SKYWAY

COORDINATED WATER SYSTEM PLAN

NOVEMBER 1988

King County
Parks, Planning and Resources Department
Building & Land Development Division

SKYWAY

COORDINATED WATER SYSTEM PLAN

NOVEMBER, 1988

Prepared By:

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Kirkland, Washington

In Association with:

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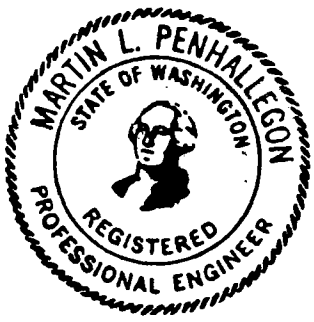
SKYWAY
COORDINATED WATER SYSTEM PLAN

November 1988

The technical material and data contained in this Report were prepared under the supervision and direction of the undersigned, whose seal as a professional engineer licensed to practice as such in the State of Washington is affixed below.



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SKYWAY

COORDINATED WATER SYSTEM PLAN

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EXECUTIVE SUMMARY

This study was developed pursuant to the Public Water System Coordination Act of 1977 which established procedures for adjacent water utility purveyors to jointly coordinate and plan needed improvements and service areas. The study area for this SKYWAY Coordinated Water System Plan includes all or parts of the following ten (10) water purveyors: City of Seattle, City of Renton, City of Tukwila, King County Water Districts 14, 25, 57, 125, Skyway and Lakeridge and Creston a private water company.

To accomplish this coordination, a Water Utility Coordinating Committee was formed with representatives of all the ten purveyors and various State and County agencies. The goal of the committee was to develop and implement a coordinated plan that would accomplish the following:

- Identify all water purveyors and their existing systems in the SKYWAY area.

- Establish Coordinated Minimum Design Standards for future improvements.

- Establish a plan for future changes to existing service area boundaries for the various water purveyors, to more efficiently allocate water service.

- Develop a plan to improve system reliabilities and operation and maintenance programs. The Plan will also reduce health, safety and welfare deficiencies of the existing systems.

The Plan identifies the various systems and area wide (and in some cases local) deficiencies. Many alternatives to improve system operations, reliability and level of service were discussed in the planning process and several of the most viable alternatives were presented in the following Plan. This Plan considered joint use projects (those that benefit more than one purveyor) and merged/consolidated district schemes. The Plan additionally considered the most logical and cost effective methods of achieving the defined goals and impacts to the rate payers.

Many hours of work by all the participants have resulted in the realization of the recommendations in this Plan. It reflects the tremendous coordination and extensive study and work completed for this project. The Plan, completely implemented, will result in only one King County Water District for the SKYWAY area (where seven existed before) and no opportunity for new water systems to be created. The proposed new district represents a merging of King County Water District No. 14 and the Lakeridge Water and Sewer District to form the Bryn-Mawr Lakeridge Water and Sewer District. The other existing King County Water Districts (or portions thereof) within the SKYWAY area will be absorbed by the participating municipalities' service areas but not necessarily annexed. This reduction in the number of local governments combined with improved system reliability, better operation and maintenance programs and elimination of health, safety and welfare deficiencies is clearly a benefit to the entire SKYWAY community.

This plan in and of itself provides only the vision and the road map for the benefits described herein. This Plan will only be realized, however, if the affected water purveyors continue to support and implement this Plan. For this to happen will require the education of the local communities and support of the various municipal elected officials. Additionally, it will require the financial support of the State, County, Cities and local districts. The WUCC is the designated body to implement this plan, however, the County, with support of the State, should be the lead agency.

PART I – INTRODUCTION

I. INTRODUCTION

A. BACKGROUND

The Public Water System Coordination Act of 1977 (RCW 70.116) establishes procedures for adjacent water utilities and local governmental agencies to coordinate the planning and development of water facilities. These procedures are intended as guidelines for providing future water service in the most efficient manner possible with the objectives of coordinating development by geographical area and integrating water system development with future land use plans.

The procedures outlined in this Act allow either the State Department of Social and Health Services (DSHS) or a County to declare an area as a Critical Water Supply Service Area based on Preliminary Assessment identifying problems associated with water quality, unreliable service or lack of coordinated planning.

Pursuant to this provision, the King County Council passed Motion 6407 on December 16, 1985. In doing so, the Council adopted the "Preliminary Assessment of Water Supply and Fire Protection" declared the SKYWAY area a Critical Water Supply Service Area (CWSSA) and initiated this Coordinated Water System planning process.

B. AUTHORITY

The SKYWAY Coordinated Water System Plan (CWSP) has been prepared in accordance with the contract signed by King County and Horton Dennis & Associates, Inc. on March 23, 1987, the scope of work put forth by King County, and the guidelines established in the DSHS' "Public Water System Coordination Act Handbook".

C. INTENT OF PLAN

The intent of this effort is generally described in the project "Scope of Work" as follows:

1. Identification of existing water systems within the Study Area and summary deficiencies in those systems;

2. Establishment of service area boundaries of water purveyors in the SKYWAY area;

3. Projection of future land use, population and water consumption;

4. Development and consideration of alternatives for meeting future needs.

D. APPROACH

The first step in developing this Plan was King County's "Preliminary Assessment of Water Supply and Fire Protection" which identified SKYWAY as a Critical Water Supply Service Area (CWSSA).

As a result of this study a Water Utility Coordinating Committee (WUCC) was formed by all water purveyors within the SKYWAY study area boundary. This WUCC has held monthly meetings throughout the planning process to discuss the individual and collective needs of participating purveyors. The WUCC has had an active role in the development of alternatives and standards. The coordination of efforts between the WUCC, King County staff, DSHS and the consultant have helped assure that this Coordinated Water System Plan will be a valuable planning tool for all purveyors in the SKYWAY area.

After public solicitation for proposals, Horton Dennis & Associates, Inc. was selected as consultants to assist the Committee in preparing this subsequent plan.

PART II – BASIC PLANNING DATA

II BASIC PLANNING DATA

A. GENERAL

The SKYWAY area is generally located, as shown on Plate II-1, between the Cities of Renton, Tukwila and Seattle in King County, Washington. The area includes all or part of Sections 1-3, 10-15 and 23, Township 23 North, Range 5 East, W.M. and Sections 6,7, and 18, Township 23 North, Range 4 East W.M. A legal description of the SKYWAY CWSSA is contained in the Appendix.

As shown on Plate II-2, SKYWAY is bounded on the northeast by the shores of Lake Washington and the Duwamish River runs near the southwestern boundary of the area.

Interstate Highway 5 is near the west boundary of the area, while Rainier Avenue (State Route 167) forms the east boundary. Additional access to the area is provided by Interstate 405. Other important roads in the SKYWAY transportation network are Interurban Avenue South, Empire Way South (SR 900), Beacon Avenue South and Renton Avenue South which all run northwest-southeast through the area. The City of Renton Airport is adjacent to the east edge of SKYWAY and both Boeing Field and Sea Tac International Airport are in the immediate vicinity. In addition, several railroads run through or near SKYWAY.

All or parts of the Lake Ridge, Bryn Mawr, Earlington, Foster, Allentown and Rainier Beach neighborhoods are within SKYWAY.

B. PHYSICAL FEATURES

1. Topography

Topography of the study areas ranges from lowlands at the Lake Washington shore and Duwamish River in the northeast and southeast corners, to a ridge with elevations of nearly 500 feet near the center of the area.

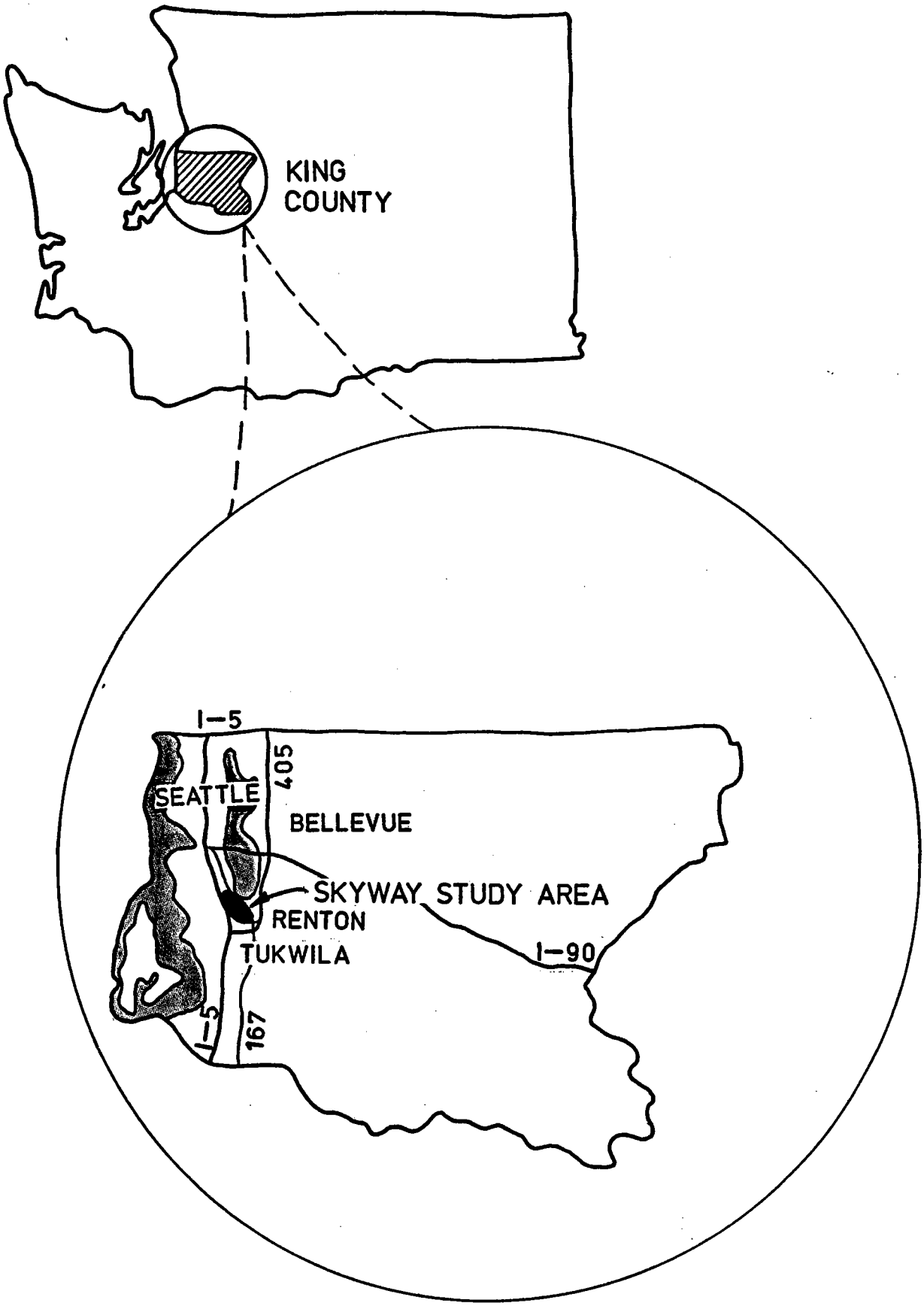

PLATE II-1
LOCATION MAP

PLATE II-2
PLANNING AREA

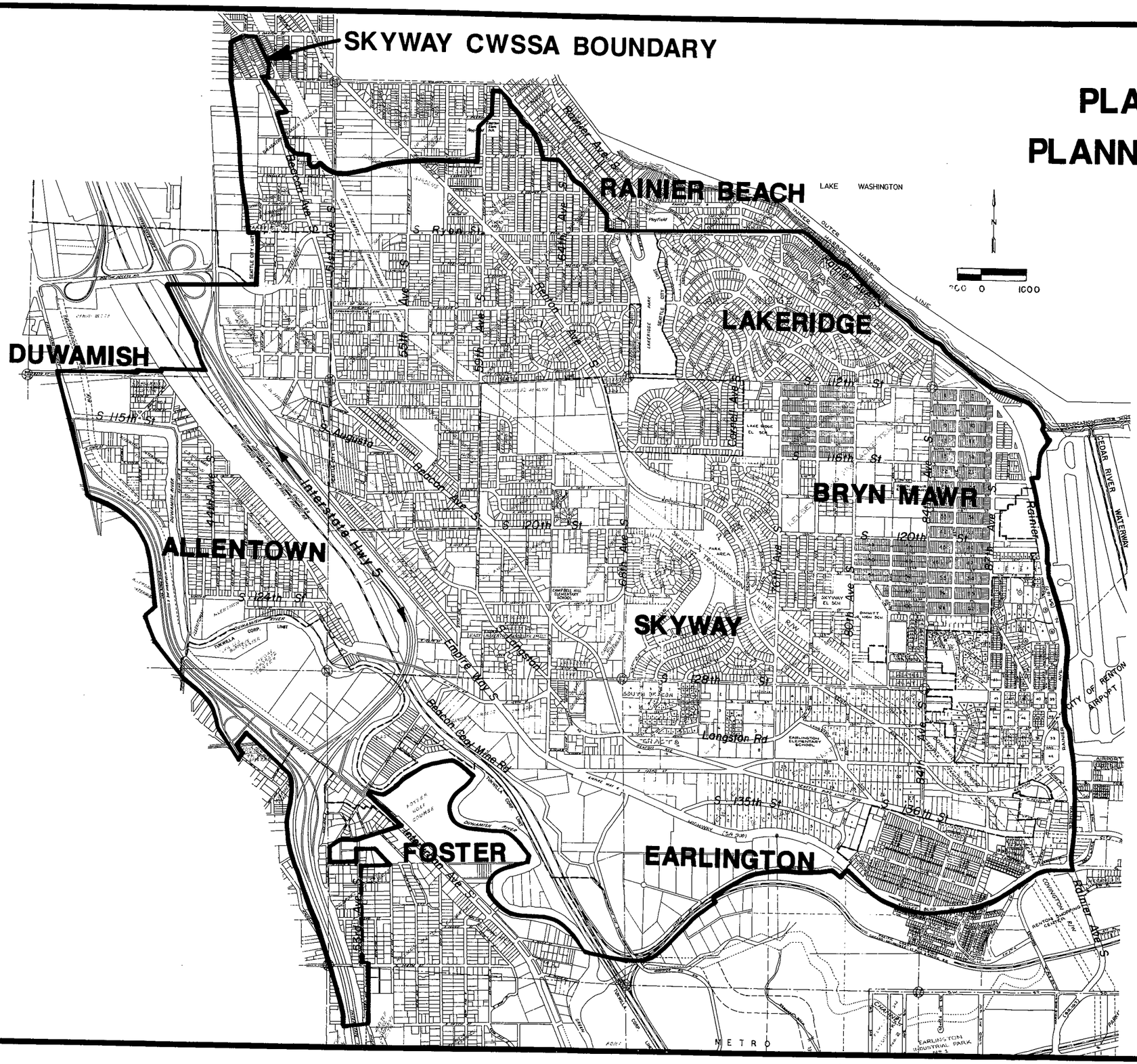

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PLATE II-3
BOUNDARY MAP

SKYWAY CWSSA BOUNDARY

CRESTON WATER ASSN.
(NO LEGAL BOUNDARY)

CITY OF SEATTLE

WATER DISTRICT 57

LAKERIDGE WATER DISTRICT

WATER DISTRICT 25

WATER DISTRICT 14

SKYWAY WATER & SEWER DISTRICT

WATER DISTRICT 125

CITY OF TUKWILA

CITY OF RENTON

WATER DISTRICT 125

TUKWILA

CITY OF RENTON

LAKE WASHINGTON

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Topography in this area varies greatly from a steep ravine in Lakeridge Park at South Ryan Street and 68th Avenue South to high points in the vicinity of Beacon Avenue South. The City of Seattle Skagit Power Transmission Line right of way cuts through SKYWAY from the southeastern to the northwestern corners of the area.

Approximately 3200 customers are currently served directly by the City of Seattle. Most of these services are single family, middle income residences and no significant changes in land use are anticipated.

2. **Lakeridge Water District**

Lakeridge Water District (formerly King County Water District No. 63) is located near the southwestern shore of Lake Washington, generally between the Cities of Renton and Seattle. The District was franchised in 1940 and presently serves 890 customers.

All of the Lakeridge Water District is zoned for single family residential land use and it is a "bedroom" community for neighboring areas. There currently are no commercial or industrial establishments within the District and no changes in land use are anticipated.

3. **King County Water District No. 57**

Water District 57 is located in the northeastern corner of the study area, along Rainier Avenue and Lake Washington. The District has approximately 70 customers and is a residential area. In the November, 1987 general election the people of Water District No. 57 elected to grant the Commissioners the authority to dissolve. Further discussion of the alternatives for service to the area is contained in Part VI.

4. **King County Water District No. 14**

Water District 14 is adjacent to Lakeridge Water District and the City of Renton, and is also on the southwestern shore of Lake Washington. The District currently serves 817 customers, 15 of which are commercial.

The District is primarily single family residential, although there are some commercial and multi-family land uses along Rainier Avenue.

5. **City of Renton**

Only the West Hill and Earlington areas of Renton are included in this study (generally, that portion of the City which is west of Rainier Avenue and north of Sunset Blvd.).

The West Hill area is characterized by steep terrain rising from the west side of Rainier Avenue. Along Rainier Avenue land use is primarily commerical with some multi-family developments. West of Rainier Avenue is a single family residential area.

The Earlington area was served by King County Water District No. 62 until the District merged with the City in 1959. This area is south of Beacon Avenue and north of Sunset Blvd. It is a residential neighborhood with some multi-family and commercial establishments. Other small water cooperatives and associations which have merged with the City of Renton include the 84th Avenue Water Coop., King County Water District No. 60, Wallin and Edwards, Bonnell and Henderson systems.

There are approximately 725 customers (in residential equivalents) in the SKYWAY area which are served by Renton. Many of these are outside the City Limits but within the City's Franchise area.

6. **Skyway Water and Sewer District**

In 1983 King County Water District Nos. 69,77 and 88 consolidated to form Water District No. 128, which is now known as the Skyway Water and Sewer District. The District covers the higher elevations near the center of SKYWAY area and serves 1375 customers.

The District's customers are primarily residential but there is a cluster of neighborhood type commercial establishments and multi-family development near the center of the District. The Skagit Power Transmission Line Right of Way cuts through the District and Skyway Park is within that right of way.

7. **King County Water District No. 125**

Consolidation of King County Water District Nos. 38 and 43 in 1977 created the existing Water District 125. Only the Water District No. 38 portion of the District is included in this study (generally, that area of the District which is east of Interstate 5. The District has 301 customers within the SKYWAY area.

This area is also an established residential neighborhood with commercial and industrial land uses occurring along major arterials. The District serves a few customers outside of it's boundary while Tukwila and Seattle both serve customers within the Water District No. 125 boundary.

8. **City of Tukwila**

The City of Tukwila currently serves only 11 customers within the SKYWAY area. These include both residential onnections and the corporate park located northwest of the I-5-Interurban Avenue interchange. As detailed in Part III-Existing Facilities, the City maintains transmission

facilities through the existing Water District 25 service area. A pending annexation proposal contemplates extending the Tukwila City Limits northward to include all of Fire District No. 1 (See Appendix). The City service area is expected to greatly increase, as discussed in Future Service Areas.

9. **King County Water District No. 25**

Water District No. 25 is in the Allentown area of King County, north of the Duwamish River and east of East Marginal Way. The District has 505 connections, which are a mixture of residential, neighborhood business and industrial and customers.

10. **Creston Water Association**

The Creston Water Association is a water cooperative of 15 homes in the western part of the SKYWAY study area, at South Ryan Way and 47th Avenue South. The Water Association operates without a franchise. By agreement with the City of Seattle, no new customers will connect to the Creston system. In addition it was intended that if any changes in ownership of existing houses connected to the system occur, the new owners will connect to City of Seattle lines in the area.

D. POPULATION

Current and projected populations for this report are based on data published by the Puget Sound Council of Governments (PSCOG). Current (1986) population by census tract was obtained from "Population and Housing Estimates - April 1, 1986". Census tract boundaries are shown on Plate II-4. In that these boundaries do not coincide with the limits of the study area, estimates had to be made to determine the percentage of the study area within each

census tract. Such estimates are based on water purveyor customer information, average household sizes, and land areas. Table II-1 presents the estimated population of the study area (22,065) by census tract.

The PSCOG combines census tracts by geographical area into Forecast Analysis Zones (FAZ's) for the purpose of projecting population and employment. Although it is helpful to look at forecasts on a broader scale than by census tract, the FAZ boundaries also do not coincide with the study area limits. Table II-2 shows projected population by FAZ and the percentage of the study area within each FAZ.

As illustrated in Tables II-1 and II-2, the Puget Sound Council of Governments projects the study area population will remain relatively constant, with a slight decline in the near future, followed by a slight increase. Land use data, however, indicates that more than 300 acres of undeveloped land area within the study area, most of which is zoned for single family residential development. Development of that property could easily result in a population increase of 1,500 to 2,000 people.

PLATE II-4
CENSUS TRACT - FAZ BOUNDARIES

SKYWAY CWSSA BOUNDARY

FAZ 5910

CT 119

FAZ 3820

CT 263

CT 260.01

FAZ 4000

CT 261

CT 260.02

FAZ 4130

FAZ 3900

CT 262

LAKE WASHINGTON

0 1000

LEGEND

CENSUS TRACT BOUNDARY

FAZ BOUNDARY

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TABLE II-1
1986 POPULATION BY CENSUS TRACTS
SKYWAY STUDY AREA

CENSUS TRACT	TOTAL POPULATION	% OF TRACT W/IN STUDY AREA	ADJUSTED 1986 TOTAL POPULATION
119	6,179	100%	6,179
260.01	4,995	100%	4,995
260.02	4,054	100%	4,054
261	5,458	100%	5,458
262	3,590	28%	1,005
263	1,305	21%	275
272	1,986	5%	99
	ESTIMATED CURRENT TOTAL POPULATION		22,065

Source: "Population and Housing Estimates: April 1, 1986"; Puget Sound Council of Governments

TABLE II-2

PROJECTED POPULATION

(By Forecast Analysis Zones)

FAZ	EST. 1986 TOTAL POP.	% FAZ POP. IN SKYWAY	ADJUSTED 1986 POP.	PROJECTED POPULATION 1990	2000	2020
3820 (Riverton)	28,496	< 1%	99	104	108	114
3900 (Tukwila)	3,590	28	1,005	1,180	1,443	1,823
4000 (Skyway/Boeing Field)	11,283	95	10,728	11,334	11,557	11,783
4130 (Renton Airport/CBD)	9,887	41	4,054	4,094	4,377	4,852
5910 (Columbia/ Rainier Beach)	45,770	13.5	6,179	6,001	5,892	5,680
	TOTAL POPULATION		22,065	22,173	23,377	24,252

Sources: "Population and Employment Forecasts - 1984";
Puget Sound Council of Governments
"Draft Population and Employment Forecasts - 1988";
Puget Sound Council of Governments

E. LAND USE

General land use and zoning information was provided by King County, Seattle, Tukwila and Renton planning departments and comprehensive plans and is presented on Plates II-5 and II-6. These exhibits are intended only to show trends and readers are directed to the various City and County Planning Departments for site specific information. As illustrated, the majority of the SKYWAY area is zoned and used for single family residential, with multi-family and commercial developments along major arterials and near the center of the area.

There is undeveloped land zoned for single family residential throughout the study area. There is also potential for further development of commercial property along Rainier Avenue South in the City of Renton and higher density redevelopment can be anticipated for waterfront property in the east-northeast corner of the area. Additional multi-family development can be anticipated at the southwest corner of 64th Avenue South and Empire Way as a 450 unit apartment complex has been proposed for that site. There is more than 100 acres of undeveloped land zoned for industrial use, within the study area.

The abandoned Black River Quarry area in the southern portion of the study area (south of Empire Way South) includes most of that property. This area has been considered for a variety of industrial type development.

F. WATER CONSUMPTION

Existing and projected water use has been compiled from purveyor records, comprehensive plans and contracts and the 1985 "Seattle Comprehensive Regional Water Plan." A breakdown of projected water use by census tract is contained in Appendix B.

PLATE II-5
GENERAL LAND USE

SKYWAY CWSSA BOUNDARY

NOTE:

THIS MAP IS INTENDED TO SHOW GENERAL LAND USE ONLY. PLEASE CONSULT THE APPROPRIATE PLANNING AND/OR LAND USE DEPARTMENT FOR SITE SPECIFIC INFORMATION.

LEGEND

- Single Family Residential
- Multi-Family Residential
- Commercial
- Public/Quasi Public
- Industrial
- Recreation

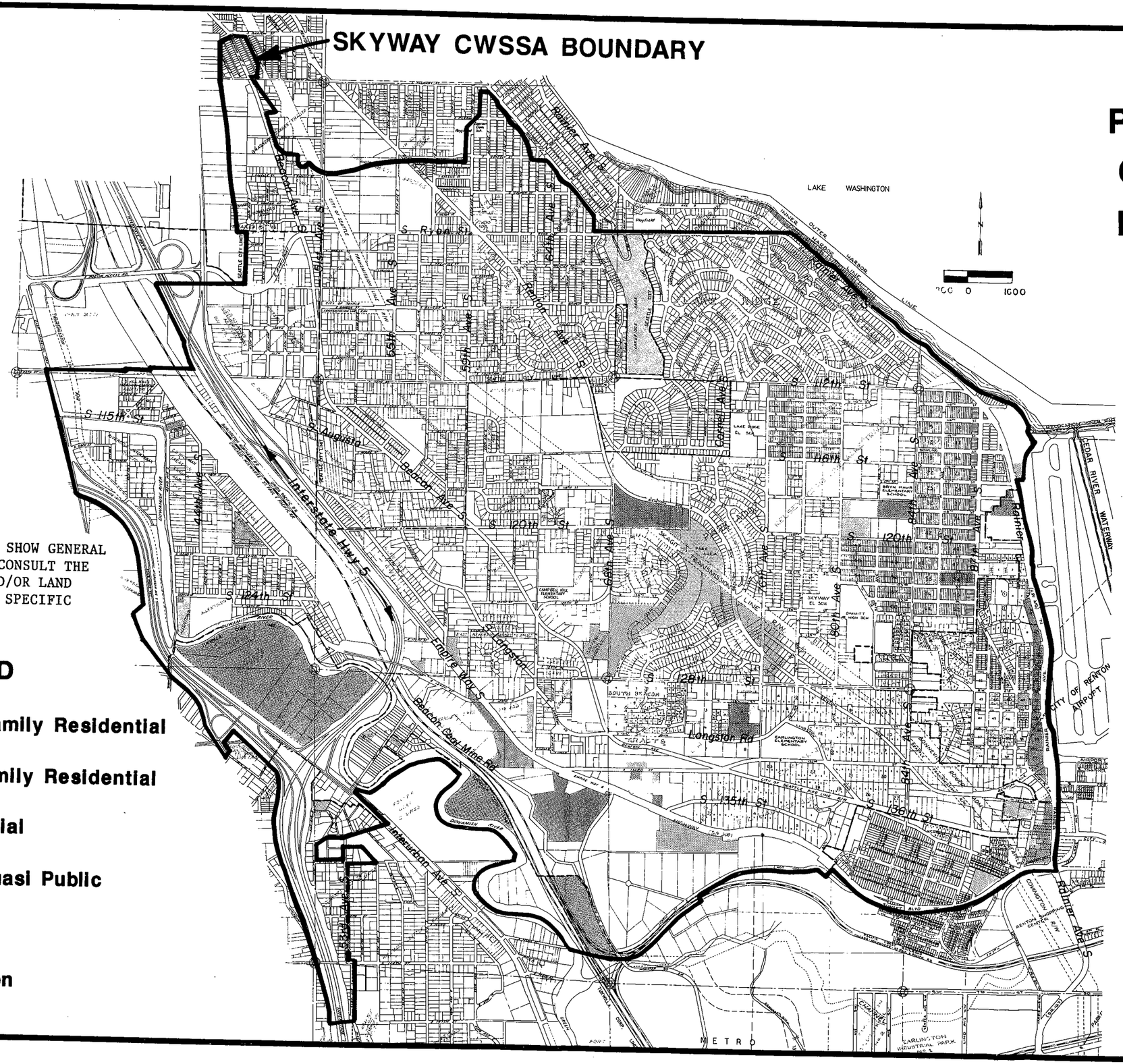

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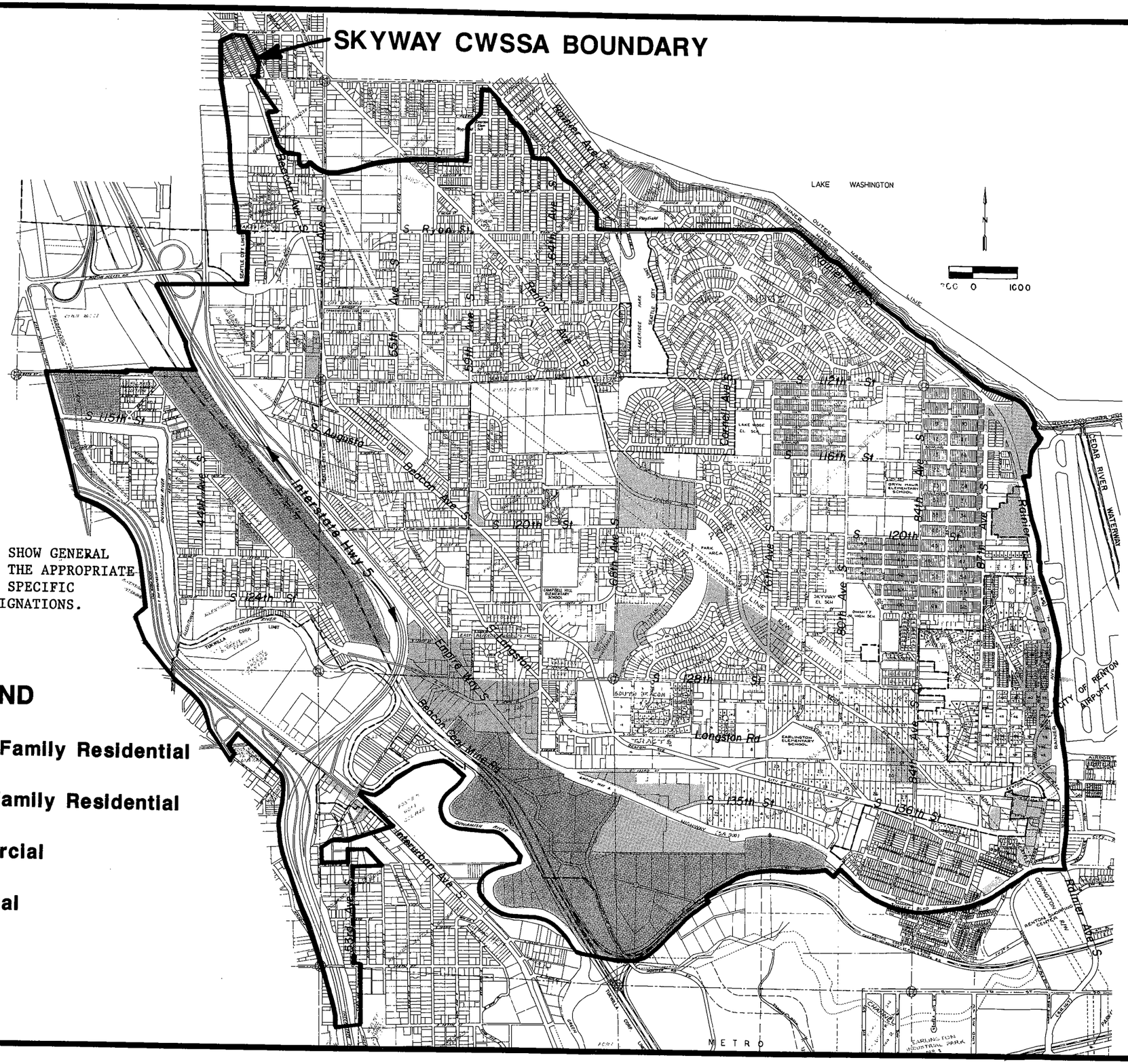
PLATE II-6
GENERAL ZONING



NOTE:

THIS MAP IS INTENDED TO SHOW GENERAL ZONING. PLEASE CONSULT THE APPROPRIATE PLANNING DEPARTMENT FOR SPECIFIC CLASSIFICATIONS AND DESIGNATIONS.

LEGEND

- Single Family Residential
- Multi-Family Residential
- Commercial
- Industrial

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Consulting Engineers and Surveyors

TABLE II-3

PROJECTED WATER DEMAND

PURVEYOR/	CUSTOMERS RES. EQUIV.	1985 DEMAND, MGD ADD	MDD	P/A	1990 ADD	MDD	2000 ADD	MDD	2010 ADD	MDD
WATER DISTRICT 14	817/878	0.212	0.55(E)	--	0.270	0.760	0.340	0.930	0.470	1.240
WATER DISTRICT 125	301/728	0.196	0.353	1.8	0.202	0.383	0.202	0.383	0.202	0.383
WATER DISTRICT 25	505/480	0.130	0.256	1.96	0.030	0.058	0.040	0.080	0.06	0.13
WATER DISTRICT 57	69/69	0.019	0.037	1.95	0.020	0.040	0.030	0.058	0.030	0.058
SKYWAY	1375/1436	0.388	0.85(E)	2.19	0.210	0.590	0.250	0.700	0.310	0.880
RENTON	725/725	0.517	1.743	3.9	0.200	0.500	0.340	0.850	0.480	1.200
CRESTON	15/15	0.003(E)	0.007(E)	---	0.009	0.021	0.008	0.020	0.009	0.021
LAKERIDGE	890/739	0.200	0.48(E)	2.4	0.140	0.450	0.170	0.520	0.210	0.640
TUKWILA	11/11	0.003(E)	0.007(E)	---	0.009	0.021	0.008	0.020	0.009	0.021
SEATTLE	3255/3255	0.878	1.400(E)	2.2	0.825	2.062	0.768	1.919	0.738	1.846
TOTALS	7963/8386	2.546	5.683		1.915	4.885	2.33	5.48	2.51	6.39

ADD = AVERAGE DAILY DEMAND, MGD
MDD = MAXIMUM DAILY DEMAND, MGD
P/A = PEAK AVERAGE RATIO, MDD/ADD
E = ESTIMATED VALUE

SOURCES: SEATTLE COMP PLAN
: RENTON WEST HILL STUDY
: SEATTLE DEMAND METER RECORDS

G. RELATED PLANS AND POLICIES

1. Comprehensive Water Plans and Studies

- City of Tukwila, Comprehensive Water Plan, August 1983, Horton Dennis & Associates
- City of Renton and King County Water District Nos. 14, 63, 69, 77 and 88. Comprehensive Water Plan, October 1976, Amended 1979, Harstad Associates
- City of Renton Comprehensive Water System Plan, 1983, RH2 Engineering
- King County Water District No. 63, Comprehensive Water Plan, February 1986, Horton Dennis & Associates, Inc.
- King County Water District No. 125, 1985-1990, Comprehensive Plan, Philip M. Botch and Associates
- 1985 COMPLAN, Seattle Comprehensive Regional Water Plan, City of Seattle, Seattle Water Department, et. al.
- Black River Quarry Reservoir Engineering Report, March 1986, by Horton Dennis & Associates, Inc.
- City of Renton, King County Water District Nos. 14 and 63 Engineering Report of West Hill Joint Water System Facilities, March 1981, by RH2 Engineering.

2. Other Plans and Data

- King County Comprehensive Plan, July 1985, King County Planning Division
- Highline Community Plan, November 1977, King County Planning Division
- City of Renton Comprehensive Plan, Compendium, March 1986, City of Renton Planning Department
- City of Tukwila Comprehensive Land Use Policy Plan, March 1982, City of Tukwila Planning Division
- Population and Employment Forecasts: 1984, Puget Sound Council of Governments
- Population and Housing Estimates: April 1, 1986, Puget Sound Council of Governments

- King County Sewerage General Plan, January 1979, King County
- King County Supply and Demand Study, November 1978, Group Management Program
- Sizing Guidelines for Public Water Supplies - September 1983 by DSHS
- Various King County Ordinances relating to Fire Flows and Hydrants
- Various Franchises on record at King County
- Legal District Boundaries per records of King County Assessor's Office

PART III – EXISTING FACILITIES

III EXISTING FACILITIES

A. INTRODUCTION

This Part is intended to describe the individual systems of each participating purveyor in the SKYWAY area. Information was obtained from comprehensive plans, purveyor records and interviews with purveyor personnel. An Existing System Map is provided in the back pocket of this document. Hydraulic profile, pump station data source/storage chart and description of interties appear later in this section. System deficiencies are summarized in this Part and a more detailed Hydraulic Analysis Report appears in the Appendix.

Of the ten purveyors in the study area, all are defined as Class 1 (100 or more permanent services) except the Creston Water Association and King County Water District No. 57. These two purveyors are Class 2 systems, having ten through 99 permanent services. By the DSHS classification system, there are no Class 3 or 4 water systems in the SKYWAY area.

B. DESCRIPTION OF INDIVIDUAL SYSTEMS

1. City of Seattle

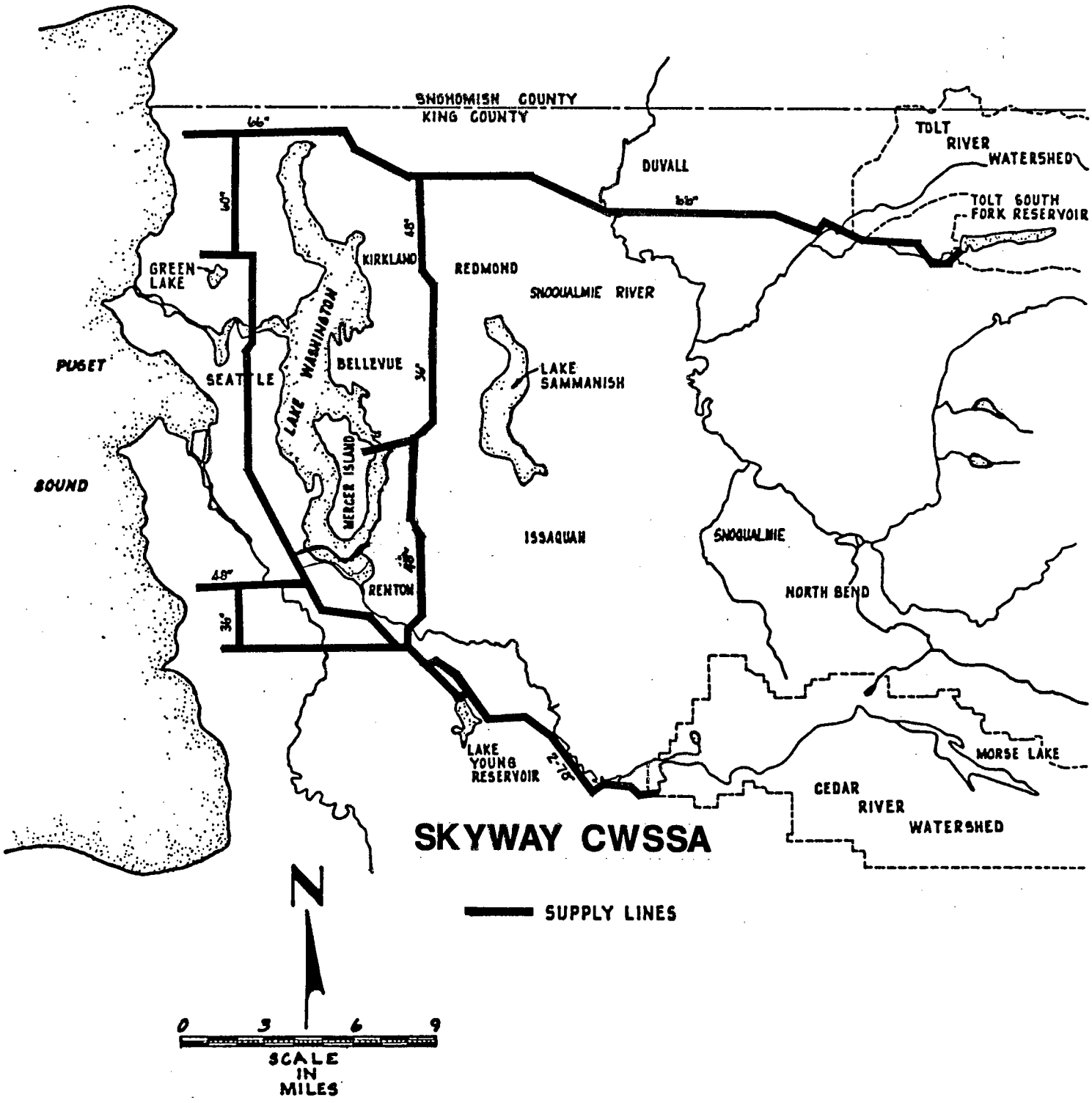
The City of Seattle directly serves approximately 3,200 customers within the SKYWAY area and, through wholesaling, indirectly provides water to an additional 2,700 customers. This is achieved by the Cedar River Pipelines, the major transmission facility from the Cedar River Basin to the City of Seattle distribution system.

Water from the Cedar River is collected in the Chester Morse Lake Reservoir and Dam, which in turn fills the Lake Youngs Reservoir. From the headworks at Lake Youngs there are three transmission mains which cross the SKYWAY area via Beacon Avenue South. Two of these transmission lines (Nos. 1 and 3) are interconnected and are both 66 inches in diameter. Line No. 2 (55 1/2 inch diameter) operates independently and does not supply the outlying areas of Seattle. Plate III-1 generally illustrates the City of Seattle supply system.

The hydraulic gradient of the transmission lines is directly tied to the elevation of water in Lake Youngs but can fluctuate by as much as 30 feet in a peak day. In the SKYWAY area, the City has assigned a hydraulic gradient of 450-490 feet (444-489 KCAS). Much of the SKYWAY area receives water under this pressure gradient by gravity. There is, however, a pump station at S. Augusta Street and Beacon Avenue that serves a 540 pressure zone in that area. (See Table III-2 Pump Station Data). In the north part of the study area there is a pressure reducing station which supplies the 316 zone north of SKYWAY and provides water to Water District No. 57. Water supplied to King County Water District No. 25 and the City of Tukwila are also served by Seattle's 316 pressure zone.

Distribution to the City's customers within or near the City limits is by a network of primarily 8" cast iron lines which feed off of the Cedar River lines. In the outlying areas, primarily in the south and eastern portions of the study area, there are numerous individual service lines tapping the Seattle transmission mains. Many of these are within other Districts and would logically be better served by the local purveyor. (See Service Area discussion for details.)

PLATE III-1
SEATTLE SUPPLY SYSTEM



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Horton Dennis & Associates, Inc.
Consulting Engineers and Surveyors
KIRKLAND, WASHINGTON • 822-2525

There is no local storage for the 450-490 or 540 pressure zones. Lake Youngs is the only storage facility for much of the SKYWAY area and is located miles away. This facility does not qualify as peaking and emergency storage volume under DSHS criteria. In the event of an emergency, the City can backflow from the Tolt River source to supply areas normally served by the Cedar River Pipelines.

Seattle monitors the quality of water supply from the Cedar River Basin. Water quality reports from Seattle and other purveyors are contained in Appendix C.

2. **Lakeridge Water District**

Lakeridge has purchased it's water from the City of Renton since completion of the West Hill Joint Use Facilities in June, 1986. These facilities, jointly used by Lakeridge and Renton, include connection to a Renton Transmission Main, a pump station, 12" transmission line to a 1.4 MG reservoir at the Dimmitt Jr. High School site, and a 12" main with a metered connection to Lakeridge on 80th Avenue South.

The Lakeridge system operates by gravity flow from the West Hill Reservoir which has an overflow elevation of 495'. Pressure reducing valves (PRV's) drop pressure from the 495' zone to a lower service zone which has a hydraulic gradient elevation of 270 feet. The 890 customers served are at elevations ranging from approximately 20 to 350 feet.

Storage for fire and equalization is provided in the West Hill Reservoir. The District's contractual share of the 1.4 MG reservoir is .585 MG but additional water is available on a demand basis in the event of an emergency. If supply from the reservoir was cut off in an emergency situation, water could be taken from the City of Seattle system at the southwestern corner of the District by reactivating an old connection that is not in service. No intertie agreement exists for this connection.

3. **King County Water District No. 14**

Water District No. 14 purchases approximately 40% of it's water from the City of Seattle through a 6-inch meter located at 84th Avenue South and Beacon Avenue South.

A few houses outside of the District Limits are served directly off of this 8" transmission line. At 84th Avenue South and South 123rd Street there is a pressure reducing station to Water District No. 14's 335' pressure zone. The approximately 250 customers in this zone have the City of Seattle as their sole source with no emergency backup. The quantity of supply through the Cedar River Pipeline is unlimited as far as the demands of this service area are concerned. This connection to Seattle is uncontrolled and therefore is restricted by available head and inlet losses and the 8-inch pipe sizes. Because of this uncontrolled condition and lack of local storage, payment of peak demand charges are required. The Water District 14 335' zone is not hydraulically intertied to the 279' zone.

The other 60% of the District's supply is from their ten acre watershed area located between South 116th and 118th Streets and 78th and 80th Avenues South. The watershed area occupies the northeast slope of the main ridge through the study area. The site is naturally wooded with deciduous trees and a light cover of vegetation. Elevations in the watershed area range from 230 feet to 370 feet. The site is used to maintain three operational groundwater supply wells and surface storage facilities as described below. Water from the District's well supplies the 279' pressure zone.

Well No. 5

Well No. 5 is an artesian spring well located at approximate elevation 350. The perforated well casing is about 8 feet in diameter and the well is 35 feet deep. Average 24 hour production is 34 gpm and the well operates on a continuous basis.

Well No. 6

Well No. 6 is a 12 inch, 307 feet deep well located at an approximate elevation of 300 feet. The well is the principal source of supply and produces about 86,000 gpd at 60 gpm (24 hour average). The results of a drawdown test indicates that the well is within the zone of influence of Lake Washington but may have additional influence from an aquifer recharge area.

The well is currently operated on an intermittent basis, depending on system demand as measured in the storage tanks. A submersible four-stage Pleuger pump is set to switch on at depth level 28 feet in the water tanks and turn off at level 29 feet. The submersible pump is approximately 35 horsepower and currently operates at a power consumption rate of 1.6 kilowatt hours per 1,000 gallons of water pumped.

Well No. 7

Well No. 7 is an 8-inch, 346 feet deep well that was constructed in May, 1987. The well produces approximately 90 gpm (24 hours average) or 130,000 gpd. Well No. 7 is operated on an intermittent basis as necessary to supplement water produced from Well Nos. 5 and 6.

Well Nos. 5 and 6 pump into a chlorination facility located next to the storage tanks. This facility, constructed in 1986, treats well water by gas chlorination.

Water District 14 storage facilities consist of two 250,000 gallon steel storage tanks, each 38 feet in diameter and approximately 30 feet high, interconnected to operate on the same level settings.

The high water level is set at elevation 279 and the level at which the tanks are empty is elevation 250. The tanks are supplied directly from the existing chlorination facility.

One tank was constructed in 1947 and the other in 1967 and are connected to the distribution system by a 10-inch main.

4. King County Water District No. 57

Information regarding the Water District No. 57 system is limited. The District receives its water directly from the City of Seattle 316 Zone through a 1 1/2 inch meter off a 16 inch line along Rainier Avenue South. A 2-inch steel line serves approximately 70 customers before looping back into the Seattle system. There is no direct storage in the Water District No. 57 system.

5. City of Renton

The West Hill area of Renton receives its water from the 196 pressure zone, which is supplied by a combination of sources, described as follows:

Wells

The City of Renton maintains five groundwater wells to supply the 196 Zone and West Hill area. The wells are located in Liberty Park and produce the following approximate amounts: Well No. 1 - 2,000 GPM; Well No. 2 - 3,000 GPM; Well No. 3- 1,600 GPM; Well No. 8 - 1,500 GPM; Well No. 9 - 1,000 GPM. Water from all sources are chlorinated and flouridated and no water quality problems exist.

Other Sources

Springbrook Springs watershed also supplies the 196 Zone. The Springbrook watershed is located approximately four miles south of the City center and consists of water collection,

chlorination and transmission facilities. There is a natural flow of water from a course gravel stratum in the side of a steep ravine in the watershed area. The Spring produces approximately 2 MGD and water collection operations have been continuous since 1909.

The City also maintains an emergency intertie in the SKYWAY area with the City of Seattle Cedar River Pipeline at 84th Avenue South. Under an agreement between the Cities, Renton receives water at a wholesale rate and granted Seattle permission to construct and operate the three Cedar River Pipelines within the City of Renton. This 50 year agreement terminated in 1981 and a new contract has not been signed.

From a connection with the 196 zone on Rainier Avenue South, water is pumped through a 12-inch line to the 1.4 MG West Hill Reservoir. These facilities were constructed by the City of Renton in 1986 and serve Lakeridge as a contract District. From the Reservoir (overflow elevation 495') water is distributed throughout the higher elevations of West Hill and to Lakeridge by a series of 4, 6, 8 and 12 inch lines.

Two PRV's connect to the 270 pressure zone serving the lower elevations of West Hill (generally that area between Lind Avenue NW and Rainier Avenue).

The Earlington area of Renton's system is that area south of the Cedar River Pipelines and north of Sunset Boulevard. The Earlington system was purchased from the now defunct King County Water District No. 62. Water supply to this area is from the West Hill facilities. A PRV station on SW Langston Road provides additional supply to the 270 pressure zone serving the Earlington area.

6. **Skyway Water and Sewer District**

The Skyway Water District system is located at the higher elevations near the center of the SKYWAY study area. As mentioned earlier, the District is comprised of three districts (Nos. 69, 77 and 88) which merged in 1983.

The City of Seattle supplies the District through the Cedar River Pipeline. The principal source is through a 6-inch meter located at South 124th Street and Beacon Avenue South. Water is pumped via one of two 750± GPM pumps from that point to fill the Districts two elevated storage tanks (75,000 gallons each). The tank located at South 124th Street and 68th Avenue South has a high water level of 550' and serves the northern and western areas of the District by gravity.

The other storage tank is on South 128th Street and operates with a high water elevation of 559'. This tank is supplied by a transfer pump station from the 550' tank located at South 128th and South 69th Streets.

For emergency purposes there are metered connections to the Cedar River Pipelines at South 128th Street and 76th Avenue South. For these emergency connections to operate, the District wide pressure would have to drop below 30 psi.

7. **King County Water District No. 125**

Only that portion of Water District 125 which is east of Interstate 5 is included in the SKYWAY study area. This area is identified as the District's Pressure Zone 4 (hydraulic gradient 478').

The District receives its water supply for this area through a six-inch meter located at 64th Avenue South and Beacon Avenue South and a six-inch meter at South 131st Street and Beacon Avenue. A network of 4, 6 and 8 inch lines carry water to the Districts 301 customers within the SKYWAY area. A new 8 inch line crosses the Duwamish at Foster Point to deliver water to customers along 53rd Avenue South in the Foster neighborhood.

No storage is provided for this area of Water District No. 125 by the DSHS criteria used for this Plan, although there are two emergency interties with Tukwila on the west side of the Duwamish.

8. **City of Tukwila**

The City of Tukwila has only a few customers within the SKYWAY study area. These customers, like the rest of Tukwila, receive their water from City of Seattle supply lines.

At Beacon Avenue South and South Langston Road there is a six-inch meter from the Cedar River Pipelines. This was at one time the main supply meter to Tukwila, carrying water across the Duwamish River through a six-inch steel line. The supply line crossing the river has since been removed from service, leaving the City with only a few customers on the east side of the Duwamish River on a dead end main.

Another meter (at 40th Avenue South and South 112th Street) provides water to Tukwila from the 48" West Seattle Supply line. After passing through a Pressure Reducing Station, an 18" line carries water through the Allentown area (Water District No. 25) along 40th Avenue South and across the Duwamish River. This line then runs along Interurban Avenue South and serves the corporate park near the intersection of Interurban and Interstate 5. Tukwila receives water at four other locations from a City of Seattle 60-inch main near Southcenter, south of I-405.

Continuing to the east side of Interstate 5, Tukwila and Water District No. 125 both serve the southwestern part of the study area. (See Service Area discussion for further information).

The entire Tukwila system operates under one pressure zone of 360'±. Currently, no storage exists for Tukwila's system but a new 2 MG facility is expected to be in operation before the 1989 demand period.

9. **King County Water District No. 25**

Water District No. 25 is located in the Allentown area of the County and is in the western portion of the SKYWAY study area. The District does not have a comprehensive plan and information on the existing system is limited.

The District purchases its water from the City of Seattle at two locations and a third connection is planned. A six-inch meter located at South 112th Street and 51st Avenue South carries water from the Cedar River Pipelines to serve the small portion of the District which is east of Interstate Highway 5. The few customers in this area are served by a 2" dead end line under the City of Seattle pressure gradient of 450-490'. Water District No. 25 has no storage.

The remainder of the District currently receives its water from the West Seattle Supply Line through a six-inch meter located at South 112th Street and East Marginal Way. Water from this meter (Seattle 316' pressure gradient) flows by gravity through a network of 2 and 4 inch lines to serve the Allentown area. Reconstruction of the Interurban Avenue South bridge across the Duwamish will put the supply connection out of service and the District intends to purchase water from the City of Tukwila on an interim basis.

At approximately 119th Avenue South, a Water District No. 25 line crosses to the west side of the Duwamish River to serve the Riverside Interurban Tract along East Marginal Way.

A 4 inch line crosses Interstate 5 and runs along the railroad tracts to serve a portion of East Riverton Garden Tracts along 56th Avenue South.

A 10" line along the railroad right-of-way between South 112th Street and approximately South 127th Street is under construction. This line is intended to have a metered connection to the West Seattle Supply Line and will provide additional fire protection to the Burlington Northern Railroad yard.

10. **Creston Water Association**

The Creston Water Association is a water cooperative of 15 services in the vicinity of 47th Avenue South and South Ryan Way.

The Association purchases it's water through a 1-1/2 inch meter located at Beacon Avenue South and South 107th Street. Water is distributed through a 4-inch line along 47th Avenue South.

By agreement, no new connections to the Creston system are allowed and if any services change ownership, the new owners shall connect to City of Seattle facilities in the area.

C. WATER QUALITY

Water quality is monitored throughout the study area. Sample reports of the required analyses are contained in Appendix C.

D. HYDRAULIC ANALYSIS/SYSTEM DEFICIENCIES

A hydraulic analysis of the existing systems within the SKYWAY study area was performed by the consulting firm CH_2M-Hill. A detailed report of the methodology and findings of the analysis is provided in Appendix D to supplement this summary of system deficiencies. Plate III-2 shows the existing hydraulic profile for the systems within the SKYWAY CWSSA.

1. General

The hydraulic analysis and this summary of system deficiencies are intended only to generally define problems and deficiencies in the SKYWAY area. No attempt has been made to identify the numerous instances of undersized and leaking mains, isolated areas of high and low pressures, dead end mains and other items that are not in compliance with the Minimum Design Standards adopted by the SKYWAY WUCC. These items should be identified in the Comprehensive Plans of each participating water purveyor.

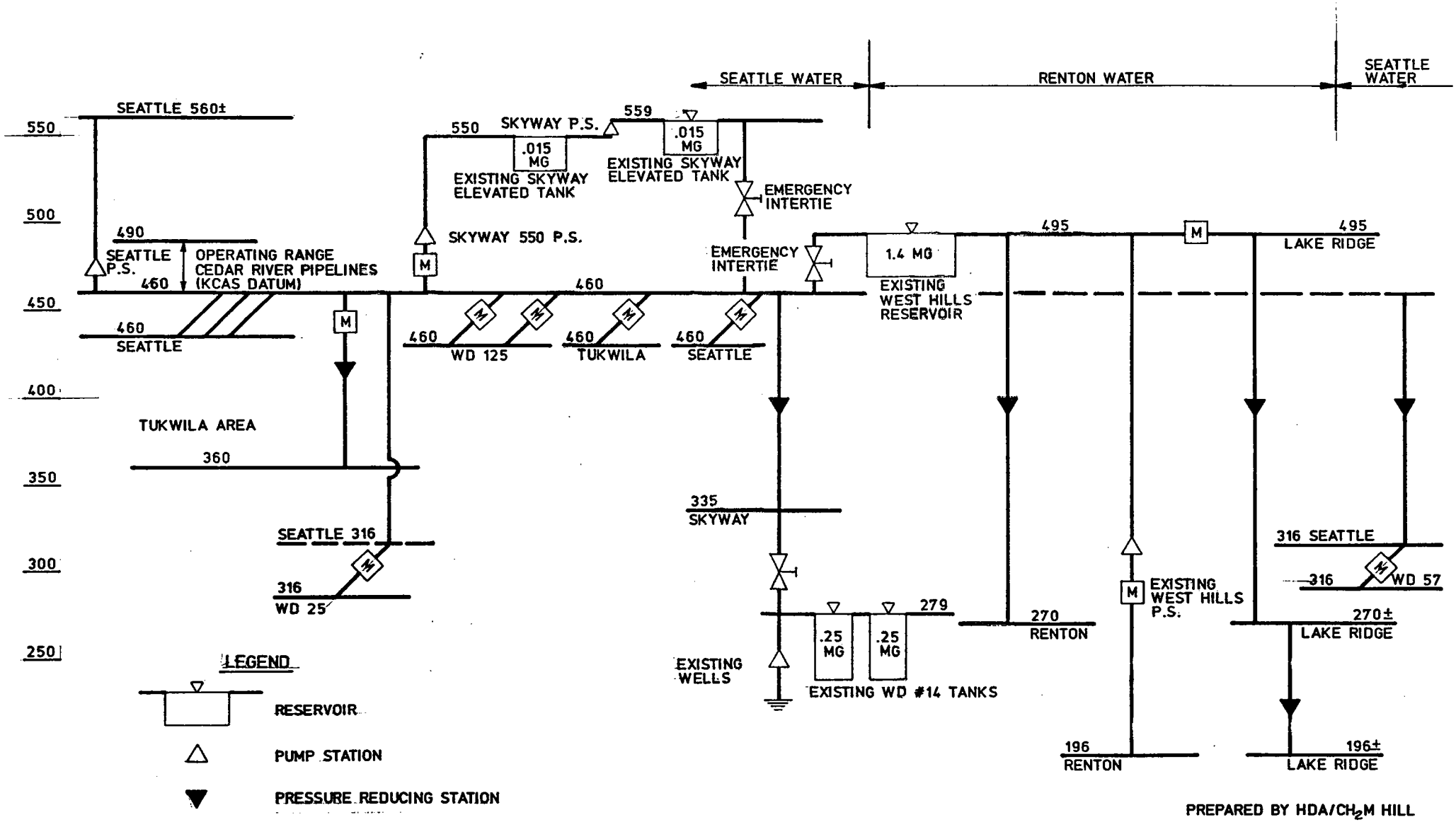
2. Sources

Table III-1 presents source requirements and existing capacities for each purveyor within the study area. Most sources appear to have adequate capacity to meet the needs of the immediate future under normal conditions. In the event of an emergency or power outage, however, some potential problems exist.

The most serious deficiencies involve those systems which rely on pumping facilities (See Table III-2), either to supply well water or to boost system pressures, but are not equipped with standby power sources. Such conditions exist in the systems of Seattle (Augusta Street Pump Station), Water District 14 (Well supply), and the Skyway Water

10/6/87

SKYWAY C.W.S.P. HYDRAULIC PROFILE — EXISTING CONDITIONS



PREPARED BY HDA/CH_2M HILL

PLATE III-2
HYDRAULIC PROFILE

TABLE III-1

EXISTING SOURCES/STORAGE

PURVEYOR	CUSTOMERS/ RES. EQUIV.	EXISTING SOURCE/ CAPACITY	EXISTING SOURCE/COMMENTS
Skyway	1375/1436	City of Seattle 2-6" meters/1.8 MGD	1-75,000 gallon tank serves 550' zone 1-75,000 gallon tank serves 559' Zone See Pump Station Data
Water Dist. 25	505/480	City of Seattle 1-4" & 1-6" meter/ 1.33 MGD	No Storage. District operates by gravity from City of Seattle Cedar River and West Seattle Pipelines.
Water Dist. 125	301/728	City of Seattle 2-6" meters/1.8 MGD	No Storage to District's 478' Zone. System operates by gravity from Cedar River Pipeline.
Water Dist. 57	69/69	City of Seattle 1-1 1/2" meter/	No Storage. District operates by gravity from Seattle 316' Zone.
Water Dist. 14			
279' Zone	567/533	Groundwater/.27 MGD & Standby from 335' Zone.	2-250,000 gallons storage tanks.
335' Zone	250/345	City of Seattle 1-6" meter/.9 MGD	No Storage. PRV to 335' Zone.
Renton	725/725	1.7 MGD* & Standby from Seattle	.765 MG** of 1.4 MG Reservoir serves 495' Zone and PRV to 270' Zone.
Lakeridge	890/739	City of Renton Well #9/.75 MGD	.585 MG** of 1.4 MG Reservoir serves 495' Zone and PRV to 270' Zone.
Creston	15/15	City of Seattle 1- 1 1/2" meter/.2 MGD	No Storage.
Tukwila	11/11	City of Seattle 1-6" & 1-10" meter/ 2.63 MGD	No Storage. MG Facility in design phase.

* Capacity of West Hill Pump Station.
** By Contract Between Renton and Lakeridge.

Existing Source/Storage

Seattle 444-484 Zone	1727/1727	Seattle Cedar River Pipeline N/A	No Storage.
540 Zone	673/673	Seattle Cedar River Pipeline via Augusta St. Pump Station/1.7 MGD.	No Storage. See Pump Station Data.

TABLE III-2

PUMP STATION DATA

PURVEYOR/STATION	LOCATION	CAPACITY	HORSEPOWER	BACKUP
Renton/West Hill	Rainier Ave. S & NW 6th Street	1-600 GPM 1-1000 GPM		Diesel Drive
Skyway/Main	Beacon Ave. S & S. 128th St.	2-750 GPM	25	None
Skyway/Booster	S. 126th St. & S. 128th Street	2-200 GPM		None
Seattle/Augusta Street	Beacon Ave. S & Augusta Street	2-300 GPM 1-1200 GPM 1-2400 GPM	15 40 80	None-Gravity Flow at Low Pressure

District (at both the main and booster pump stations). These systems are highly vulnerable to source interruption due to power outage. Provisions of standby power in pumping facilities is a requirement of the Minimum Design Standards established for SKYWAY (Part V).

An analysis of geologic characteristics in the area indicates that there is little or no potential for development of additional groundwater sources within the SKYWAY CWSSA.

3. Storage

Table III-3 provides a summary of the existing and required storage capacity of each purveyor in the Skyway area. With the exception of Lakeridge and Renton (West Hill Joint Use Storage Reservoir), the entire SKYWAY area is deficient in storage capacity by more than 5 million gallons. As indicated in the notes to Table III-3, this total deficit could be reduced to an estimated 3.5 MG for existing populations and 4.0 MG to meet ultimate storage requirements if a joint use storage facility were constructed for the area. Further details on this proposed joint use facility are presented in Part VI - Alternatives and Recommendations.

4. Fire Flows

Minimum fire flow requirements are generally established by the Minimum Design Standards (Part IV) and in more detail by the King County and City Fire Marshalls using the Guide for Determination of Required Fire Flows, 1974 Edition, as published by the Insurance Service Office and adopted by the King County Department of Planning and Community Development.

Table III-4 summarizes the results of computer fire flow simulations at selected locations as illustrated on Plate III-3. These simulations were made with the distribution system "loaded" under existing (1986) maximum day demand (MDD) conditions. As shown on the Table, there are several

SOURCE/STORAGE REQUIREMENTS
NOTE: The following estimates are minimum figures
Source and Storage beyond the minimum is recommended

PURVEYOR	CUSTOMERS/ RES. EQUIV.	1 SOURCE REQUIREMENT	EXIST. SOURCE/ CAPACITY	2 STANDBY STORAGE	3.5 EQUAL STORAGE	4.5 FIRE STORAGE	MIN. STORAGE REQ PER REGULATIONS	RECOM. MIN. STORAGE	EXIST STORAGE	EXIST DEFICIENCY PER REGULATIONS	MIN. ADDITIONAL RECOM. STORAGE	COMMENTS
Skyway	1375/1436	1.15 MGD	2 - 6" meters/ 1.8 MGD	1.149 MG	.287 MG	.36 MG	1.44 MG	1.44 MG	.15 MG	1.29 MG	1.29 MG	Most of District lies above el. 350. therefore, Seattle backup connection is not effective for fire. standby or equalization storage. Main pump station lacks standby power.
WD 25	505/480 (20 E. of I-5)	.38	1 - 4" & 1 - 6" meter/1.33 MGD	.384 (.016)	.096 (.004)	.36 (.12)	.384 (.016)	.48 (.136)	0 0	.38 (.016)	.48 (.136)	
WD 125	301/728 (250 E. of I-5)	.582	2 - 6" meters/ 1.8 MGD	.146 (.050)	.146 (.050)	.36 (.12)	.146 (.05)	.51 (.17)	0 0	.15 (.05)	.51 (.17)	
WD 57	69/69	.05	1 - 1 1/2" meter/ .2 MGD	.055	.013	.09	.055	.103	0	.10	.10	
Creston	15/15	.012	1 - 1 1/2" meter/ .2 MGD	.012	.003	.06	.012	.015	0	.012	.015	
Lakeridge	890/739	.591	Well #9/.75 MGD	.591	.148	.12	.74	.74	.585	.15	.15	Need backup intertie tc reduce storage by .44 MG.
WD 14 Zone 279 Zone 335	567/533 250/345	.626	Wells/.27MGD total 1-6" meter/.9 MGD	.107 .276	.107 .069	.36 .12	.47 .345	.47 .345	.5 0	0 .276	0 .276	portions above elev. 350'
Renton	725/725	.58	WHPS/1.7 MGD Stdby conn. to Sea	.145	.145	.36	.145	.51	.765	0	0	
Seattle 444-484 Zone 540 Zone	2250/2250 1005/1005	2.60 (total)	N/A	.450 .804	.450(.04) .201	.36 .12	.490 1.00	.90 1.00	0 0	.45 1.00	.90 1.00	Assume 200 RE's is above el. 350 Standby power engine driven pump needed.
Tukwila (E. of I-5)	11/11	.008	1-6" & 1-10" meter/2.63 MGD	.08	.02	.36	.08	.38	0	.38	.38	
Present Totals	7963/8386	-----	-----	3.752	1.495	3.03	4.777	6.80	2.0	3.767	5.08	
Projected Additional Requirements	678	.542	-----	-----	-----	-----	-----	.515@760gal/RE	-----	-----	.515	
							FUTURE TOTALS	7.408	-----	-----	5.616	
6 Joint Use Reqm'ts (WD 25 and 125 and Tukwila E. of I-5, Creston, Seattle and Skyway)	4972	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
								3.45	0	2.99	3.4[illegible]	
								.515	0	-----	.51[illegible]	
444-484 Zone and Below	2531	3.98(total)	-----	.506	.506(.04)	.36(total)	2.99(total)					
540 Zone	2441	-----	-----	1.953	.488	-----	-----					
							TOTAL JOINT USE	3.97			4.0	

TABLE III-3 SOURCE/STORAGE REQUIREMENTS (cont'd)

NOTES:

1) Source Requirement = Res. Equiv. x 800 gpd/Res. Equiv.

2) Standby Storage = Res. Equiv. x 800 gpd/Res. Equiv. for Single Source.
x 200 gpd/Res. Equiv. for Multiple Source.

3) Equal Storage = Res. Equiv. x 200 gpd/Res. Equiv.

4) Fire Storage = 1000 gpm x 2 Hours for Res. Areas if over 75 R.E.'s (less than 75 R.E.'s Per K.C. Ord. #5828)
3000 gpm x 2 Hours for Comm. Areas per KC Ord. #5828.

5) Equalization and fire storage is not actually mandated in the various ordinances and regulations, however, if the source of water is being regulated by control valves off Seattle's supply lines or well pump booster pumps, or if transmission main is out of service, provisions for equalization and fire storage is the most reliable method to insure the required flow rate is available for these required durations.

6) A 2 hour duration was utilized per King County Ordinance #5828 although I.S.O. states a 3000 gpm flow requires a 3 hour duration supply.

7) Minimum storage required per regulations is the absolute minimum storage required to meet DSHS regulations. Those purveyor customers receiving water directly from Seattle and below elevation 350 feet (KCAS) can provide equalization and fire flows without storage if no flow control is used on the Seattle tap.

8) Recommend minimum storage is figured based on the following formula. Recommended Minimum Storage = Equalization Storage plus the larger of Fire or Standby Storage.

* For Customers East of Green/Duwamish River Only. A reservoir to provide storage to Tukwila Customers west of river is being constructed.

** If a single, large reservoir was constructed to meet all requirements of SKYWAY area, current recommended minimum required storage would be reduced to about 3.5 MG, and Ultimate Storage Requirements is about 4.0 MG.

areas where fire flows are inadequate. Note that at some of these locations, adequate hydraulic capacity exists in the distribution systems but source capacity or reliability and storage volumes are inadequate.

5. **Operating Pressures**

Plate III-3 summarizes operating pressures within the study area, as delineated by computer simulation with the existing distribution systems loaded under peak hour demand conditions, based on recorded 1986 MDD flows. Plate III-3 does not attempt to show the numerous localized areas where pressures were below 30 PSI due to small diameter distribution lines or other reasons associated with local distribution system problems or operating practices.

Areas of high pressure present problems in terms of potential for high system leakage, the need for pressure reducing devices on individual service lines, and potential operational difficulties for fire fighting personnel.

PLATE III-3
FIRE FLOW AND PRESSURE ANALYSIS

SKYWAY CWSSA BOUNDARY

LAKE WASHINGTON

0 1000

LEGEND

⓪ Fire Flow Simulation (See Table III-4)

Pressure > 120 psi

Pressure > 100 < 120 psi

Pressure > 85 < 100 psi

Pressure < 30 psi

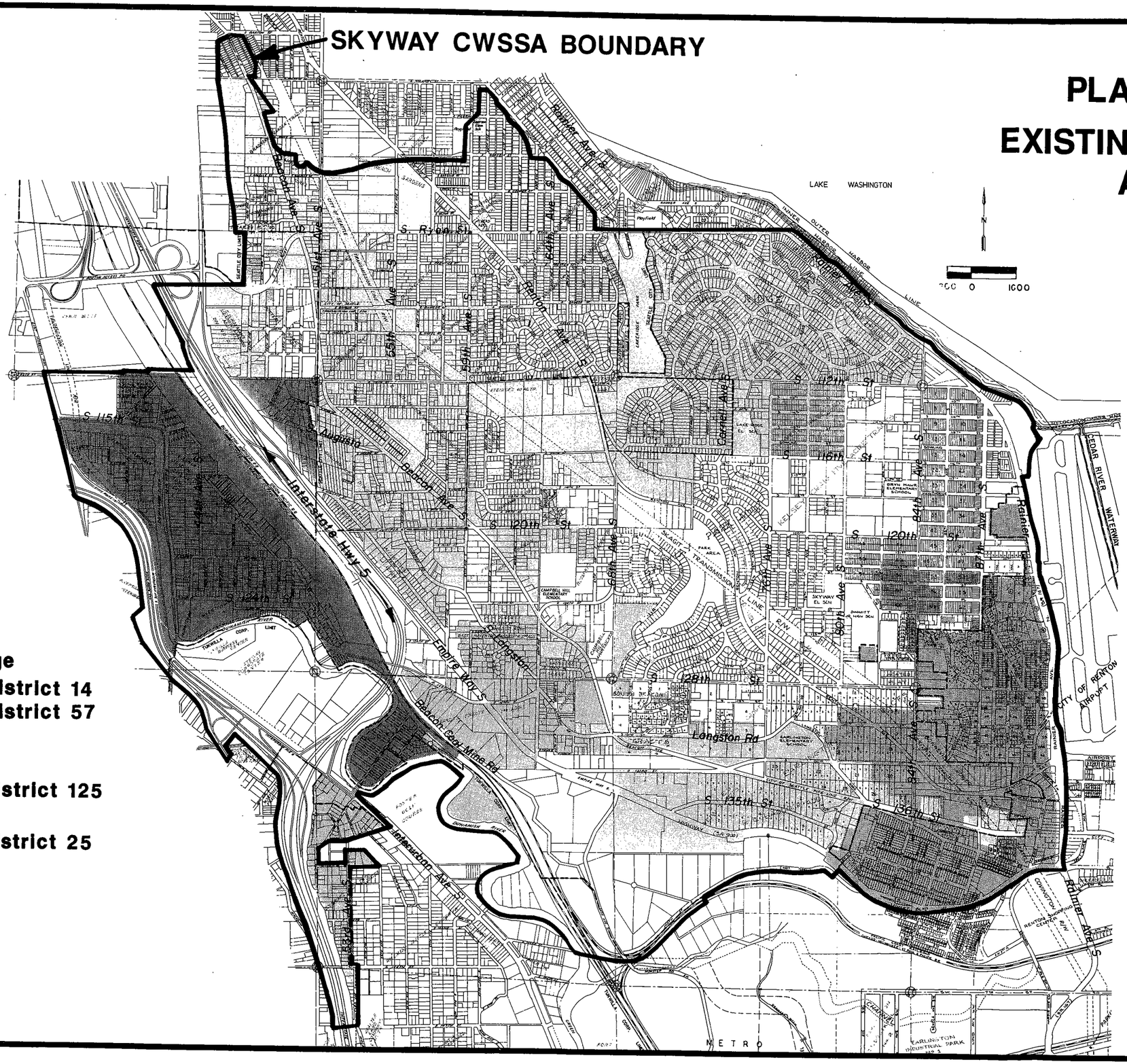
Prepared by:

Horton Dennis & Associates, Inc.
Consulting Engineers and Surveyors

PLATE IV-1

EXISTING SERVICE AREAS

SKYWAY CWSSA BOUNDARY



LEGEND

- Seattle
- Lakeridge
- Water District 14
- Water District 57
- Renton
- Skyway
- Water District 125
- Tukwila
- Water District 25
- Creston

Prepared by:

HDA Horton Dennis & Associates, Inc.
Consulting Engineers and Surveyors

PLATE IV-2
FRANCHISE AREA MAP

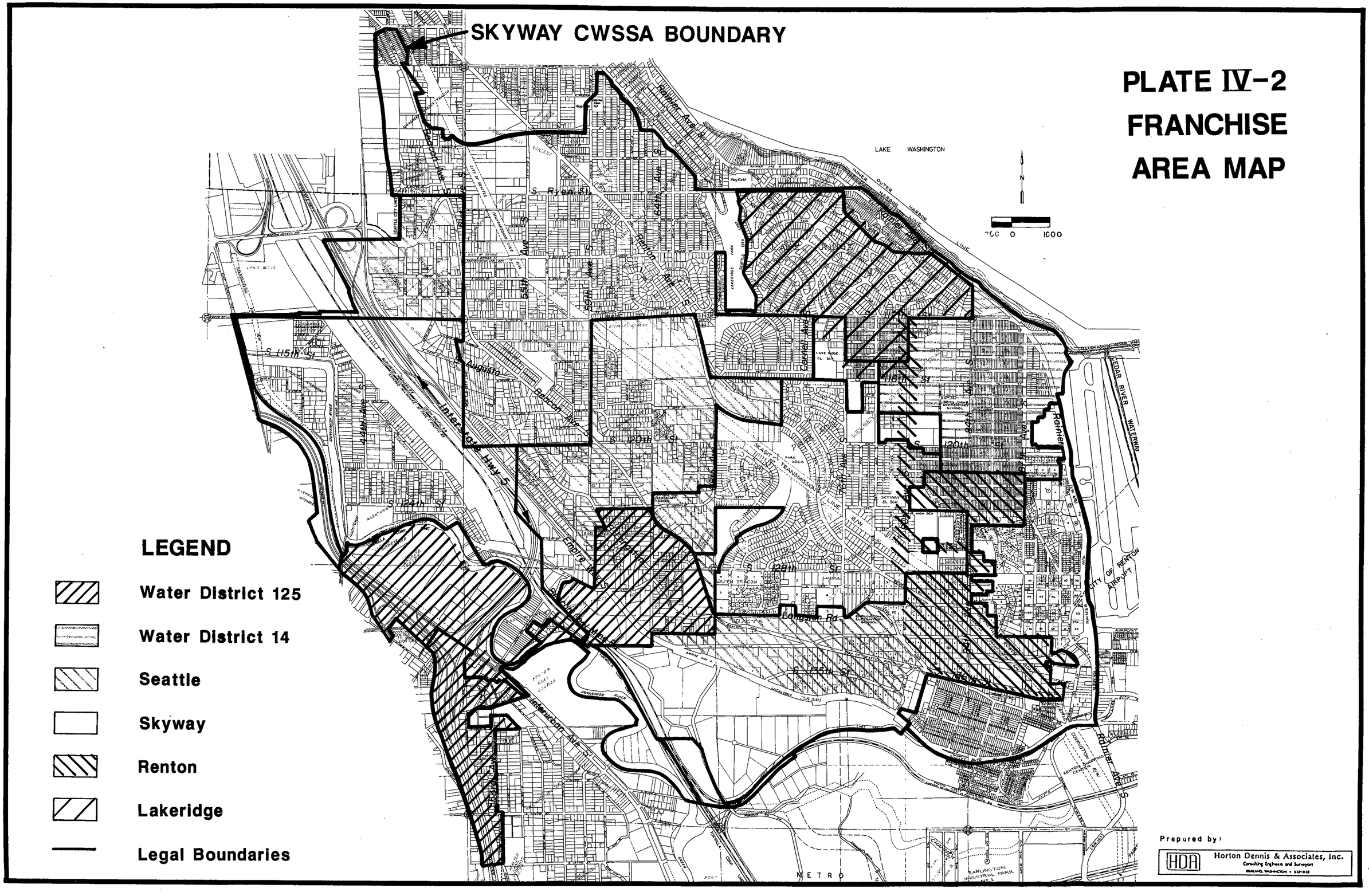


TABLE III-4
SIMULATED FIRE FLOWS

REFERENCE NO. *	LOCATION	ZONING	PURVEYOR	FIRE FLOW CALC. GPM	REQ'D GPM	COMMENTS
1	Bangor Street @ 59th Ave. S.	Residential	Seattle	2908	1000	No storage serving the area.
2	South 120th Street @ 62nd Ave. So.	Residential	Seattle	1423	1000	Flow limited by Augusta Street P.S. (No backup power source.)
3	South 128th Street @ 73rd Avenue So.	Residential	Skyway Water District	1799	1000	Flow limited by Skyway storage volume. (Cannot maintain required duration.)
4	Renton Avenue So. @ 68th Avenue So.	Commercial	Skyway Water District	3269	3000	Flow limited by Skyway storage volume. (Cannot maintain required duration.)
5	Interurban Avenue So. @ Gateway Corp. Center	Commercial	Tukwila	13370	3000	
6	Beacon Coal Mine Rd. @ Duwamish River	Commercial	Water District 125	1566	3000	Located on dead end main.
7	South 117th Street @ Rainier Avenue	Commercial	Water District 125	723	3000	Small diameter mains serve the area.
8	Campbell Hill Elementary School	School	Skyway Water District	2000	3000	Flow limited by Skyway storage volume. (Cannot maintain required duration.)
9	Earlington Elementary School	School	Seattle	1320	3000	
10	Lakeridge Elementary School	School	Lakeridge Water District	635	3000	
11	Emerson Elementary School	School	Seattle	3005	3000	
12	Dimmitt High School	School	Skyway Water District	1150	3000	
13	Dimmitt High School	School	Renton	3643	3000	
14	Bryn Mawr Elementary School	School	Water District 14	1903	3000	
15	Skyway School	School	Skyway Water District	1150	3000	
16	Duwamish High School	School	Water District 25	1090	3000	
17	Duwamish	School	Tukwila	13370	3000	

* SEE PLATE III-3

PART IV – EXISTING SERVICE AREAS

IV EXISTING SERVICE AREAS

A. INTRODUCTION

A primary goal of this Plan is to determine and compare existing legal, franchise and service area limits so that logical boundaries can be established for the future planning and development of water systems within the CWSSA. This Part is intended to define existing conditions, while Part VI offers solutions to the problems identified herein.

As shown in Plate IV-1, purveyor legal boundaries do not always correspond with actual service areas and in many instances, service area limits are incongruous. Service area overlaps are common throughout the CWSSA and City of Seattle individual service connections to the Cedar River Pipelines are of concern in this regard. Such service area overlaps and individual connections have resulted in duplication of facilities and confusion over actual boundaries.

Plate IV-2 illustrates water purveyor franchise areas. These franchise areas (and sewer service areas) have been considered insofar as it might be practical to establish corresponding boundaries. It should be noted that a franchise area does not establish a service area and only gives the franchise holder the right to maintain facilities within the grantors rights-of-way.

B. EXISTING SERVICE AREAS

1. City of Seattle

The City of Seattle direct water service area is generally defined as that area of the City and King County Franchise Nos. 110 and 617 which are within the SKYWAY CWSSA. In addition, there are numerous individual service connections to the Cedar River Pipelines which occur within the limits and/or logical service areas of other purveyors. These connections are not in conformance with the SKYWAY Minimum Design Standards and are subject to problems associated with improper maintenance of

privately owned lines and lack of knowledge as to where existing facilities are located. Current Seattle Water Department policies prohibit connection to the Cedar River Pipelines by anyone other than approved water purveyors. In keeping with this, such individual connections are to be served by the appropriate purveyor, as detailed in Part VI. For the most part, these City of Seattle services can easily be connected to the existing Renton, Skyway and/or Water District No. 125 facilities.

The south-central area of the SKYWAY CWSSA is within the City of Seattles' franchise area. Although the City of Renton maintains a franchise to a portion of the area, several service alternatives to this and the gravel pit area south of Empire Way South. These are also presented in Part VI.

2. **Lakeridge Water District**

The existing southern boundary of Lakeridge Water District is at South 112th Street (between the Seattle City Limit and 76th Avenue South) and a mid-block between South 115th Street and South Bowling Street (from 76th to 80th Avenue South). The Lakeridge service and franchise areas, however, extend as far south as the north side of South 116th Street. This Lakeridge franchise/service area is outside of any purveyors legal limits, with the exception of a small area (between 78th and 80th Avenue South) which is within Water District 14 but served by Lakeridge (by agreement dated 1985).

3. **King County Water District No. 57**

Although the legal boundary of Water District No. 57 corresponds to it's existing service area, the District operates without a franchise and is currently in the process of dissolution. As detailed in Part VI, the 70 customers within Water District No. 57 could be served by either direct service from the City of Seattle or by service via the existing Lakeridge water system. In either

case, complete replacement of the Water District 57 system is required and the purveyor assuming service to the area would need to modify their franchise and/or legal limits.

4. **King County Water District No. 14**

The southern legal and franchise boundaries of Water District No. 14 are at South 122nd Street, although the District provides service as far south as approximately South 129th Street. This area is within the City of Renton's franchise area.

Service area overlaps exist throughout this southern part of the District's service area and confusing boundaries and duplication of facilities has resulted. This is especially true in the area between South 122nd Street and the Renton City Limits, where both the District and Renton maintain facilities and service connections.

Another area of confusion is around the Dimmitt Middle School, where Water District 14 operates facilities in an isolated pocket, surrounded by Renton and Skyway Water District service areas.

Several Water District 14 connections along 84th Avenue South (south of South 124th Street) are served by the District's transmission main from the Cedar River Pipeline. These connections could more appropriately be served by the City of Renton.

By agreement, Water District No. 14 provides domestic flow to a small area within the Renton City limits (along Rainier Avenue South). Fire flow to this area is provided by the City.

5. **City of Renton**

As mentioned above in Item 4, several service area overlaps exist between the City of Renton and Water District No. 14. In addition, there are individual service connections to the Cedar

River Pipelines along Beacon Avenue South which are within the Renton City Limits and/or logical service area. These City of Seattle direct services could easily be connected to existing Renton lines in the area.

Although no future water service area has been established for the SKYWAY area of Renton, existing lines and those proposed for the near future are within the City's franchise boundary. The only exception to this might be the gravel pit/industrial area in the south part of the CWSSA. Further discussion on this area occurs in Part VI.

6. **Skyway Water District**

The existing boundaries and water service area of the Skyway Water District represents a conglomeration of three former districts (Nos. 69, 77 and 88).

As shown on the maps contained in this Part, the District's service area does not coincide with it's legal boundaries. Of particular concern are the area around and south of the Dimmitt Middle School, the areas around the District boundary which are not within any purveyors limits, and the City of Seattle individual service connections which are within and adjacent to the District's legal limits.

7. **King County Water District No. 125**

Although only a small portion of Water District No. 125 is within the SKYWAY CWSSA, service area overlaps occur between the District, the CIty of Seattle and the City of Tukwila.

In the southernmost part of the CWSSA, Water District No. 125 serves customers just east of Interstate 5. This remote area of the District is adjacent to (and in some cases overlaps) the City of Tukwila's water service area. This area has been the subject of proposed service area agreements, as discussed in Item 8 of this Part.

The District serves a few customers within Water District No. 25 and the City of Tukwila limits (adjacent to the Duwamish River). In turn, there are nearly 20 City of Seattle and a few Tukwila services within the Water District No. 125 boundaries (in the area of Beacon Avenue South). These areas have been adjacent as part of the recommendations of this Plan.

8. **City of Tukwila**

Only a small portion of the SKYWAY CWSSA is currently within the Tukwila city limits but a significantly larger area is proposed for annexation to the City. This annexation proposal includes all of King County Fire District No. 1 and, if approved, would put all of King County Water District No. 25 within the Tukwila city limits. This annexation could also include the Creston Water Association, although the City does not currently provide any water service in that area of the CWSSA.

Other areas of concern within the Tukwila service area are the overlaps and proposed service area agreements with Water District No. 125 (as mentioned in Paragraph 7 above) and service to a few industrial customers south of Empire Way South (near 64th Avenue South). These customers are connected to a substandard Tukwila line which the City would like to abandon. Service alternatives from other purveyors have also been considered.

9. **King County Water District No. 25**

With few exceptions, the King County Water District No. 25 legal boundary corresponds with the District's service area. The District does not have a current franchise. As discussed above, the entire Water District No. 25 area is being considered for annexation to the City of Tukwila. Please refer to the recommendations contained in Part VI for further information on the District's future service area.

10. Creston Water Association

The Creston Water Association, as a water cooperative, does not have a formal legal boundary or franchise. The Association serves 15 homes along 47th Avenue South (north of S. Ryan Way) and it is anticipated that the City of Seattle will provide service to these homes in the future.

C. INTERLOCAL AGREEMENTS

The following summary identifies existing and proposed agreements which pertain to water service within the SKYWAY CWWSA.

1. Existing Agreements

Water District No. 14 and:

- Lakeridge Water District; Service Area Agreement; 1985; Provides authorization for Lakeridge to serve the area within Water District 14 that is bounded by 78th Avenue South on the West, South 116th Street on the South, 80th Avenue South on the East and South 114th on the North.

- City of Seattle; Purveyors Contract; Provides for supply of water by City of Seattle through the year 2012 and states conditions of service, cost of water, etc.

- City of Renton; Service Area Agreement; 1982; Allows City of Renton to provide water supply for fire flow purposes only, to an area within the District's boundary. The subject property being that of Public Storage, Inc. located on the West side of Rainier Avenue South at approximately South 118th Street.

- Skyway Water and Sewer District; Water Purchase Agreement; 1988; Provides for purchase of water from Skyway Water and Sewer District; 5 year agreement.

Lakeridge Water District and:

- Water District No. 14; Service Area Agreement; 1985; Authorizes Lakeridge to serve the area within Water District No. 14 that is bounded by 78th Avenue South on the West, South 116th Street on the South, 80th Avenue South on the East and South 114th Street on the North.

- City of Renton; Joint Use of West Hill Facilities; 1983; Provides an agreement for improving the water facilities serving the West Hill area of Renton and Lakeridge Water District and/or operating and maintaining joint supply, storage and transmissions facilities. This Contract also ensures that Lakeridge will receive the water supply and facilities capacity stated and that the City will be compensated for such service.

Skyway Water and Sewer District and:

- City of Seattle; Purveyor's Contract; Provides for supply of water by City of Seattle until the year 2012 and states conditions of service, cost of water, etc.

- City of Renton, 1974; Transfer of Water Service Area; Agreement transfers water service to lots along west side of 84th Avenue South between South 124th Street and South 128th Street from Water District 88 (Skyway) to the City of Renton.

- Water District No. 14; Water Sales Agreement; 1988; Provides for sale of water to Water District No. 14; 5 year agreement.

City of Renton and:

- Water District No. 14; Service Area Agreement; 1982; Allows City of Renton to provide water for fire flow purposes only, to an area within the District's boundary. The subject property being that of Public Storage, Inc. located on the west side of Rainier Avenue South at approximately South 118th Street.

- Lakeridge Water District; Joint Use of West Hill Facilities; 1983; Provides an agreement for improving water facilities serving the West Hill area of Renton and Lakeridge Water District and for operating and maintaining joint supply storage and transmission facilities. This contract also ensures that Lakeridge will receive the water supply and facilities capacity stated and that the City will be compensated for such service.

- Water District No. 62; Takeover Agreement; 1952; City of Renton Res. 1017 authorizes acquisition and transfer of assets of Water District No. 62 by City of Renton.

- Water District No. 88; 1974; Transfer of Service Area; Agreement transfers service to lots along west side of 84th Avenue South between South 124th Street and South 128th Street from Water District 88 (Skyway) to the City of Renton.

Water District No. 125 and:

- City of Tukwila; Intertie Agreements; Provides for operation and maintenance of a 2" intertie located at South 144th Street and 53rd Avenue South (to 125 only) and a 4" intertie at Interurban Avenue South and 52nd Avenue South (two way).
- City of Seattle; Purveyor Contract; Provides for supply of water by City of Seattle until the year 2012 and states conditions of service, cost of water, etc.

City of Tukwila and:

- Water District No. 125; Intertie Agreements; Provides for operation and maintenance of a 2" intertie located at South 144th Street and 53rd Avenue South (to 125 only) and a 4" intertie at Interurban Avenue South and 52nd Avenue South (two way).

- City of Seattle; Purveyors Contract; Provides for supply of water by City of Seattle until the year 2012 and states conditions of services, cost of water, etc.

Water District No. 25 and:

- City of Seattle; Purveyors Contract; Provides for supply of water by City of Seattle until the year 2012 and states conditions for service, cost of water, etc.

2. **Pending Agreements**

City of Renton and City of Seattle, Franchise Agreement. The Cities of Renton and Seattle are negotiating a franchise agreement for the City of Seattle's Cedar River Pipeline. The previous Franchise Agreement expired in 1981.

City of Tukwila and Water District No. 125; Exchange of Land/Service Areas. The possibility of an exchange of service areas involving three areas within the Water District 125 and/or City of Tukwila boundaries has been explored. This proposal involves the City taking responsibility for all services within the overlap of boundaries between 55th Avenue South and 53rd South. Water District No. 125 would in turn relinquish it's customer's outside the City limits (West of 55th and South and East of I-5), in addition, the District would takeover the City's water line and customers in the vicinity of Beacon Avenue South and 68th Avenue South.

PART V – MINIMUM DESIGN STANDARDS

V MINIMUM DESIGN STANDARDS

A. GENERAL

A main goal of this SKYWAY Coordinated Water System Planning effort was to establish common minimum design standards for all participating. After great deliberation, the Water Utilities Coordinating Committee arrived at and adopted the following standards.

B. SKYWAY MINIMUM DESIGN STANDARDS

1. Introduction

This Section of the Coordinated Water System Plan (CWSP) provides a set of design standards and performance specifications which are adopted as minimum requirements for new and existing water utilities within the Skyway CWSP boundary. Subsection 2 details the application of the minimum design standards for water utility planning and construction. The design standards are included in Subsection 3 and 4 entitled: General Provisions, which identifies laws, regulations, and standard specifications which are applicable unless otherwise superseded; and Specific Provisions, which details specific design guidelines adopted by the Water Utility Coordinating Committee (WUCC) of the Skyway Community and King County. These standards do not supersede any other legally constituted and applicable standards that are more stringent.

2. Application of Standards

a. Utility Plans and King County Comprehensive Plan

Within the designated service area of a utility, new facilities shall be designed and installed according to the minimum design standards adopted by the utility. The utility

may adopt the minimum standards described herein, or may adopt more stringent standards. The design standards are intended to establish minimum levels of service, especially fire flow, required for different land use designations. Land use designations shall be those identified in the adopted City of Seattle, City of Renton, City of Tukwila and King County Comprehensive Plans and Zoning Ordinances.

New and expanding utilities shall meet water system planning requirements using land use designations for their service area as prescribed in the land use documents described above. Approved land use activities in the service area shall be identified jointly by the utility and the King County Planning Department, King County Building and Land Development Division (BALD) or a City Planning Department. Such designations shall be identified in the utility's comprehensive plan, and shall be used to establish design requirements.

The utility shall prepare a plan and a program of capital improvements required to provide the anticipated level of service in each land use area, or if this plan adequately addresses the utilities requirements, adopt this document as it's comprehensive plan. When the utility is requested to provide water service, it will identify that portion of planned capital facilities as well as other installations, which are necessary to provide the service requested. As growth occurs, the full level of water service will eventually be provided throughout the service area of the utility in a planned, phased program which meets County requirements and minimizes overall cost to the customers.

The minimum design standards described herein, do not apply to municipalities insofar as service within corporate boundaries that is outside the Skyway CWSP boundary.

However, it is expected that municipalities will adopt, or have adopted, design standards at least equal to those herein.

The King County Comprehensive Plan identifies a group of major land use designations and subcategories which help define the growth and development pattern in King County. The Plan distinguishes between Urban Areas, Urban Activity Centers, Transitional Areas, Open Space, Rural Areas, Rural Activity Centers, and Resource Lands. Under this Plan, the Skyway area is designated as an Urban Area. This is defined as an area planned for growth at a range of residential densities (from very high to very low) where urban public facilities and service standards will apply.

Other current land use plans indicate that development within the Skyway area will continue to be a mixture of varying residential densities, commercial and industrial uses. These land use designations indicate a similar need for urban public facilities and service standards.

There are also open areas such as public parks, recreation areas and natural features protected by environmental regulations within the Skyway area. Maps showing the location of these and other land use concept areas are available from King County BALD and/or the appropriate City Planning Departments.

Planning for public water system improvements, and the application of the minimum design standards discussed in this document, shall be in accordance with the major land use designation areas discussed in the King County Comprehensive Plan and comprehensive plans of the various cities for service areas lying inside the Skyway CWSP boundary. The various utilities may adopt these standards or higher level of standards provided that such levels are not inconsistent

with the Comprehensive Plan and the provision of domestic and fire protection service required to support those land use policies.

b. Phased Development of Water Systems

In situations where water service is requested of a utility that does not currently have adequate facilities for the ultimate growth potential, the utility and developer may reach an agreement to provide the desired service through a schedule of improvements over a reasonable period of time.

A phased development plan shall be applicable when the following conditions are met:

(1) The written phased development plan shall be submitted and approved prior to issuing a development permit (plat, short plat, etc.). The plan must identify the water service level to be provided initially, projected growth expected in the new service area, additional capital facilities required, a schedule of construction, and eventual level of service to be provided. The phased construction schedule must provide for compliance with design standards in a reasonable period of time, usually 5 years.

(2) If the proposed new service is within the utility's designated service area, the utility shall have an approved comprehensive plan. If the new service is proposed outside of a designated service area, or if it is to be operated as a Satellite System Management Agency (SSMA), the utility or SSMA shall submit an amendment to its comprehensive plan which addresses the needs of the new service area.

(3) All water mains and other permanent facilities installed during the phased development period shall be in accordance with the eventual system design identified in this Plan or the utility's Plan.

If land use changes occur, or if growth does not occur as anticipated, the utility may submit a revised plan which identifies the reasons for relief from the original plan and a fixed date for compliance to be achieved.

3. General Provisions

a. Source Development

New sources must be designed to meet the Department of Ecology (DOE), the Department of Social and Health Services (DSHS), and the SKCDPH regulations and design guideline. These include: WAC 173-160, Minimum Standards for Construction and Maintenance of Water Wells, as administered by DOE; WAC 248-54, "Rules and Regulations of the State Board of Health Regarding Public Water System", as administered by DSHS; and, "King County Public Water Rules and Regulations No. 9," as administered by the SKCDPH.

b. Water Rights

Water rights must be obtained in accordance with DOE regulations and procedures. Copies of water rights documents, correspondence and other records are to be maintained on file with the purveyor and in the name of the purveyor.

c. Water Quality

Water quality must be proven to conform with DSHS criteria specified in WAC 248-54 and/or any additional requirements contained in Rules and Regulations No. 9, SKCDPH. Each

utility may reserve the right to reject any source whose raw water quality does not meet these criteria or is incompatible with the existing water source.

d. **General Design Specifications**

Except as otherwise superseded in these standards, water system design, installation, modification and operation is subject to the "Rules and Regulations of the State Board of Health Regarding Public Water Systems", WAC 248-54, as administered by DSHS and/or "King County Public Water Rules and Regulations No. 9", as administered by SKCDPH.

e. **General Material Specifications and Construction Standards**

Except as provided in approved plans and specifications, or in these minimum standards, selection of materials and construction of water system facilities in King County shall conform to the following:

(1) Approved Standards of the Participating Utilities that meet or exceed these requirements;

(2) Applicable County or Municipal ordinance;

(3) "Standard Specifications for Road, Bridge and Municipal Construction", Washington State Department of Transportation/American Public Works Association, (DOT/APWA) Latest Edition;

(4) Standards of the American Water Works Association (AWWA);

(5) "Recommended Standards for Water Works," (Ten State Standards). Great Lakes-Upper Mississippi River, Board of State Sanitary Engineers.

(6) Recommendations of the individual manufacturer of materials or equipment;

Along County road rights-of-way in unincorporated areas, a County right-of-way and/or franchise permit must be applied for and approved by the County prior to construction. Construction within incorporated areas remains subject to municipal permitting requirements. All requirements of the permit shall become part of these specifications.

All new facilities shall be inspected by a qualified inspector under the direction of the purveyor. If the new improvements require certification by DSHS, then the inspection must also be under the direction of a professional engineer. Detailed asbuilts shall be prepared and maintained on file for all new system improvements including system upgrades and replacements.

f. Hydrostatic Pressure Test

A hydrostatic pressure leakage test will be conducted on all newly constructed water mains, fire lines, fire hydrant leads and stubouts in accordance with DOT/APWA Section 7-11.3(11) and AWWA C-600 specifications. Minimum test pressure on all systems shall be 150 psi over working pressure; or as prescribed by alternate methods that have been approved by DSHS.

g. Disinfection and Bacteriological Testing

All pipe, reservoirs and appurtenances shall be flushed and disinfected in accordance with the standards of the DSHS, AWWA C601 and D105, and DOT/APWA Section 7-11.3(12), unless specified otherwise by the designated utility.

h. **Auxiliary Power**

All source and booster pumping facilities required for primary supply in an emergency shall be equipped with auxiliary power. Where pumping is to a storage facility which is sized to permit down time for mobilization of a portable standby power unit, pigtail outlets and a manual transfer switching device is adequate. If the pigtail outlet approach is taken, the purveyor must either own and maintain a portable power unit or have an acceptable rental agreement assuring the use of a unit when needed. Where adequate gravity standby storage has been provided, no auxillary power is required for pumping facilities. An adequately sized engine driven pumping device is an acceptable method to meet this requirement.

i. **Utility Interties**

Specific locations, size and alignment of major water lines should consider emergency interties with adjacent water utilities.

j. **Flow Measurement**

Unless otherwise directed by the designated utility, all service lines shall be installed so that each residential, commercial and industrial structure will have a separate metered service for domestic water received from the designated utility. If approved by the designated utility, domestic water consumption may be measured by a master meter for service to a complex under single ownership. Service lines providing fire flow may be required by the utility to be equipped with fire detection check and meter.

All new groundwater sources shall be provided with devices for measurement of depth to water and total production. Installation of these devices is also recommended for existing groundwater sources. All new sources for which water treatment is included shall be provided with flow measurement.

k. **Cross Connection Control**

Where the possibility of contamination of the supply exists, water services shall be equipped with appropriate cross connection control devices in accordance with WAC 248-54. The designated utility shall adopt and maintain a cross connection control program in compliance with State requirements. This is especially important where systems are intertied to prevent contamination transferring from one system to another.

4. Specific Provisions

a. Pressure Requirement

Water systems shall be designed to maintain a minimum residual pressure of 30 psi at the water meter under maximum demand flow conditions, excluding fire demand. All water systems shall be adequately sized to maintain, under fire flow conditions, positive pressure throughout the system and a 20 psi residual pressure in mains supplying fire hydrants in use (c.f. WAC 248-54). Maximum pressure of water used by domestic customers shall not exceed 85 psi. This may be accomplished by the purveyor requiring the customer to install and use private pressure reducing valves (PRV's). Transmission mains not directly serving customers are not required to meet these pressure standards.

b. Pipe Sizing and Materials

Water mains shall be sized using the current edition of "Sizing Guidelines for Public Water Supplies", prepared by DSHS; or may be established by a licensed engineer using recognized hydraulic analysis techniques.

All water mains within the Skyway CWSP boundary shall be a minimum of 8 inches nominal diameter for dead end mains and 6 inches nominal diameter for circulating mains. Hydrant leads less than 50 feet in length may be 6 inches in diameter. In a dead end cul-de-sac, mains sized for only domestic flow may be installed from the last hydrant to remaining residences.

Larger pipe sizes may be required to deliver fire flow and maintain the pressure requirement defined above or transfer water from source and storage to the individual systems. All water mains shall meet applicable engineering and health standards adopted by the State of Washington or the water purveyor, including WAC Chapter 248-54 and 248-57.

All new mains shall be minimum Class 52 ductile iron with cement lining. All pipe material for new water systems shall be constructed with "lead-free" materials. The lead content for joint compound materials (solder and flux) used for installation pipe shall be less than 0.2 percent in order to be considered "lead-free". The lead content for all installed pipe shall be less than 8 percent in order to be considered "lead-free".

c. **Isolation Valving**

Valving shall be installed in a configuration which permits isolation of lines. A valve is not generally required for short block lines of less than 100 feet. Valves should be installed at intersections with normal maximum spacing at 500 feet in commercial, industrial and multi-family districts, 800 feet in residential districts, and 1/4 mile in transmission mains. (Note: City of Seattle Cedar River Pipelines are exempt from valve spacing requirements).

d. Air and Air-Vacuum Relief Valves

In order to minimize problems associated with air entrainment, air or combined air-vacuum relief valves at appropriate points of high elevation in the system shall be provided. All piping shall be sloped to permit escape of any entrained air. Combination air release/air vacuum valves shall have a maximum operating pressure of 300 psi.

e. Blow-off Assembly

A blow-off assembly shall be installed on all dead end runs and where system fire hydrants don't provide adequate points of blowoff at designated points of low elevation within the distribution system. The blow-off assembly shall be installed in the utility right-of-way except where an access and construction easement is provided for in writing to the water utility. In no case shall the location be such that there is a possibility of back-siphonage into the distribution system. The following table of minimum blow-off assembly sizes shall be utilized in accordance with the following distribution main sizes:

Distribution Main Size	Minimum Blow-off Assembly Size Required
12-inch and less	2 inch
greater than 12-inch	determined upon review on a case-by-case basis

f. Storage

Storage requirements are based upon three components:

(1) Equalizing Storage, required to supplement production from water sources during high demand periods,

(2) Standby Storage, required as backup supply in case the largest source is out of service.

(3) Fire Storage, required in order to deliver the level of fire flow service identified in the utility's approved plan (see "Fire Flow Requirements" below) for the required duration.

The minimum size of storage facilities shall be that storage required for equalizing storage, plus the larger of standby or fire storage requirements. Equalizing and standby storage volumes shall be determined using "Sizing Guidelines for Public Water Supplies", DSHS. For purveyors with a single source of water or where multiple sources are not capable of assuring delivery of standby storage at the minimum designated pressure, the standby storage provided shall be 800 gallons/R.E. For purveyors with multiple sources the required volume may be reduced as prescribed by DSHS "Sizing

Guidelines for Public Water Supplies", but in no case shall the standby storage by reduced to less than 200 gallons/R.E.Minimum fire storage volumes shall be required if the source of water can not assure the minimum fire flow rates are available for the minimum specified duration. The determination for fire flow rates and duration requirements shall be as a minimum as setforth in these design standards. When joint use storage facilities are utilized, storage for only one fire at a time need be considered in sizing the storage facility.

Siting of storage facilities should consider locations which maximize the use of gravity flow.

g. General Facility Placement

Utilities within the County right-of-way on new roads or in roadways where existing topography, utilities, or storm drains are not in conflict, shall be located as indicated below. Where existing utilities or storm drains are in place, new utilities shall conform to these standards as

nearly as practicable and yet be compatible with the existing installations. In addition, where practical, there shall be at least 3 feet horizontal separation from other utilities. For incorporated areas, City ordinances and utility placement standards will apply. However, unincorporated areas will be required to adhere to the following criteria.

1. Shoulder and Ditch Section

    a. If practical: Outside of Ditch Line
    b. Otherwise: In shoulder three feet from edge of travelled lane.

2. Curb and Gutter Section:

    a. Preferable: 1.5 feet back of curb, or at a distance which will clear root masses of street trees, if these are present or anticipated.

    b. Otherwise: In the street as close to the curb as practical without conflicting with storm drain placement. Mains and service connections to all lots shall be completed prior to placement of surface materials.

3. Designated Side of Centerline: North and East sides of the street.

4. Individual Water Service Lines:

    a. Shall use road right-of-way only as necessary to make side connections.
    b. Any one connection can not extend more than 60 feet along or through the right-of-way, or the minimum width of the existing right-of-way.

In addition, all piping, pumping, source, storage and other facilities, shall be located on public rights-of-way or dedicated utility easements. Utility easements must be a minimum of 15 feet in width, and piping shall be installed no closer than 5 feet from the easement's edge and the required separation between water lines and other utilities must be maintained. Exceptions to this minimum easement may be approved by the operating water utility. Unrestricted access shall be provided to all public water system lines and their appurtenances and public fire hydrants that are maintained by public agencies or utilities.

h. Pipe Cover

The depth of trenching, installation of pipes, and backfill shall be such as to give a minimum cover of 30 inches over the top of the pipe from finished grade. This standard shall apply to transmission, distribution, and service piping. Backfilling up to 12 inches over the top of the pipe shall be evenly and carefully placed. Remaining depth of trench to be filled in accordance with applicable construction standards identified in the General Provisions. In unincorporated areas, compaction requirements shall adhere to the King County administrative Rule on "Utility Trench Compaction", dated December 12, 1983 or as amended.

i. Separation Distances

Transmission and distribution water piping shall be laid at least 10 feet horizontally from any existing or proposed on-site waste disposal piping, drain fields, and/or wastewater gravity or force mains. The distance shall be measured edge to edge. In cases where it is not practical to maintain a ten foot separation, the health agency with review responsibility may allow deviation on a case-by-case basis, if supported by data from the design engineer.

Closer spacing may be permissible where the sewer piping is constructed to water main standards and has been pressure tested to ensure water tightness prior to backfilling. As allowed in the D.O.E. "Criteria for Sewage Works Design" manual, 18 inches of vertical separation shall be maintained between the top of a sewer main and bottom of a water line. Where possible, the water line shall pass over the sewer line. Exceptions to this shall meet D.O.E. requirements.

j. Fire Hydrants

Fire hydrants within cities shall adhere to the specific design criteria and standards utilized by the City. Fire hydrants within the unincorporated areas of King County shall comply with the minimum design criteria set forth in King County Code 17.08. Fire Hydrants shall meet the following standards:

5 1/4" MVO with 1-4" Port
2 - 2 1/2" end hose ports and,

have thread of local jurisdiction. A plan shall be made by the various purveyors to upgrade substandard hydrants.

k. Fire Hydrant Location Installation Criteria

The location of fire hydrants within cities shall be located and/or installed as specified by the design standards of the City. Fire hydrants within the unincorporated areas of King County shall comply with the minimum location/installation criteria set forth in the King County Code 17.08, and the King County Fire Marshall. In general, the minimum spacing for hydrants shall be 300' on center in commercial and multi family residential areas and 600' on center in single family residential areas.

l. Fire Flow Requirements

For residential land use classifications, a minimum of 1,000 gpm fire flow shall be provided for a duration of at least 2 hours. For commercial and industrial classifications, flow requirements shall be according to the guidelines published by the Insurance Services Office (I.S.O.). Land use classifications shall be as put forth by current land use plans and policies. In no case shall minimum required flow be less than 1,000 gpm.

The King County Fire Marshal or City fire department may allow a variance in required design fire flow, duration, or other requirements of the water utility, if such a variance will provide an equivalent degree of fire protection. The water system providing water for flow requirements shall be capable of supplying such flow for a minimum duration of 2 hours.

m. **Pipe Velocities**

In order to minimize water hammer, pipe scour, reduced pressures during peak demands and damage to the water system facilities, velocities should not exceed 10 F.P.S. When designing and sizing water mains for fire flows and peak demands maximum allowable velocity shall be 10 F.P.S.

n. **Maintenance of Fire Protection Facilities**

A written operational agreement which identifies responsibilities for maintenance and testing of fire protection facilities should be negotiated between the fire department or district and the water utility.

5. Standards Review Subcommittee

The Standards Review Subcommittee shall be established by the WUCC and shall convene at least annually to review these standards and their implementation. The Subcommittee shall seek input from the King County Fire Marshal and the City Fire departments in matters related to fire protection standards. Recommendations of the Standards Review Committee shall be submitted to the WUCC and, if revisions are approved, they shall be forwarded to the County Council for adoption.

6. Severability

If any provision of these standards or their application is found to be invalid, the remainder of the standards and their implementation are not affected.

PART VI – ALTERNATIVES AND RECOMMENDATIONS

VI ALTERNATIVES AND RECOMMENDATIONS

A. GOALS

In developing a recommended Plan for SKYWAY Critical Water Supply Service Area, a variety of general concepts and specific issues were considered. The goals for this effort were established by the findings outlined in previous chapters and are generally summarized as follows:

1. Establish a plan for logical changes to existing service areas based on existing systems, hydraulic conditions, legal and franchise boundaries, "sphere of influence" planning areas, and existing and projected population and land uses; subject to meeting the requirements of Title 57, RCW and Chapter 36.93; RCW as appropriate.

2. Provide necessary facilities to meet the Minimum Design Standards (Part V) and correct area wide deficiencies. No attempt was made to identify localized deficiencies such as insufficient distribution, pipe sizes, local areas of high and low pressure, etc. except as they might relate to the area as a whole. These individual deficiencies should be addressed in each purveyor's Comprehensive Plan.

B. OBJECTIVES

Members of the SKYWAY WUCC identified the following objectives to be used in selecting an Alternative:

1. Provide logical and continuous boundaries for existing water systems;
2. Provide storage to all customers;
3. Maximize existing facilities;
4. Provide at least 40 psi static pressure;
5. Provide adequate fire flows;
6. Avoid duplication of facilities;

7. Minimize dead ends;
8. Maximize backup sources and interties;
9. Establish equitable allocation of traded assets;
10. Achieve all of the above in the most cost effective way possible to minimize impact on rates.

C. SERVICE AREA RECOMMENDATIONS

Plate VI-1 presents the WUCC recommendations for changes to existing service areas within the SKYWAY CWSSA. This recommendation evolved after careful consideration of many alternatives, some of which are presented later in this Part. Please refer to PART VII-FINANCING AND IMPLEMENTATION for procedural recommendations for achieving the service area recommendations shown on Plate VI-1 and listed below.

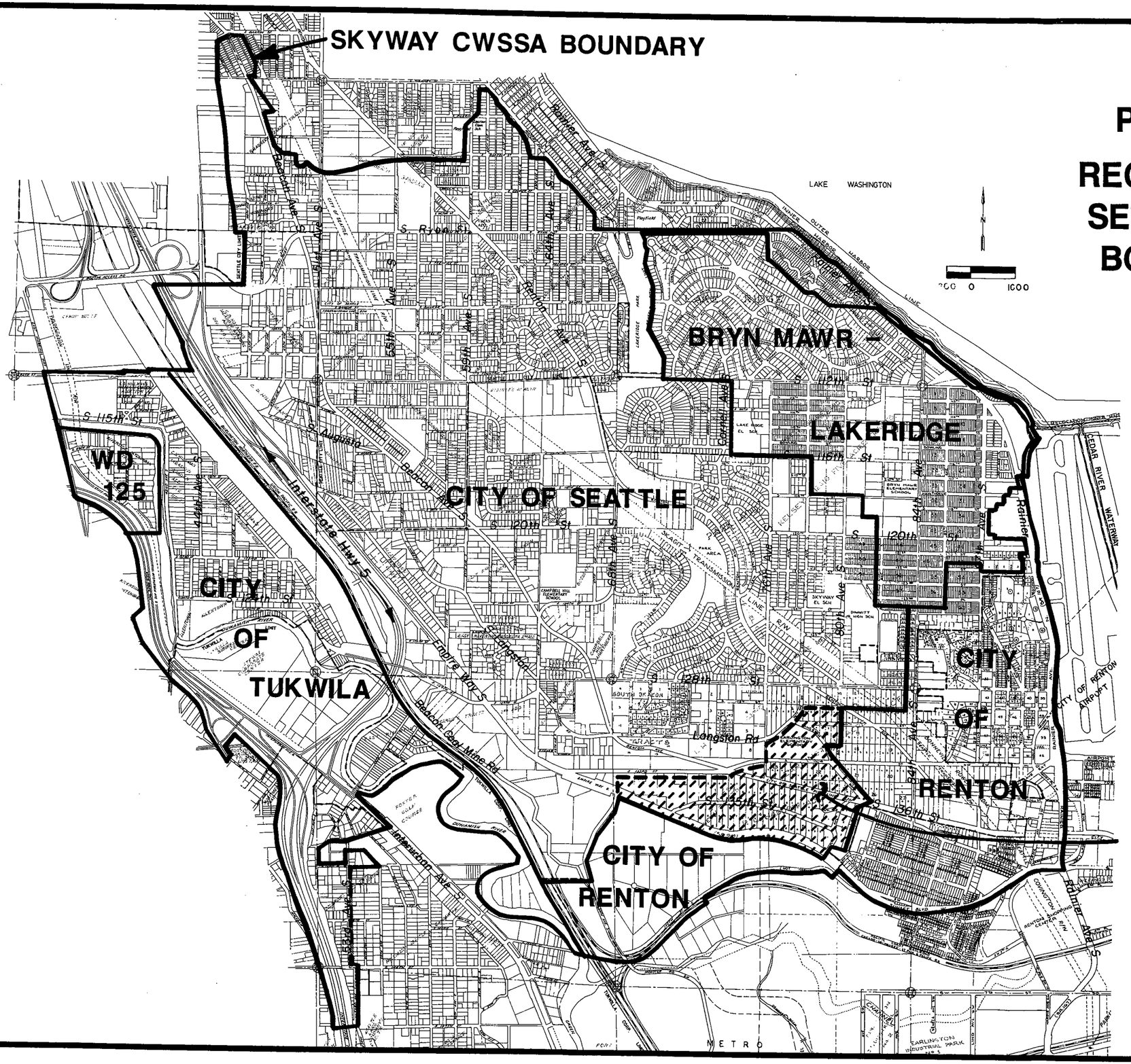
- The merging of Lakeridge Water District and Water District No. 14 is proposed to form the Bryn Mawr-Lakeridge Water and Sewer District. Source of supply and storage to the area would be by the existing Water District No. 14 facilities and Renton West Hill Joint Use Facilities. Additional emergency interties with Seattle and Renton are required to reduce the total amount of storage required and to provide adequate fire flows as defined by the Minimum Design Standards.

- Although Water District No. 57 could logically be included in this merged Bryn Mawr-Lakeridge District, the voters of that area have selected to receive direct service from the City of Seattle.

- Expansion of the City of Seattle service area is proposed to include all of the Skyway Water District and those Water District No. 125, City of Tukwila and Water District No. 25 customers which are east of the railroad right-of-way. It is also recommended that Creston Water Association customers be connected to existing Seattle facilities. This expanded Seattle service area would be served by interconnecting the various existing systems in the area and construction of a new storage facility. Takeover of these areas is subject to the approval of voters and each purveyor will be required to upgrade facilities to City of Seattle standards.

PLATE VI-1

RECOMMENDED SERVICE AREA BOUNDARIES



AREA TO BE SERVED BY RENTON IF ANNEXED

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Consulting Engineers and Surveyors

- The area south of Empire Way South (in the vicinity of the abandoned Black River Quarry) is recommended for inclusion in the City of Renton's service area. The City of Seattle currently has a few customers south of Empire Way in this area but the remainder of the area is undeveloped. As such, facilities required to serve this area will be designed and installed as development occurs. This area is included in the City of Tukwila's Fire District No. 1 annexation proposal but Tukwila does not intend to serve east of the railroad right-of-way.

- The shaded area north of Empire Way South is currently served by the City of Seattle and is outside of any purveyors legal boundaries. When and if this area is annexed to the City of Renton, it should be included in their service area. This will necessitate transfer of facilities and customers from the City of Seattle to Renton.

- This recommendation proposes that City of Tukwila serve Water District No. 25 and Water District No. 125 customers west of railroad right-of-way (with exception as noted west of the Duwamish River - to be transferred from Water District No. 25 to Water District No. 125). This will include transfer of Water District No. 125 customers and facilities east of Interstate Highway 5 and west of Interurban Avenue South. If a proposed Tukwila annexation of Fire District No. 1 is approved, Water District No. 25's service area will lie within Tukwila's City limits and therefore the City can provide direct service to area as shown. If the proposed Tukwila annexation is not approved, Water District No. 25 and Tukwila should negotiate an agreement for either Tukwila takeover of Water District No. 25's facilities between the Duwamish and I-5 or intertie with the Tukwila system (by interlocal agreement) to provide storage via proposed Tukwila 2 MG reservoir facility.

- It is recommended that no new water systems be created within the SKYWAY CWSSA. This is based on the ability of existing systems to efficiently and effectively serve all property within the planning area.

D. SYSTEM IMPROVEMENT RECOMMENDATIONS

Plate VI-2 illustrates the system improvements required to accommodate the service areas recommendations and meet the overall criteria established by the Minimum Design Standards. (Note: Options noted in this Section refer to a more complete analysis presented later in this Part).

These system improvements/recommendations do not include local improvements required to meet the Minimum Design Standards. Additional work may be required in takeover areas to bring systems to City of Seattle standards. Estimated costs for recommended system improvements are presented as listed below.

1. **Dissolution of King County Water District No. 57**
   - Option A is recommended: Direct service from City of Seattle 316 pressure zone.
   - Replace Existing System $300,000±

2. **Extend Lakeridge Boundary to Include Its Actual Service Area and Increase Fire Flow to Lakeridge Elementary School Area.**
   - Extend boundary to South 116th Street. $ 20,000±
   Install emergency intertie with City of Seattle and additional piping to loop system through school.
   - Seattle/Lakeridge Emergency Intertie $ 20,000±
   - 1,600 LF 8" DI Loop through School $ 70,000±

3. **Provide Adequate Fire Flow to Lakefront Area Northwest of Rainier Avenue South.**
   - Option B is recommended: Water District No. 14 installs new facilities to serve area and constructs an intertie with Renton.
   - Water District 14/Renton Emergency Intertie $ 20,000±
   - 5,000 LF 12" DI from Source to Lakefront $225,000±

PLATE VI-2
RECOMMENDED SYSTEM IMPROVEMENTS

SKYWAY CWSSA BOUNDARY

LAKE WASHINGTON

1000 0 1000

LEGEND

- Systems Intertie
- Proposed Waterline

Prepared by:

Horton Dennis & Associates, Inc.
Consulting Engineers and Surveyors

4. **Provide Storage to Water District No. 14 335' Zone and Establish Logical and Continuous Renton/Water District No. 14 Service Area Boundaries**

- Option C is recommended: Merge with Lakeridge and utilize some of Lakeridge storage capacity in West Hill Joint Use Facilities.
- Transfer Renton Facilities to WD 14 — Cost to be Determined
- Connect WD 14 to West Hill Reservoir — $ 12,000±

5. **Clarify Renton/Skyway/Water District No. 14 Boundaries Around Dimmitt Middle School**

- Option B is recommended: Renton serves both sides of 84th Avenue South, Skyway (Seattle) serves area west of 84th between South 124th and South 128th Streets.
- Transfer WD 14 facilities to Skyway — Cost to be Determined

Note: It is possible for Water District 14 to serve this area but this would require takeover of Skyway customers along South 128th Street (west of 80th) to achieve the required loop through the area.

6. **Eliminate City of Seattle Individual Service Connections to the Cedar River Pipeline within City of Renton Service Area**

- Transfer services to City of Renton and reconnect to existing Renton facilities.
- Miscellaneous meters and service lines — $ 15,000±

7. **Eliminate City of Seattle Individual Service Connections to the Cedar River Pipeline within the Skyway Service Area**

- Reconnect individual services to existing Skyway lines where possible and install new lines where required.
- 3,900 LF 8" DI — $170,000±

8. **Eliminate City of Seattle Individual Service Connections to the Cedar River Pipelines and City of Tukwila Services within the Water District No. 125 Service Area**

- Reconnect individual services to existing facilities where possible, and construct new lines where required.
- 900 LF 6" DI and Miscellaneous Reconnections

9. **Determine Which Purveyor Should Serve Area South of Empire Way South (in vicinity of 64th Avenue South)**

- Option D is recommended: City of Renton constructs new facilities and serves area from West Hill Reservoir. Maximum service elevation from West Hill Reservoir is 320'± (KCAS).
- Required facilities to be constructed as development dictates. — Cost to be Determined

10. **Clarify Water District 125/Tukwila Service Area Limits East of Interstate Highway 5**

- Option A is recommended: Tukwila serves entire area.
- Transfer of WD 125 facilities to Tukwila — $100,000±
- Required Improvements — $ 70,000±

11. **Provide Adequate Service to Water District No. 25 Customers West of Railroad Right-of-Way**

- Option A: Water District 25 constructs necessary improvements and purchases water and storage from City of Tukwila by agreement; **OR**
- Option D: Tukwila takes over Water District 25 area east of the Duwamish and west of the railroad tracks (including Foster Point).
- Water District 125 takes over area west of Duwamish.
- Construct Connections to WD 125 System — $ 80,000±
- Improvements to WD 25 System — Cost to be Determined
- Connection to Tukwila System — Cost to be Determined

12. **Provide Adequate Service to Water District 25 Customers East of Railroad Right-of-Way**
    - Transfer customers to City of Seattle
    - 2,000 LF 8" DI $ 85,000±

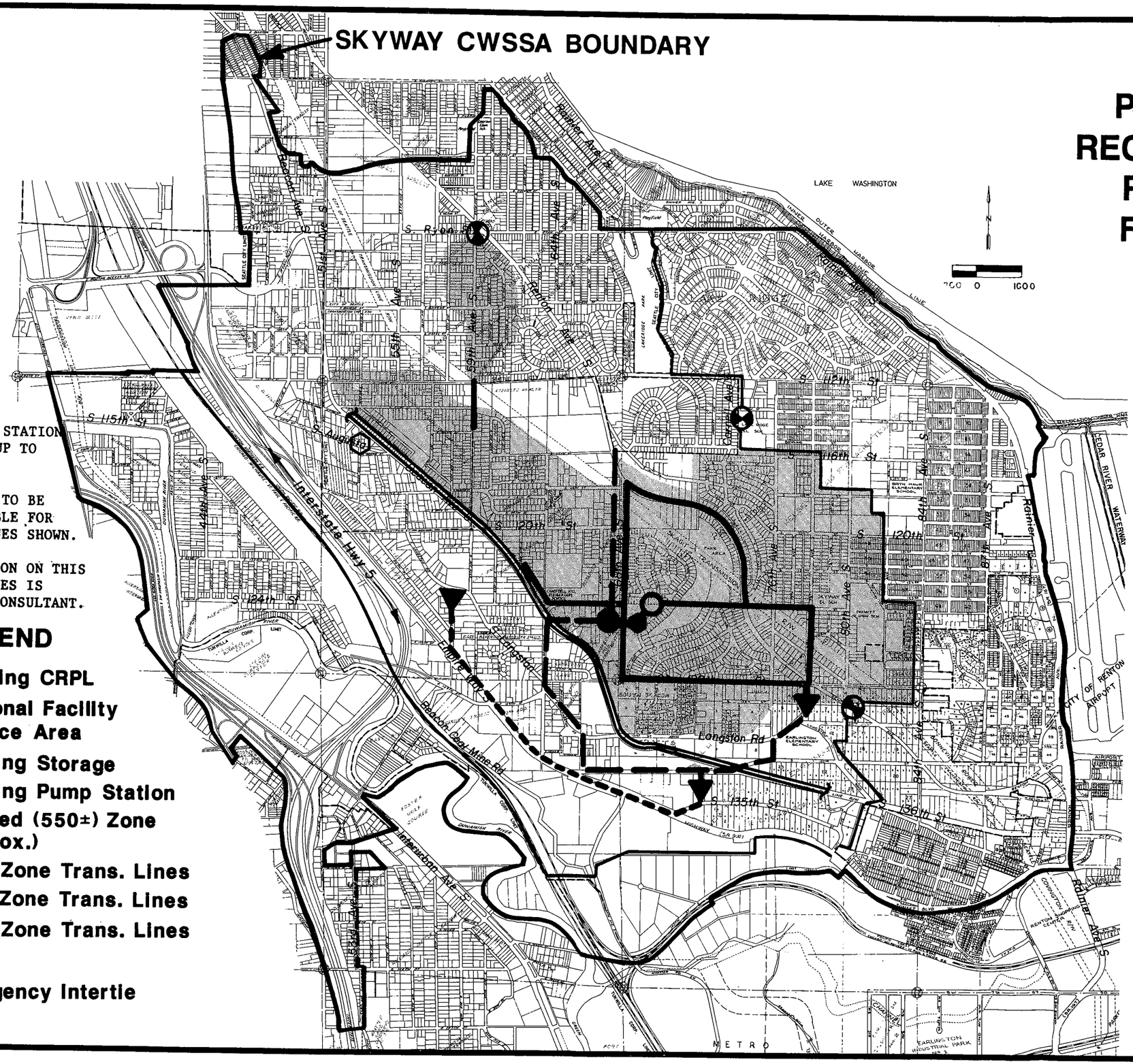
13. **Provide Adequate Service to Creston Water Association**
    - Transfer services to City of Seattle existing facilities.
    - Miscellaneous Reconnections $ 5,000±

E. RECOMMENDED REGIONAL FACILITIES

To resolve the lack of storage in the existing Skyway Water District, Water District No. 125 and Seattle Service Areas, an estimated 4 million gallon reservoir is recommended. This facility and the associated pump station and transmission lines are conceptually shown on Plate VI-3. A detailed engineering report is required for site selection, sizing and design of joint use facilities.

A cost estimate for the recommended facilities is presented in Table VI-1. This estimate is based on the 450' Option (gravity feed from Seattle CRPL) discussed in Alternative 3 (Paragraph I) of this Part.

PLATE VI-3
RECOMMENDED REGIONAL FACILITIES



NOTE:

1. AUGUSTA STREET PUMP STATION TO BE USED AS BACK UP TO 550± ZONE
2. EXISTING FACILITIES TO BE USED WHENEVER POSSIBLE FOR THE TRANSMISSION LINES SHOWN.
3. ADDITIONAL INFORMATION ON THIS AND OTHER ALTERNATIVES IS AVAILABLE FROM THE CONSULTANT.

LEGEND

- Existing CRPL
- Regional Facility Service Area
- Existing Storage
- Existing Pump Station
- Pumped (550±) Zone (Approx.)
- 550± Zone Trans. Lines
- 450± Zone Trans. Lines
- 360± Zone Trans. Lines
- PRV
- Emergency Intertie

Prepared by:

HDA Horton Dennis & Associates, Inc.
Consulting Engineers and Surveyors

TABLE VI-1

PRELIMINARY COST ESTIMATE

REGIONAL FACILITIES

CUSTOMERS SERVED (In Residential Equivalents)

	LOW ZONES	HIGH ZONES	TOTAL
Skyway		1436	1436
Seattle	2250	1005	3255
WD 125	250		250
Others	31		31
	2531	2441	4972

1.	REGIONAL FACILITIES - ALL ZONES	$1,560,000±
	$300 - $350/RE	
2.	HIGH ZONE FACILITIES	$ 562,000±
	$200 - $250/RE	
3.	LOW ZONE FACILITIES	$ 350,000±
	$125 - $150/RE	

Note: Local System Improvements and Bond Interest Not Included

F. ADDITIONAL RECOMMENDATIONS

During the development of this Plan a number of issues and deficiencies were discovered. These additional items are setforth below and need to be addressed in the various purveyor comprehensive plans.

1. City of Seattle

- A significant area in the north and northwest portion of the Skyway CWSP boundary is being served at pressure that exceed the design standard established herein. Creating a reduced pressure zone should be considered.
- An island of residences lying between 57th and 61st Avenues South from approximately South Prentice Street to South 112th Street are served at pressures below the recommended standard. Extending the existing City 550' Zone into the area is recommended.
- An emergency intertie with Lakeridge Water District is recommended to eliminate single source service to a significant area near Lakeridge School.

2. Lakeridge Water District

- The District should consider installing an additional pressure zone to prevent over pressuring the lower portion of the District's 495' Zone.

3. Water District 14

- The District should consider installing an additional pressure zone for the area served along Rainier Avenue. (This should be the same gradient as Lakeridge facilities on Rainier Avenue to allow for future interconnection.)
- Water District 14 needs to resolve the lack of storage provided to their 335' zone if continued supply is provided via City of Seattle. If this area is served from the West Hill Reservoir, then the commitment with the City of Seattle contract (approximately $12,000/yr) needs to be resolved.

4. City of Renton

- For the City of Renton to serve the quarry area in the southern part of the CWSSA, a considerable amount of new facilities will be required. The City has expressed their intention to construct a new storage tank in this area but preliminary studies have been for this tank to serve only the 196 pressure zone outside of the CWSSA. Consideration of other alternatives should be made to determine if there is a hydraulic option which could benefit both the quarry area and the 196 zone, thereby reducing the demand on the existing West Hill Reservoir. This will be increasingly important, if the City annexes additional area north of Empire Way and intends to serve the area with water. As discussed in Alternative 3, as this area would presumably be served by the facilities constructed to interconnect the West Hill and proposed Black River Quarry Tanks.

5. Replacement/Renewal Programs

King County Water District No. 14, Skyway and Water District No. 25 need to update their comprehensive plans and develop detailed replacement/renewal programs for upgrading undersized pipes.

Upgrading of systems will be required prior to the City of Seattle taking over the service areas.

G. ALTERNATIVES

The recommendations previously set forth are a combination of the various options and alternatives identified and discussed by the WUCC. Some of the most viable alternatives that were considered are presented as follows:

1. **Alternative 1 - Clarify Existing Service Areas**

Alternate 1 presented a means for clarifying boundaries and providing adequate storage to all customers by each purveyor constructing the necessary facilities to meet their Districts needs. All of the identified objectives could be met under Alternative 1, except Number 6 - Duplication of facilities and Number 10 - Cost effectiveness. As discussed in Part III - Existing Systems, the total amount of storage required can be reduced from 5.4 MG to 4 MG if a joint use facility was constructed to meet the future needs of all areas deficient in storage.

In clarifying boundaries and establishing future service areas the following 13 items have been identified as specific issues critical to the needs of the overall CWSSA. The items identified below are specifically addressed in Paragraph D of this Part (SYSTEM IMPROVEMENT RECOMMENDATIONS) and are shown on Plate VI-2.

Item 1. Dissolution of King County Water District No. 57

- Option A: Direct service from the City of Seattle 316 pressure zone.

Item 2. Provide Adequate Fire Flow to Lakefront Area Northwest of Rainier Avenue South

- Option A: Renton serves area requiring greater than 1,000 gpm.
- Option B: Water District No. 14 installs new facilities to serve area and constructs intertie with Renton.
- Option C: Extension of City of Seattle line along Rainier Avenue and emergency intertie.

Item 3. Extend Lakeridge Boundary to Include Actual Service Area and Increase Fire Flow to Lakeridge Elementary School

- Extend boundary to South 116th Street
- Install emergency intertie with City of Seattle and additional piping to loop system through school.

Item 4. Provide Storage to Water District 14 335' Zone and Establish Logical and Continuous Renton/Water District 14 Service Area Boundaries

- Option A: Purchase water and storage from Skyway.
- Option B: Purchase water and storage from Renton.
- Option C: Merge with Lakeridge and utilize some of Lakeridge storage capacity in West Hill Joint Use Facilities.

Item 5. Clarify Renton/Skyway/Water District 14 Boundaries Around Dimmitt Middle School

- Option A: Renton serves both sides of 84th Avenue South, Skyway serves both sides of 80th, Water District 14 serves area between (School, church and homes) from South 128th Street North.
- Option B: Renton serves both sides of 84th Avenue South, Skyway serves area west of 84th between South 124th and South 128th Streets.

Item 6. Eliminate City of Seattle Individual Service Connections to the Cedar River Pipeline within City of Renton Service Area

- Transfer services to City of Renton and reconnect to existing Renton facilities.

Item 7. Eliminate City of Seattle Individual Service Connections to the Cedar River Pipeline Within the Skyway Service Area

- Transfer existing Seattle services to Skyway, reconnect to existing Skyway lines where possible and install new lines where required.

Item 8. Eliminate City of Seattle Individual Service Connections to the Cedar River Pipelines and City of Tukwila Services Within the Water District No. 125 Service Area

- Transfer services to Water District No. 125, reconnect to existing facilities where possible, and construct new lines where required.

Item 9. Determine Which Purveyor Should Serve Area South of Empire Way South (in vicinity of 64th Avenue South)

- Option A: City of Seattle serves area by extension of facilities north of and along Empire Way South.
- Option B: Skyway takeover of Seattle facilities north of and along Empire Way South and serves area in question.
- Option C: City of Renton takeover of Seattle facilities north of and along Empire Way South and serves area.
- Option D: City of Renton constructs new facilities from West Hill Reservoir to serve area.

Item 10. Clarify Water District 125/Tukwila Service Area Limits East of Interstate Highway 5

- Option A: Tukwila serves entire area.
- Option B: Water District No. 125 serves entire area.

Item 11. Provide Adequate Service to Water District No. 25 Customers West of Railroad Right-of-Way

- Option A: Water District 25 constructs necessary improvements and purchases water and storage from City of Tukwila by agreement.
- Option B: City of Tukwila takes over Water District No. 25, makes required improvements and provides direct service.
- Option C: Tukwila takes over Water District 25 except Foster Point and area west of the Duwamish River - these areas to be taken over by Water District No. 125.
- Option D: Tukwila takes over Water District 25 area east of the Duwamish and west of the railroad tracks (including Foster Point). Water District 125 takes over the area west of Duwamish.

Item 12. Provide Adequate Service to Water District No. 25 Customers East of Railroad Right-of-Way

- Transfer customers to City of Seattle.

Item 13. Provide Adequate Service to Creston Water Association

- Transfer services to City of Seattle existing facilities.

2. Alternative 2 - Joint Use Storage Facilities

Alternative 2 is identical to Alternative 1 with respect to clarification of service areas and Items 1-13 but introduces the concept of a joint use storage facility as an alternate to each purveyor constructing individual reservoirs to meet the Minimum Design Standards.

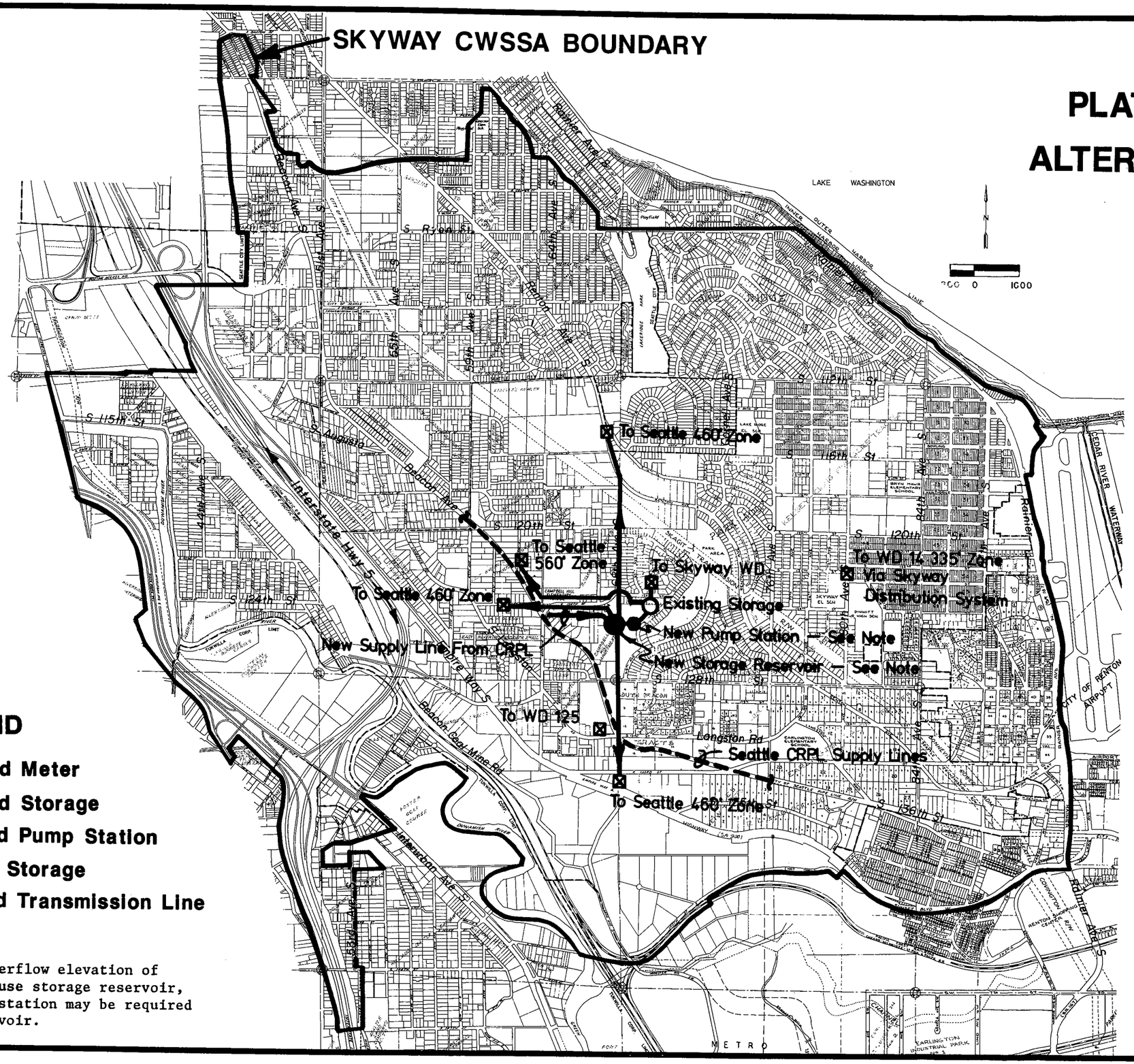
Under this Alternative, water supply would be from the Cedar River Pipeline and an estimated 4 MG reservoir would be constructed to provide standby storage to the City of Seattle, Skyway, Water District No. 125 and possibly the 335 Zone of Water District 14. This would be achieved by separate transmission lines with meters to each purveyor service area(s). Lakeridge and the City of Renton would continue to utilize the storage in the existing West Hill Reservoir and Water District 14 and the Water District 57 area may also hook up to that facility depending on the Options chosen in Item 1 and 4. The area west of the railroad right-of-way (I-5 utility corridor) would be served by storage provided in the City of Tukwila system.

A variety of pressure gradient configurations are possible under Alternative 2, depending on the overflow elevation of the proposed joint use storage facility. The following two hydraulic options have been considered. Plate VI-4 is a conceptual illustration of the joint use facilities required for Alternative 2.

450'± Option: This Option proposes an approximate tank overflow elevation of about 450' to utilize gravity flow from the Cedar River Pipelines. This would create a 450± pressure zone to serve areas below approximately 360 feet in elevation by gravity. Lower elevations would require pressure reducing while the elevations above 360± feet would require pumping to an existing Skyway storage tank (Overflow 550'±). Although gravity feed from the Cedar River Pipelines is conceptually desirable, the topography of the joint use service area restricts the area that could be included in the 450' gravity flow zone.

495'± Option: This Option contemplates an overflow elevation of 495' to match the existing Renton West Hill Storage Tank.

PLATE VI-4
ALTERNATIVE 2



LEGEND

- ⊠ Proposed Meter
- ● Proposed Storage
- ⬢ Proposed Pump Station
- ○ Existing Storage
- ▬ Proposed Transmission Line

NOTE:

Dependent on the overflow elevation of the proposed joint use storage reservoir, an additional pump station may be required to supply the reservoir.

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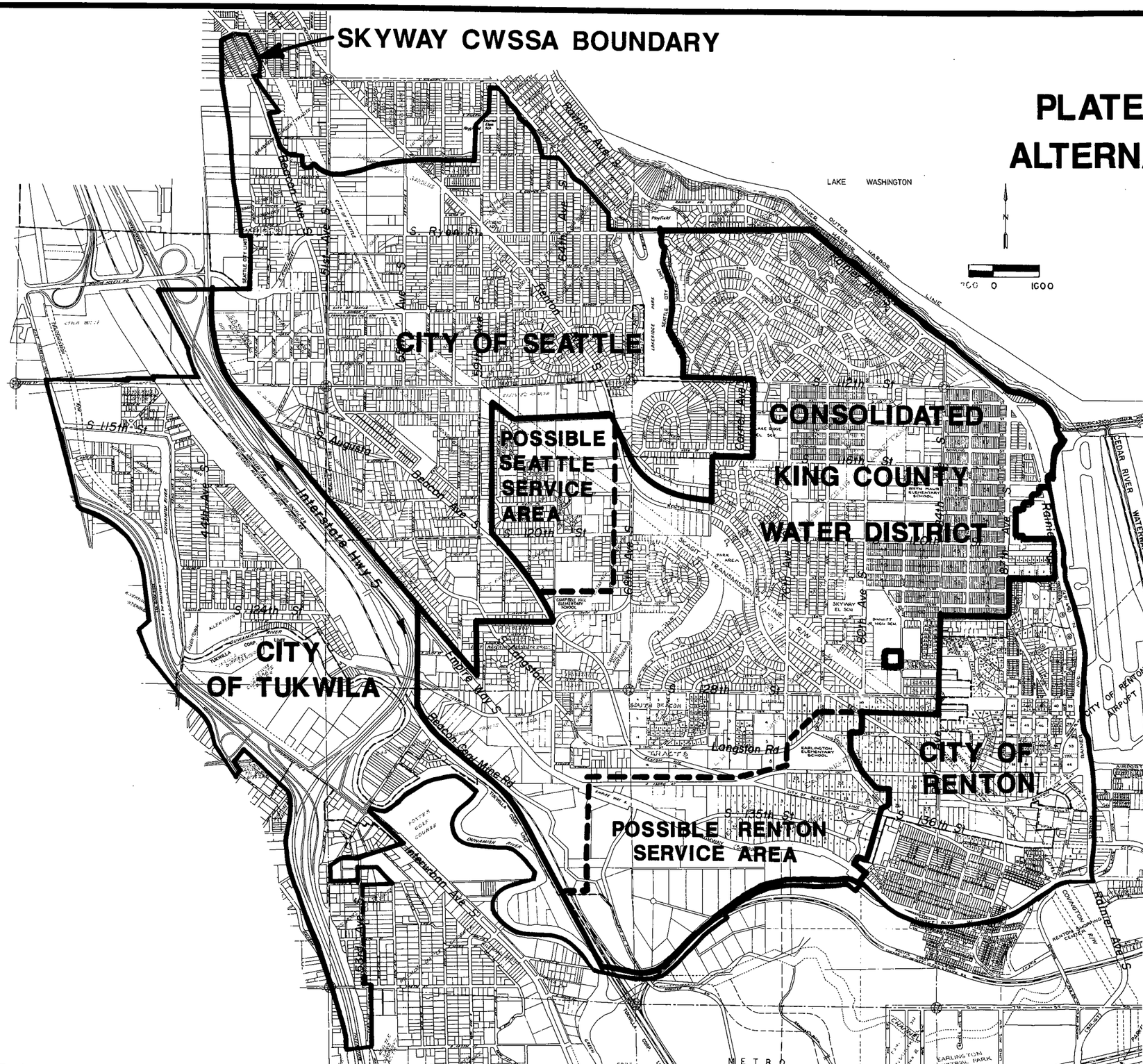
Consulting Engineers and Surveyors

PLATE VI- 5
ALTERNATIVE 3



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Consulting Engineers and Surveyors

Although pumping from the Cedar River Pipelines to the proposed storage facility would be required, the 495' overflow elevation would allow for a larger direct gravity flow service area, thereby reducing the higher elevation area served by an additional pump station. An additional benefit to the 495' Option is that it provides for emergency interties with the 495' zone from the West Hill Tank. A taller and perhaps less environmentally sensitive facility would be required under this Option. The cost of interconnecting existing systems would be similar under either Option.

Although the joint use storage concept reduces the total amount of storage required in the CWSSA, separate transmission facilities to each service area is not as cost effective as the combination of facilities presented in later Alternatives. Looping of major transmission lines throughout the CWSSA would provide a desired increase in the level of service in the area. Furthermore, the small service area of Water District No. 125 is isolated from the rest of the District (the majority of WD 125 is outside of this CWSSA) and the WUCC members anticipate that some sort of merging of Districts will occur in the future.

3. **Alternative 3 - Consolidated District Concept**

Alternative 3 proposes that the SKYWAY CWSSA be served by the existing three municipal purveyors (Seattle, Tukwila and Renton) and one consolidated King County Water District. The "consolidated District" would be formed by merging Skyway Water District, Water District No. 14, Lakeridge Water District, Water District No. 57 and that portion of Water District No. 125 which is east of the railroad right-of-way. Additional areas around the limits of these existing Districts would be annexed to form the boundary illustrated on Plate VI-5.

The consolidated District would have three separate sources of supply; City of Renton groundwater; Water District No. 14 groundwater; and City of Seattle surface water (via the Cedar River Pipelines). Because of the incompatibility of Seattle surface water and Renton groundwater, the three sources would supply isolated areas of the consolidated District. Generally, the east part of CWSSA (Renton, WD 14, Lakeridge and WD 57) would use the Renton West Hill and Water District 14 systems as their source of supply and storage. The remainder of the area would receive water from the City of Seattle Cedar River Pipelines. The City of Tukwila would serve that area west of the railroad tracks (with exception as shown on Plate VI-5) from it's proposed 2 MG storage facility. The Consolidated District (except as noted above) and City of Seattle service area would have storage provided by a new joint use storage facility (approximately 4 MG) and utilize existing Skyway storage tanks as presented in Alternative 2.

As shown on Plate VI-5, there are two areas within the proposed Consolidated District that might logically be served by others. The area shown as a possible Seattle service area is currently served by the City as part of their contiguous service area.

The possible Renton service area in the southern part of the CWSSA is partially served by the City of Seattle (along and north of Empire Way South) but is not part of their contiguous service area. Although no formal plans for annexation exist at this time, the City of Renton has expressed an interest in annexing this area. If this in fact occurs, additional studies of the most cost effective way to serve the area will be required as discussed in Paragraph F (ADDITIONAL RECOMMENDATIONS) of this Part.

PART VII - FINANCING AND IMPLEMENTATION

VII. FINANCING AND IMPLEMENTATION

A. FINANCIAL CONSIDERATIONS

Implementation of any Plan is largely dependent on capability of financing both the initial cost of required improvements and long term operation and maintenance costs. Each water purveyor must give consideration to the following expenses in determining the feasibility of implementation:

1. Financing capital improvements that are necessary to provide adequate service and extension to existing and new service areas.

2. Replacement and updating of existing facilities that require renewal because they are obsolete or no longer serviceable.

3. Administration, operation, maintenance and the expenses to cover day-to-day costs of operating and maintaining the water system, including the purchase cost of water.

4. Debt service requirements to provide repayment of interest and principal for all outstanding bonds for previous system improvements.

This Coordinated Water System Plan is intended to address only the capital improvements required to meet the goals and objectives established. Local improvement, system update, operation and maintenance issues should be addressed in each individual water purveyor's comprehensive plan.

B. FINANCING CAPITAL IMPROVEMENTS

1. General Facilities

General Facilities include storage reservoirs, pump stations, transmission mains, oversized pipes to serve the large areas, etc. These are generally the most difficult type of improvements to finance because they are usually quite costly and if properly planned, will benefit a large area. Funding of General Facilities can be achieved in one of the following ways:

(a) Passing a General Obligation Bond insured by the voters:
(b) Forming a ULID and assessing the benefited properties equitably;
(c) District obtain grants or low interest loans to assist in construction of these types of improvements;
(d) Requiring the initial developers to pay for the improvements with a pay-back arrangement as the area develops (latercomer agreements);
(e) District funding improvements and assessing a general facilities charge to each property within the benefited area as development occurs. This charge must cover all costs incurred including interest on money and an allowance at a rate that will amortize the investment.

Funding options (d) and (e) above are not as practical for established service areas with limited growth potential such as the majority of SKYWAY.

2. Local Facilities

Financing Local Facility Improvements (waterlines, pressure reducing stations, valves, hydrants, etc.) is an easier task in that only property owners receiving service from such lines must pay for the costs associated with design and construction. Methods of financing Local Facility Improvements are:

(a) Formation of a ULID (Utility Local Improvement District);

(b) Developer extension agreement;

(c) Payback later comer agreement;

(d) Grants and outside assistance to reduce local costs, including District participation.

Funding Local Improvements from monthly utility rates is not recommended as it results in all water customers pay for improvements that benefit only small areas. There are cases, however, where required Local Facility projects can be combined to expand the area benefited enough to warrant levying an area wide or zone charge.

3. Individual Service Lines

Financing for individual service line piping and associated meters and accessories is typically the responsibility of the property owner.

C. GENERAL OBLIGATION AND REVENUE BONDS

Major distribution lines, transmission mains, reservoirs, pump station, source improvements and other major improvements may be accomplished by the sale of general obligation or revenue bonds. General obligation bonds, must have the support of the majority of the voters. These bonds become assessments against the various properties and are paid for by assessments or other funds available to the Water Purveyor. Revenue Bonds, on the other hand, may be paid for by whatever funds are available for the payment of a debt service. A major source of these funds is from the sale of water or ULID assessments, however, all funds, such as general fees or latecomer charges, may be used for the debt service for revenue bonds.

D. GRANT FUNDING AND LOANS

Although Federal and State grant funding has provided assistance in financing capital water improvement projects in the past, such monies have become increasingly scarce in recent years. The State Referendum 38 funds which previously helped finance water quality and supply projects have all but been exhausted in recent years and have not been replenished. DSHS loans are also no longer available for water projects.

The U.S. Department of Housing and Urban Development (HUD) administers a block grant program, which provides for a range of community development projects, including water systems. These grants, however, are only available for low and moderate income areas as defined by HUD. Although it is unlikely that the entire SKYWAY area could qualify for such assistance, there may be small local improvement areas which are eligible.

HUD also administers a program for low interest loans for community development projects. These Section 108 Loans are guaranteed under the Housing and Community Development Act and are available to any entitlement community of HUD's Community Development Block Grant program.

Public Works Trust Fund Loans are available for capital water improvement projects and provide loans at various interest rates dependant on the percentage matched by the purveyor.

E. DEVELOPER FINANCING

Where applicable, developers of presently unimproved property or those responsible for redevelopment of property, should finance all improvements necessary to provide water service consistent with this and individual water purveyor comprehensive plans and minimum design standards. In some instances it may be necessary for a developer to oversize facilities to provide for the comprehensive development of the area. In such cases the cost of facilities may be shared by the local water purveyor or reimbursed to the original purveyor by future developers (i.e. latecomers agreement).

APPENDIX F – APPROVAL DOCUMENTATION

F. WATER RATES

Those costs that are not paid either when the initial system was constructed or by assessment or general facility fees must be paid by the water rates. The water rates must be adequate to cover the costs associated with the revenue rate base.

The revenue rate base is that amount of revenue which must be recovered by a utility through charges for service provided. The determination of those elements of cost which must be recovered from rates or from other sources of income are itemized:

a) Operation expense;
b) Maintenance expense;
c) Purchase of Water expense;
d) Demand Charge on Purchase of Water;
e) Customer Accounting & Collection Expense;
f) Administrative & General Expense;
g) Taxes;
h) Debt Service Requirements;
i) Renewal & Replacement.

A summary of the rates of each purveyor within the SKYWAY CWSSA is contained in Table VII-1.

SKYWAY CWSP SCHEDULE OF RATES AND FEES

PURVEYOR		Monthly Meter Charges (Base Amount) 3/4"	1"	2"	3"	Cost/ 100ft³	NOTES	1,000 ft³ + 3/4" Meter	5,000 ft³ + 3" Meter
Skyway Water Dist.		9.00	9.50	11.50	14.50	.75	Includes 300ft³/mo. Add. $3. Surcharge in Zone 2.	14.25	49.75
Water Dist. 125		5.00	7.00	17.50	31.50	.40	Add $3.50/mo. per multi family unit	9.00	51.50
Water Dist. 25		8.00	8.00	8.00	8.00	.70	Includes 400 ft³/mo.	12.20	40.20
Tukwila	Res	4.00	4.00	N/A	N/A	.80		12.00	N/A
	Comm	8.50	13.00	24.50	47.00	.99		18.40	96.50
Renton	Inside	4.00	5.20	13.55	27.40	.98	2500-35000 ft³ $ .91 (Inside) $1.37 (Outside)	13.80	72.90
	Outside	6.00	7.80	20.33	41.10	1.47	>35000 ft³ $ .79 (Inside) $1.19 (Outside)	20.70	109.60
Lakeridge	Inside	7.45	7.45	7.45	7.45	1.20		19.45	67.45
	Outside	10.17	10.17	10.17	10.17	1.80		28.17	100.17
Water Dist. 14	Res	4.50	4.50	4.50	4.50	1.00		14.50	N/A
	Comm	9.45	9.45	9.45	9.45	1.00	Comm. incl. 500 ft³/mo.	14.45	54.45
Seattle	SF Res	1.40	2.40	5.70	11.40	.615	Inside	7.55	N/A
						.665	Outside	8.05	N/A
	MF+Comm	2.40	3.60	6.90	12.60	.343		5.83	29.75
	Fire Inside	4.30	4.30	4.30	7.20	1.37	Fire test allowance 100 ft³		
	Fire Outside	9.10	9.10	9.10	13.20	1.37	No charge for exting. fires		
Creston Water Assn.		5.00	5.00	N/A	N/A	.75	Includes 750 ft³/mo.	6.88	N/A

WHOLESALE RATES:

Seattle: 22.5¢/100 ft³ Old Water
46¢/100 ft³ New Water

Renton: 70.5¢/100 ft³ (16¢/100 ft³ for West Hill Reservoir Payoff)

G. IMPLEMENTATION

The following sets forth an implementation program to accomplish the various recommendations of this Plan. These implementation steps should be carried out with the assistance of legal and engineering counsel.

1. Boundary Adjustments

a) WUCC Approval. Approval and adoption of this SKYWAY Coordinated Water System Plan by the WUCC and recommendation to each participating purveyors legislative body to sign an Interlocal Service Area Agreement.

b) Establish Overall Service Areas. Each purveyor's legislative body signs the Interlocal Service Area Agreement endorsing this Plan and the overall Recommended Service Areas presented on Plate VI-1. This Interlocal Service Area Agreement is to be supplemented by individual agreements as described in paragraph d below.

c) King County Approval; DSHS Approval of Plan.

d) Planned Boundary Adjustments/Transfer Areas. To achieve the overall service areas agreed to in the Interlocal Service Area Agreement, a variety of individual agreements are required. These agreements will detail the conditions of exchange of customers, territory and/or facilities in the transfer areas listed below. All such agreements are subject to the requirements of Title 57 RCW pertaining to the annexation and withdrawl of water district territory and the consolidation merger or dissolution of districts; WAC 36.93 pertaining to the review of proposed actions by the Washington State Boundary Review Board of King County; and the annexation actions of member cities. As applicable, each purveyor shall conduct the necessary customer notifications, public hearings, votes of the people, etc. to achieve the below listed boundary adjustments in transfer areas. Projected dates for accomplishing these changes are as shown.

- Establish Water District No. 14/Renton Service Areas; 1990;
- Merge Water District No. 14 with Lakeridge Water District to form Bryn Mawr-Lakeridge Water and Sewer District - Complete any necessary annexations to achieve Recommended Service Areas; 1990;
- Seattle takeover of Water District No. 57; 1990;
- Seattle takeover of Water District No. 125 customers east of railroad right-of-way; 1990;
- Seattle takeover of Water District No. 25 customers east of railroad right-of-way; 1990;
- Seattle takeover of Creston Water Association;
- Seattle takeover of City of Tukwila customers east of railroad right-of-way; 1989;
- Seattle takeover of Skyway water customers; Phased 1991-93;
- Renton takeover of City of Seattle individual connections to the Cedar River Pipeline; 1990;
- Renton takeover of City of Seattle customers south of Empire Way South; 1993;
- Tukwila - Water District No. 125 transfer of services east of Interstate Highway 5; 1989-1994;
- Tukwila takeover of Water District No. 25 customers east of the Duwamish River and west of the railroad right-of-way; 1990;
- Water District No. 125 takeover of Water District No. 25 customers west of the Duwamish River; 1990;
- Renton takeover of City of Seattle customers north of Empire Way South; As annexation occurs.

e) Interim Procedures. Each purveyor within the CWSSA is obligated to provide water service to customers or potential customers within their respective service areas, subject to the conditions of state law and regulations and as provided in their individual comprehensive plans; notwithstanding any proposals to change existing water service area boundaries contained in this Plan, until the recommended changes actually take place.

In order to maintain continuity, new applications for water service within an area proposed for transfer by this Plan shall be coordinated between the existing and "gaining" purveyor. Any conditions required to assure compatibility with the "gaining" purveyors system should be agreed upon prior to construction of new facilities. If the request for service involves only a service connection with no extension or expansion of the existing system, or if otherwise agreed to in individual interlocal agreements, review and concurrance by the "gaining" purveyors may not be required.

f) Activate Changes. Changes to purveyor service areas will be carried out in compliance with established agreements and boundary adjustment authorizations.

g) Comprehensive Plan Updates. Each purveyor and/or merged/consolidated District is required to address the items identified herein and comply with this CWSP in updating their Comprehensive Plan.

2. Regional Facilities

a) Conduct detailed engineering study of required storage, pumping and transmission facilities.

b) Conduct financial analysis of methods of financing (including existing rate structures, application for available grant funding, bond sales, etc) and formulate detailed financial plan.

c) Location and acquisition of site for required facilities.

d) Design and construction of required regional facilities.

e) Modification and connection of existing facilities as required.

3. **Other System Improvements**

a) In updating their comprehensive plans each purveyor:

- Prepares a specific capital improvement program identifying the projects recommended herein as well as localized improvements.
- Considers interties and connections necessitated by boundary changes.

b) Each purveyor must consider their operation and maintenance programs in relation to changes in service areas (this includes staffing, equipment, procedures, etc.)

c) Detailed rate analyses should be prepared and financial plans made to finance required improvements.

d) Emergency operation programs must be developed with consideration of new or amended service areas and possible intertie configurations.

4. **New Water Systems and Appeals**

Under the provisions of the Coordination Act (WAC 248-57-720) Coordinated Water System Plans are required to include procedures for authorizing new water systems within the planing area. This Plan, however, recommends that no new water systems be allowed in the SKYWAY Critical Water Supply Service Area. This is based on the developed urban character of the area and the ability of existing purveyors to serve the entire planning area.

As shown on Plate V1-1 - Recommended Service Areas and agreed to in the Service Area Agreement (Part VIII), all properties within the CWSSA are within an existing purveyor's service area. If an owner of property in unincorporated King County finds that the purveyor responsible for the service area in which the property is located is unable to provide timely and reasonable service, and an

adjacent purveyor is, the property owner has the right to a hearing before the King County Utilities Technical Review Committee. Such appeals are to be handled in a manner consistent with the Committee's standard procedures and decisions of the Committe are final.

5. Monitoring

a) The implementation of this Plan must be monitored by the participating purveyors, King County and DSHS if it is to be effective. For this reason, the Water Utility Coordinating Committee to remain in effect until June 30th, 1992, or longer if extended by the King County Council. The Committee will be responsible for approving any proposed changes and/or amendments to the Plan and will meet periodically, at least annually, to review the progress of implementing the recommendations put forth herein.

b) Proposed changes to the recommendations adopted herein shall be submitted to the King County Building and Land Development Division, Utilities Section. If the proposed change warrants, the WUCC members will be notified and the appropriate approval meetings held.

c) In accordance with the Coordination Act, this Plan shall be reviewed and updated at least every 5 years.

PART VIII – SERVICE AREA AGREEMENT

AGREEMENT
FOR ESTABLISHING WATER UTILITY SERVICE AREA BOUNDARIES
AS IDENTIFIED BY THE
SKYWAY COORDINATED WATER SYSTEM PLAN

PREAMBLE

This agreement for water utility service area boundaries identifies the external boundaries of the service areas for which the designated water purveyors will assume direct water service responsibility. The responsibilities associated with this agreement are essentially identified in the Skyway Coordinated Water System Plan (CWSP), and as defined by the adopted rules and regulations of the Washington State Department of Social and Health Services (DSHS).

This agreement does not give new authorities or responsibilities to the water purveyors or to the County or State regulatory agencies, but rather acknowledges the geographical area for these designated service responsibilities.

The terms used within this agreement shall be as defined in the implementing regulations of Chapter 70.116, RCW, except as identified below.

1. SKYWAY OVERALL WATER SERVICE AREA MAP shall mean the map referenced in the agreement as Attachment A which represents the overall water service areas for the Skyway Critical Water Supply Service Area including agreed upon changes to existing water service areas, except as may be amended in accordance with the CWSP procedures and with the concurrence of the affected water purveyors.

2. WATER SERVICE AREA shall mean the designated geographical area in which a water utility shall supply water, as identified in Attachment A.

3. TRANSFER AREA shall mean that portion of a water service area presently served by one utility but which under the terms of this agreement shall be transferred to another designated utility within a specified time frame.

4. LEAD AGENCY for administering the Skyway critical water supply service area agreements and service area maps shall be the King County Building and Land Development (BALD) Division, Parks, Planning and Resources Department, unless otherwise established by amendment to the CWSP.

The authority for this agreement is granted by the Public Water System Coordination Act of 1977, Chapter 70.116, RCW.

WHEREAS, such an agreement is required in accordance with WAC 248-56-730, "Service Area Agreements-Requirements," and

WHEREAS, the designation of retail water service areas, together with the cooperation of utilities, will help assure that time, effort and money are best used by avoiding unnecessary duplication of service, and

WHEREAS, definite future changes to existing service area boundaries as well as definite future service areas for those areas of Skyway not presently served will facilitate efficient planning for, and provision of, water system improvements to accommodate future development;

NOW, THEREFORE, the undersigned utility, having entered into this agreement by signature of its authorized representative, concurs with and will abide by the following provisions:

SECTION 1. Service Area Boundaries. The undersigned utility acknowledges that the Skyway Overall Water Service Area Map, included as Attachment A to the agreement, identifies the utility's water service area. The undersigned also acknowledges that there are no water service area conflicts with adjacent water utilities, or, where such conflict exists, agrees that no new water service will be extended within the disputed area until such conflict shall be resolved.

SECTION 2. Transfer Areas. It is understood that utilities may initially continue providing water service within existing service areas which are within the boundaries of adjacent water service areas, as defined in Section 1 hereof, and which shall be known as transfer areas. Such transfer areas, if they exist for the undersigned utilities, are described in Attachment B to this agreement. The undersigned utility agrees that any retail water service line extending outside of the service area boundary, as set forth in Section 1, shall be phased out and service transferred to the designated adjacent utility on an economic basis or by mutual agreement within the time frames indicated in Attachment B.

Economic basis considerations may inculde, but are not limited to:

(a) A determination by the present owner of service lines that maintenance, repair and/or replacement costs exceed attributable income.

(b) Planned or imminent major street improvements or major improvements to either or both water systems which include an opportunity to transfer service.

SECTION 3. Service Within Transfer Areas. Provisions detailing responsibilities of each utility with regards to interim service within any transfer area, and the terms of the transfer of the service area, as specified in Section VII of the Skyway CWSP, shall be established in a separate agreement among adjacent utilities whose boundaries are affected.

SECTION 4. Service Area Boundary Lines. Unless separate agreements exist with adjacent utilities, the undersigned agrees that the centerlines of public streets, roads or highways shall not be used to define any part of a service area boundary. Depth of service on boundary streets shall be limited to one platted lot or as otherwise agreed upon by the utilities. Existing services on boundary streets shall remain as connected unless transfer of service is agreed to by both parties, as per Section 2. Nothing in this agreement shall prohibit the placement of water mains in the same street by adjacent utilities where geographic or economic constraints require such placement for the hydraulic benefit of both utilities.

SECTION 5. Boundary Adjustments. If, at some time in the future, it is in the best interest of the undersigned to make adjustments to the service areas agreed to herein, such modifications must be by written concurrence of all involved utilities and the proper legislative authorities. These written modifications must be noted and filed with the designated King County lead agency and DSHS.

This agreement by reference includes the following attachments:

ATTACHMENT A	Skyway Overall Water Service Area Map.
ATTACHMENT B	Transfer Area Descriptions.
ATTACHMENT C	Transfer Area Agreements. (Optional - Utility may attach copies or list such agreements if relevant).

IT WITNESS WHEREOF, the undersigned party has executed this agreement as of the _____ day of _____, 198____.

_____
Water Utility

_____
Signature of Representative

_____
Title

Receipt Acknowledged:

_____
King County; Parks, Planning and
Resource Department

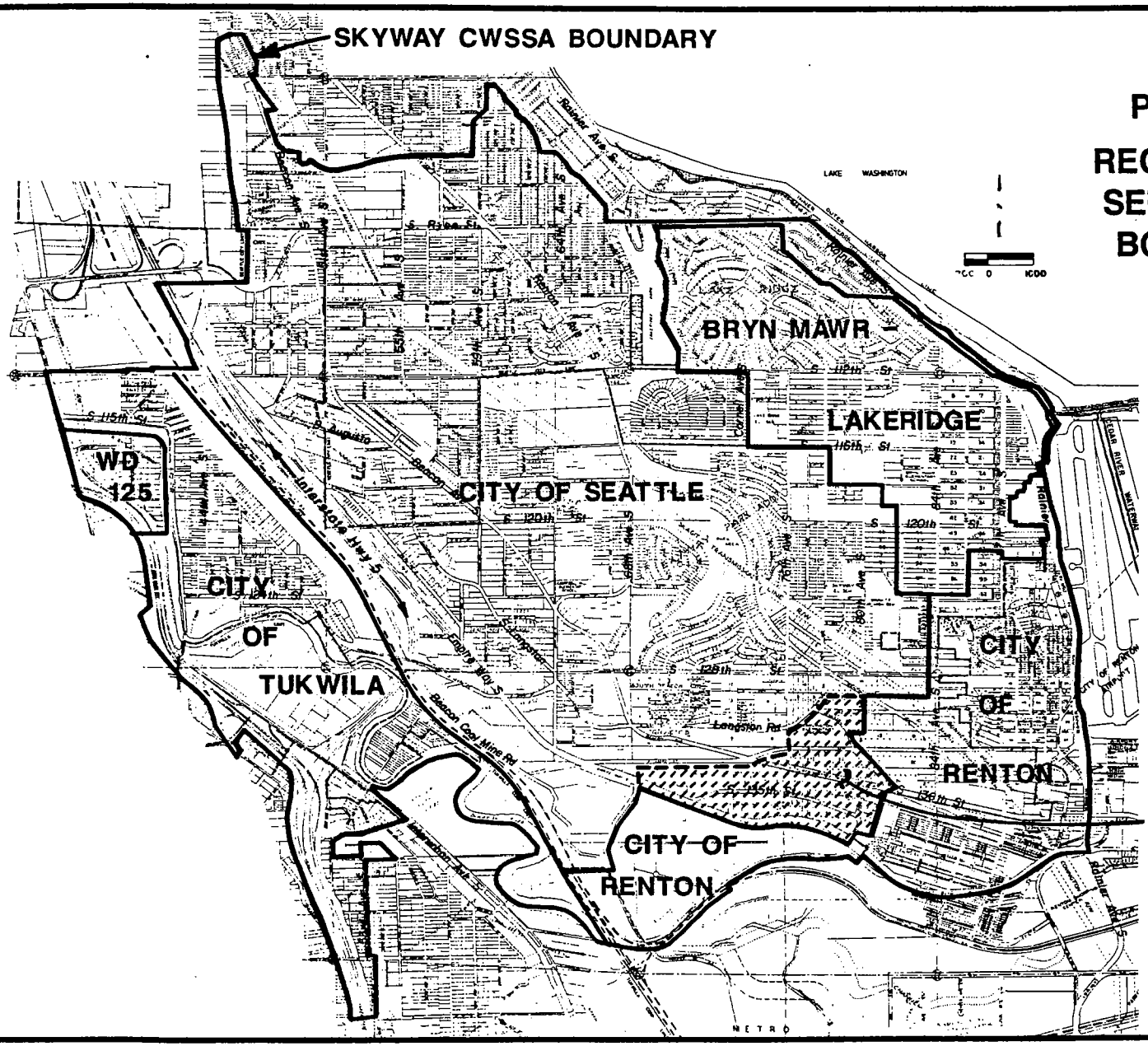
ATTACHMENT B

TRANSFER AREAS

- Establish Water District No. 14/Renton Service Areas; 1990;
- Merge Water District No. 14 with Lakeridge Water District to form Bryn Mawr-Lakeridge Water and Sewer District - Complete any necessary annexations to achieve Recommended Service Areas; 1989;
- Seattle takeover of Water District No. 57; 1990;
- Seattle takeover of Water District No. 125 customers east of railroad right-of-way; 1994;
- Seattle takeover of Water District No. 25 customers east of railroad right-of-way; 1990;
- Seattle takeover of Creston Water Association; 1990;
- Seattle takeover of City of Tukwila customers east of railroad right-of-way; 1989;
- Seattle takeover of Skyway water customers; Phased 1991-93;
- Renton takeover of City of Seattle individual connections to the Cedar River Pipeline; 1990;
- Renton takeover of City of Seattle customers south of Empire Way South; 1993;
- Tukwila - Water District No. 125 transfer of services east of Interstate Highway 5 and west of railroad right-of-way; 1989-1994;
- Tukwila takeover of Water District No. 25 customers east of the Duwamish River and west of the railroad right-of-way; 1990;
- Water District No. 125 takeover of Water District No. 25 customers west of the Duwamish River; 1990;
- Renton takeover of City of Seattle customers north of Empire Way South; As annexation occurs.

PLATE VI-1

RECOMMENDED SERVICE AREA BOUNDARIES



AREA TO BE SERVED BY RENTON IF ANNEXED

Prepared by:

HDA Horton Dennis & Associates, Inc.

ATTACHMENT A

APPENDIX A – SKYWAY CWSSA LEGAL DESCRIPTION

AMENDED SKYWAY COORDINATED WATER PLAN BOUNDARY

APRIL, 1988

BEGINNING AT THE INTERSECTION OF THE CURRENT CITY OF RENTON'S WESTERN BOUNDARY AND LAKE WASHINGTON; THENCE SOUTH ALONG THE PRESENT RENTON CITY LIMITS LINE TO RAINIER AVENUE; THENCE SOUTH ALONG THE EAST SIDE OF RAINIER AVENUE TO THE INTERSECTION WITH SUNSET BOULEVARD WEST (SR900); THENCE FOLLOWING THE SOUTH SIDE OF SUNSET BOULEVARD WEST WESTERLY (FOR APPROXIMATELY 4,300 FEET±) TO THE PRESENT RENTON CITY LIMITS LINE; THENCE FOLLOWING THE PRESENT RENTON CITY LIMITS LINE WEST TO ITS INTERSECTION WITH THE CHICAGO, MILWAUKEE, ST. PAUL AND PACIFIC RAILROAD; THENCE FOLLOWING THE SOUTH SIDE OF THE RAILROAD IN A SOUTHWESTERLY DIRECTION TO IT'S INTERSECTION WITH 68TH AVENUE SOUTH; THENCE IN A WESTERLY DIRECTION ACROSS THE DUWAMISH RIVER TO THE INTERSECTION OF THE WEST BANK OF THE DUWAMISH RIVER AND THE SOUTH RIGHT-OF-WAY OF SOUTH 143RD STREET; THENCE FOLLOWING THE WEST AND SOUTH RIVER BANK OF THE DUWAMISH RIVER IN A NORTHWESTERLY DIRECTION TO ITS INTERSECTION WITH 56TH AVENUE SOUTH; THENCE SOUTHWESTERLY ALONG 56TH AVENUE SOUTH TO THE SOUTHERLY RIGHT-OF-WAY OF INTERURBAN AVENUE SOUTH; THENCE SOUTHEASTERLY ALONG THE SOUTH SIDE OF INTERURBAN AVENUE SOUTH APPROXIMATELY 800 FEET± TO SOUTH 137TH STREET WHICH IS THE PRESENT TUKWILA CITY LIMITS; THENCE FOLLOWING THE PRESENT TUKWILA CITY LIMITS LINE FOR THE NEXT EIGHT (8) COURSES; THENCE WEST ALONG SOUTH 137TH STREET TO 51ST AVENUE SOUTH; THENCE SOUTH ALONG 51ST AVENUE SOUTH TO SOUTH 139TH STREET; THENCE EAST ALONG SOUTH 139TH STREET TO 53RD AVENUE SOUTH; THENCE NORTH ALONG 53RD AVENUE SOUTH APPROXIMATELY 250 FEET±; THENCE EASTERLY ALONG THE PRESENT TUKWILA CITY LIMITS APPROXIMATELY 250± FEET; THENCE SOUTHEASTERLY ALONG THE TUKWILA CITY LIMITS LINE APPROXIMATELY 350 FEET± TO IT'S INTERSECTION WITH SOUTH 139TH STREET; THENCE WEST ALONG SOUTH 139TH STREET TO 53RD AVENUE SOUTH; THENCE SOUTH ALONG 53RD AVENUE SOUTH TO IT'S INTERSECTION WITH THE EASTERLY RIGHT-OF-WAY OF I-5 AND THE NORTH END OF MACADAM ROAD; THENCE WEST ACROSS I-5 TO THE WESTERLY RIGHT-OF-WAY OF I-5; THENCE NORTH FOLLOWING THE WESTERLY RIGHT OF WAY OF I-5 TO IT'S INTERSECTION WITH THE SOUTHERLY RIGHT-OF-WAY OF HIGHWAY 599; THENCE NORTH AND WEST FOLLOWING THE WESTERLY AND SOUTHERLY RIGHT-OF-WAY OF HIGHWAY 599 TO IT'S INTERSECTION WITH EAST MARGINAL WAY SOUTH; THENCE FOLLOWING THE WESTERLY RIGHT-OF-WAY OF EAST MARGINAL WAY SOUTH TO SOUTH 112TH STREET; THENCE EAST ALONG THE NORTHERLY RIGHT-OF-WAY OF SOUTH 112TH STREET (IF EXTENDED) TO THE WESTERLY RIGHT-OF-WAY OF I-5; THENCE NORTHWEST ALONG THE WESTERLY RIGHT-OF-WAY OF I-5 TO SOUTH 107TH STREET (IF EXTENDED); THENCE EASTERLY APPROXIMATELY 1,600 FEET± ALONG THE EXTENSION OF SOUTH 107TH STREET TO IT'S INTERSECTION WITH THE CURRENT CITY OF SEATTLE CITY LIMITS; THENCE NORTH ALONG THE PRESENT SEATTLE CITY LIMITS TO IT'S INTERSECTION WITH THE CURRENT CITY OF SEATTLE 316/450 PRESSURE ZONE BOUNDARY; THENCE NORTHWESTERLY FOLLOWING THE CURRENT CITY OF SEATTLE 316/450 PRESSURE ZONE BOUNDARY THROUGH A LOOP AROUND BEACON AVENUE SOUTH, WEST IN THE VICINITY OF SOUTH NORFOLK STREET, NORTH IN THE AREA OF 59TH AVENUE SOUTH TO WATERS AVENUE SOUTH WHERE THE PRESSURE ZONE LINE TURNS SOUTHEAST AND FOLLOWS WATERS AVENUE SOUTH TO IT'S INTERSECTION WITH SOUTH RYAN STREET; THENCE EASTERLY FOLLOWING THE NORTH RIGHT-OF-WAY OF SOUTH RYAN STREET (IF EXTENDED) TO THE SOUTHEASTERLY SHORE OF LAKE WASHINGTON; THENCE SOUTHEASTERLY ALONG THE MEAN LOW WATER LINE OF LAKE WASHINGTON TO THE POINT OF BEGINNING. (ALL COMPASS DIRECTIONS ARE GENERAL)

ESTABLISHED BY KING COUNTY ORDINANCE 8532
JUNE 20, 1988

APPENDIX B –
PROJECTED WATER DEMAND BY CENSUS TRACT

APPENDIX B
BILLED WATER CONSUMPTION (IN CCF/YEAR)

Census Tract	1980 / 2000 SF Res	MF Res	Comm/Ind	Govt/Edu	TOTAL	1990 / 2010 SF Res	MF Res	Comm/Ind	Govt/Edu	TOTAL
119.00	285762	4440	3673	5518	299393	280901	5174	4477	6158	296709
119.00	259627	5186	5608	5773	276193	247325	5609	7122	5516	265573
260.01	124878	975	6274	3206	135333	127604	1623	7276	4250	140753
260.01	149488	5100	8081	4555	167225	186732	11882	9231	5017	212862
260.02	146013	29463	14368	2971	192815	139584	34647	18965	2977	196174
260.02	170819	61842	21986	2979	257627	230854	114935	26316	2983	375088
261.00	122332	37400	17589	3265	180586	125033	41138	20672	3522	190366
261.00	149378	60265	22684	3577	235905	188399	97724	25857	3678	315657
262.00*	50732	141500	410325	2439	604996	81953	156513	646868	5044	800378
262.00*	60312	153938	776968	6128	997346	49668	154744	950620	7581	1162612
263.00*	500	976	48780	976	51232	399	1635	-0	3141	5176
263.00*	4510	5121	-0	3744	13376	12125	11948	-0	4680	28753
272.00*	35636	11696	25896	3114	76342	37600	13341	32015	2613	85570
272.00*	30070	13205	36059	2440	81775	26092	13428	41204	2359	83083

* Only a portion of these Census Tracts are included in Study Area. See Part II for further discussion.

Source: Seattle 1985 COMPLAN, Volume II

APPENDIX C – WATER QUALITY REPORTS

am test inc.
4900 9TH AVENUE N.W., • SEATTLE, WASHINGTON 98107-3697 • 206/783-4700

ANALYSIS REPORT

CLIENT: City of Renton

DATE RECEIVED: 10/4/83

REPORT TO: 800 Edmonds Avenue N.
Renton, WA 98052

DATE REPORTED: 10/18/83

Laboratory Sample No.	71442	MCL *
Client Identification	9:00 Well 9 Renton	
pH	6.0	---
Arsenic (mg/l)	<0.001	0.05
Barium (mg/l)	<0.25	1.0
Cadmium (mg/l)	0.0001	0.01
Chromium (mg/l)	<0.001	0.05
Iron (mg/l)	<0.05	0.3
Lead (mg/l)	0.003	0.05
Manganese (mg/l)	<0.03	0.05
Mercury (mg/l)	<0.0002 <0.0002]	0.002
Selenium(mg/l)	<0.002	0.01
Silver (mg/l)	<0.0003	0.05
Sodium (mg/l)	5.7 5.6]	---
Hardness (mg/l as $CaCO_3$)	56.7 56.7]	---
Conductivity (μhmos/cm)	170.	700.
Turbidity (NTU)	0.36	1.0
Color (color units)	<5.	15.
Fluoride (mg/l)	<0.10	2.0
Nitrate + Nitrite (mg/l as N)	0.38	10.0

*Washington State drinking water Maximum Contaminant Level allowed.

REPORTED BY _____
John M. Blunt

JMB:bc

SEATTLE WATER DEPARTMENT
1987 ANNUAL WATER ANALYSIS OF CEDAR & TOLT WATER SUPPLIES

Samples Collected:
November 3, 1987

Prepared by
Water Quality Laboratory
Seattle Water Department
1509 South Spokane Street
Seattle, Washington 98144
(206) 684-7404

Cedar Distribution Area: South of Lake Washington Ship Canal
Tolt Distribution Area: North of Lake Washington Ship Canal

Results given in milligrams per liter, i.e., parts per million (ppm), except as noted.

WATER QUALITY PARAMETERS	WASHINGTON STATE BOARD OF HEALTH MAXIMUM CONTAMINANT LEVEL	CEDAR DISTRIBUTION	TOLT DISTRIBUTION
Primary Standards*			
†Arsenic, µg/l	50.0	<5	<5
Barium	1.0	<0.05	<0.05
Cadmium, µg/l	10.0	0.05	<0.05
Chromium	50.0	<0.01	<0.01
Fluoride	2.0	1.03	1.06
Lead, µg/l	50.0	<0.5	<0.5
†Mercury, µg/l	2.0	<1	<1
Nitrate-Nitrogen	10.0	0.04	0.06
†Selenium, µg/l	10.0	<5	<5
Silver, µg/l	50.0	<1	<1
Turbidity, NTU	1.0‡	0.7	0.75
Secondary Standards**			
Chloride	250.0	4.1	3.1
Color, apparent, Standard Units	15.	7	15
Copper	1.0	<.008	<.008
Iron	0.3	.20	.29
Manganese, µg/l	50.0	22	30
Residue, Total Dissolved	500.0	40	36
Sulfate	250.0	2.55	2.4
Zinc, µg/l	5000.0	<.012	<.012
Non-Regulated Standards			
Alkalinity, Total	N/A	11.4	10.3
Alkalinity, Bicarbonate	N/A	11.4	10.3
Aluminum	N/A	0.10	0.08
Calcium, mg/l $CaCO_3$	N/A	17.25	12.6
Carbon Dioxide, Free (calc.)	N/A	0.45	0.5§
Hardness ($CaCO_3$, calc.)	N/A	20.7	14.8
Hardness, grains per gallon (calc.)	N/A	1.2	0.9
Lithium, µg/l	N/A	0.3	<0.2
Magnesium	N/A	0.76	0.41
Nickel	N/A	<.016	<.016
Oxygen, Dissolved	N/A	10.35	10.4
Oxygen, % saturation	N/A	97	103
pH	N/A	7.80	7.7§
Phosphorus, Ortho PO_4, µg/l	N/A	2.5	5.5
Potassium	N/A	0.18	0.16
Silica, Reactive	N/A	5.9	5.0
Sodium	N/A	3.6	4.85
Specific Conductance, µmhos	N/A	59.4	52.3
Strontium, µg/l	N/A	19.5	11.5
Tannin-Lignin (as Tannic Acid)	N/A	---	---
Temperature, °C	N/A	15	15

*Primary standards: Water supplier subject to public notification if standard is exceeded.
**Secondary standards: Water supplier not subject to public notification if standard is exceeded.
†Analysis performed by Laucks Testing Laboratories, Inc., Seattle, Washington.
‡As measured at point of intake to distribution system.
§Typical value (results from 11/3/87 sample not available).

µg/l = Micrograms per liter.
< = Less than.

SEATTLE WATER DEPARTMENT
1985 ANNUAL WATER ANALYSIS OF CEDAR & TOLT RIVER SUPPLIES

Samples Collected:
October 15, 1985

Cedar Distribution Area: South of Lake Washington Ship Canal
Tolt Distribution Area: North of Lake Washington Ship Canal

Prepared by
Water Quality Laboratory
Seattle Water Department
1509 South Spokane Street
Seattle, Washington 98144
(206) 625-4305

Results given in milligrams per liter, i.e., parts per million (ppm), except as noted.

WATER QUALITY PARAMETERS	WASHINGTON STATE BOARD OF HEALTH MAXIMUM CONTAMINANT LEVEL	CEDAR DISTRIBUTION	TOLT DISTRIBUTION
Primary Standards*			
†Arsenic, Total, µg/l.	50.0	<0.01	<0.01
Barium.	1.0	<.05	<.05
Cadmium, µg/l	10.0	<.05	<.05
Chromium, µg/l.	50.0	<2	<2
Fluoride.	2.0	.87	.88
Lead, µg/l.	50.0	<½	<½
†Mercury, Total, µg/l.	2.0	<1	<1
Nitrate-Nitrogen.	10.0	<.02	<.04
†Selenium, µg/l.	10.0	<5	<5
Silver, µg/l.	50.0	<2	<2
Turbidity, NTU.	1.0‡	0.6	0.5
Secondary Standards**			
Chloride.	250.0	3.1	4.3
Color, standard units	15.	3	8
Copper.	1.0	<.01	<.01
Iron.	0.3	0.035	0.15
Manganese, µg/l	50.0	3	12
Residue, Total Dissolved.	500.0	48	39
Sulfate	250.0	1.5	3.1
Zinc, µg/l.	5000.0	<5	<5
Non-Regulated Standards			
Alkalinity, Total (as $CaCO_3$). . . .	N/A	22.6	11.7
Alkalinity, Bicarbonate (as $CaCO_3$).	N/A	22.6	11.7
Aluminum.	N/A	<0.1	0.1
Calcium (as $CaCO_3$).	N/A	24.7	12.7
Carbon Dioxide, free (calculated) .	N/A	0.5	0.8
Hardness (as $CaCO_3$) (calculated). .	N/A	29.8	14.5
Hardness, grains per gallon (calc.)	N/A	1.74	0.85
Magnesium	N/A	1.22	0.37
Nickel.	N/A	<.01	<.01
Oxygen, Dissolved	N/A	10.53	10.22
Oxygen, % of Saturation	N/A	101.3	102.2
pH.	N/A	8.00	7.51
Phosphorus, Tot. Ortho.-PO_4, µg/l .	N/A	1½	<1
Potassium	N/A	.28	.19
Silica, Reactive.	N/A	10.4	5.4
Sodium.	N/A	1.79	4.36
Specific Conductance, µmhos	N/A	64.5	48.7
Tannin-Lignin (as Tannic Acid). . .	N/A	<0.02	0.04
Temperature, °C	N/A	14	16

*Primary standards: Water supplier subject to public notification if standard exceeded.
**Secondary standards: Water supplier not subject to public notification if standard exceeded.
†Analysis performed by Laucks Testing Laboratories, Inc., Seattle, Washington.
‡As measured at point of intake to distribution system.
µg/l = Micrograms per liter.
< = Less than.

EC 21 1987

_NCIL
_ITE IN SHADED AREAS

LABORATORY NAME
Lauks Testing Labs
Gilo & Harvey
Seattle Wa 98108

Susan W.

SEE BACK FOR INSTRUCTIONS

WATER SAMPLE INFORMATION FOR INORGANIC CHEMICAL ANALYSES

NUMBER	CO.	CITY	DATE RECEIVED	DATE COLLECTED	COLLECTED BY:
95415			02/25/86	02/25/86	Tom Earwood Telephone: 772-1580

is a follow up of a previous out of compliance sample? Yes ☐ No ☒

es, what was the laboratory number of the previous sample? — — — — — — —

EM I.D. NO.	SYSTEM NAME:	SYSTEM CLASS (circle one)	COUNTY
8800	King County Water Dist. #14	(1) 2 3 4	King

LE LOCATION	THIS SAMPLE TAKEN BEFORE TREATMENT	IF TAKEN AFTER TREATMENT WAS IT
1 Well - #5	☒ U AFTER ☐ T	___FILTERED ___FLUORIDATED ___CHLORINATED ___WATER SOFTENER: TYPE USED ___

RCE	SOURCE NO.	IF SOURCE IS LAKE OR STREAM, ENTER NAME	IF SAMPLE WAS DRAWN FROM DISTRIBUTION SYSTEM IT WAS COLLECTED FROM SYSTEM AT: (ADDRESS)
___ 1. SURFACE ✓ 3. WELL ___ 2. SPRING ___ 4. PURCHASE	— —		

DATE OF FINAL REPORT: 03/26/86

SEND REPORT TO: (PRINT FULL NAME & ADDRESS)
K.C.W.D. No. 14
Name
9419 - So. 116th St.
Street
Seattle, WA 98178
CITY ZIP CODE
Telephone: ( ) 772-1580
Area Code

MARKS:

LABORATORY REPORT
(DO NOT WRITE BELOW THIS LINE)

TESTS		*MCL	Less Than <	RESULTS		Compliance YES	Compliance NO	Chemist Initials	Laboratory Number (If different than above)
enic	As	0.05 P	<	.01	mg/l	X		HR	
um	Ba	1.0 P	<	.25	mg/l	X			
mium	Cd	0.01 P	<	.002	mg/l	X			
mium	Cr	0.05 P	<	.01	mg/l	X			
	Fe	0.3	<	.05	mg/l	X			
	Pb	0.05 P	<	.01	mg/l	X			
ganese	Mn	0.05	<	.01	mg/l	X			
cury	Hg	0.002 P	<	.001	mg/l	X			
nium	Se	0.01 P	<	.005	mg/l	X			
er	Ag	0.05 P	<	.01	mg/l	X			
um	Na		<	10	mg/l				
ness				120	mg/l As CaCO3				
ductivity		700		270	Micromhos/cm 25° C	X			
idity		1.0 P	<	.5	NTU	X			
r		15.0	<	5.0	Color Units	X			
ride	F	2.0 P	<	.2	mg/l	X			
te	as N	10.0 P		3.0	mg/l	X			
ride	Cl	250	<	10	mg/l	X			
te	SO_4	250			mg/l				

Pick the Maximum Contaminant Level Allowed

Laboratory Supervisor

ase Print Plainly
E HEAVY PENCIL
NOT WRITE IN SHADED AREAS

LABORATORY NAME
Lancks Testing Labs
[illegible] S. Harney
Seattle WA 98108

SEE BACK FOR INSTRUCTIONS

WATER SAMPLE INFORMATION FOR INORGANIC CHEMICAL ANALYSES

NUMBER	CO.	CITY	DATE RECEIVED	DATE COLLECTED	COLLECTED BY:
95416			02/25/86	02/25/86	Tom Earwood Telephone: 772-1580

his a follow up of a previous out of compliance sample? Yes ☐ No ☒

es, what was the laboratory number of the previous sample? — — — — — — —

TEM I.D. NO.	SYSTEM NAME:	SYSTEM CLASS (circle one)	COUNTY
8800	King County Water Dist. No. 14	1 2 3 4	King

PLE LOCATION	THIS SAMPLE TAKEN BEFORE TREATMENT	IF TAKEN AFTER TREATMENT WAS IT
1 Well - #6	☒ AFTER ☐	___FILTERED ___FLUORIDATED ___CHLORINATED ___WATER SOFTENER: TYPE USED

RCE E:	SOURCE NO.	IF SOURCE IS LAKE OR STREAM, ENTER NAME	IF SAMPLE WAS DRAWN FROM DISTRIBUTION SYSTEM IT WAS COLLECTED FROM SYSTEM AT: (ADDRESS)
___ 1. SURFACE ✓ 3. WELL ___ 2. SPRING ___ 4. PURCHASE	— —		

DATE OF FINAL REPORT: 03/26/86

EMARKS:

SEND REPORT TO: (PRINT FULL NAME & ADDRESS)
K.C.W.D. No. 14
Name
8419 - So. 116th St.
Street
Seattle, WA. 98178
CITY ZIP CODE
Telephone: ( ) 772-1580
Area Code

LABORATORY REPORT
(DO NOT WRITE BELOW THIS LINE)

ESTS		*MCL	Less Than <	RESULTS		Compliance YES	Compliance NO	Chemist Initials	Laboratory Number (If different than above)
enic	As	0.05 P	<	.01	mg/l	X		HR	
um	Ba	1.0 P	<	.25	mg/l	X			
mium	Cd	0.01 P	<	.002	mg/l	X			
omium	Cr	0.05 P	<	.01	mg/l	X			
	Fe	0.3		.05	mg/l	X			
ad	Pb	0.05 P	<	.01	mg/l	X			
nganese	Mn	0.05		.048	mg/l	X			
cury	Hg	0.002 P	<	1.001	mg/l	X			
enium	Se	0.01 P	<	.005	mg/l	X			
er	Ag	0.05 P	<	.01	mg/l	X			
ium	Na			11	mg/l				
dness				92	mg/l As CaCO3				
ductivity		700		210	Micromhos/cm 25° C	X			
bidity		1.0 P	<	.5	NTU	X			
or		15.0		5.0	Color Units	X			
oride	F	2.0 P		.2	mg/l	X			
ate	as N	10.0 P	<	.2	mg/l	X			
oride	Cl	250	<	10	mg/l	X			
ate	SO_4	250			mg/l				

Maximum Contaminant Level Allowed

Laboratory Supervisor

Print Plainly
HEAVY PENCIL
OT WRITE IN SHADED AREAS

Seattle, WA. 98108

LABORATORY NAME Lauces Testing Lab

RECEIVED AUG 13 1985

SEE BACK FOR INSTRUCTIONS

WATER SAMPLE INFORMATION FOR INORGANIC CHEMICAL ANALYSES

UMBER	CO.	CITY	DATE RECEIVED	DATE COLLECTED	COLLECTED BY:
92142			07/25/85	07/25/85	Tony Earwood Telephone: 772-1580

is a follow up of a previous out of compliance sample? Yes ☐ No ☒

, what was the laboratory number of the previous sample? — — — — — — —

EM I.D. NO.	SYSTEM NAME:	SYSTEM CLASS (circle one)	COUNTY
8800	King County Water Dist No. 14	1 2 3 4	King

E LOCATION	THIS SAMPLE TAKEN BEFORE TREATMENT	☐ U AFTER ☐ T	IF TAKEN AFTER TREATMENT WAS IT ___FILTERED ___FLUORIDATED ___CHLORINATED ___WATER SOFTENER: TYPE USED
1 well #7	✓		

CE	SOURCE NO.	IF SOURCE IS LAKE OR STREAM, ENTER NAME	IF SAMPLE WAS DRAWN FROM DISTRIBUTION SYSTEM IT WAS COLLECTED FROM SYSTEM AT: (ADDRESS)
___ 1. SURFACE ✓ 3. WELL ___ 2. SPRING ___ 4. PURCHASE	— —		

DATE OF FINAL REPORT: 8/29/85

New well 346'

MARKS:

SEND REPORT TO: (PRINT FULL NAME & ADDRESS)

King County Water Dist #14
Name

8419 - So. 116th St
Street

Seattle, WA. 98178
CITY ZIP CODE

Telephone: ( ) 772-1580
Area Code

LABORATORY REPORT
(DO NOT WRITE BELOW THIS LINE)

ESTS		*MCL	Less Than <	RESULTS		Compliance YES	Compliance NO	Chemist Initials	Laboratory Number (If different than above)
nic	As	0.05 P		.01	mg/l	X		LL	
um	Ba	1.0 P	<	.25	mg/l	X			
mium	Cd	0.01 P	<	.002	mg/l	X			
mium	Cr	0.05 P	<	.01	mg/l	X			
	Fe	0.3		.41	mg/l		X		
	Pb	0.05 P	<	.01	mg/l	X			
ganese	Mn	0.05		.087	mg/l		X		
ury	Hg	0.002 P	<	.001	mg/l	X			
nium	Se	0.01 P	<	.005	mg/l	X			
	Ag	0.05 P	<	.01	mg/l	X			
um	Na			73	mg/l				
ness				92	mg/l As CaCO3				
uctivity		700		460	Micromhos/cm 25° C	X			
dity		1.0 P		1.0	NTU	X			
		15.0		15.	Color Units	X			
ide	F	2.0 P		.2	mg/l	X			
e	as N	10.0 P	<	.2	mg/l				
ide	Cl	250		61	mg/l	X			
e	SO_4	250			mg/l				

L is the Maximum Contaminant Level Allowed

Laboratory Supervisor

Seattle Water Department
QUALITY CONTROL DIVISION
1509 South Spokane Street
Seattle 98144

No. DATE	Location	Coll by	Time	°C	Cl_2 Res	Vol ml	COUNT Coli	COUNT Non	Coli per 100 ml	SPC 1 ml	
	WATER DISTRICT 14										
1985											
2-7-85				5	0.8			1	1		
2-11				4.5	0.8			7	0	0	
2-12				4.5	0.85			0	0		
2-23				6	0.7			57	0	2	
2-24				6	0.6			0	0	0	
1986				13.5	0.6			10	9		
5-23-86				13	1.0			0	0	0	
5-24				12	0.7			0	0	0	
5-25											

Seattle Water Department
QUALITY CONTROL DIVISION
1509 South Spokane Street
Seattle 98144

No. DATE	Location	Coll by	Time	°C	Cl_2 Res	Vol ml	COUNT Coli	COUNT Non	Coli per 100 ml	SPC 1 ml	
	WATER DISTRICT #25										
1985											
2-14-85				5	0.6			280	TNTC		
2-15				5	0.7			0	0	0	
2-16				5	0.6			0	0	0	
2-17				5	0.6			160	0	0	
2-19				5	0.7			25	0		
2-25				5	0.7			0	0		
4-11				10	0.6			140	2		
4-12				10	0.5			190	1	2	
4-14				12.5	0.6			0	0	0	
7-8				20.5	0.2		80	150	TNTC		
7-9				21	0.25			0	0	0	
1986				8	0.7		170	0	TNTC		
5-10-86											
8-29				21	TR		190	120	TNTC		
8-30				20	TR.		0	0		0	
1987											
7-14-87				18	TR		0	>200	TNTC		
7-16				20	0.2			0	0	0	

Seattle Water Department
QUALITY CONTROL DIVISION
1509 South Spokane Street
Seattle 98144

No.	Location	Coll by	Time	°C	Cl_2 Res	Vol ml	COUNT Coli	COUNT Non	Coli per 100 ml	SPC 1 ml	
	WATER DISTRICT #57										
2-7-85				4	0.5			8	6		
2-8				3	0.45			13	0	0	
2-10				4.5	0.5			3	0		
2-11				4	0.4			32	0	0	
2-22				-	0.3		3	400	TNTC	0	
2-23				7	0.5			0	0	0	
2-24				7	0.3			1	0	0	

Seattle Water Department
QUALITY CONTROL DIVISION
1509 South Spokane Street
Seattle 98144

No.	Location	Coll by	Time	°C	Cl_2 Res	Vol ml	COUNT Coli	COUNT Non	Coli per 100 ml	SPC 1 ml	
	WATER DISTRICT 125										
1-5-85	125-2			6	0.7			0	6		
	125-3			6	0.6			27	2		
	125-4			5.5	0.7			0	0		
1-7	125-3			5.5	0.6			0	0	0	
1-8	125-2			5	0.7			0	0		
1-6	125-3			5	0.55			0	0	0	
1-15	125-2			5	0.5			0	0		
	125-3			5	0.6			0	0		
	125 4			4	0.6			0	0		
1-24	125-2			6	0.5			0	0		
	125-3			6	0.5			0	0		
	125-4			5	0.6			0	0		
2-21	125-2			-	0.7			0	0		
	125-3			-	0.7		34	430	TNTC		
	125-4			-	0.7			0	0		
2-22	125-3			5.5	0.7			2	0	0	
2-23	125-3			6	0.6			0	0	0	
2-24	125-3			6	0.65			0	0	0	
2-25	125-2			6	0.8			71	0		
	125-3			5	0.8			0	0	0	
	125-4			5	0.9			5	0		
4-11	125-2			10	0.5		3	61	3		
4-12	125-2			10	0.4			2	0	3	
4-14	125-2			11	0.6			0	0	0	
4-18	125-2			11	0.4			0	0		
	125-3			10	0.4			0	0		
	125-4			11	0.4		1	8	1		

Seattle Water Department
QUALITY CONTROL DIVISION
1509 South Spokane Street
Seattle 98144

No. DATE	Location	Coll by	Time	°C	Cl_2 Res	Vol ml	COUNT Coli	COUNT Non	Coli per 100 ml	SPC HPC 1 ml	
	Sample Stand C3										
	59th Ave So. & So Norfolk										
11-6-87				14	.6			0	0		
11-30-87				11	.5			0	0	0	

APPENDIX D – HYDRAULIC ANALYSIS

10/6/87

SKYWAY C.W.S.P. HYDRAULIC PROFILE — EXISTING CONDITIONS

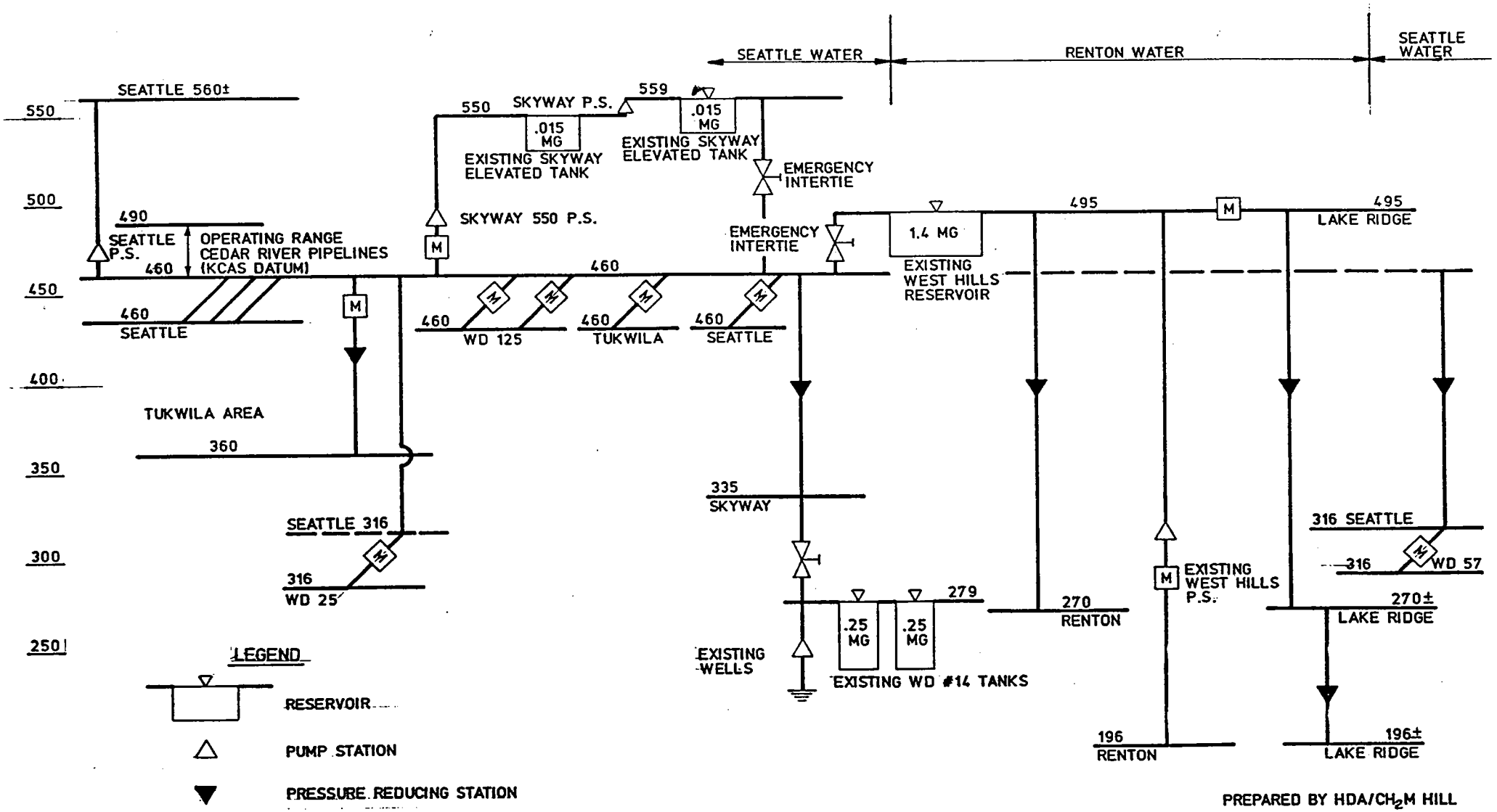


FIGURE 2
HYDRAULIC PROFILE

HYDRAULIC ANALYSIS

A. INTRODUCTION

As described in Parts II and III, the study area defined by the Skyway Critical Water Supply Service Area (CWSSA) is located within the corporate boundaries of the cities of Seattle, Renton and Tukwila, as well as unincorporated areas of King County. The Skyway CWSSA includes all or portions of the existing service areas of ten water purveyors. The affected water purveyors currently operate their water systems in at least thirteen separate service zones which are supplied by one or more of three water sources (City of Seattle, City of Renton, and groundwater). Distribution of water within the service zones is both by gravity and by pumping. In general few of the service zones are physically or hydraulically intertied. Figure 1 provides a schematic hydraulic profile of the existing water systems within the Skyway CWSSA.

To determine the hydraulic capacity and operational behavior of the many supply, pumping, distribution, and storage components within the study area, the distribution systems were analyzed by computer simulation using the NETWK model. The hydraulic analysis included existing and projected future demand conditions to determine system deficiencies and hydraulic response under fire and peak demand loads.

B. HYDRAULIC EVALUATION CRITERIA

1. Demand Conditions

A water system must be capable of meeting the supply needs of various residential, commercial, industrial, and public user groups. The quantity of water required from the water system over a given period of time is called the system demand. System demand includes water for the user categories listed above, as well as for fire fighting, distribution system losses, and miscellaneous uses.

In analyzing existing and future water demands, it is convenient to present the demand conditions in terms of required volume of water delivered during a fixed time period. Water consumption data which is of particular interest in a hydraulic analysis includes:

- Average Daily Demand (ADD) - Also called average annual demand, this is the total volume of water consumed within a calendar year, divided by 365 days. The ADD is usually expressed in units of millions of gallons per day (mgd). It is useful in comparing water consumption which has occurred over preceding years, but more importantly it provides a base flow for comparison of other trend data which are described below.

- Maximum Daily Demand (MDD) - Also called the peak day demand, this is the peak volume consumed over a 24-hour period within a given calendar year. It is typically expressed in mgd, or as a ratio to the ADD. The MDD is useful in determining needed storage volumes and maximum water supply requirements.

  The water system must be capable of delivering design fire flows when the distribution grid is supplying the MDD. Also, system supply and storage capacities should be balanced, and storage reservoirs should recover fully under a MDD condition.

- Peak Hour Demand - This is the peak hourly consumption observed within a calendar year. It is quite often observed during late afternoon or early evening on a hot summer day when storage reservoirs are lowest and when lawn and garden irrigation is at a peak. In some cases, timing of major industrial demands can also have significant impacts on peak hour demands. Peak hour is also expressed as a ratio to the ADD. The distribution grid should have adequate hydraulic capacity to carry the peak hour flow, while still maintaining adequate system pressures.

- Diurnal Demand - This is the hourly fluctuation in demand which occurs during a 24-hour period. Demand is typically lowest in the early morning hours, then rises sharply starting at about 6:00 A.M. During the summer, the peak typically occurs during the evening hours. Diurnal demand is used to determine required distribution storage volume for flow equalization purposes. Figure 2 is a curve taken from SWD's 1980 COMPLAN that shows typical diurnal demand variation within the Puget Sound area.

2. Development of Flow Demands

Several of the purveyors within the study area purchase water directly from the City of Seattle. Determination of existing and projected future flow demands within these areas was relatively straight forward, as Seattle Water Department records were used to determine existing flow demands, and the Seattle Water Department's 1985 COMPLAN was used to determine projected future flow demands. City of Renton flow records were used in a similar manner to determine flow demands for areas supplied by Renton. Individual well production records were used to calculate demands within the area served by Water District 14's wells.

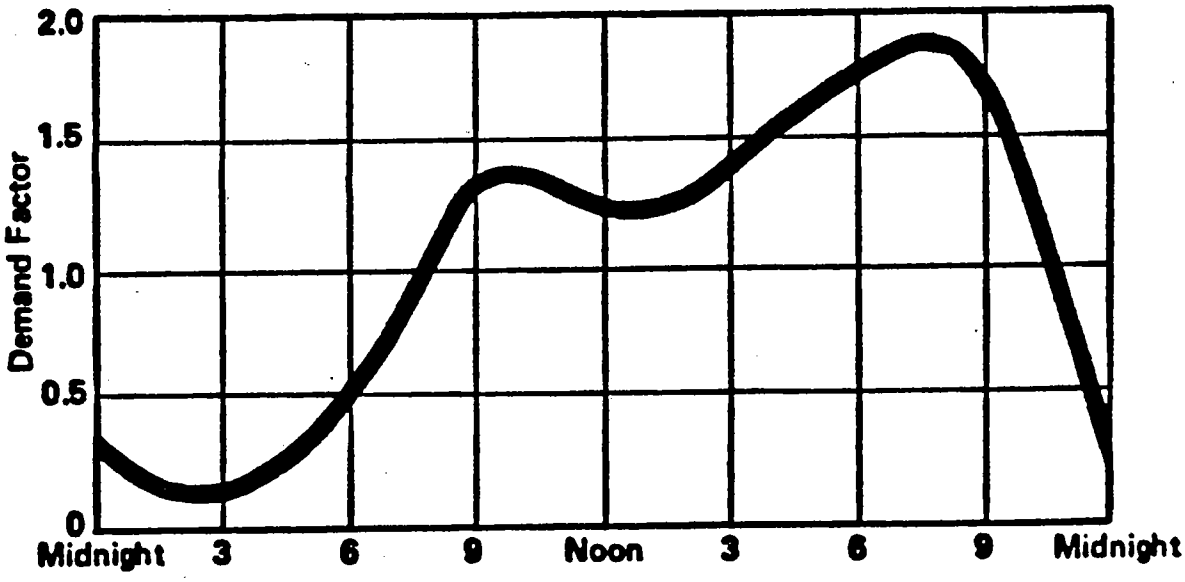


FIGURE 2
DIURNAL DEMAND CURVE

Flow demands within the area served by Seattle's Augusta Street pump station were determined using pump station records. Flow demands within other areas served directly by Seattle were estimated based on per capita usage within the Augusta Street pumped zone, bacause Seattle does not have master meters on its mains which connect to the Cedar River pipelines. Flow demands within the Renton, Tukwila and Water District 125 systems was also estimated, because the Skyway CWSSA includes only portions of these districts.

Table 1 presents existing and projected flow demands for the purveyors included within the Skyway CWSSA. Existing demands were based on 1986 conditions, which provided the most recent full year of flow data.

3. Hydraulic Controls

In performing the hydraulic analysis, certain boundary conditions had to be considered, as they defined critical datum elevations controlling maximum (or minimum) available pressures. Hydraulic controls that affected the hydraulic analysis consisted of two elements:

- Physical hydraulic gradeline (HGL) considerations such as reservoir overflow elevations, pump operating conditions, pressure reducing valve set points, etc.

- Contractual minimum HGL elevations at purveyor connection points along Seattle's Cedar River pipelines.

Table 2 presents a summary of key hydraulic control elevations which affected the hydraulic analysis.

4. Hydraulic Parameters

Hydraulic parameters used to evaluate the distribution systems are summarized below:

TABLE I

PROJECTED WATER DEMAND

PURVEYOR/	CUSTOMERS RES. EQUIV.	1985 DEMAND, MGD ADD	MDD	P/A	1990 ADD	MDD	2000 ADD	MDD	2010 ADD	MDD
WATER DISTRICT 14	817/878	0.212	0.55(E)	--	0.270	0.760	0.340	0.930	0.470	1.240
WATER DISTRICT 125	301/728	0.196	0.353	1.8	0.202	0.383	0.202	0.383	0.202	0.383
WATER DISTRICT 25	505/480	0.130	0.256	1.96	0.030	0.058	0.040	0.080	0.06	0.13
WATER DISTRICT 57	69/69	0.019	0.037	1.95	0.020	0.040	0.030	0.058	0.030	0.058
SKYWAY	1375/1436	0.388	0.85(E)	2.19	0.210	0.590	0.250	0.700	0.310	0.880
RENTON	725/725	0.517	1.743	3.9	0.200	0.500	0.340	0.850	0.480	1.200
CRESTON	15/15	0.003(E)	0.007(E)	---	0.009	0.021	0.008	0.020	0.009	0.021
LAKERIDGE	890/739	0.200	0.48(E)	2.4	0.140	0.450	0.170	0.520	0.210	0.640
TUKWILA	11/11	0.003(E)	0.007(E)	---	0.009	0.021	0.008	0.020	0.009	0.021
SEATTLE	3255/3255	0.878	1.400(E)	2.2	0.825	2.062	0.768	1.919	0.738	1.846
TOTALS	7963/8386	2.546	5.683		1.915	4.885	2.33	5.48	2.51	6.39

ADD = AVERAGE DAILY DEMAND, MGD
MDD = MAXIMUM DAILY DEMAND, MGD
P/A = PEAK AVERAGE RATIO, MDD/ADD
E = ESTIMATED VALUE

SOURCES: SEATTLE COMP PLAN
: RENTON WEST HILL STUDY
: SEATTLE DEMAND METER RECORDS

Table 2
Hydraulic Control Elevations and
Minimum Contractual HGL Elevations

District	Source	Minimum Contractual HGL Seattle Datum	Overflow Elevation KCAS
WATER DISTRICT 14			
	DMS No. 1	455	
	Storage Tanks		270
SKYWAY WATER DISTRICT			
	DMS No. 4	445	
	DMS No. 5	445	
	Storage Tank		559
	Storage Tank		550
LAKERIDGE WATER DISTRICT			
	West Hill Res.		495
WATER DISTRICT 57			
	DMS No. 2	195	
WATER DISTRICT 25			
	DMS No. 6	445	
	DMS No. 7	435	
WATER DISTRICT 125			
	DMS No. 8	450	
	DMS No. 119	445	
	DMS No. 120	435	
TUKWILA			
	DMS No. 11	440	
	DMS No. 12	450	
RENTON			
	West Hill Res.		495

- Operating Pressure - The "target" minimum system operating pressure should be in the range of 40 to 50 psi puring peak hour operation. The DSHS allows a minimum pressure of 30 psi during peak hour demand conditions. Positive pressures of 20 psi must be maintained during fire flow conditions, which are evaluated during MDD conditions.

  Maximum distribution system pressures should not exceed 80 psi in residential areas; with 100 psi as a target maximum limit. Some purveyors within the Skyway CWSSA operate their distribution system at pressures in excess of 100 psi. Areas which exceed 100 psi should be examined for possible rezoning or for installation of pressure reducing facilities.

- Pipeline Capacity - The capacity of major distribution mains was evaluated in terms of the maximum allowable head loss in the main. Good design practice is to size gravity distribution mains to operate within a maximum HGL of less than 10-feet of loss per 1000-feet of length. In pumped systems, the allowable head loss should be held lower; in the range of 6-feet to 8-feet per 1,000-feet of length.

- Storage Facilities - The hydraulics of filling and drawing from proposed storage facilities were evaluated in terms of diurnal operation requirements. Of particular concern was ability to refill the proposed reservoir under MDD flow conditions.

C. FIRE FLOWS

Minimum fire flow requirements within the Skyway CWSSA are determined by the King County Fire Marshall using the Guide for Determination of Required Fire Flow, 1974 Edition, as published by the Insurance Services Office, and adopted by the King County Department of Planning and Community Development. A number of variables are considered in using the above referenced standards to determine minimum fire flow

requirements. These include, but are not limited to building floor area, type of construction, intended use, proximity to adjacent structures, and whether or not the structure is equipped with automatic sprinklers.

Evaluation of ability of the distribution system to meet minimum fire flow requirements is a function of two elements:

- Physical hydraulic capacity of the distribution system to provide the required flow at the required 20 psi residual pressure.

- Ability of the distribution system to maintain the required flow for the required minimum duration.

The first element is related primarily to the physical properties of the distribution system itself, i.e. diameter and configuration of the distribution mains, frictional resistance of the pipe interiors, and the available static pressure. The second element is related to the ability of the source and storage facilities to maintain the required flow for the required duration times listed in Table 3. This latter element relates to hydraulic capacity of sources, available storage volume, and potential for source interruption due to power outages, etc.

Table 3
Fire Flow Duration Times
ISO Criteria

Fire Flow (gpm)	Duration (hrs)
2,500 and less	2
3,000	3
3,500	3
4,000	4
4,500	4
5,000	5
5,500	5
6,000	6
6,500	6

Table 4 summarizes the results of computer fire flow simulations at selected locations within the Skyway CWSSA. The simulations were made with the distribution system loaded under existing (year 1986) MDD conditions. The table lists required and available fire flows. Note that at many locations, adequate hydraulic capacity exists in the distribution system, but source capacity or reliability and storage volumes are inadequate.

D. SUMMARY OF SYSTEM DEFICIENCIES

1. Sources

Table 5 provides an inventory of existing sources within the Skyway CWSSA. Most sources appear to have sufficient hydraulic capacity to meet needs within the immediate future.

The most serious deficiencies involve those systems which rely on pumping facilities either to supply well water or to boost system pressures to required operation limits, but are not equipped with

Table 4
Existing Distribution Systems - Maximum Daily Demand
Fire Flow Simulations

Node No.	Location	Zoning	Purveyor	Fire Flow Calc. gpm	Fire Flow Req'd gpm	Comments
189	Bangor Street @ 59th Ave. S.	Residential	Seattle	2908	1000	No storage serving the area.
23	South 120th Street @ 62nd Ave. So.	Residential	Seattle	1423	1000	Flow limited by Augusta Street P.S. (No backup power source.)
3148	South 128th Street @ 73rd Avenue So.	Residential	Skyway Water District	1799	1000	Flow limited by Skyway storage volume. (Cannot maintain required duration.)
3066	Renton Avenue So. @ 68th Avenue So.	Commercial	Skyway Water District	3269	3000	Flow limited by Skyway storage volume. (Cannot maintain required duration.)
4018	Interurban Avenue So. @ Gateway Corp. Center	Commercial	Tukwila	13370	3000	
6022	Beacon Coal Mine Rd. @ Duwamish River	Commercial	Water District 125	1566	3000	Located on dead end main.
5072	South 117th Street @ Rainier Avenue	Commercial	Water District 125	723	3000	Small diameter mains serve the area.
3118	Campbell Hill Elementary School	School	Skyway Water District	2000	3000	Flow limited by Skyway storage volume. (Cannot maintain required duration.)
13	Earlington Elementary School	School	Seattle	1320	3000	
1024	Lakeridge Elementary School	School	Lakeridge Water District	635	3000	
281	Emerson Elementary School	School	Seattle	3005	3000	
3048	Dimmitt High School	School	Skyway Water District	1150	3000	
2082	Dimmitt High School	School	Renton	3643	3000	
5052	Bryn Mawr Elementary School	School	Water District 14	1903	3000	
3048	Skyway School	School	Skyway Water District	1150	3000	
7014	Duwamish High School	School	Water District 25	1090	3000	
4024	Duwamish High School	School	Tukwila	13370	3000	

TABLE 5

EXISTING SOURCES/STORAGE

PURVEYOR	CUSTOMERS/ RES. EQUIV.	EXISTING SOURCE/ CAPACITY	EXISTING SOURCE/COMMENTS
Skyway	1375/1436	City of Seattle 2-6" meters/1.8 MGD	1-75,000 gallon tank serves 550' zone 1-75,000 gallon tank serves 559' Zone See Pump Station Data
Water Dist. 25	505/480	City of Seattle 1-4" & 1-6" meter/ 1.33 MGD	No Storage. District operates by gravity from City of Seattle Cedar River and West Seattle Pipelines.
Water Dist. 25	301/728	City of Seattle 2-6" meters/1.8 MGD	No Storage to District's 478' Zone. System operates by gravity from Cedar River Pipeline.
Water Dist. 57	69/69	City of Seattle 1-1 1/2" meter/	No Storage. District operates by gravity from Seattle 316' Zone.
Water Dist. 14			
279' Zone	567/533	Groundwater/.27 MGD & Standby from 335' Zone.	2-250,000 gallons storage tanks.
335' Zone	250/345	City of Seattle 1-6" meter/.9 MGD	No Storage. PRV to 335' Zone.
Renton	725/725	1.7 MGD* & Standby from Seattle	.765 MG** of 1.4 MG Reservoir serves 495' Zone and PRV to 270' Zone.
Lakeridge	890/739	City of Renton Well #9/.75 MGD	.585 MG** of 1.4 MG Reservoir serves 495' Zone and PRV to 270' Zone.
Creston	15/15	City of Seattle 1- 1 1/2" meter/.2 MGD	No Storage.
Tukwila	11/11	City of Seattle 1-6" & 1-10" meter/ 2.63 MGD	No Storage. MG Facility in design phase.

* Capacity of West Hill Pump Station.
** By Contract Between Renton and Lakeridge.

Existing Source/Storage

Seattle 444-484 Zone	1727/1727	Seattle Cedar River Pipeline N/A	No Storage.
540 Zone	673/673	Seattle Cedar River Pipeline via Augusta St. Pump Station/1.7 MGD.	No Storage. See Pump Station Data.

standby power sources. These systems are highly vulnerable to source interruption as a result of power outages. Purveyors who are affected include the Seattle Water Department (Augusta Street Pump Station), Water District 14 (well source) and the Skyway Water District. System deficiencies associated with a lack of standby power are further heightened by the absence of, or a serious deficiency in available emergency storage volume.

2. Storage

Refer to Part III for Storage Analysis.

3. Operating Pressures

Plate III-3 (See Part III of Text) summarizes locations of area-wide operating pressure deficiencies (pressure under 30 psi), and areas where pressures exceed 85 psi. The areas delineated were determined through computer simulation with the existing distribution systems loaded under peak hour demand conditions, based on recorded 1986 MDD flows. Plate III-3 does not indicate numerous localized areas where pressures were below 30 psi due to small diameter distribution lines or other reasons associated with local distribution system problems or operating practices.

Areas of high pressure present problems in terms of potential for high system leakage, the need for pressure reducing devices on individual service lines, and potential operational difficulties for fire fighting personnel.

APPENDIX E – SEPA CHECKLIST

King County
Building & Land Development Division
Parks, Planning and Resources Department
3600 - 136th Place Southeast
Bellevue, Washington 98006-1400

April 20, 1988
Determination of Non-Significance

Effective Determination Date: April 26, 1988

File: NPA880418 Skyway Coord. Water Plan

Proponent: Rickard Rodriguez for the Skyway Coord. Comm.
3600 136th Place SE, Suite A
Bellevue, WA 98006
296-6666

Proposal Description:
The approval of a Coordinated Water Supply Plan for Skyway, which would establish water system's service area boundaries; establish minimum design standards; project land use, population, and water consumption; and develop alternatives to meet future needs.

Location: Generally, between the cities of Seattle, Renton, and Tukwila, south and west of Lake Washington.

The Building and Land Development Division has determined that the above proposal does not have a probable significant adverse impact on the environment. An environmental Impact Statement (EIS) is not required under RWC 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file at the Division's office.

Any interested party may submit written comments on this proposal. Written comments or appeals will be accepted until May 11, 1988

Any appeal shall state with specificity the reasons why the determination should be reversed. ALL APPEALS MUST BE ACCOMPANIED BY A NON-REFUNDABLE $50.00 FILING FEE.

Comments or appeals should be addressed to:

King County Building and Land Development Division
3600 - 136th Place SE
Bellevue, WA 98006
ATTN: SEPA Center
Phone: (206) 296-6662

PLEASE REFERENCE FILE NUMBERS WHEN CORRESPONDING.
Responsible Official

King County Executive
Tim Hill

RCW 197-11-960 Environmental checklist.

ENVIRONMENTAL CHECKLIST

Purpose of Checklist:

The State Environmental Policy Act (SEPA), chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

Instructions for Applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply". Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Use of checklist for nonproject proposals:

Complete this checklist for nonproject proposals, even though questions may be answered "does not apply." IN ADDITION, complete the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D).

For nonproject actions, the references in the checklist to the words "project," "applicant," and "property or site" should be read as "proposal," "proposer," and "affected geographic area," respectively.

A. BACKGROUND

1. Name of proposed project, if applicable:

Skyway Coordinated Water Supply Plan

2. Name of applicant: King County, Parks, Planning and Resources

3. Address and phone number of applicant and contact person: Richard Rodriguez
3600-136th Place Southeast, Suite A
Bellevue, WA 98006
Tel: 296-6666

4. Date checklist prepared: April 15, 1988

5. Agency requesting checklist: Building and Land Development Division

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

Updated every five years

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

Yes, participating districts will update their respective comprehensive plans every five years. District plans will be updated for consistency with this plan.

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

Extensive background studies
King County Comprehensive Plan
Local Water Plan
Tukwila, Renton Seattle Zoning and Comprehensive Plans

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

NO

10. List any government approvals or permits that will be needed for your proposal, if known.

Final approval by Department of Social and Health Services.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.) This is a non project action. King County designated Skyway as a critical water supply service area; Principally due to a lack of coordinated water system planning. The proposed water system plan identifies existing water systems within the study area and summarizes deficiencies in those systems; establish service area boundaries of water purveyors in the Skyway area and minimum design standards for the water systems. Future land use, population and water consumption are projected. Development of all natives for meeting future needs are considered.

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

Generally, between the cities of Seattle, Renton and Tukwila, South and west of Lake Washington.

See attachments: I + II

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

B. ENVIRONMENTAL ELEMENTS

1. **Earth**

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

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

40%+

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

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

All of above

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

Some unstable soils are in the area.

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

N/A

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

N/A

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

Unknown

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

None

2. Air

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

N/A

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

NO

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

None

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

3. **Water**

a. Surface:

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

Lake Washington, the Cedar and Duwamish Rivers

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

N/A

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

None

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

Some increase in water consumption due to population increases will occur - Cedar and Tolt River Waters

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

Parts of this proposal are in the floodplain.

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

Increased use of water will result in increased discharge of sewers (through the Renton Treatment plant).

b. Ground:

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

Some existing purveyors currently withdraw groundwater in the area. As need increases, withdrawls may increase.

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

N/A

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

c. Water Runoff (including storm water):

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

N/A

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

N/A

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

None

4. **Plants**

a. Check or circle types of vegetation found on the site:
X deciduous tree: alder, maple, aspen, other
X evergreen tree: fir, cedar, pine, other
X shrubs
X grass
__ pasture
__ crop or grain
__ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
__ water plants: water lily, eelgrass, milfoil, other
X other types of vegetation

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

Unknown

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

None

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

Unknown

5. **Animals**

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

birds: (hawk) (heron) eagle, songbirds, other: .....
mammals: (deer) bear, elk, beaver, other: Urban, Suburban, Watermammals
fish: (bass) (salmon) (trout) herring, shellfish, other: Riverine fishes+

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

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

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

Puget Sound flyway and anadromous spawning rivers

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

None

6. **Energy and Natural Resources**

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

Electricity for pumps

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

N/A

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

None

7. **Environmental Health**

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

Small risk of above. Increased water pressure and availability will improve emergency response.

1) Describe special emergency services that might be required.

N/A

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

None

b. **Noise**

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

None

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

N/A

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

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

None

8. **Land and Shoreline Use**

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

Multiple uses.

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

Urban designation

c. Describe any structures on the site.

Mostly residential and commercial

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

Unknown

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

Varies

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

Varies

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

Varies

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

N/A

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

Unknown

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

Unknown

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

None

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

Existing zoning and land use plans will be followed

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

9. **Housing**

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

None

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

Unknown

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

None

10. **Aesthetics**

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

Unknown

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

Unknown

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

None

11. **Light and Glare**

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

Unknown

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

NO

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

None

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

None

12. **Recreation**

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

Skyway Park, Local City Parks, Lake Washington, Cedar and Duwamish Rivers

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

Unknown - Possibly yes

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EVALUATION FOR AGENCY USE ONLY

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

None

13. **Historic and Cultural Preservation**

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

Unknown

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

None

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

None

14. **Transportation**

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

See Attachment II

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

N/A

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

Unknown

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

N/A

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

N/A

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

Unknown

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

None

15. **Public Services**

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

N/A

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

None

16. **Utilities**

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other. All of the above utilities are available in the area.

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

N/A

C. SIGNATURE

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

Signature: Richard Rodriguez

Date Submitted: April 18, 1988

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D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS

(do not use this sheet for project actions)

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

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

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

N/A

Proposed measures to avoid or reduce such increases are:

None

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

N/A

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

None

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

Increased use of water and electricity, both of which are partially renewable.

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

None

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

N/A

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

None

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

N/A

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EVALUATION FOR
AGENCY USE ONLY

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

None

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

Plan will allow planned growth to proceed in an orderly manner consistent with existing zoning and land use plans.

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

See above

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

No conflict expected, as plan and all development must be approved by local and state regulators.

II BASIC PLANNING DATA

A. GENERAL

The SKYWAY area is generally located, as shown on Plate II-1, between the Cities of Renton, Tukwila and Seattle in King County, Washington. The area includes all or part of Sections 1-3, 10-15 and 23, Township 23 North, Range 5 East, W.M. and Sections 6,7, and 18, Township 23 North, Range 4 East W.M. A legal description of the SKYWAY CWSSA is contained in the Appendix.

As shown on Plate II-2, SKYWAY is bounded on the northeast by the shores of Lake Washington and the Duwamish River runs near the southwestern boundary of the area.

Interstate Highway 5 is near the west boundary of the area, while Rainier Avenue (State Route 167) forms the east boundary. Additional access to the area is provided by Interstate 405. Other important roads in the SKYWAY transportation network are Interurban Avenue South, Empire Way South (SR 900), Beacon Avenue South and Renton Avenue South which all run northwest-southeast through the area. The City of Renton Airport is adjacent to the east edge of SKYWAY and both Boeing Field and Sea Tac International Airport are in the immediate vicinity. In addition, several railroads run through or near SKYWAY.

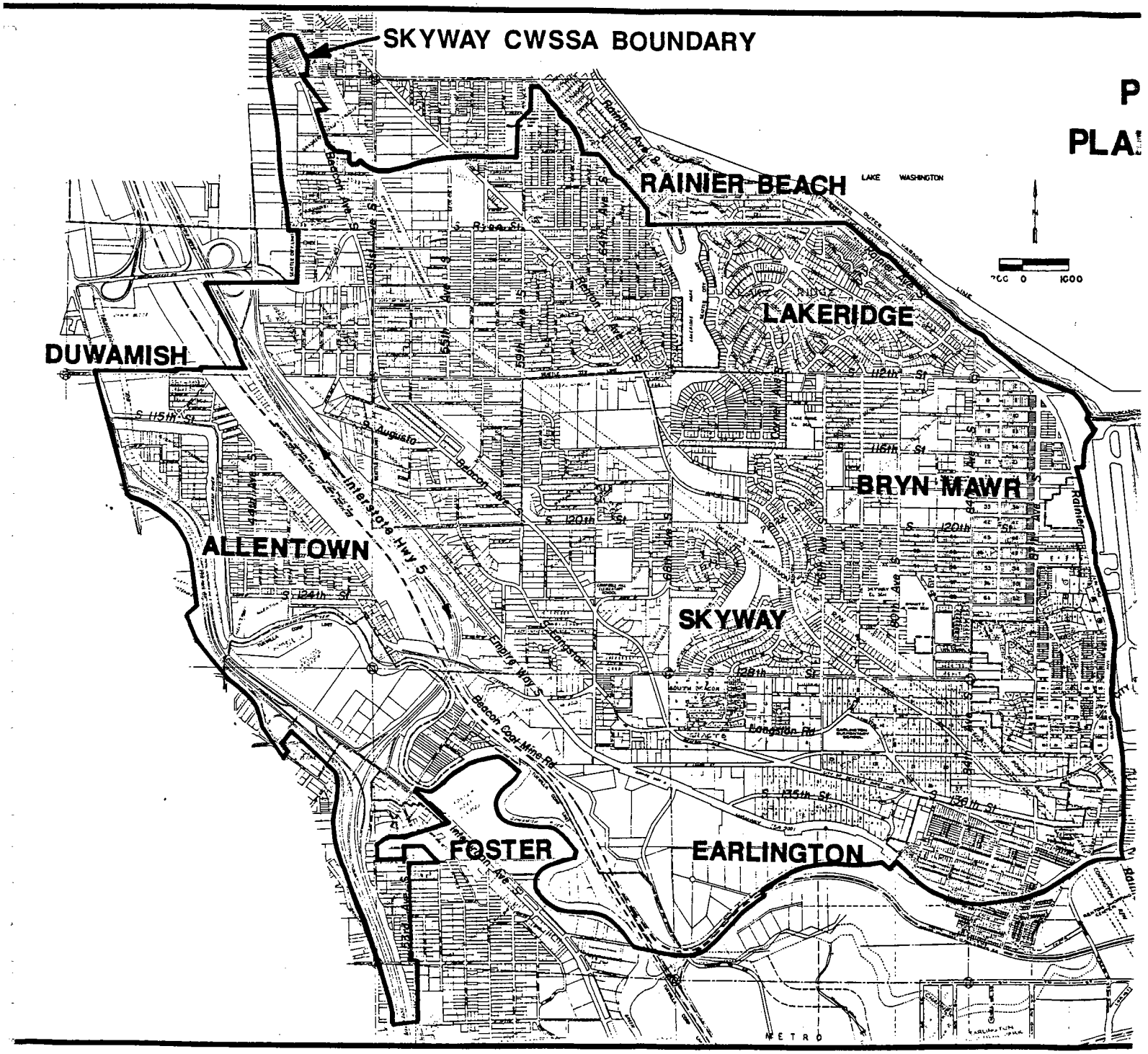
All or parts of the Lake Ridge, Bryn Mawr, Earlington, Foster, Allentown and Rainier Beach neighborhoods are within SKYWAY.

B. PHYSICAL FEATURES

1. Topography

Topography of the study areas ranges from lowlands at the Lake Washington shore and Duwamish River in the northeast and southeast corners, to a ridge with elevations of nearly 500 feet near the center of the area.

ATTACH II


SKYWAY CWSSA BOUNDARY
RAINIER BEACH
LAKE WASHINGTON
LAKERIDGE
DUWAMISH
BRYN MAWR
ALLENTOWN
SKYWAY
FOSTER
EARLINGTON
Interstate Hwy 5
Beacon Coal Mine Rd
Langston Rd
S 115th St
S 120th St
S 124th St
S 128th St
S 135th St
S 136th St
S 112th St
S 116th St
Rainier Ave S
Beacon Ave S
Empire Way S
METRO