Priority: 0-5 years

Project No.: P-5

Go to CIP Summary Table

Project Information:

Description: Install new 12-inch pipe on S 152nd Place from existing pipe to Sunwood Blvd. Upsize 6-inch cast iron pipeline on S 152nd Street from Macadam Road S east to the end of the pipe near 58th Avenue S.

Justification The proposed project is a looping project and will address fire flow deficiency (4,000 gpm fire flow requirement) on long, dead-end pipe. The existing pipeline is cast iron and is subject to cracking and breaking apart with age. Based on revised remaining useful life analysis, this pipeline is also identified as medium priority for replacement.

Maint. Impact Pipeline is at end of useful life based on pipe material and age. Looping pipe may improve water quality on S 152nd Street.

Comment Easement acquisitions will be needed but are not included in CIP cost.

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
12 " Pipe	1,750	LF	$ -	$350,000	$ 105,000	$ 455,000	$ 45,500	$ 68,250	$ 91,000	$ 660,000
Total Anticipated Project Cost										$ 660,000

Notes on Cost Estimation:

Total cost does not include easement acquisition.

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	50%	$ 330,000
Capacity:	0%	$ -
Condition:	50%	$ 330,000
Total Anticipated Project Cost	100%	$ 660,000

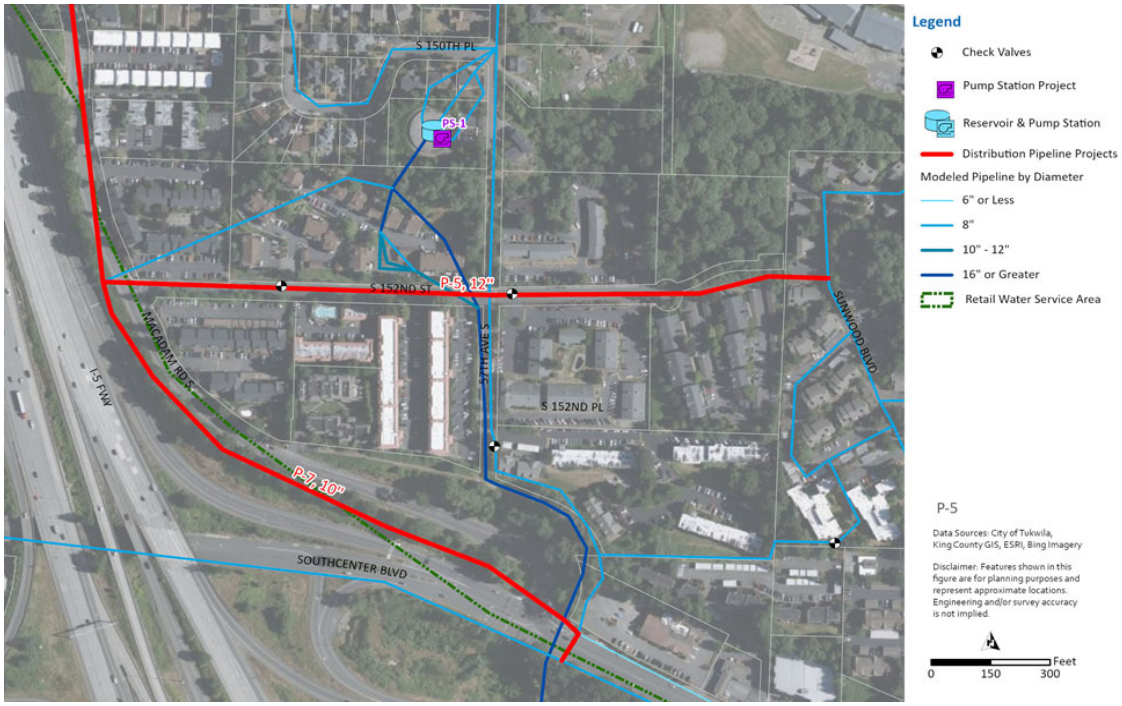
Project Timing:

Project Element		Timing	Cost
Entire Project		0-5 years	$ 660,000
Total Anticipated Project Cost			$ 660,000

Project Title: S 152nd Street Pipe Project
Facility Type: Distribution Pipeline
Project No.: P-5

Go to CIP Summary Table
Go to Maps Tab

Project Location Map:



City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: 51st Avenue S Pipe Upsize
Facility Type: Distribution Pipeline
Pressure Zone: 465 PZ
Priority: 5 to 10 years

Project No.: P-6

Go to CIP Summary Table

Project Information:

Description: Upsize 8-inch pipe to 12-inch pipe at the following locations:
-Connection from SS169 to 51st Ave S.
-51st Avenue S from S 112th to S 109th Street.
-112th Street from 51st Avenue S west to end of street.

Justification The proposed project will address future fire flow deficiencies (4,000 gpm fire flow requirement for MFR) in area.

Maint. Impact

Comment Fire flow requirement should be confirmed before project is implemented. The project may not be required depending on the storage option selected.

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
12 " Pipe	1,530	LF	$ 200	$ 306,000	$ 91,800	$ 397,800	$ 39,780	$ 59,670	$ 79,560	$ 577,000
Total Anticipated Project Cost										$ 577,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

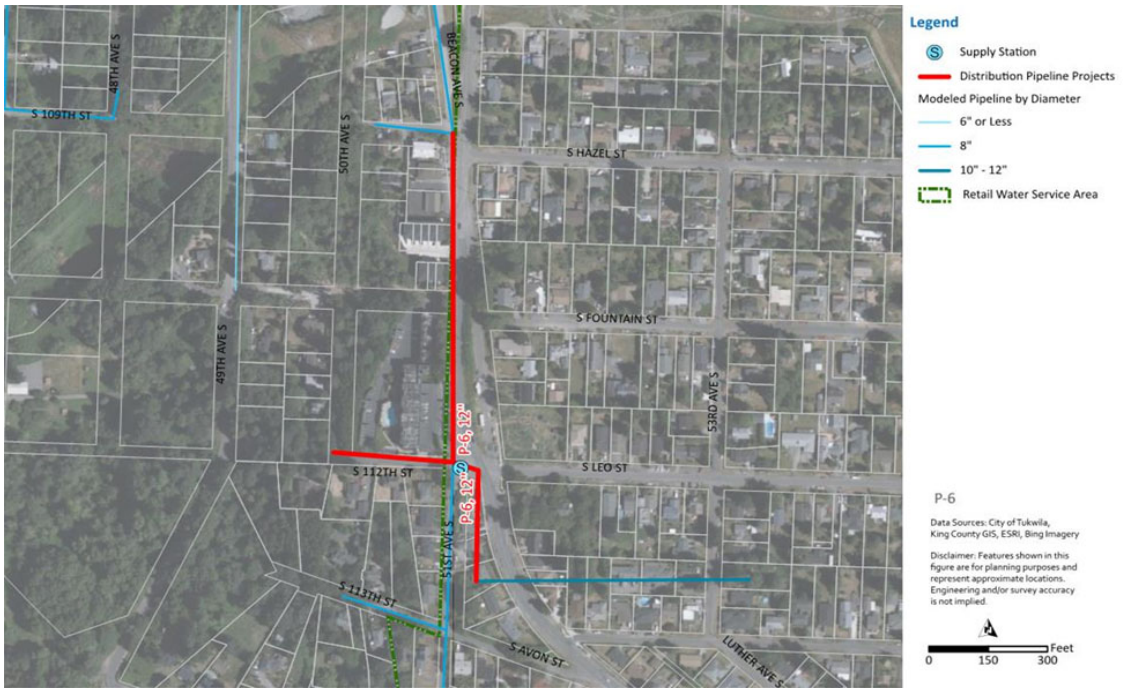
Project Type	Percent	Cost
Improvement:	100%	$ 577,000
Capacity:	0%	$ -
Condition:	0%	$ -
Total Anticipated Project Cost	100%	$ 577,000

Project Timing:

Project Element		Timing	Cost
Entire Project		5 to 10 years	$ 577,000
Total Anticipated Project Cost			$ 577,000

Project Location Map:

Go to Maps Tab



City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: Macadam Road Water Upgrade
Facility Type: Distribution Pipeline
Pressure Zone: 360 PZ
Priority: 0-5 years

Project No.: P-7

Go to CIP Summary Table

Project Information:

Description: Design and construct 4,300 LF of 10-inch pipeline on Macadam Road S from S 144th Street to Southcenter Blvd.

Justification This City-driven project will improve fire flow water quality to the north side of Tukwila Hill.

Maint. Impact The new pipeline will eliminate maintenance time for flushing the dead end pipeline while increasing service reliability.

Comment Project is in design phase and construction is expected to be completed in 2022.

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
10 " Pipe	4,300	LF	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,500,000
Total Anticipated Project Cost										$ 2,500,000

Notes on Cost Estimation:

Cost estimate for project provided by City.

Go to Assumptions Tab

Cost Allocation:

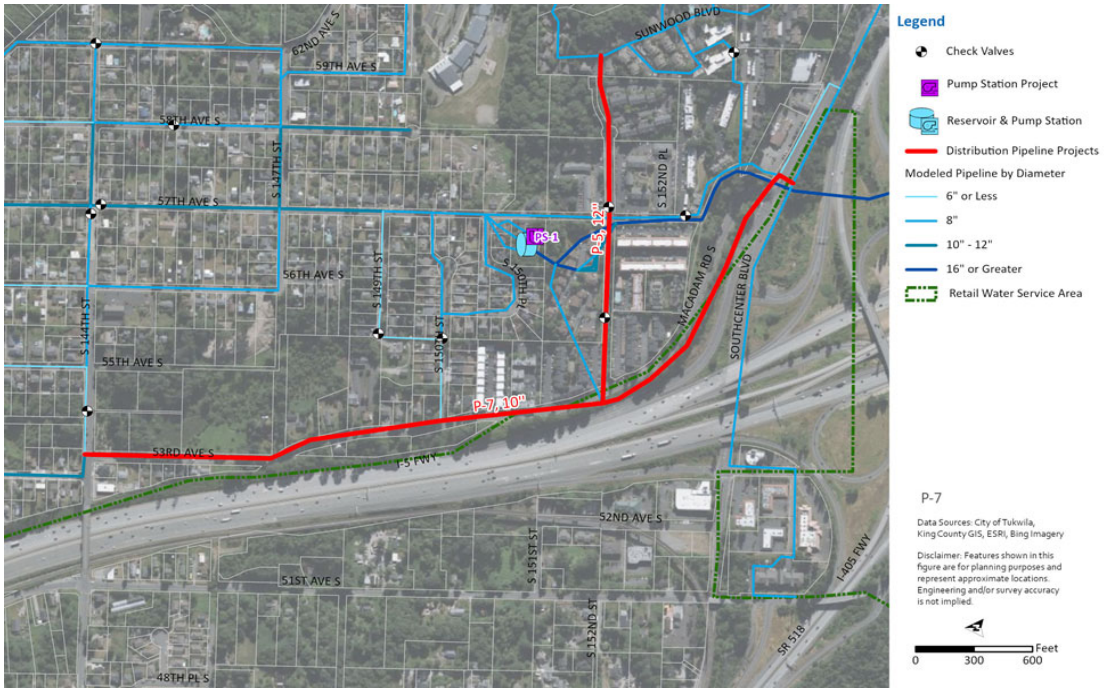
Project Type	Percent	Cost
Improvement:	100%	$ 2,500,000
Capacity:	0%	$ -
Repair & Replacement:	0%	$ -
Total Anticipated Project Cost	100%	$ 2,500,000

Project Timing:

Project Element		Timing	Cost
Entire Project		0-5 years	$ 2,500,000
Total Anticipated Project Cost			$ 2,500,000

Project Location Map:

Go to Maps Tab



City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: North Hill BPS Back-up Power
Facility Type: Pump Station
Pressure Zone: 360 PZ and 465 PZ
Priority: 10 to 20 years

Project No.: PS-1

Go to CIP Summary Table

Project Information:

Description: Add back-up power to North Hill BPS High Pumps and Fire Flow Pumps for pumping reliability.

Justification Project is recommended to provide reliability to North Hill BPS through back-up power.

Maint. Impact

Comment

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
Pump Station	300	per 100 HP	$ 200,000	$600,000	$ 180,000	$ 780,000	$ 78,000	$ 117,000	$ 156,000	$ 1,131,000
Total Anticipated Project Cost										$ 1,131,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	100%	$ 1,131,000
Capacity:	0%	$ -
Condition:	0%	$ -
Total Anticipated Project Cost	100%	$ 1,131,000

Project Timing:

Project Element		Timing	Cost
Entire Project		10 to 20 years	$ 1,131,000
Total Anticipated Project Cost			$ 1,131,000

Project Location Map:

Go to Maps Tab

City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: New Storage Alternative 1A: North Hill Gravel Site w/ BPS to 465 Zone **Project No.:** ST-1 Alt 1A
Facility Type: Storage
Pressure Zone: System-Wide
Priority: 5 to 10 years

Go to CIP Summary Table

Project Information:

Description: This storage alternative constructs a new tank that will serve as a storage reservoir at the North Hill Gravel Site and fills it using existing supply stations in the 360 service level. A new BPS will also be constructed to serve the 360 service level, namely customers in the 360 PZ and 400 PZ. In addition, a new, separate BPS will be constructed to serve customers in the 465 service level. A pipe crossing of I-5 and the railroad will be required for the 465 service level to utilize this new reservoir. This alternative assumes the pipe crossing of I-5 and the railroad will be constructed near S Boeing Access Rd as shown in project location map.

Justification As shown in the Storage Analysis, each service level in the City's water system has storage deficiencies. The City has different options to build additional storage needs. This project represents one alternative to address storage deficiencies in the 360 and 465 service levels.

Maint. Impact New tank, booster pump stations, and pipeline will require ongoing maintenance.

Comment Project G-7 (Planning Pre-Design Alternative Analysis for Project ST-1) should be completed prior to commencing this project.

Anticipated Project Cost:

Project Element	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
			30%		10%	15%	20%	
Tank and BPS (and associated elements)		$ 15,150,900	$ 4,550,000	$19,700,900	$ 1,970,000	$ 2,960,000	$ 3,940,000	$ 28,570,900
Pipe Crossing of I-5 and RR		$ 7,680,000	$ 2,300,000	$ 9,980,000	$ 1,000,000	$ 1,500,000	$ 2,000,000	$ 14,469,100
Total Anticipated Project Cost								$ 43,040,000

Notes on Cost Estimation:

See Appendix R for details costs.

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	50%	$ 21,520,000
Capacity:	50%	$ 21,520,000
Condition:	0%	$ -
Total Anticipated Project Cost	100%	$ 43,040,000

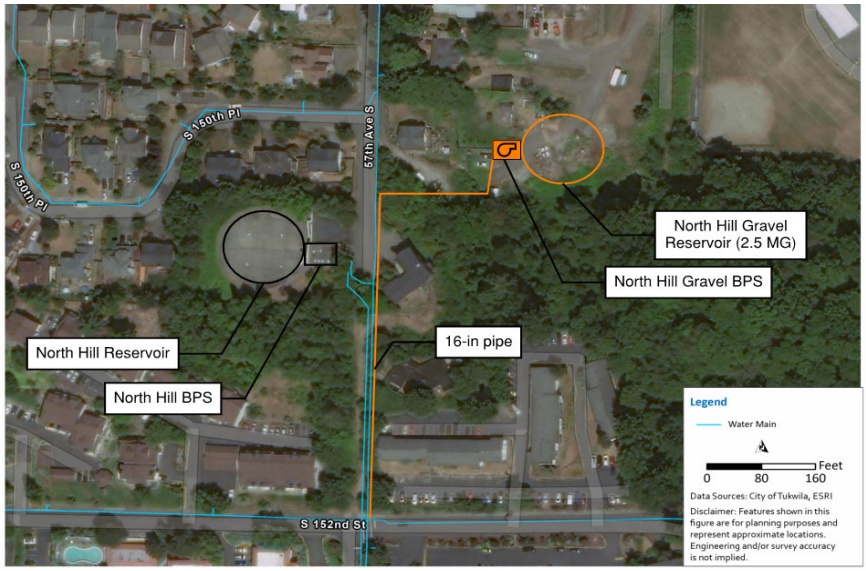
Project Timing:

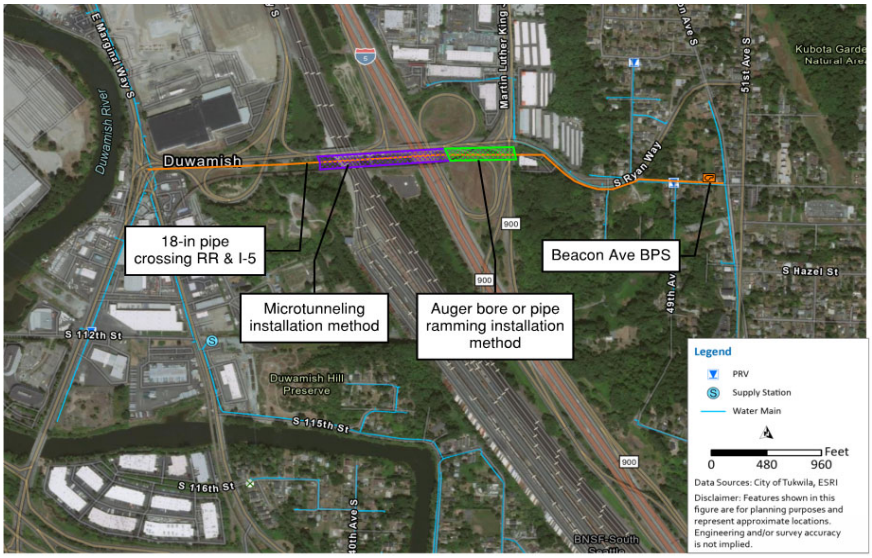
Project Element	Timing	Cost
Entire Project	5 to 10 years	$ 43,040,000
Total Anticipated Project Cost		$ 43,040,000

Project Title: New Storage Alternative 1A: North Hill Gravel Site w/ BPS to 465 Zone **Project No.:** ST-1 Alt 1A
Facility Type: Storage

Go to CIP Summary Table
Go to Maps Tab

Project Location Map:





City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: New Storage Alternative 1B: North Hill Gravel Site w/ Separate 465 Tank **Project No.:** ST-1 Alt 1B
Facility Type: Storage
Pressure Zone: System-Wide
Priority: 5 to 10 years

Go to CIP Summary Table

Project Information:

Description: This storage alternative constructs two new tanks: one that will serve as a storage reservoir at the North Hill Gravel Site that is filled using existing supply stations in the 360 service level and one that will serve as a storage reservoir at the Beacon Avenue Site that is filled using existing supply stations in the 465 service level. Two new BPSs will also be constructed to serve customers in the respective service levels.

Justification As shown in the Storage Analysis, each service level in the City's water system has storage deficiencies. The City has different options to build additional storage needs. This project represents one alternative to address storage deficiencies in the 360 and 465 service levels.

Maint. Impact New tank, booster pump stations, and pipeline will require ongoing maintenance.

Comment Project G-7 (Planning Pre-Design Alternative Analysis for Project ST-1) should be completed prior to commencing this project.

Anticipated Project Cost:

Project Element	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
			30%		10%	15%	20%	
Tank and BPS (and associated elements)		$ 18,370,900	$ 5,510,000	$23,880,900	$ 2,390,000	$ 3,580,000	$ 4,780,000	$ 34,630,000
Total Anticipated Project Cost								$ 34,630,000

Notes on Cost Estimation:

See Appendix R for details costs.

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	50%	$ 17,315,000
Capacity:	50%	$ 17,315,000
Condition:	0%	$ -
Total Anticipated Project Cost	100%	$ 34,630,000

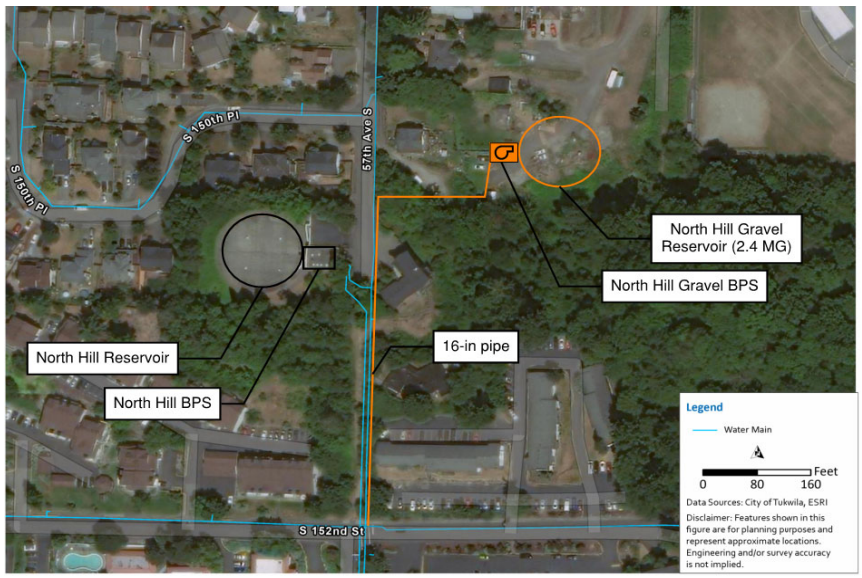
Project Timing:

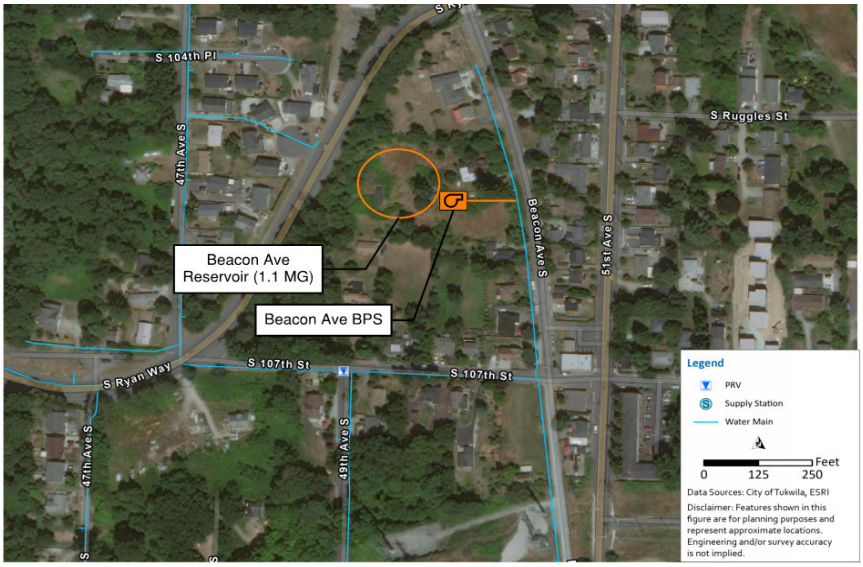
Project Element	Timing	Cost
Entire Project	5 to 10 years	$ 34,630,000
Total Anticipated Project Cost		$ 34,630,000

Project Title: New Storage Alternative 1B: North Hill Gravel Site w/ Separate 465 Tank **Project No.:** ST-1 Alt 1B
Facility Type: Storage

Go to CIP Summary Table
Go to Maps Tab

Project Location Map:





City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: New Storage Alternative 2: Beacon Ave Site
Facility Type: Storage
Pressure Zone: System-Wide
Priority: 5 to 10 years

Project No.: ST-1 Alt 2

Go to CIP Summary Table

Project Information:

Description: This storage alternative constructs a new tank that will serve as a storage reservoir at the Beacon Ave Site in the 465 service level and fills it using existing supply stations in the 360 and 465 service levels. In addition, a new BPS will be constructed to serve the 465 service level. A pipe crossing of I-5 and the railroad will be required so the 360 and 465 service levels can share the new storage and so that the supply stations in the 360 service level can fill the tank. This alternative assumes the pipe crossing of I-5 and the railroad will be constructed near S Boeing Access Rd as shown in project location map. A new pressure reducing valve (PRV) will be required to reduce pressure from the BPS down to the 360 service level. New check valves will be required at SS 169 in the 465 service level and the fill line to the tank from the 360 service level.

Justification As shown in the Storage Analysis, each service level in the City's water system has storage deficiencies. The City has different options to build additional storage needs. This project represents one alternative to address storage deficiencies in the 360 and 465 service levels.

Maint. Impact New tank, booster pump stations, and pipeline will require ongoing maintenance.

Comment Project G-7 (Planning Pre-Design Alternative Analysis for Project ST-1) should be completed prior to commencing this project.

Anticipated Project Cost:

Project Element	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
			30%		10%	15%	20%	
Tank and BPS (and associated elements)		$ 11,772,000	$ 3,530,000	$15,302,000	$ 1,530,000	$ 2,300,000	$ 3,060,000	$ 22,192,000
Pipe Crossing of I-5 and RR		$ 7,680,000	$ 2,300,000	$ 9,980,000	$ 1,000,000	$ 1,500,000	$ 2,000,000	$ 14,478,000

Total Anticipated Project Cost	$ 36,670,000

Notes on Cost Estimation:

See Appendix R for details costs.

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	50%	$ 18,335,000
Capacity:	50%	$ 18,335,000
Condition:	0%	$ -
Total Anticipated Project Cost	100%	$ 36,670,000

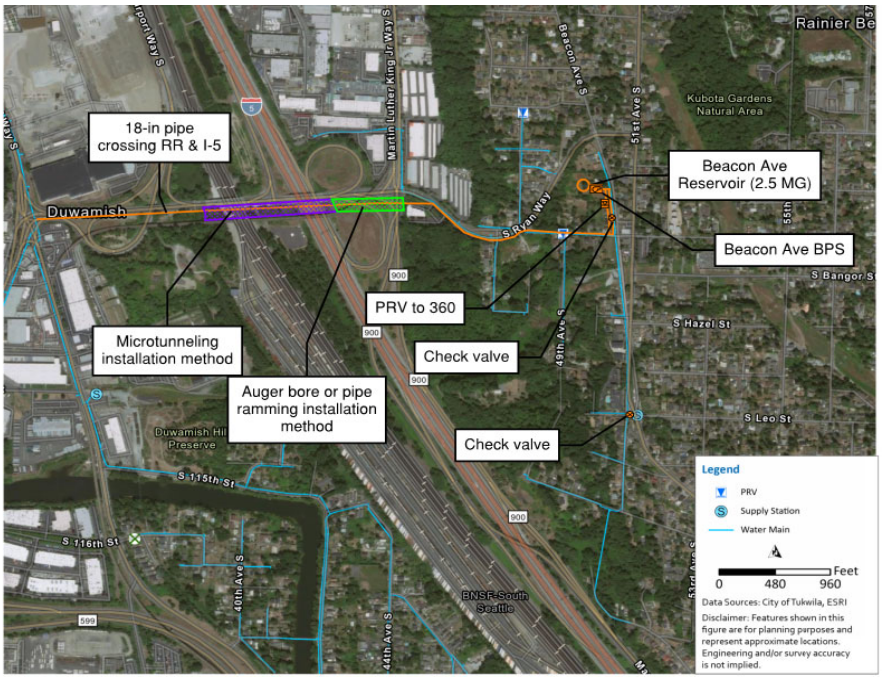
Project Timing:

Project Element	Timing	Cost
Entire Project	5 to 10 years	$ 36,670,000
Total Anticipated Project Cost		$ 36,670,000

Project Title: New Storage Alternative 2: Beacon Ave Site
Project No.: ST-1 Alt 2
Facility Type: Storage

Go to CIP Summary Table
Go to Maps Tab

Project Location Map:



City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: New Storage Alternative 3: Ryan Hill 2 Acre Site
Facility Type: Storage
Pressure Zone: System-Wide
Priority: 5 to 10 years

Project No.: ST-1 Alt 3

Go to CIP Summary Table

Project Information:

Description: This storage alternative constructs a new tank that will serve as a storage reservoir at the Ryan Hill 2 Acre Site in the 465 service level and fills it using existing supply stations in the 360 and 465 service levels. In addition, a new BPS will be constructed to serve the 465 service level. A pipe crossing of I-5 and the railroad will be required so the 360 and 465 service levels can share the new storage and so that the supply stations in the 360 service level can fill the tank. This alternative assumes the pipe crossing of I-5 and the railroad will be constructed from S 116th St on the west side of the railroad to S 114th St on the east side of I-5 as shown in project location map. A new PRV will be required to reduce pressure from the BPS down to the 360 service level. New check valves will be required at SS 169 in the 465 service level and the fill line to the tank from the 360 service level.

Justification As shown in the Storage Analysis, each service level in the City's water system has storage deficiencies. The City has different options to build additional storage needs. This project represents one alternative to address storage deficiencies in the 360 and 465 service levels.

Maint. Impact New tank, booster pump stations, and pipeline will require ongoing maintenance.

Comment Project G-7 (Planning Pre-Design Alternative Analysis for Project ST-1) should be completed prior to commencing this project.

Anticipated Project Cost:

Project Element	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
			30%		10%	15%	20%	
Tank and BPS (and associated elements)		$ 11,772,000	$ 3,530,000	$15,302,000	$ 1,530,000	$ 2,300,000	$ 3,060,000	$ 22,192,000
Pipe Crossing of I-5 and RR		$ 7,680,000	$ 2,300,000	$ 9,980,000	$ 1,000,000	$ 1,500,000	$ 2,000,000	$ 14,478,000

Total Anticipated Project Cost	$ 36,670,000

Notes on Cost Estimation:

See Appendix R for details costs. An additional 20 percent contingency was added for the pipe crossing of I-5 and the railroad due to the length of the crossing and associated construction uncertainties.

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	50%	$ 18,335,000
Capacity:	50%	$ 18,335,000
Condition:	0%	$ -
Total Anticipated Project Cost	100%	$ 36,670,000

Project Timing:

Project Element	Timing	Cost
Entire Project	5 to 10 years	$ 36,670,000
Total Anticipated Project Cost		$ 36,670,000

Project Title: New Storage Alternative 3: Ryan Hill 2 Acre Site
Project No.: ST-1 Alt 3
Facility Type: Storage

Go to CIP Summary Table
Go to Maps Tab

Project Location Map:

City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: Transfer Customers in 380 PZ to HWD
Facility Type: Storage
Pressure Zone: 380 PZ
Priority: 0-5 years

Project No.: ST-2

Go to CIP Summary Table

Project Information:

Description: Storage project ST-1 does not provide storage for the 380 PZ. It is recommended that the City work with Highline Water District (HWD) to transfer customers from the 380 PZ to HWD service.

Justification The Department of Health requires storage be provided for all service levels.

Maint. Impact Transferring customers would mean maintenance on pipeline in 380 PZ would be transferred to HWD.

Comment If ST-3 is completed, ST-2 may not be required. No costs are associated with this project.

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
No costs associated with project										
Total Anticipated Project Cost										$ -

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	100%	$ -
Capacity:	0%	$ -
Condition:	0%	$ -
Total Anticipated Project Cost	100%	$ -

Project Timing:

Project Element		Timing	Cost
Entire Project		0-5 years	$ -
Total Anticipated Project Cost			$ -

Project Location Map:

Go to Maps Tab

City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: Study for Replacing Pipe Connection to 380 PZ
Facility Type: Storage
Pressure Zone: 380 PZ
Priority: 0-5 years

Project No.: ST-3

Go to CIP Summary Table

Project Information:

Description: The City has a pipe that connects the 380 PZ to the 360 PZ, but it is not currently used because the pipe is not deep enough per WSDOT's requirements for depth below roadway. This project is to increase the depth of the one section of pipe that does not meet WSDOT's requirements so that the 380 PZ can be connected to

Justification The Department of Health requires storage be provided for all service levels.

Maint. Impact Pipeline under freeway would need to be maintained by the City if it is brought into use.

Comment If ST-2 is completed, ST-3 is not required.

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
Storage	1	Study	$ -	$ 75,000	$ -	$ -	$ -	$ -	$ -	$ 75,000
Total Anticipated Project Cost										$ 75,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	100%	$ 75,000
Capacity:	0%	$ -
Condition:	0%	$ -
Total Anticipated Project Cost	100%	$ 75,000

Project Timing:

Project Element		Timing	Cost
Entire Project		0-5 years	$ 75,000
Total Anticipated Project Cost			$ 75,000

Project Location Map:

Go to Maps Tab

City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: Cascade Contract Update
Facility Type: Supply
Pressure Zone: System-Wide
Priority: 10 to 20 years

Project No.: S-1

Go to CIP Summary Table

Project Information:

Description: It is recommended that the City work with Cascade to update the management agreement so that contractual flows are sufficient to meet the City's projected maximum day demand while concurrently refilling fire suppression storage. Approximately 1.5 mgd additional supply is needed by 2040 to meet the City's goal.

Justification Increases to the City's contractual water supply are needed to meet the City's supply criteria.

Maint. Impact

Comment No costs are associated with this project.

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
No costs associated with project										
Total Anticipated Project Cost										$ -

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	0%	$ -
Capacity:	100%	$ -
Condition:	0%	$ -
Total Anticipated Project Cost	100%	$ -

Project Timing:

Project Element		Timing	Cost
Entire Project		10 to 20 years	$ -
Total Anticipated Project Cost			$ -

Project Location Map:

Go to Maps Tab

City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: SS 15 Operational Changes
Facility Type: Supply
Pressure Zone: 360 PZ
Priority: 10 to 20 years

Project No.: S-2

Go to CIP Summary Table

Project Information:

Description: It is recommended that supply operational changes are implemented to use a different lead supply or limit the amount of flow supplied by SS 15 when velocity reaches 8 fps in the future. No infrastructure improvements are recommended to address this deficiency.

Justification Velocity in SS 15 connection to system may reach the City's maximum velocity criteria in the future.

Maint. Impact High velocities in pipelines could lead to increased required maintenance.

Comment No costs are associated with this project.

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
No costs associated with project										
Total Anticipated Project Cost										$ -

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	0%	$ -
Capacity:	100%	$ -
Condition:	0%	$ -
Total Anticipated Project Cost	100%	$ -

Project Timing:

Project Element		Timing	Cost
Entire Project		10 to 20 years	$ -
Total Anticipated Project Cost			$ -

Project Location Map:

Go to Maps Tab

City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: Pipeline Repair and Replacement Program (High Priority)
Facility Type: General
Pressure Zone: System-wide
Priority: Annual

Project No.: G-1

Go to CIP Summary Table

Project Information:

Description: Project to replace pipes that were identified as "high priority" in the revised version of the 2014 Remaining Useful Life Analysis. (see RUL Summary tab for breakdown of LF by pipe diameter size)

Justification Pipelines are at the end of their useful life based on material and age.

Maint. Impact Replacing old pipes may reduce impact on maintenance crews from risk of failure.

Comment

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
12 " Pipe	25,580	LF	$ 200	$ 5,116,000	$ 1,534,800	$ 6,650,800	$ 665,080	$ 997,620	$ 1,330,160	$ 9,644,000
16 " Pipe	1,010	LF	$ 240	$ 242,400	$ 72,720	$ 315,120	$ 31,512	$ 47,268	$ 63,024	$ 457,000
Total Anticipated Project Cost										$ 10,101,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	0%	$ -
Capacity:	0%	$ -
Condition:	100%	$ 10,101,000
Total Anticipated Project Cost	100%	$ 10,101,000

Project Timing:

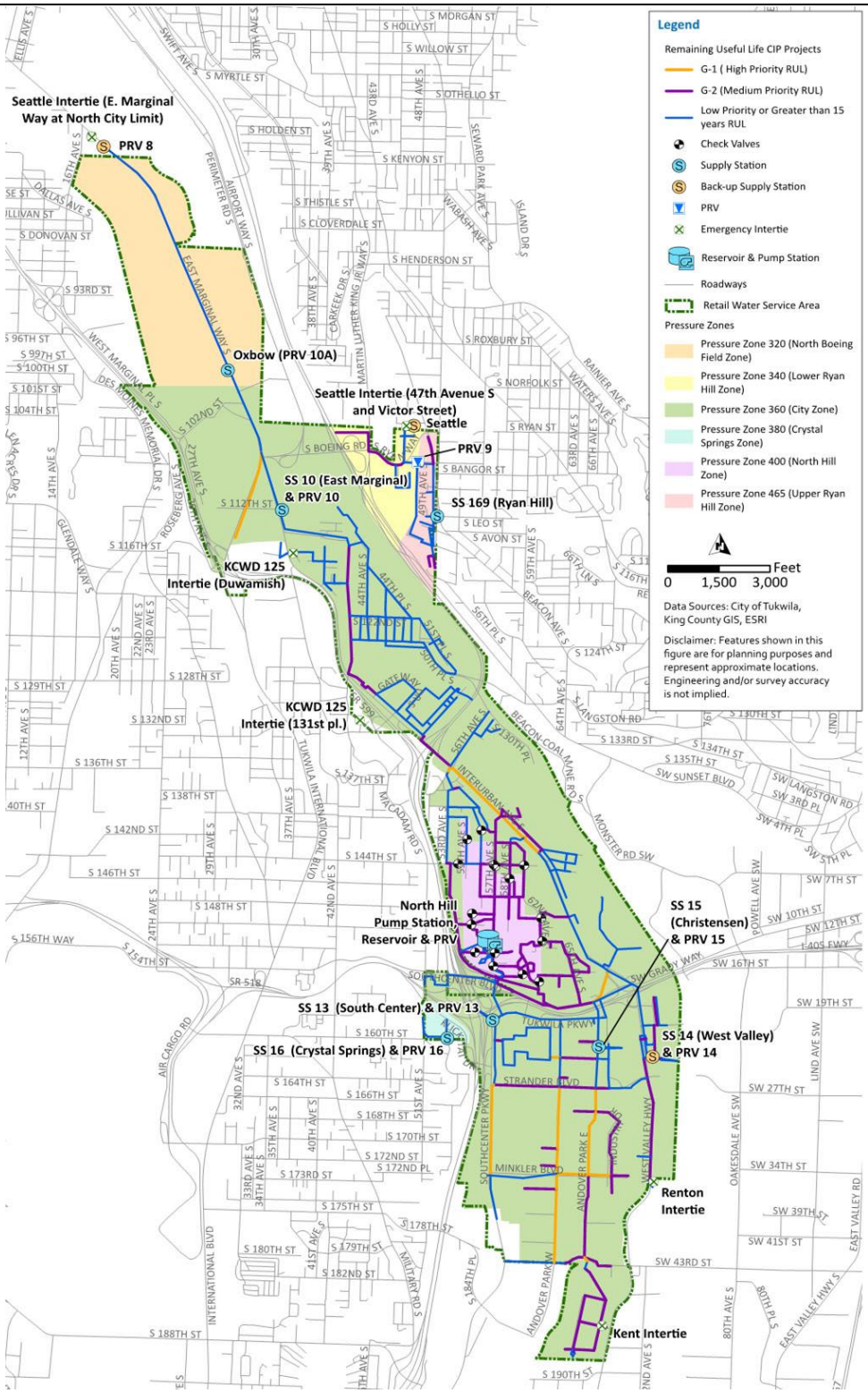
Project Element		Timing	Cost
Entire Project		Annual	$ 10,101,000
Total Anticipated Project Cost			$ 10,101,000

Project Title: Pipeline Repair and Replacement Program (High Priority) **Project No.:** G-1

Facility Type: General

Go to CIP Summary Table
Go to Maps Tab

Project Location Map:



City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: Pipeline Repair and Replacement Program (Medium Priority)
Facility Type: General
Pressure Zone: System-wide
Priority: Annual
Project No.: G-2

Go to CIP Summary Table

Project Information:

Description: Project to replace pipes that were identified as "medium priority" in the revised version of the 2014 Remaining Useful Life Analysis. (see RUL Summary tab for breakdown of LF by pipe diameter size)

Justification Pipelines are at or approaching the end of their useful life based on material and age.

Maint. Impact Replacing old pipes may reduce impact on maintenance crews from risk of failure.

Comment

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
6 " Pipe	7,380	LF	$ 160	$ 1,180,800	$ 354,240	$ 1,535,040	$ 153,504	$ 230,256	$ 307,008	$ 2,226,000
8 " Pipe	37,040	LF	$ 180	$ 6,667,200	$ 2,000,160	$ 8,667,360	$ 866,736	$ 1,300,104	$ 1,733,472	$ 12,568,000
10 " Pipe	23,990	LF	$ 190	$ 4,558,100	$ 1,367,430	$ 5,925,530	$ 592,553	$ 888,830	$ 1,185,106	$ 8,592,000
12 " Pipe	17,000	LF	$ 200	$ 3,400,000	$ 1,020,000	$ 4,420,000	$ 442,000	$ 663,000	$ 884,000	$ 6,409,000
18 " Pipe	3,420	LF	$ 250	$ 855,000	$ 256,500	$ 1,111,500	$ 111,150	$ 166,725	$ 222,300	$ 1,612,000
Total Anticipated Project Cost										$ 31,406,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	0%	$ -
Capacity:	0%	$ -
Condition:	100%	$ 31,406,000
Total Anticipated Project Cost	100%	$ 31,406,000

Project Timing:

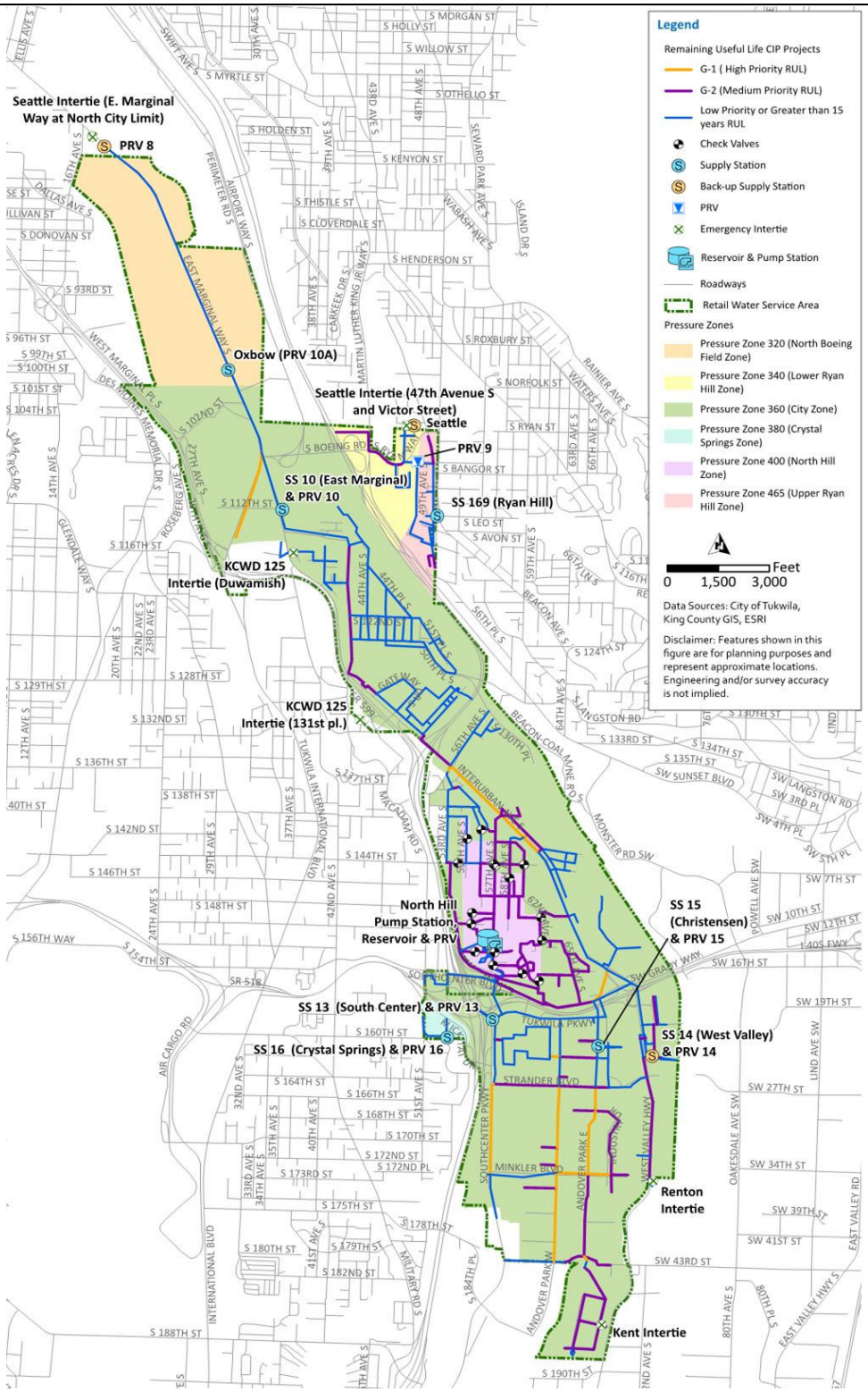
Project Element		Timing	Cost
Entire Project		Annual	$ 31,406,000
Total Anticipated Project Cost			$ 31,406,000

Project Title: Pipeline Repair and Replacement Program (Medium Priority) **Project No.:** G-2

Facility Type: General

Go to CIP Summary Table
Go to Maps Tab

Project Location Map:



City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: Water System Plan
Facility Type: General
Pressure Zone: System-wide
Priority: Annual

Project No.: G-3

Go to CIP Summary Table

Project Information:

Description: Prepare 10-year and 20-year updates to the City's Comprehensive Water System Plan.

Justification Plan needs to be consistent with the City's Comprehensive Plan and the Department of Health requires the plan to be updated every 10 years.

Maint. Impact

Comment

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
Plans	2	Each	$ 200,000	$ 400,000	$ -	$ -	$ -	$ -	$ -	$ 400,000
Total Anticipated Project Cost										$ 400,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	100%	$ 400,000
Capacity:	0%	$ -
Condition:	0%	$ -
Total Anticipated Project Cost	100%	$ 400,000

Project Timing:

Project Element		Timing	Cost
Entire Project		Annual	$ 400,000
Total Anticipated Project Cost			$ 400,000

Project Location Map:

Go to Maps Tab

City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: Large Meter Replacement
Facility Type: General
Pressure Zone: System-wide
Priority: 0-5 years

Project No.: G-4

Go to CIP Summary Table

Project Information:

Description: This project is to replace three 10-inch meters and seven 8-inch large water meters at the following account locations:
07-0001-000, Westfield Shoppingtown #12286, 2800 Southcenter Mall, 10-inch water meter.
07-0002-000, Westfield Shoppingtown #12286, 2800 Southcenter Mall, 10-inch water meter.
12-0327-000, Boeing Company Store #14-01, 8701 E Marginal Way S, 10-inch water meter.
12-0170-000, Boeing Company Store #13-01, 9800 E Marginal Way S, 8-inch water meter.
12-0190-000, Boeing Company Store #13-01, 9800 E Marginal Way S, 8-inch water meter.
12-0220-000, King County Int'l Airport, 9010 E Marginal Way S, 8-inch water meter.
12-0221-000, King County Int'l Airport, 9010 E Marginal Way S, 8-inch water meter.
12-0350-000, Boeing Company Store #9-05, 9265 E Marginal Way S, 8-inch water meter.
12-0360-000, Boeing Company Store #9-51, 9407 E Marginal Way S, 8-inch water meter.
12-0365-000, Boeing Company Store #9-43, 2630 S 98th St, 8-inch water meter.

Justification Many large water meters have reach their useful life and need to be replaced.

Maint. Impact Reduce risk of meter maintenance issues.

Comment Estimated project cost is $100,000 per year for 5 years.

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
Meter Replacements				$ 500,000						$ 500,000
Total Anticipated Project Cost										$ 500,000

Notes on Cost Estimation:

Estimates project cost is $100,000 per year for 5 years.

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	0%	$ -
Capacity:	0%	$ -
Condition:	100%	$ 500,000
Total Anticipated Project Cost	100%	$ 500,000

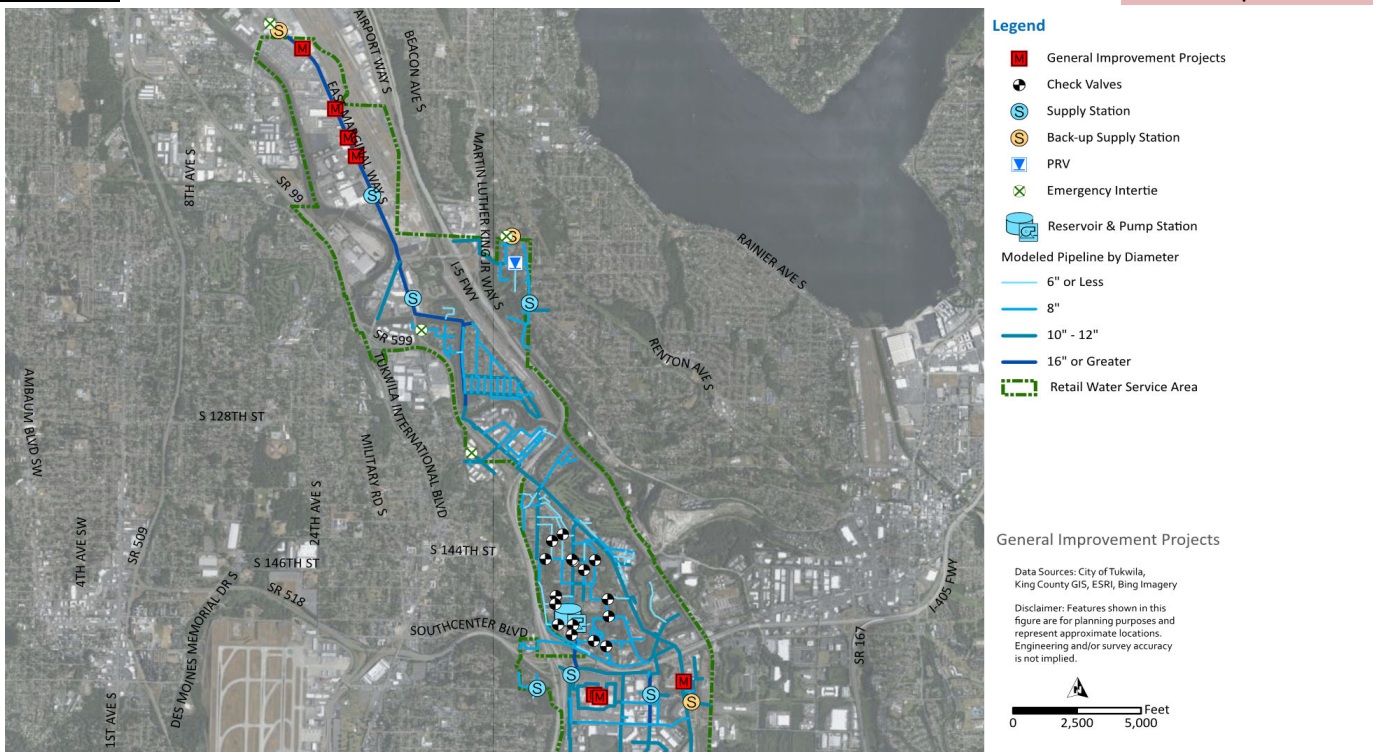
Project Timing:

Project Element		Timing	Cost
Entire Project		0-5 years	$ 500,000
Total Anticipated Project Cost			$ 500,000

Project Title: Large Meter Replacement
Facility Type: General
Project No.: G-4

Go to CIP Summary Table
Go to Maps Tab

Project Location Map:



City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: Highline Intertie Rebuild
Facility Type: General
Pressure Zone: System-wide
Priority: 10 to 20 years

Project No.: G-5

Go to CIP Summary Table

Project Information:

Description: Project to rebuild the existing intertie with Highline Water District

Justification Rebuilding the intertie with HWD will help increase the resiliency of the system by providing an additional source of supply to the City's system, which can be used during emergencies.

Maint. Impact

Comment

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
Interties	1	Each		$ 200,000	$ 60,000	$ 260,000	$ 26,000	$ 39,000	$ 52,000	$ 377,000
Total Anticipated Project Cost										$ 377,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	0%	$ -
Capacity:	0%	$ -
Condition:	100%	$ 377,000
Total Anticipated Project Cost	100%	$ 377,000

Project Timing:

Project Element		Timing	Cost
Entire Project		10 to 20 years	$ 377,000
Total Anticipated Project Cost			$ 377,000

Project Location Map:

Go to Maps Tab

City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: Interties with WD 125
Facility Type: General
Pressure Zone: System-wide
Priority: 10 to 20 years

Project No.: G-6

Go to CIP Summary Table

Project Information:

Description: The existing connections with WD 125 are closed valves. The City and WD 125 have had discussions about putting in official two-way interties at the existing valve locations.

Justification Creating official interties with WD 125 will help increase the resiliency of the system by providing additional sources of supply, which can be used during emergencies.

Maint. Impact

Comment

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency 30%	Total Construction Cost	General Conditions 10%	Contractor Overhead and Profit 15%	ELA 20%	Total Cost
Interties	2	Each	$ 200,000	$ 400,000	$ 120,000	$ 520,000	$ 52,000	$ 78,000	$ 104,000	$ 754,000
Total Anticipated Project Cost										$ 754,000

Notes on Cost Estimation:

Go to Assumptions Tab

Cost Allocation:

Project Type	Percent	Cost
Improvement:	100%	$ 754,000
Capacity:	0%	$ -
Condition:	0%	$ -
Total Anticipated Project Cost	100%	$ 754,000

Project Timing:

Project Element		Timing	Cost
Entire Project		10 to 20 years	$ 754,000
Total Anticipated Project Cost			$ 754,000

Project Location Map:

Go to Maps Tab

City of Tukwila
Water System Plan
Capital Improvement Plan

Project Title: Planning Pre-Design Alternatives Analysis for Project ST-1
Project No.: G-7
Facility Type: General
Pressure Zone: System-wide
Priority: 0-5 years

Go to CIP Summary Table

Project Information:

Description: This study will refine the storage alternatives analysis based on available sites for the future storage tank and booster pump stations, as needed. The study also includes performing a more detailed evaluation of trenchless technology after groundwater and boring details are more thoroughly investigated.

Justification A comprehensive alternatives analysis for the new storage is recommended before any design of the new storage facility begins.

Maint. Impact

Comment Project should be completed before commencing any alternative for project ST-1

Anticipated Project Cost:

Project Element	Quantity	Unit	Unit Cost ($/Unit)	Subtotal	Construction Contingency	Total Construction Cost	General Conditions	Contractor Overhead and Profit	ELA	Total Cost
					30%		10%	15%	20%	
Study	1	Each		$ 150,000	$ -	$ -	$ -	$ -	$ -	$ 150,000
Total Anticipated Project Cost										$ 150,000

Notes on Cost Estimation:

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Cost Allocation:

Project Type	Percent	Cost
Improvement:	50%	$ 75,000
Capacity:	50%	$ 75,000
Condition:		$ -
Total Anticipated Project Cost	100%	$ 150,000

Project Timing:

Project Element		Timing	Cost
Entire Project		0-5 years	$ 150,000
Total Anticipated Project Cost			$ 150,000

Project Location Map:

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