RESOLUTION NO. R-3611

A RESOLUTION OF THE KIRKLAND CITY COUNCIL RELATING TO THE ROSE HILL WATER DISTRICT AND APPROVING A PROPOSED ROSE HILL WATER DISTRICT COMPREHENSIVE WATER PLAN AS SAID PLAN RELATES TO THE PORTION OF THE ROSE HILL WATER DISTRICT SERVICE AREA AND FACILITIES LYING WTIHIN THE CITY LIMITS OF THE CITY OF KIRKLAND.

WHEREAS, a portion of the Rose Hill Water District service area and facilities lie within the City of Kirkland; and

WHEREAS, state law (RCW 57.16.010) requires any adoption or amendment of a Water District Comprehensive Water Plan relating to the service area and facilities within a city to be submitted to the city for its approval; and

WHEREAS, the Rose Hill Water District has submitted to the City of Kirkland a proposed Rose Hill Water District Comprehensive Water Plan, copy of which plan is attached to the original of this resolution and by this reference incorporated herein; and

WHEREAS, the Kirkland Water Division, Department of Public Works, has reviewed said proposed plan and recommended approval of the plan by the Kirkland City Council.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Kirkland as follows:

Section 1. The proposed Rose Hill Water District Comprehensive Water Plan set forth in Attachment A to this Resolution, to the extent said plan relates to the service area and facilities of the water district within the corporate limits of the City of Kirkland, is hereby approved by the City of Kirkland.

Section 2. The Kirkland City Clerk is hereby directed to forward to the Rose Hill Water District a certified copy of the resolution.

PASSED by majority bote of the Kirkland City Council in regular, open meeting on the 3rd day of July, 1990.

SIGNED IN AUTHENTICATION THEREOF on the 3rd of July, 1990.

Richard W Eker
MAYOR PRO TEM

ATTEST:

City Clerk

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Attachment to
Resolution R-3611

ROSE HILL WATER DISTRICT

KING COUNTY, WASHINGTON

WATER SYSTEM PLAN

ST ENGINEERING INC., P.S.

JANUARY, 1983

- ERRATA -

ROSE HILL WATER DISTRICT
WATER SYSTEM PLAN
January, 1989

page 2-3 delete the first paragraph and replace it with:

"This document is intended to be an update to the District's 1982 Water System Plan, rather than a complete replacement of that plan. Under State law, water system plans must be updated at least every five years."

page 2-4 second paragraph under City of Bellevue section, revise the second sentence from:

"The District has a new sixteen-inch diameter main extending southward from N.E. 60th Street along 116th Avenue N.E."

to read:

"The District has a new twelve-inch diameter main extending..."

page i delete the first paragraph and replace with:

"The Rose Hill Water District awarded the contract for engineering services for the years 1987-1988 to S T ENGINEERING by resolution of the Board of Commissioners on March 11, 1987. On August 12, 1987, the Commissioners authorized S T ENGINEERING to proceed with preparation of an updated comprehensive water system plan."

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

AUTHORIZATION

The Rose Hill Water District awarded the contract for engineering services for the years 1987 and 1988 to S T ENGINEERING, INC., P. S., by resolution of the Board of Commissioners on March 11, 1987. A copy of Resolution Number 567 will be found in Appendix E to this water system plan. On August 12, 1987, the Commissioners authorized S T ENGINEERING, INC., to proceed with preparation of a comprehensive water system plan. This 1989 update, of the November, 1982 water system plan, prepared by Gardner Engineers, Inc., supersedes the earlier plan in its entirety.

COORDINATION

The adjacent municipalities of Kirkland, Redmond and Bellevue have current water system plans that are due for routine, if not major, update. Similarly, the two adjacent special purpose districts, Northeast Lake Washington Sewer and Water District and the Woodinville Water District, have older water system plans that are currently being updated. To the extent possible, the latest water system plans of these purveyors have been reviewed, together with the most recent additional information, and their impact has been reflected in this 1989 water system plan update for Rose Hill.

The East King County Regional Water Association is in the process of preparing a coordinated water system plan (CWSP). This will address overall water supply and demand requirements in east King County to the year 2040. The CWSP, however, is not expected to be in near final form until the Spring of 1989. We understand that some purveyors and municipalities, including the Cities of Redmond and Kirkland, have deferred preparation of their comprehensive plan updates until after the CWSP is in final form. This will probably mean that their draft updates will not be ready for external review until mid-1990.

However, the Rose Hill Water District is currently in a position where a number of capital improvements are necessary in 1989 and 1990, for orderly development and service reliability within their service area. These improvements were not detailed in their earlier (1982) comprehensive water system plan, as this essentially only focused on the immediate five year planning horizon. Service to customers within the existing service area would be jeopardized if the District was to wait until 1990, or 1991, before implementing the next phases of their capital improvement program. Since the District purchases all of its water from the City of Seattle Water Department, with metered connections to only the TESSL No. 1 pipeline, we see no justification to delay preparation of this update. If necessary, minor transmission and distribution system details can be revised as events dictate.

Much of the water service area lies within the corporate boundaries of the Cities of Kirkland and Redmond. However, neither municipality has fifty per cent of the service area within its current municipal boundaries. Nevertheless, these two municipalities take lead agency status for land use planning and zoning for those portions of the service area that lie within their

boundary. Previously, King County was responsible for this (formerly) unincorporated region. Kirkland has not yet adopted a land use policies plan for much of their newly annexed area of Rose Hill. To the extent possible, this 1989 comprehensive water system plan udpate reflects the current zoning within the Rose Hill water service area. It is recognized that, at some stage, the water utilities will be taken over by the Cities of Kirkland and Redmond.

FINDINGS AND RECOMMENDATIONS

Over one-half of the wholesale water purchased from the City of Seattle is conveyed by the District to the adjacent cities of Kirkland and Redmond. With completion of Phase 1 of the TESSL No. 2 pipeline, possibly in the early 1990's, the City of Redmond will purchase less water from the District, but will still purchase up to 2.7 MGD from the metering station located at N.E. 51st Street and West Lake Sammamish Parkway N.E. Purchases by the City of Kirkland are expected to increase due to developments within the existing Kirkland water service area. Wholesale purchases by the District are also expected to increase for similar reasons.

Although the District does not provide storage facilities specifically to meet the requirements of adjacent municipalities, Kirkland and Bellevue did participate in the 1972 construction of the 11.2 MG storage facility. A new 6.7 MG capacity storage facility will be required before the mid-1990's. Both Redmond and Kirkland may wish to participate in construction of an even larger storage facility at the same, or another, site. Kirkland, in particular, may have insufficient storage to meet medium term development requirements, let alone ultimate development requirements within their existing water service area.

Because the TESSL pipeline runs approximately north-south through the middle of the District, the local transmission network is not as well developed as might otherwise be the case. With construction of a second large capacity storage reservoir, the opportunity has also been taken to link these two facilities with a large diameter pipeline. Thus, in the event of one, or two, of the metered connections to the TESSL being out of service, supply can be maintained throughout the District and to the two adjacent municipalities.

Since the early 1970's, the northeastern portion of Kirkland's water service area (north of N. E. 116th Street and west of Interstate 405) has been served from Rose Hill's 395 pressure zone. We now understand that the City of Kirkland would prefer to use an elevation 450 pressure gradient in this area. This would permit an intertie between this zone and an existing large 450 pressure zone in the southerly portion of their service area. A number of major revisions to the District's system must be made to accomplish this, including increasing the number of pressure zones from seven to eight. A large portion of Rose Hill's existing 395 pressure zone can be upgraded to an elevation 450 pressure gradient. However, a small 395 pressure zone will still be necessary in the northwest corner of the service area. This will entail both installation of parallel pipelines and construction of two new pressure reducing stations. This work can be undertaken prior to construction of the proposed new storage facility at the north tank site.

With this major revision to required service pressures in the north end of Kirkland's and Rose Hill's service area, corresponding revisions to the overflow elevation of the proposed new storage reservoir become desirable. The existing standpipe has an elevation 450 overflow. For Rose Hill's needs, an elevation 395, or possibly 425 overflow on any new tank, would be adequate.

However, if the new facility were also to provide storage for Kirkland's 450 pressure zone, a 450 overflow would be required. Redevelopment of an existing storage site is frequently much less contentious than development of an entirely new site. Accordingly, we have assumed that the City of Kirkland will likely participate in this construction. The total storage capacity would be the 6.7 MG required by Rose Hill, plus whatever additional volumes are required by Kirkland. The City of Redmond is not yet in a position to adequately assess either their interest, or ability, to participate in construction of the storage facility.

Redmond has been experiencing difficulty in obtaining all of its required water from the three metered connections to the Rose Hill system. Hence, their participation with the City of Seattle in constructing Phase 1 of the second Tolt Eastside Supply Line (TESSL No. 2). They will continue to make bulk purchases from the metering station located in the southeastern corner of the Rose Hill service area. Selected water main improvements within the Rose Hill system are planned to ensure adequate pressures and volumes at this Redmond metering point. The Cities of Redmond and Bellevue are also planning, a shared use, 6.0 MG storage facility at 140th Avenue N. E. and N. E. 40th Street, south of the Rose Hill service area. This new reservoir and pump station will serve their elevation 520, 450, 400 and 270 pressure zones, but will have no effect on Redmond's 335 pressure zone, which is supplied principally by Rose Hill via the metering and pressure reducing station located at N. E. 51st Street and West Lake Sammamish Parkway N. E.

In 1987, an immediate program was identified to strengthen the existing system of pressure reducing stations serving the present configuration of seven pressure zones within the District. During 1988, the major TESSL supply metering and pressure reducing station located at N. E. 116th Street and 132nd Avenue N. E. was completely upgraded. In addition, five new pressure reducing stations were added to the system. The objectives have been to ensure that each pressure zone is served by at lest two pressure reducing stations and, wherever possible, all pressure zones are adequately intertied.

The remainder of the proposed system improvements comprise installation of selected new lines and replacement of aging, or undersized, existing transmission and distribution mains. This program is essentially part of a twenty-year replacement and rehabilitation schedule. The work items identified for the next five years represent only current perceptions of priorities. Our recommendation is that the construction program be critically reviewed on an annual basis, taking advantage of any exceedingly competitive swings in the utility construction industry, or major road improvements planned by adjacent municipalities. This means having a number of projects, either already designed, or sufficiently advanced, that they may be put out for bid at very short notice.

The District currently purchases all of its water from the Seattle Water Department. They have no secondary source of their own to augment supplies during periods of heavy demand, or to cushion the impact of any increases in the rates charged for bulk water supply. Since even a small groundwater source (for example, 250 gpm = 0.36 MGD) can have such an enormous impact on peak demand and overall costs, particularly during peak consumption periods; the District has identified potential groundwater sources within its water service boundaries. The District is now concentrating on one site located on the southeast corner of Old Redmond Road and 132nd Avenue N. E. The Commissioners of the District have authorized test drilling on this County-owned property and the permitting process has been initiated.

Finally, a new rate structure and financial plan has been devised. This will permit the District to implement this water system plan without burdening the users with excessive debt service charges. The objective has been to place the costs of water service on the various classes of customer, new and old, residential, commercial and institutional, according to their overall impact on the system.

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CHAPTER ONE
INTRODUCTION

1.0 INTRODUCTION

This 1989 water system plan update is based on a number of studies authorized by the Rose Hill Water and Sewer District during 1987 and 1988. The conclusions and recommendations presented in this study cover all aspects of water transmission, storage and distribution within the water service area and specific aspects of on-going wholesale/retail water transmission to the neighboring municipalities of Bellevue, Kirkland and Redmond. Also included are considerations of water conservation, the operations, customer service and maintenance activities of the District.

A financial plan is also presented. The financial plan shows how the significant capital improvements, that are necessary over the next five years, can be implemented. This water system plan has been prepared in accordance with the applicable requirements of the State of Washington - Department of Social and Health Services and the King County - Utilities Technical Review Committee.

We note that much of the service area lies within the revised municipal boundaries of the City of Kirkland and the City of Redmond. The remainder is in unincorporated King County.

Objectives and Scope

The scope and objectives of this 1988/1989 water system plan update include a critical review of the earlier, 1982 water system plan and incorporation of the recommendations contained in the 1987/1988 financial analysis and rate studies conducted by S T ENGINEERING, INC., in association with CCA, Inc. A number of independent, but related tasks, have been undertaken as part of this water system plan update.

- Technical review and revision of pressure zone boundaries and gradients, to enhance both present service and service under ultimate development conditions.
- Critical review and analysis of dedicated fire storage and fire flow requirements within each pressure zone in the service area.
- Assessment of fire storage and flow requirements in the adjacent municipal water service areas that rely on Rose Hill's transmission and storage facilities.
- Hydraulic analyses of the existing transmission and distribution system; to identify which facilities must be upgraded to meet present day requirements, both within and outside the water service area.

- Hydraulic analyses to identify the improvements required in the transmission system to meet ultimate development demand both within and outside of the present service area.

- Critical review of the total storage requirements to meet both present day conditions and ultimate development conditions within the service area boundary.

- Critical review of land use projections within the present service area to assess the magnitude of ultimate development demand.

- Preparation of a replacement and rehabilitation (R&R) program covering all aspects of the District's existing facilities.

- Preliminary engineering evaluation of the capital improvements necessary for water service under ultimate development conditions.

- Development of an environmental impact assessment, or a negative declaration, covering the capital improvements in general.

- Preparation of cost estimates, in constant 1988 dollars, for the capital improvements, including replacement and rehabilitation, identified in the water system plan update.

- Assessment of priorities and preparation of an outline implementation schedule for the District's capital improvement program.

- Review and revision of the District's policies and charges for developer extensions to the system.

- Critical review and evaluation of the District's operations, customer service and routine maintenance activities.

- Critical review of the District's financial requirements and ability to undertake the necessary scale and pace of capital improvements.

Definitions

The following terms are used in this water system plan update:

Consumption - the actual volume of water used by the District's customers, as measured at each customer's metered connection to the distribution system.

Demand - the volume of water obtained from the supply source over a given period of time to meet the District's needs. These needs comprise; domestic, commercial, industrial, institutional and public use, but also include fire-fighting water, system losses,

and miscellaneous other water uses. Demands are usually discussed in terms of flow rates, such as: million gallons per day (MGD), gallons per minute (gpm), or simply hundreds of cubic feet (CCF) in a given time period. Flow rates commonly referred to in the design and analysis of municipal water system are as follows:

- Average Daily Demand (ADD) - the total amount of water delivered to the system in a year, divided by the number of days in a year. For very large systems, ADD can be further categorized into average residential (ADDR), average commercial (ADDC) and so on.

- Maximum Month Demand (MMD) - the total amount of water delivered to the system during the month of maximum water use. For Seattle-Eastside communities, this will be either July or August.

- Maximum Day Demand (MDD) - the total amount of water delivered to the system on the year's maximum water use day.

- Peak Water Demand - the total amount of water delivered to the system in the hour of maximum use; this usually occurs during the maximum water use day.

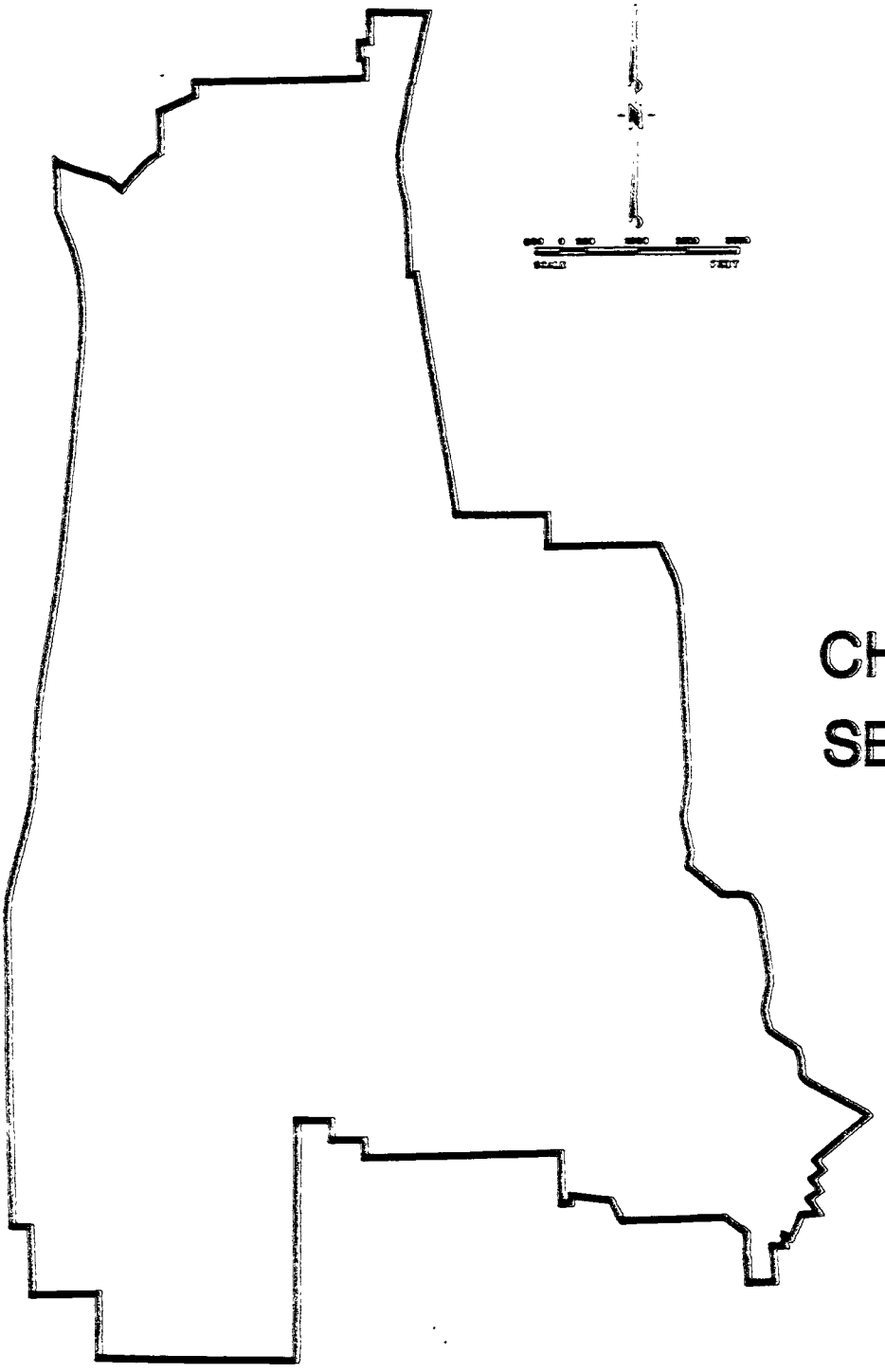
Fire Flow - the rate of flow required to fight fires, usually also defined for a minimum time period, or duration.

Fire Storage - reservoir capacity required to meet fire flows.

Emergency or Reserve Storage - reservoir capacity provided to meet emergencies, such as; supply failure due to transmission pipeline failure, pump station failures, or power outages.

Pressure Zone - a subsection of the water system operated at a common hydraulic elevation.

Hydraulic Elevation, or Head - the height of a free water surface above a defined datum (the District uses the King County aerial survey 1929 datum, which is 5.96 feet higher than the Seattle Water Department's datum). This can be imagined as the height above datum that a column of water would rise in a vertical, open-ended pipe connected to a pressure pipeline.



CHAPTER TWO
SERVICE AREA

CHAPTER TWO

SERVICE AREA

2.1 BACKGROUND

The Rose Hill Water District's water service area is identical to that formerly served by King County Water District No. 81. The original Water District was formed on 23 June 1947 by the King County Board of Commissioners, following voter approval in a special election. The first change of name to the Rose Hill Water and Sewer District, occurred in 1986 when the District assumed control of the small, Trend area sewer system, in north Rose Hill, operated directly by King County. On January 1, 1989, the entire sewer system operated by the Rose Hill Water and Sewer District was transferred to the City of Kirkland. The existing sewer service area lies entirely within the revised municipal boundaries of the City. A restraint to development in the north Rose Hill area has been the lack of a well developed, gravity sewer system. As a result of this acquisition, the City of Kirkland will become solely responsible for provision of the required new systems. As a consequence of this transfer, the Rose Hill Water and Sewer District, formerly King County Water District No. 81, has again changed its corporate name to the Rose Hill Water District.

Originally, the Water District purchased all of its water from the City of Kirkland. At that time, Kirkland, like most Eastside communities, was comparatively small and was able to operate its own surface water and groundwater collection and distribution systems. Redmond, at that time, an even smaller community at the north end of Lake Sammamish, also operated its own groundwater sources. Water District 81 was formed to serve customers in the unincorporated area of King County between these two small municipalities.

In the late 1950's, the Seattle Water Department constructed the Tolt Eastside Supply Line. At that time, the City of Kirkland abandoned its own supply sources and, working in conjunction with Water District 81, connected to the TESSL system. The new Seattle pipeline runs through the center of the Water District's service area. Since the early 1960's, Kirkland has been purchasing wholesale water at City of Seattle rates from Rose Hill. With residential and associated commercial and business office expansion in the 8.9 square mile Rose Hill service area and within the Kirkland water service area, the District has been making increasing withdrawals from the TESSL system. In the early 1980's, the City of Redmond also commenced purchases of retail water from the District. These purchases were a temporary measure to augment their groundwater supplies and until such time as Redmond entered into a formal purveyor contract with the Seattle Water Department.

2.2 SERVICE AREA CHARACTERISTICS

The present Rose Hill water service area comprises a total of 5,682 acres, or about 8.9 square miles. However, of this total, some 570 acres are never likely to be developed. This undeveloped acreage comprises five parcels; the Bridle Trails State Park, the Bellevue Municipal Golf Course and three small areas, zoned strictly agricultural. This leaves about eight square miles which is either already improved, or zoned for single family residential, multi-family, or commercial development.

Under present zoning, approximately sixty-eight per cent of the net developable service area is zoned single family residential and another eight per cent is zoned for multi-family development. The remainder is zoned for commercial/industrial, which includes institutional uses such as schools, churches and business office parks, et cetera. Of this eight square mile service area, over seventy-four per cent is already served and connected to the Rose Hill distribution system. Almost twenty per cent of the remaining area has water service available. This leaves less than seven per cent of the service area for which water mains must be provided before new development can take place.

2.3 ADJACENT PURVEYOR PLANS

The present Rose Hill service area is bounded by three large municipalities and two special purpose districts. In general, there are no service area disputes, or boundary conflicts, with these five existing purveyors. The most recent comprehensive water system plan updates of these purveyors have been carefully reviewed, prior to preparation of this comprehensive plan update.

Many of adjacent purveyors were in the process of updating their earlier water system plans; most of which were produced in the early 1980's. However, a number of these purveyors have elected to defer preparation of their next updates until after the East King County - Regional Water Association has its coordinated Water System Plan (CWSP) in final form. The first draft of the CWSP is not due until April, 1989, and further time may elapse before it reaches final form. Nevertheless, Rose Hill has elected to proceed with its water system plan udpate now, for a number of reasons:

- No expansions of its service area boundaries are proposed;
- All of its present water is purchased from the Seattle Water Department; and
- Necessary capital improvements, scheduled for 1989 and 1990, were not outlined in the earlier (1982) water system plan.

Rather than produce an addendum to the 1982 plan, the District has opted to produce a new 1989 water system plan. Any amendments, which may become necessary after the East King County - CWSP is approved, can be covered by an addendum, or revised issue, at some later date.

The present municipal boundaries of the Cities of Kirkland, Bellevue and Redmond are unlikely to further affect Rose Hill. With the exception of a small parcel west of the State Park,the City of Kirkland has already annexed up to the easterly right-of-way margin of 132nd Avenue N. E. This will also become the future western annexation boundary of the City of Redmond. The northern municipal boundary of Bellevue is contiguous with those established for Kirkland, Redmond and the Bridle Trails State Park. However, at present, there are several quite large areas of unincorporated King County, east of 132nd Avenue N. E. that are zoned for development and have not voted to annex to Redmond.

The northern municipal boundary of the City of Bellevue is formed by the southern boundary of Bridle Trails State Park (projection of N. E. 40th Street) between 116th Avenue N. E. and 132nd Avenue N. E. and the projections of N. E. 60th Street between 132nd Avenue N. E. and 148th Avenue N. E. East of 148th Avenue N. E., the Redmond/Bellevue municipal boundary extends south to N. E. 20th Street and N. E. Bellevue-Redmond Road.

The northern water service area boundary, in the Totem Lake area, is largely within the municipal boundaries of Kirkland. However, in this area, water service for Kirkland is provided by the Northeast Lake Washington Sewer and Water District. To the east, water service is also provided by the Woodinville Water District. Should the Woodinville community, one day, vote to incorporate, it is likely that the municipality so formed will have corporate boundaries somewhat smaller than those of the Woodinville Water District.

So, although there are no current boundary, or service area, disputes between the three special purpose districts (Rose Hill, Woodinville and Northeast Lake Washington), the picture is somewhat less clear with respect to future municipal boundaries and their respective utility service areas. Redmond currently has a municipal policy of not providing utilities without annexation. This lends to some interesting engineering problems when sewer and water services are requested by a developer. The ultimate service area boundaries of all East King County purveyors are being established as part of the Regional Water Association's CWSP. These ultimate water service boundaries will become the new corporate boundaries. Thus, in the future, there will be no difference between service area and corporate boundary.

City of Kirkland

Kirkland's current water system plan was approved in May of 1986. However, it should be noted that their municipal water service area is very much smaller than that defined by their corporate limits. Many Kirkland businesses and residents receive water service from the Northeast Lake Washington Sewer and Water District and from the Rose Hill Water District. The City has no current plans to take over the water utilities within their corporate boundaries from either of these two special purpose districts.

City of Bellevue

Bellevue's current water system plan was approved in August, 1985. The City currently provides water service to one small area that is within their municipal boundary but also within Rose Hill's present corporate boundary. There are two interties between the two systems. One is along 140th Avenue N. E. where Bellevue has a sixteen-inch diameter main, with a direct connection to the elevation 545 south storage tank. The other intertie is at 148th Avenue N.E. and N.E. 51st Street where both purveyors have an eight-inch diameter main.

The possibility exists for an intertie along 116th Avenue N.E., west of the Bridle Trails State Park from Rose Hill's elevation 590 pressure zones to Bellevue's 520 pressure zone. The District has a new sixteen-inch diameter main extending southward from N.E. 60th Steet along 116th Avenue N. E.

City of Redmond

Redmond's current water system plan was approved in July, 1983. The City currently obtains two-thirds of its water supplies from a number of groundwater sources. The balance has been obtained by purchases from the Rose Hill Water District. In the early 1990's, Redmond will have a direct tap to the City of Seattle system. This tap will reduce, but not eliminate, the volumes that are currently purchased from Rose Hill. Rose Hill currently provides water service to a small area within the City of Redmond that lies outside of the District's current corporate boundary.

Two of the three metered connections to Redmond's water system will not be required when Phase 1 of the TESSL No. 2 pipeline is completed in the early 1990's. These will remain in service, as emergency interties to Redmond's 238 pressure zone from Rose Hill's 285 zone.

Northeast Lake Washington Sewer and Water District

NELWSWD's current water system plan was approved in August, 1982. Water service to the high value commercial developments in the Totem Lake area are by this special purpose district. Ground elevations are such that Rose Hill cannot economically serve this

area of Kirkland. A special, isolated, elevation 450 pressure zone would be required. Discussions are currently in progress to create an intertie between Rose Hill and Northeast Lake Washington in the Totem Lake area. Under emergency conditions, when pressures fall below elevation 395, Rose Hill will be able to assist Northeast.

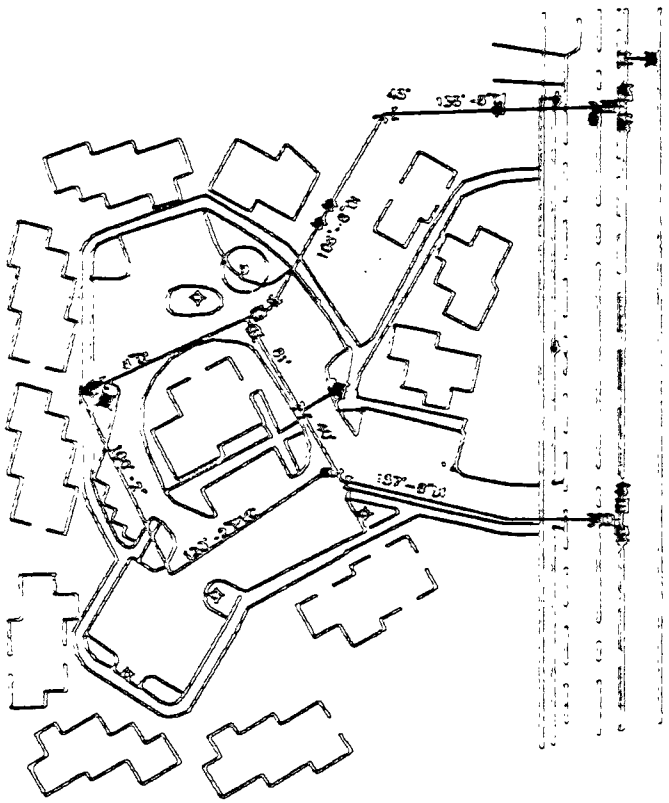
Woodinville Water District

Woodinville's (formerly KCWD 104) latest comprehensive water system plan was approved on December, 1984. There are currently no plans for interties between the special purpose districts and Rose Hill. The northeastern franchise boundary of Rose Hill abuts Woodinville's elevation 510 and elevation 260 pressure zones.

2.4 PROPOSED SERVICE AREA

The Rose Hill Water District has no plans whatsoever to have either its water service franchise boundaries expanded; or provide water services outside their present water service area. As discussed in Section 2.3 of this water system plan, by mutual agreement, water service is currently provided to one area within Redmond's water service boundary, south of N. E. 51st Street, along N. E. 49th Street and 159th Avenue N. E. Also, by agreement, the City of Bellevue provides water service to N. E. 55th Place from 132nd Avenue N. E. and the City of Redmond provides water service along 150th Avenue N. E., south of N. E. 51st Street. Along the northwest boundary of the franchise area near Totem Lake, the Northeast Lake Washington Sewer and Water District provides water service to a nominal elevation 450 pressure zone, that could only be served by Rose Hill with difficulty.

One objective of the East King County - Regional Water Association, over the course of preparing their coordinated Water System Plan (CWSP) has been to rationalize service area boundaries. In the future, the water service boundaries will be contiguous with the corporate boundaries. This will also ensure that no customer connected to a particular system becomes disenfranchised. Thus, for instance, the area of Totem Lake currently served by Northeast, under an interlocal agreement, will, in fact, become part of the new water service/corporate boundary of the Northeast Lake Washington Sewer and Water District. These customers will then be able to vote in NELWSWD elections, but not in Rose Hill elections.



CHAPTER THREE
COMMUNITY DEVELOPMENT

CHAPTER THREE

COMMUNITY DEVELOPMENT

3.1 APPROACH

In order to determine the future water demand for the Rose Hill Water District service area, it is necessary to first assess the impact of proposed land use regulations of all properties within the present water service area. Typically, land use within any given urban area can be categorized as single family residential, multi-family residential, commercial, institutional and industrial. Given the zoning, estimates of the ultimate development demand can be made using historical water consumption patterns for each category of development.

For the Rose Hill service area, which is finite in size and will not be increased by annexation, the major uncertainty is only the rate at which new development will take place. However, the rate of demand growth does not affect the magnitude of ultimate total demand. Since the improvements to the water transmission, storage and distribution systems are based on the ultimate requirements, the uncertainties about growth rates tend to affect only the implementation schedule of these capital improvements, not the nature of these improvements.

3.2 INVENTORY OF RELATED PLANS

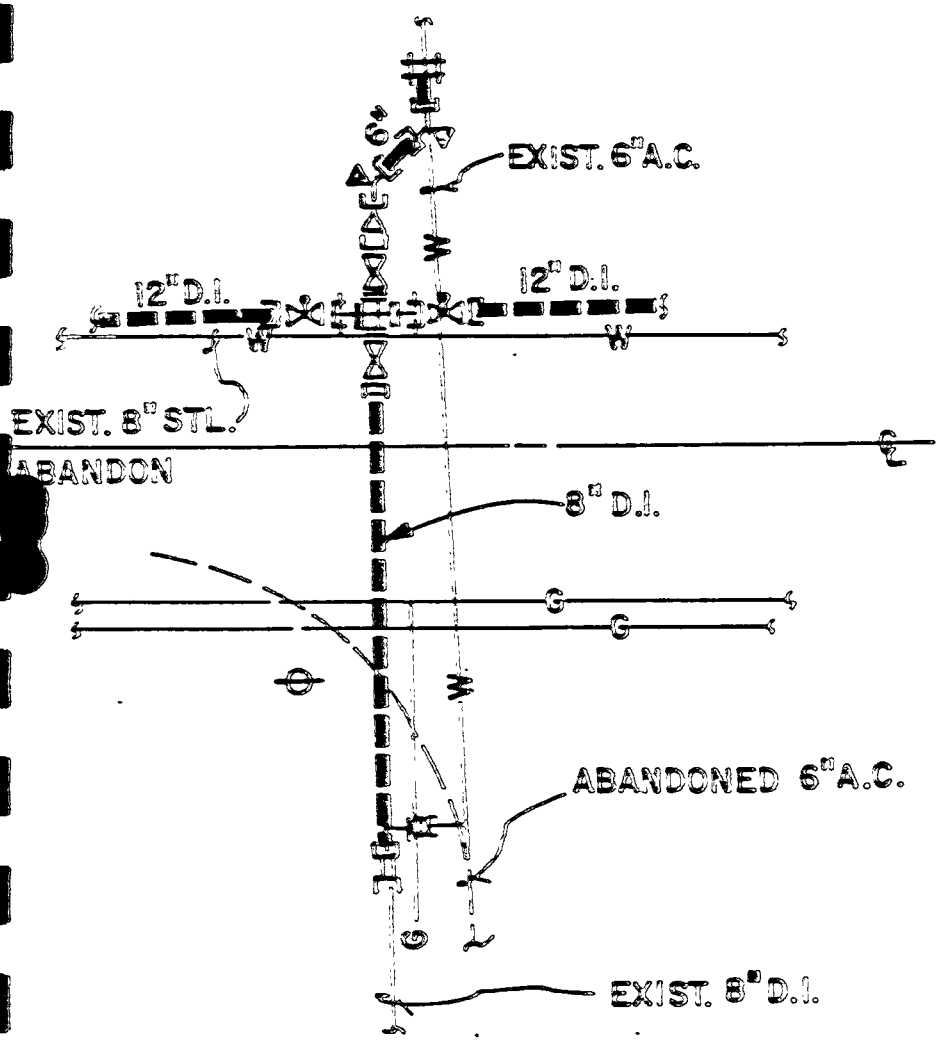
In any urban municipality such as the Rose Hill water service area, a number of regional and local agencies have developed land use policies and associated population projections. Naturally, the level of detail increases as the scale of the particular study focuses on a smaller and more defined area, or neighborhood. However, as the scale of the study area decreases, the differences become more of degree than kind. For instance, an Eastside residential area of mixed low density housing in the Puget Sound Council of Governments (PSCOG) forecasts does not reappear re-zoned as a light or heavy industrial estate in a subsequent municipal neighborhood study. Similarly, although the Rose Hill Water District originally operated in unincorporated King County, the zoning has not altered dramatically as large portions of the water service area have been annexed into the adjacent municipalities of Kirkland and Redmond. Nevertheless, these two municipalities are the responsible planning authority for new developments within much of the service area.

The largest undeveloped area within the water service area lies in North Rose Hill. This comprises about 880 acres, some seventeen per cent of the service area, of which almost half is completely undeveloped. The City of Kirkland has prepared an October, 1988, Draft EIS which discusses a number of development options for the area. King County had earlier developed a land use plan for this area, but it was never formally adopted. The Kirkland Land Use Plan for the area is unlikely to be formally adopted until 1989 at the earliest.

3.3 EXISTING ZONING

As part of the rate studies for the District carried out by S T ENGINEERING and CCA, Inc., the entire service area was analyzed by customer classification and quarter section. Each quarter section map was overlaid with the existing zoning for that quarter section. Two broad classifications were made; areas already served and areas to be served. The former was further subdivided into connected and not yet connected. Each of these three categories was subdivided into three basic zoning types; single family, commercial/industrial and multi-family.

Using the notion of single family equivalent accounts, an ultimate development total of 19,854 single family residential - equivalent connections (SFR-CE) was described. For 1988, the projections indicated 6,810 customer accounts, or 10,517 SFR-CE's. By 1992, these will have grown to 7,560 customer accounts, or 11,686 SFR-CE's.



CHAPTER FOUR
SYSTEM REQUIREMENTS

CHAPTER FOUR

SYSTEM REQUIREMENTS

4.1 INTRODUCTION

This section will address the future water system demands for the Rose Hill Water District's water service area until the year 2020, or whenever ultimate development within the service area has been attained. To a large extent, the projection of future demand is the basis for development of water system plans. However, as a water utility, which has no plans for boundary expansion, both ages and reaches ultimate, or saturation, development, so the thrust of capital improvements moves from simple system extension, to consolidation and rehabilitation of existing facilities. Some forty years have elapsed since the District was formed in the late 1940's. Several cycles of very rapid expansion in the Eastside communities has been experienced. However, at this stage, Rose Hill is still experiencing two forms of demand growth:

- As a wholesale purveyor to the Cities of Kirkland, Redmond and, to a lesser extent, Bellevue, growth in these municipalities has led to increased withdrawals by the District, from the TESSL system, on their behalf.

- In-fill development and, to a certain extent, expansion, or re-development of existing properties within the District's water service area has also led to increased demands on the supply system.

Table 4.1 on the following page shows total water usage over the period 1977 to 1988.

4.2 DEMAND FORECASTS

Although the District now uses more water within its own service area than does Kirkland, the District, in total, still wholesales more water to adjacent purveyors than it uses itself. We recognize that, beginning in the 1990's, Redmond will purchase some water directly from the SWD. Nevertheless, they will continue to make some purchases from Rose Hill. It is difficult to predict what Bellevue will do, but it is assumed that its annual purchases will vary between 15 and 60 MG*. This volume is, of course, very small compared to the 1987 annual consumption total of 2,355 MG. Overall, average annual demand growth over the period 1977 to 1987 has been almost six per cent within the Rose Hill service area. No such level of demand growth is projected over the next twenty or thirty years.

*100 cubic feet (ccf) = 748.1 U. S. gallons

TABLE 4.1 TOTAL WATER SYSTEM USAGE - 100's OF CUBIC FEET

	1977	1978	1979	1980	1981	1982
Total Purchases from Seattle	1,783,728	1,954,103	2,136,653	2,185,418	2,156,572	2,608,788
Kirkland	863,657	991,675	1,031,776	1,070,939	1,027,976	1,129,383
Redmond	221,117	239,610	224,638	246,815	210,484	184,242
Bellevue	3,628	3,484	1,826	3,809	15,401	17,972
Rose Hill	695,326	719,334	878,412	863,855	902,720	1,277,191

	1983	1984	1985	1986	1987	1988
Total Purchases from Seattle	2,216,903	2,516,653	2,708,328	2,773,239	3,000,608	3,068,813
Kirkland	1,057,280	1,115,464	1,351,135	1,445,603	1,344,200	1,323,749
Redmond	235,424	183,939	244,095	196,105	419,504	410,323
Bellevue	15,704	63,765	47,531	50,824	23,683	10,554
Rose Hill	908,495	1,153,485	1,065,567	1,080,707	1,213,221	1,397,744

In the 1982 Comprehensive Water System Plan, projections were made for water demand for the years 1990 and 2000, based on estimated population distributions within the Rose Hill Service area. These estimates were low, inasmuch as 1987 usage turned out to be higher than that projected for 1990. All this really means is that the growth rates assumed in 1982 were too low, not necessarily that the ultimate development demand was incorrect.

Preliminary demand forecasts from the East King County - Coordinated Water System Plan (CWSP) have been used to generate a likely total demand scenario for the Rose Hill Water District. The figures given are in hundreds of cubic feet (ccf) per annum.

Year	Kirkland	Redmond	Rose Hill
1986	1,117,631	1,715,238	1,450,025
1990	1,192,772	2,001,267	1,589,564
2000	1,398,803	2,657,021	1,996,915
2010	1,612,425	3,175,405	2,366.242
2020	1,861,532	3,800,505	2,799,052
2030	2,111,028	4,476,948	3,263,668
2040	2,360,524	3,164,448	3,785,850
AARG			
1980-2000	1.6%	3.2%	2.3%
1980-2040	1.3%	2.0%	1.7%

Again, it should be noted that the demand figure given for total consumption within the Rose Hill water service area alone, for the year 2000, is some fifty-eight per cent higher than that projected, for the same year, in the 1982 comprehensive plan.

Rose Hill only supplies a small proportion of the Redmond demand - currently less than twenty-five per cent. With completion of Phase One of the TESSL No. 2, pipeline in the early 1990's, this proportion will drop to about eight per cent. Rose Hill's supply percentage of Bellevue's total demand is less than one-third of a per cent. Hence, by the early nineteen-ninety's, the Rose Hill demand picture will be dominated by demands within its own service area; with Kirkland demands being only about seventy-five per cent of this. Essentially, in-fill development within the Rose Hill service area will have more impact than similar developments within the Kirkland service area.

Of particular interest in these CWSP forecasts is the breakdown by customer classes. Both Kirkland and Rose Hill are currently predominantly single family residential, with about seventy-five per cent of total consumption coming from single family and multi-family residential developments. This will continue to be a feature of both water service areas. However, these same projections to the year 2010 indicate that the proportion of total demand from residential developments will fall to about seventy per cent and the proportion of this demand total attributable to multi-family developments, as opposed to single family residential, will increase. These changes, which affect both Kirkland and Rose Hill, have more effect on the storage, transmission and distribution system than simply an increase in annual demand. Multi-family residential developments and commercial/office park developments generally have much higher fire flow and, consequently, fire storage requirements than single family residential developments. This means both larger transmission mains and increased storage capacity.

The projections produced for the East King County - CWSP were derived from updated runs of the consumption models used by the City of Seattle for their 1985 Water System Plan Update. Actual Eastside purveyor usage volumes for 1986 and 1987 were not reflected in the output for their base case set of assumptions. This can be seen in Table 4.1 where Kirkland's actual 1987 usage is almost as high as that projected for Kirkland by the CWSP, for the year 2000. This is of no major consequence as it is the ultimate development scenario and, to a lesser extent, the likely growth rates that determine the nature and scheduling of water system improvements. These demand projections were, of course, based on existing zoning and, if this were to change significantly, the forecasts could be in error. However, for the two water systems under consideration (Rose Hill and Kirkland), since no net service area boundary revisions are likely and much of the area within these boundaries has already been developed, the net effect on the projected magnitude of demand is very limited.

4.3 SOURCES OF SUPPLY

The Rose Hill Water District is currently totally dependent on the City of Seattle Water Department, and has no alternative sources. In the event that a consortium were to develop the North Fork of the Snoqualmie River, or links to other sources, then the District would be in the same contract position as many other Eastside water purveyors. In 1982, the City of Seattle entered into long-term supply contracts with 29 metropolitan water purveyors, including former King County Water District No. 81.

The major provisions of these thirty-year contracts, which expire in 2012 were as follows:

- Supply and Purchase - Seattle agrees to supply, purveyor agrees to purchase
- Term - 30 year contract with 15 year extensions
- Supply Reliability - Seattle plans, develops, maintains and operates the system. In the event of shortages, all parties share any restrictions equally.
- Water Quality - Seattle must ensure compliance with regulations.
- Water Conservation - All purveyors assist and support Seattle's conservation plan and establish their own conservation programs.
- Purveyor Committee - To review and advise on planning, operations and rate-setting matters.
- Rate Setting - The rates charged must be based upon and must recover the cost of supplying these purveyors (rate details comprised 12 pages of contract text).
- Equity in new Expansion Facilities - Accounts are kept in the event of mergers, et cetera.
- Buy-Out Clause - to permit purveyors to "buy out" upon five years' notice, but also contains a "Hold Harmless" clause.
- Purveyor Consortium - While it is Seattle's obligation to develop new facilities, the contract recognizes an option for purveyors to form a consortium and develop these new facilities themselves.
- Purveyor Independence - The individual purveyors retain the right to plan, develop, operate and set rates for their own systems.
- Uniform contract provisions - each purveyor has the same basic rights and obligations under the contract.

Essentially, these long term contracts have two objectives. Water purveyors, who had been purchasing treated water at wholesale prices from the Seattle system, wanted assurance of service continuity, with protection against arbitrary price escalation and some say in how the system was run. The City of Seattle - Water Department wanted long-term certainty of demand before investing in facilities to meet the long term needs of both their own direct-service customers (the City) and those of the adjacent metropolitan area purveyors.

The current wholesale rate structure is a two-tier rate. An "old water" rate is set to cover the costs of providing the amounts of water used by purveyors immediately prior to the contracts and a "new water" rate to reflect the higher cost of delivering water, in excess of the base amount. Under this two-tier rate, the City of Seattle - Water Department recovers the same total amount of revenue, but purveyors whose growth in demand has caused the need for new facilities now contribute more than those with less growth. Thus, Water Districts in unincorporated areas of King County are likely to pass on a higher charge to their customers than a municipality with near saturation development within its service area/corporate boundaries.

The Rose Hill Water District has three metered connections to the City's eastside supply line (TESSL). This line runs south along 132nd Avenue N.E. in a 48-inch diameter pipe, then southeasterly in a 42-inch diameter pipe along N. E. Redmond Way to the 140th Avenue N. E. intersection where it continues south along 140th Avenue N.E. in a 36-inch diameter pipeline. This pipeline joins the 36-inch diameter supply line from the south - Cedar Eastside Supply Line (CESSL) - in Bellevue where a 32 MG storage reservoir and pumping station is currently under construction.

4.4 CONSERVATION PROGRAM

There are two parallel avenues that can be pursued simultaneously by the Rose Hill Water District in order to encourage and increase water conservation and diminish misuse of the water resource. The increase in population within the water service area will continue to escalate the overall total demand for water. Since water is a renewable, but annually fixed or finite resource, effective utilization within the service area is one method of deferring the capital intensive investments that must be made to increase the magnitude of this annually finite resource.

The first avenue is through system improvements to reduce overall unmetered flows. What can readily be measured are the volumes of water withdrawn from the TESSL system and those volumes conveyed to the adjacent municipalities and individual customers within the service area. The differences between these two volumes is the overall system loss. Part of the loss will be due to non-metered, but probably quite legitimate usage, but the remainder, and by far the largest proportion, will be due to leakage. Consequently, a system-wide leak detection and repair program is an essential part of any conservation plan.

The counterpart to specific system improvements to reduce losses is efficient water usage by consumers. Several avenues of pursuit are available to purveyors including; consumer education and the rate structure.

The rate structure comprises two components; a base rate and a volume charge. Essentially, the base rate should recover those costs related directly to customer services, such as; meter reading, billing, collection and part of the general administration costs. The volume charge, sometimes referred to as a commodity charge, should recover those expenses that relate directly to the volume of water used by each customer. However, a third component is present which is related to overall demand. These are the costs relating to designing, building and maintaining a water system. These costs form a demand component that is incurred regardless of whether the District's customers actually use the system's entire capacity.

The rate structure adopted by any purveyor must achieve the primary objectives of raising adequate revenues, while being equitable. Since the District purchases water from the City of Seattle at two different "rates", the total cost of bulk water is a function of agggregate demand. However, new customers, who by definition will create the demand for new water, will pay a new water surcharge in a lump sum. This surcharge has been designed to draw down the new water surcharge account to nil over the thirty-year life of the present purveyor contract with the City of Seattle. The surcharge permits all customers (new and old) to be charged the same monthly base and unit rates for service and consumption.

Basically, two options are available to any District.

- Encourage revenue stability; or
- Encourage water conservation

To encourage stability, a large proportion of the total revenues required should be recovered from the base rate, whereas to encourage conservation, one should recover most of the required revenues from volume charges.

From an equity viewpoint, a high base rate and correspondingly low volume charge impacts adversely on low volume users - those who are already pursuing their own conservation program and does not encourage conservation by those not already attempting to do so.

Conversely, a high volume charge and low (less than cost) base rate makes the District financially vulnerable to changes in consumption. A drought with mandatory or voluntary consumption cut-backs would leave the District with a proportion of fixed costs not covered by monthly billings. Hence, most districts, including Rose Hill, attempt to balance these two issues with a tendency to recover most of their fixed costs through the base rate. Certainly, there is no discount for high volume users as is often the practice with many other utilities. Nor is there a minimum volume charge built into the base rate; a volume charge is levied for every cubic foot consumed.

With the current volume charge comprising mainly those variable costs associated with purchasing bulk water, an opportunity exists for considerable consumer education before the next adjustment in bulk unit rates charged to Rose Hill and other Eastside purveyors by the City of Seattle - Water Department. The new SWD water charges to purveyors for the period 1989-1999 are not yet known as they are currently under negotiation. However, these are likely to include additional cost incentives, or penalties to reduce both total system withdrawals and peak flow demands.

Peak daily flow demands, particularly during the high demand season, June through August, show a mid-day and early evening peak. Recently, conservation practices have been primarily concerned with restricting lawn water use (irrigation) based on a house numbering system. This reduces both total system withdrawals and the daily peak flow. However, more sophisticated techniques are available and more consumer education is required before they can successfully be implemented.

In general, the voluntary conservation techniques can be classified under two broad categories:

- Water saving devices; and
- Water saving practices.

The water-saving devices, once installed, tend to be passive; no further thought being required on the part of the consumer. These devices range from installation of flow control features, to use of toilet tank inserts, from small diameter garden hoses, to controlled sprinkler systems with a landscaping and plant selection scheme that requires little water. However, they are capital intensive, particularly for retrofitting where the existing fixtures are serviceable and a considerable investment has already been made in landscaping.

The water saving practices generally need little or no capital investment, but require conscious effort, education and development of a number of conservation habits. These range from taking showers instead of baths, to catching rooftop runoff for irrigation and washing vehicles less frequently and even then from a bucket.

The overall objectives are first to reduce waste of water and, second, to reduce per capita consumption. If this particular regional program does not succeed, then the regional supplier will have little alternative but to develop new sources of supply, or impose rationing with financial penalties for non-compliance. The financial costs of any new source developments will ultimately be passed on to the purveyor in the form of very high volume charges and perhaps other environmental costs.

4.5 CONSUMPTION STUDIES

Four separate study elements can be identified:

- Residential consumption studies;
- Multi-family consumption studies;
- Non-residential customer consumption studies; and
- Non-revenue consumption audits.

For the Rose Hill Water District, well over one-half of the volume withdrawn over any period is conveyed to the adjacent municipalities of Kirkland and Redmond. There is also a metered intertie between Rose Hill and the City of Bellevue which is largely inactive, although the City of Bellevue still maintains its 1.5 MG share of the 11.2 MG South Tank. Rose Hill's consumption efforts are, therefore, solely directed toward only their portion of the total withdrawals from the TESSL system.

The non-revenue consumption audits have been described elsewhere in other reports. Essentially, they attempt to monitor the volume difference between purchases and sales. Non-metered usage can be reliably estimated if not controlled, but leak detection prior to catastrophic breaks and service interruptions is an on-going operations and maintenance function.

From an analysis of customer accounts, eighty-six per cent of the customers fall into the single family residential category, with the remainder split evenly between the commercial/industrial category and multi-family category. Even under ultimate development conditions, this predominance of single family residential customers will remain.

The District's 1987 consumption studies indicated, however, that only sixty-one per cent of the total consumption was from single family residences, whereas fourteen per cent came from multiple family residential complexes. This leaves twenty-five per cent of the total consumption by seven per cent of the customer base - commercial/industrial, which includes; schools, motels, and light manufacturing. From a consumer education efficiency viewpoint, if this consumption contains elements of over-use, significant volume reductions can be affected by targeting the consumption programs toward this very small group of water users.

It should be remembered that the number of customer accounts represents simply the number of entities receiving regular water bills based on their metered usage. Multi-family residential complexes generally only have a single metered connection and the entire complex receives one bill. Although the water consumption

of each residential unit within a multi-family residential complex is generally less than that of a single family residential unit, additional volumes are used for the complex's communal amenities such as swimming pools, landscaped open spaces and parklands.

This category of customer, while representing only seven per cent of the customer base, accounted for fourteen per cent of the total consumption. Again, the small proportion of the total number of accounts represents a convenient and significant target for effective conservation programs.

Rose Hill Water District has distributed the City of Seattle sponsored conservation kits to all single-family residential customers, but have not yet embarked on special conservation programs for their multi-family, or commercial/industrial customers. The new rate system, which has only just been introduced, has been designed to benefit the low volume, frugal user; while maintaining some degree of revenue stability. Consumption patterns will continue to be monitored to determine the overall effect of the new rate system. The new City of Seattle water rates to purveyors for 1989-1991 will be implemented on April 1, 1989.

The District will not set its customer rates for 1989 until the details of these new rates are known and will not update their current rate model until that time. The District authorized a financial consultant to study the customer rate schedules in 1987 and make projections for the next six years. The work has been largely completed, but will be reviewed again in the light of the City of Seattle's purveyor rates for the period 1989-1991.

4.6 TOTAL STORAGE REQUIREMENTS

In general, the State of Washington - DSHS requires that all water systems must be able to meet a minimum daily demand of not less than 800 gallons per day per residential connection, or equivalent; be able to deliver water at a rate that will meet instantaneous flow demands and deliver it at a pressure of not less than 20 psi, under normal peak flow conditions. From these very simple requirements, a number of associated criteria have been developed. These recognize that, in many large metropolitan areas, the water systems have become increasingly complex, with thousands of equivalent connections and bulk water purchased from regional suppliers. In fact, for the metropolitan Seattle area from an operational viewpoint, a strong case can be made for the purveyor's pumping, storage and transmission systems to be fully integrated with the Seattle Water Department's reservoirs, pumping and transmission systems. This is, however, well beyond the scope of the water system plan.

The ultimate storage capacity requirements for the Rose Hill Water District have been based solely on meeting demands within the franchise boundaries. Consideration has not been given to the ultimate requirements of the municipalities of Kirkland and Redmond. Eventually, and it may be within the next five or ten years; the Rose Hill Water District may be dissolved and the service areas, respectively, east and west of 132nd Avenue Northeast merged with Redmond and Kirkland. At that stage, if not before, it would be prudent for either municipality to be fully aware of its own total storage requirements. In terms of planning, both municipalities would have to ensure that, for both their existing and (future) ultimate numbers of equivalent service connections, sufficient standby, fire flow and equalization storage was either available, or planned.

A preliminary first step would be for Kirkland, Redmond, Bellevue and Rose Hill to mutually agree on the method for computing the ultimate total storage requirement and the rationale underlying calculation of the three components that make up this total storage requirement.

Fire Storage

Possibly the least contentious of these requirements is the calculation of that storage required for fire fighting:

For that portion of the Rose Hill service area within the current corporate limits of the City of Redmond, the highest current fire flow requirement is 3,000 gpm for four hours. This leads to a minimum 0.72 MG fire flow storage requirement and possibly more.

For that portion of the Rose Hill service area within the current corporate limits of the City of Kirkland, the present highest fire flow requirement is 5,000 gpm for four hours. This leads to a minimum 1.20 MG fire flow storage requirement and, again, possibly more.

Some special purpose districts compute their total fire storage requirements by summing the maximum requirements for each pressure zone. For example, if six separate pressure zones are served by a combination of pumping, gravity flow and PRV stations from one reservoir complex, the total fire flow storage requirement is given by the maximum fire flow requirement in each zone, summed over all six zones. Essentially, this assumes a worst case scenario, with near simultaneous fires in each zone.

An alternative, less conservative, approach would be to assume that the likelihood of near simultaneous fires is exceedingly low and to provide fire storage for only the single largest fire flow requirement among the zones served by that storage facility. For large districts for which topography dictates the use of several reservoir complexes, particularly if pumping between reservoirs

is not possible, the fire storage requirements, however computed, must be individually met by the storage (and pumping) facilities serving those particular pressure zones. Excess storage capacity in one area being of minimal benefit to some other hydraulically remote area that has less than minimum storage.

For the Rose Hill Water District, fire flows to the highest elevation pressure zone (elevation 650 feet) must come either directly from the TESSL system if the City of Seattle pressures are high enough, or by pumping from the elevation 545 feet, 11.2 MG storage reservoir. It should be noted that this storage facility is shared by Kirkland, Rose Hill and Bellevue on a 5.6 MG, 4.1 MG and 1.5 MG basis. Hence, it can be argued that Rose Hill's fire storage requirements; indeed, all of their storage requirements, must be met only out of their 4.1 MG "share" of this particular facility.

At some point in time, the District will be dissolved and merged with the Cities of Kirkland and Redmond. Doubtless, these two municipalities will be able to devise a joint operation and maintenance agreement for the acquired storage facilities. Some proportion of Rose Hill's present 4.1 MG storage, plus whatever more storage they have constructed, will be dedicated to Kirkland, the remainder to Redmond. Again, some proportion of this storage will be dedicated to fire flow requirements in the two municipalities. Hence, it will remain important for all interested parties to find a rational basis for computing their ultimate storage requirements. Furthermore, storage volumes for fire flows will be only one of three components of this storage.

Standby Storage

According to DSHS regulations, the minimum standby storage for a system of one hundred or more connections, with multiple supply sources, is 800 gallons per equivalent residential connection. This requirement can be reduced, but in no case can it be reduced to less than 200 gallons per equivalent connection.

To determine the appropriate reduction, if any, with supply through multiple sources; the largest capacity source (pump, metering valve or well, et cetera) is assumed to be out of service. The combined supply ability of the remaining sources is computed on a gallons per equivalent connection basis. The minimum storage volume being given by the difference between 800 gallons and the remaining sources contribution, times the number of equivalent connections.

For the case of Rose Hill, until the TESSL No. 2 line is complete (not just Phase 1), there is really only one source, a large diameter pipeline (TESSL No. 1) with three metered connections. However, the SWD has the capability to feed TESSL No. 1 from either the Tolt system or from the CESSL system and the Eastside Reservoir and Pump Station. In the event of a major break along

the TESSL line, outside of the Rose Hill boundary, the line could still be supplied from the other end. Equally, if one of the metering stations were out of service, supply could be maintained from the other two. Accordingly, we consider that the DSHS requirement could reasonably be dropped to 400 gallons per equivalent connection, but probably not the minimum 200 gallons per equivalent connection, as there is still only one supply pipeline.

In any case, there is an argument for providing a total storage capacity equivalent to peak day consumption plus fire storage equal to the sum of the highest fire flow requirements in each pressure zone. If the peak day plus fire storage is equal to or exceeds that volume given by standby, plus equalization, plus fire storage, then the intent of DSHS requirements will have been met.

DSHS also has a requirement regarding pumping capacity for both, pumps delivering to storage and for continuously running service pumps. Essentially, these pump installations must be of efficient capacity to replenish standby storage within 72 hours after termination of the emergency and, while so doing, be able to continue to meet the normal daily demand requirement of 800 gallons per equivalent connection.

Equalizing Storage

Equalizing storage helps provide water during daily periods of heavy consumption. This type of storage allows the use of smaller and therefore more economical pumps and places a less variable and lower overall peak demand on the source of supply. This effectively enhances the capacity of major transmission pipelines from the supply source as they do not have to be sized to supply peak demands. These benefits are economic and affect both the supplier of bulk water and the purveyor.

For any particular situation, the volume of storage required for equalization depends on the peak day system demand, daily and hourly variation in system demand, the rate of supply and the number of hours per day the supply source is producing. For the Rose Hill Water District, the source is available twenty-four hours a day and the theoretical replenishing rate also becomes almost arbitrary.

Using the mass diagram for the rate of demand which the State of Washington - DSHS has deemed typical for many municipalities, it is possible to determine an infinite number of combinations of pumping capacity (rate and duration) and storage capacity that are applicable to any given situation. In many cases, the combination sought will be that replenishing (inflow) rate that leads to the minimum equalizing storage volume. Because the diurnal demand curve is not a straight line, to minimize storage volumes this replenishing rate will be somewhat higher than that given by the average demand over the whole twenty-four-hour period. For

Rose Hill, the equalization storage volume was computed to be just under 100 gallons per equivalent service connection. To make reasonable allowances for less than one hundred per cent equipment availability, a twenty-hour, rather than a twenty-four hour resupply cycle was assumed.

Discussion

The total storage requirement is the sum of these three components. Since the calculation of both standby storage and equalizing storage is somewhat arbitrary, there is some merit in examining an alternative policy of storing sufficient water for peak day consumption, plus the fire storage requirement. Certain assumptions must be made regarding the SWD's ability to get the line back into service after a break, or following an unscheduled service emergency. Based on recent experience, a repair to ensure partial service should take no more than three days, but restoration of full-service might require longer and perhaps a scheduled service interruption. Certainly, it would appear prudent to have sufficient water in storage to cover three days of average consumption, plus the fire storage requirement. With public appeals for restricted usage, limited service from storage only, might well be available for a much longer period.

This general storage requirement is further confounded by the Seattle Water Department's demand surcharge and the technical problems presented through supplying a large pressure zone from elevated storage. For the latter, system pressures are not constant, as in the case of direct pumping, but vary with reservoir level. For the former, the daily operational temptation is to maintain the reservoirs never more than partly full. Thus, if demand is less than predicted, the surplus (over that constant 24-hour flow rate - dialed in) can be placed in storage.

The demand surcharge was levied by the Seattle Water Department to encourage purveyors to construct their own storage facilities, rather than rely on the City's pipelines supplying varying volumes from the Cedar and Tolt river systems on an as required basis. To a large extent, most Eastside purveyors, including the Rose Hill Water District, have built the required minimium storage facilities and are planning construction of more. Since the total capacity of the SWD's system is a function of the SWD's transmission, pumping and storage facilities, plus the purveyors pumping and storage facilities, there is some merit in modeling the combined facilities of the City and the purveyors. Such a model may suggest alternative operational practices and rate schedules that have no net adverse effect on overall revenues, but simply increase overall efficiency.

CHAPTER FIVE
EXISTING
WATER SYSTEM

CHAPTER FIVE

EXISTING WATER SYSTEM

5.1 GENERAL

The following sections describe the existing water system within the Rose Hill water service area. Included are discussions of present supply sources and possible alternative sources. Other sections describe the existing transmission and distribution system, storage facilities and pressure reducing stations.

The Rose Hill Water District is a purveyor with a long term supply contract with the Seattle Water Department. They make bulk purchases of water from the SWD and convey the water to customers within their service area. In addition, they convey water to the adjacent municipalities of Redmond and Kirkland, who presently have no direct taps to the SWD's large diameter transmission pipelines.

The water service area is divided into seven pressure zones, the boundaries of which are determined by elevation contours. In addition to the transmission and distribution network, that has developed in the District over the past forty years, the District has also constructed storage reservoirs and a booster pump system. Although, for much of the year, supply pressures in the Seattle transmission system are held to the elevation 650 foot pressure gradient, the District's highest elevation storage reservoir has an overflow elevation of 545 feet. Hence, booster pumps are required to provide adequate service and fire protection to the District's higher elevation pressure zones when the SWD system pressures fall below elevation 650.

5.2 REGIONAL WATER SUPPLY

The City of Seattle has been the regional water supplier to many communities in the metropolitan Seattle and King County area since the 1930's. Their presently developed sources are the Cedar and Tolt River systems. The Cedar River system was developed at the turn of the century, whereas the Tolt River system was not devloped until the early 1960's.

The Cedar River drains a watershed of 143 square miles. Two dams on the river provide 40,000 acre-feet of storage at an elevation of 1,555 feet. The transmission system has a capacity of about 220 MGD and current developed average annual water supply from the Cedar River is 116 MGD. The Seattle Water Department has a water rights claim for an average annual diversion rate of 300 MGD from the Cedar River.

The presently developed Tolt system comprises a 19-square mile watershed. The South Fork Tolt dam provides 56,000 acre-feet of storage at an elevation of 1,765 feet. The water is diverted into the Tolt Regulating Basin, at elevation 760 feet. The transmission system comprising the Tolt River Pipeline No. 1 (TRPL No. 1), has a capacity of about 110 MGD. Current developed average annual water supply is 53 MGD. The Seattle Water Department has water rights for an average annual diversion rate of 150 MGD from the Tolt River.

About one-third of Seattle's total present supply is transmitted via the 66-inch diameter TRPL No. 1. At the TESSL junction, a portion is diverted south toward Redmond and Bellevue, with the remainder being discharged into the Lake Forest Park Reservoir. Cedar River water is diverted at Landsburg and is conveyed through a 96-inch diameter tunnel and two 78-inch pipelines to Lake Youngs. Downstream of Lake Youngs, water passes through a control works into the four Cedar River pipelines (CRPL No. 1 to CRPL No. 4). CRPL No. 4 divides and supplies the Midway area to the west and the Cedar Eastside Supply Line (CESSL) to the north.

The 36-inch diameter CESSL and TESSL supply lines are joined in Bellevue, so it is possible to maintain supply to all Eastside purveyors in the event of a break, or a service shut-down, in either the CRPL No. 4, or the TRPL No. 1 supply lines. Since the Cedar source is not only the largest, but the water is superior in quality, the Tolt source is generally only used during the high demand season. For the remainder of the year, the TESSL pipeline carries water from the Cedar River watershed and the TRPL No. 1 is shut down east of the TESSL junction.

Overall system reliability will be improved upon completion in 1988 of the 32 MG Eastside Reservoir and associated 4,500 foot long TESSL extension to the reservoir which has an overflow elevation of 550 feet. A fourth pump station,the TESS Eastgate Pump Station, is also to be constructed which will pump water to, or from, the new Eastside reservoir and the Tolt Eastside supply line (TESSL).

Depending on overall Eastside demand growth, a second Tolt Eastside supply line (TESSL No. 2) and a two-phased second Cedar Eastside supply line (CESSL No. 2) are planned, as is a second Tolt River pipeline (TRPL No. 2). These pipelines, when completed, will have the effect of both increasing supply reliability in the event that one line must be taken out of service for maintenance or repair, and provide increased peaking capacity during periods of high demand.

Phase 1 of the TESSL No. 2 line will be in service by mid-1990. However, initially, this will be only a large diameter spur from the existing TESSL No. 1. This phase of construction will improve bulk water deliveries to the City of Redmond, but will have no overall effect on total system capacity, or reliability.

5.3 ALTERNATIVE SOURCES

Presently, the Rose Hill Water and Sewer District purchases all its water from the City of Seattle Water Department under a standard thirty-year purveyor contract. This contract, under certain conditions, permits limited development of alternative sources such as groundwater. Similarly, it recognizes that at some point in the future, as total demands on the SWD system increase, another major source of supply will have to be developed. The Seattle Water Department may then become only one of several regional suppliers.

Under a number of scenarios currently under study, water supply on a large regional basis would share existing SWD transmission pipelines and involve construction of new regional pipelines. Some scenarios, looking well into the future, envisage Pierce, King, Snohomish, Skagit and Whatcom Counties, all linked with large transmission pipelines, utilizing existing reservoirs and constructing new storage facilities. Certainly, from the State viewpoint, future water supply to the Puget Sound area is a much larger issue than purveyor contracts with regional suppliers.

Since Rose Hill currently has no water sources of its own, a significant component of the District's operating costs are the charges levied by the SWD for supplying bulk water. These charges comprise two, or perhaps, three components.

- old bulk water water rates;
- new bulk water water rates; and possibly,
- demand surcharges

The old and new bulk water water rates came into being because Seattle wished to differentiate between those (new) customers whose demand for water was creating the need for major capital investments and those (old) customers who were not contributing to this increase in overall demand. By imposing a two-tiered rate on purveyors; those purveyors who are experiencing demand growth, due to development within their service area boundaries and are thus contributing to the need for new sources, will be paying proportionately more than a purveyor whose overall consumption patterns have been comparatively static.

Rose Hill currently buys water at the old and new rates. Their sales to the City of Kirkland are pro-rated at the old and new rates, as the City of Kirkland was purchasing water before the 1979-1981 historical averages (consumption) were computed by the SWD. In contrast, Rose Hill's sales to the City of Redmond are at a marked-up, new water rate. Redmond did not begin purchasing water from Rose Hill until the mid-1980's, after the historical averages were set. The twenty per cent mark-up is applied because Redmond, unlike Kirkland, did not participate in the costs of installing the necessary transmission pipelines from the TESSL pipeline and existing storage facilities.

The demand surcharge is levied when a purveyor's withdrawal rate on the system exceeds 1.3 times their average withdrawal rate for that twenty-four hour period. The City of Seattle wants purveyors to withdraw their supplies at a near constant rate over each twenty-four hour period, nine a.m. to nine a.m. the following day; supplying any peak demands from storage and not by varying their withdrawal rates from the regional transmission system. The demand surcharge is presently only computed over the summer months; June, July and August, but the SWD may extend this to other months, if fluctuating purveyor demand over a twenty-four hour cycle continues to be a problem. The demand surcharge, which is essentially a storage penalty, is applied for twelve months beginning the following year. It was devised, and included in the purveyor contracts, to encourage (by penalty) purveyors to build adequate storage facilities.

A minor problem with the demand surcharge, for purveyors with adequate storage facilities, is the SWD's insistence on a near constant flow rate that does not deviate by more than thirty per cent from the average. If the daily total consumption prediction, made at nine a.m. turns out to be significantly higher than the actual; to maintain a near constant flow rate, the excess (SWD supply over purveyor consumption) must go into storage. If the reservoirs fill before the next regular flow control valve setting, the purveyor will be obliged to either divert the excess to waste, or reset the control valve. This "resetting" may sufficiently disturb the average withdrawal rate over that period such that a demand surcharge applies. Since the penalty must be borne for a full year, the operational compromise; since no purveyor discharges bulk water supplies to waste, is to maintain any reservoir facilities only partly full. Thus, the storage facilities which were originally built to provide emergency standby, equalization and fire storage are frequently operated to reduce the likelihood of demand surcharges being incurred. One partial result, of course, is that actual storage is only a fraction of installed capacity. This effectively defeats the original purpose of the surcharge.

Should a new regional supplier, or perhaps a consortium of suppliers and purveyors appear on the scene, it is possible that a number of Eastside purveyors would want to tap into the new source. One objective of any coordinated water system plan would be to avoid a situation where large regional suppliers were competing for purveyor contracts. However, implementation of these regional scenarios would still leave the District without an independent, supplementary, source of supply to utilize to its own advantage.

The overall customer base in the Rose Hill water service area is likely to virtually double in the next two decades, particularly if a significant proportion of the new construction is multi-family residential accommodation. If the SWD continues to charge their purveyors a two-tiered rate for bulk water supplies, very

large sums will have to be collected by the District in the form of a new water surcharge, or some equivalent charge. It is possible that the new water surcharge may, in fact, restrict development. On a County-wide basis, a number of general proposals are being considered that will shift more of the costs of infrastructure improvements on to the developers whose projects help create the need for these improvements.

Either way, Rose Hill is likely to find that an increasing proportion of its bulk purchases are going to be at the premium rate for new water. When the City of Redmond begins direct bulk water purchases from the SWD in mid-1990, Rose Hill's total purchases will fall. All of this decrease will be in the new water portion of their purchases. However, this portion will rise as unimproved properties are developed and existing properties are redeveloped within the Kirkland and Rose Hill water service areas. If new source development, or transmission improvements, by the SWD, lag a regional increase in demand, some type of use restriction may come into effect during periods of high demand.

Since even a modest groundwater source can have such an enormous impact on peak demand capability and overall bulk water costs, particularly given the regional suppliers current rate structure, the District has been investigating for the possibility of developing a groundwater source within their water service area. Even a modest yield well, at (say) 500 gallons per minute, pumped for only part of each day, yields over one-half million gallons. A number of potential sites has been identified in the northeastern sector of the District. Deep wells offer the advantage that contamination from surficial pollutants is somewhat less likely than shallower wells. In addition, within the aquifer, the zone of influence is less likely to have adverse impacts on adjacent property owners, particularly if the latter have already developed a shallow groundwater source for their own purposes.

The District has reviewed a preliminary report prepared by a specialist, groundwater consulting firm and is in the process of acquiring use, or outright ownership, of suitably located property. Should this proposed drilling program prove successful, the intention is to eventually develop a least one deep well to augment bulk water purchases from the City of Seattle.

In general, these wells are not pumped for more than eighteen hours each day. This prevents excessive drawdown and permits orderly servicing and maintenance of the pump station. Because the heavy demand generally only occurs during the period June to August, there would be no particular demand-related need to operate these facilities for twelve months each year. Again, this would enhance regional recharge of the aquifer, but extend the pay back period for the capital investment. Since present supplies from Seattle are chlorinated, supplies from the source would be similarly treated, if required. Difficulty has been

experienced with Tolt (as opposed to Cedar) untreated water being particularly corrosive. As part of the auxiliary source evaluation program, water quality analyses will be conducted. These tests will result in a realistic assessment of any potential corrosion problem associated with utilizing a local groundwater source to augment bulk deliveries by the Seattle Water Department.

Development of Ground Water Sources

The general purveyor contracts with the Seattle Water Department permit augmentation of supply using other sources. However, there are restrictions:

- Five years' written notice;
- A hold harmless clause with compensation paid by the purveyors; and
- Compensation to be determined by SWD.

In view of recent supply restrictions, particularly during the summer, these contract conditions may not be enforceable. The regional supplier (SWD) favors purveyors augmenting their supplies only during the peak demand season, as this would reduce peaking demand on the existing system. However, if (say) a groundwater source with a sustained yield as low as 210 gpm (0.3 MGD) were developed, any purveyor would be reluctant to utilize this source for only four months each year - as this restricted usage would extend the breakeven period for the return on investment.

5.4 EXISTING TRANSMISSION SYSTEM

The Rose Hill transmission system is essentially that network of pipelines, twelve-inches in diameter, or greater, that conveys water from the TESSL system to the storage tanks, pump stations, pressure reducing stations and the metered supply connections to adjacent municipalities. It should be noted that over one-half of the water volumes withdrawn by the District from the City of Seattle system, is conveyed, either directly, or via storage reservoirs, to the adjacent municipal purveyors, Kirkland and Redmond. Originally, of course, Water District 81 (Rose Hill) purchased its water from Kirkland, who had its own supply sources and Redmond has its own well system. Now, Redmond must purchase bulk water to augment its well supplies and the City of Kirkland abandoned its own sources long ago.

The Seattle Water Department's TESSL No. 1 pipeline runs approximately north-south through the middle of Rose Hill's service area. Since neither municipality presently has direct taps to the TESSL system, they purchase bulk water from the District, taking advantage of the District's pumping, storage and transmission/distribution system. For many years, the City of

Kirkland has always financially participated in capital improvements to the general facilities that had an impact on service. In contrast, the City of Redmond, who has only been purchasing bulk water from Rose Hill since the early 1980's, has never financially participated in capital improvements to the transmission and storage systems.

Three large diameter transmission mains have been laid to supply the City of Kirkland. These are twenty-inch, sixteen-inch and twenty-four inch diameter, together with large capacity metering stations at the service area boundaries. Kirkland's adjacent pressure zones are elevation 545, 450 and 395, identical to existing and proposed pressure zones within the Rose Hill service area. One of the four metering stations includes a PRV to feed part of their 450 pressure zone from an elevation 545 supply.

In comparison, the pipelines used to convey water to the three City of Redmond metering/pressure reducing stations are longer and of smaller diameter. They were constructed to facilitate transmission to the distribution system within the easterly portion of the District's service area. This construction took place over many years, but was largely complete before Rose Hill commenced supplying bulk water to the City of Redmond system. Two Redmond pressure zones are involved; the 238, which is supplied from Rose Hill's 285 zone and the 335, which is supplied from Rose Hill's 350 zone.

To a certain extent, the nature of any planned upgrading of the transmission/distribution system to the east of the TESSL No. 1 pipeline has been dependent upon Redmond's long-term planned purchases of bulk water. Several options have been under study, including; bulk purchases direct from the City of Seattle, under a purveyor contract and continuing to purchase some bulk water from the District.

Accordingly, the transmission system improvements outlined in this comprehensive plan are those designed primarily to enhance transmission and distribution within the District's present service area. Naturally, these transmission improvements, within the District's system, have some enhancement effects at the service area boundaries. In some cases, more extensive improvements are required to fully enhance transmission to consumers outside the District's franchise area. Implementation of these more extensive improvements; that is, improvements beyond those which are required for service within the District, are subject to negotiation with adjacent purveyors.

5.5 EXISTING STORAGE

The District has two reservoirs and associated transmission lines that nominally have a total storage capacity of 12.7 MG. However, this volume is not entirely available to meet the equalization, standby and fire flow storage requirements of the District.

The north tank, a 1.5 MG standpipe located at N. E. 108th Street an 132nd Avenue N. E., has an overflow elevation of 454 feet, but is not utilized to provide storage for the 425 pressure zone. Rather, it is used as a pump primer for supply to the 545 pressure zone. We do not believe that it is appropriate to include this facility when addressing any overall storage requirements.

The south tank, an 11.2 MG reservoir located at N. E. 65th Street and 132nd Avenue N. E., has an overflow elevation of 545 feet. It is utilized to provide storage for the 545 pressure zone, lower elevation pressure zones within the system and as a pump primer to supply water to the elevation 650 pressure zone when the City of Seattle supply pressure is insufficient. However, this particular storage facility was constructed with participation from the Cities of Kirkland and Bellevue. Rose Hill Water and Sewer District owns a 36.4 per cent share of the facility, amounting to 4.1 MG. Using the present (Spring, 1988) number of equivalent connections, it is likely that insufficient standby storage is available, even neglecting any equalization and fire flow requirements.

A significant operations consequence to the City of Seattle demand sucharges is now affecting all purveyors; particularly those who have constructed more than adequate storage facilities. One purpose of the demand surcharge was to encourage purveyors to construct their own storage facilities and thereby reduce peak demand flows on the SWD transmission system; that is, supplying the[illegible]n [illegible]eak demands from storage, rather than directly from [illegible] trans[illegible]ssion [illegible]line. However, since the demand surcharge is [illegible]ased [illegible]viatic[illegible]s from a constant flow rate, that is dialed in on a da[illegible] basis, [illegible]here is a significant penalty to the purveyor if the real demands are less than those predicted. The operational solution, to minimize these surcharges, is to keep the reservoirs only partly full. Thus, if demand is less than predicted, the magnitude of any apparent peak, due to a low demand trough, can be masked by putting these "excess" volumes into storage.

5.6 EXISTING FIRE FLOW REQUIREMENTS

One basis for assessing that portion of total storage that should be dedicated to fire flow storage is to sum the maximum fire flows that occur in each pressure zone served by that storage facility. For the current pressure zone configuration and storage capacity utilization at Rose Hill, the following assessment would apply:

Pressure Zone	Required Storage	Comments
650	0.24 MG	Pumped from 545 or TESSL supply
590	0.24 MG	PRV from 650 zone
545	1.20 MG	South Tank or TESSL supply
425	0.60 MG	PRV from 545
395	0.60 MG	PRV from 425
350	0.24 MG	PRV from 425
285	0.96 MG	PRV from 425
Total	4.08 MG	

It may be overly cautious to assume near simultaneous fires in all seven pressure zones, but it would not be unreasonable to assess the storage requirement as the two highest flow rates; that is, 5,000 gpm for 4 hours in the 545 zone and 4,000 gpm for 4 hours in the 285 zone. This would give a fire storage requirement of about 2.16 MG.

Rose Hill, unlike many Eastside purveyors, does not possess many opportunities for meaningful emergency interties with adjacent special purpose districts and municipalities. To the south, there is a metered connection to the City of Bellevue system, to the north, there are possibilities of interties to the Woodinville Water District and the Northeast Lake Washington Sewer and Water District.

In the event of a shutdown of the TESSL pipeline, the Northeast Lake Washington Sewer and Water District would have difficulty in providing emergency service from storage to the Totem Lake area. This elevation 446 pressure zone (future upgrade to 450) could be intertied to Rose Hill's 395 pressure zone. It is possible that NELWSWD would be interested in participating in construction of Rose Hill's proposed elevation 450 storage reservoir at the North Tank site.

The City of Redmond theoretically could help with emergency service to the lower pressure zones. Kirkland, of course, has no storage other than that shared with Rose Hill and Bellevue. Hence, it is important that Rose Hill maintain adequate storage, as they will not be able to obtain significant emergency assistance from their corporate neighbors, particularly for their higher elevation pressure zones.

5.7 EXISTING DISTRIBUTION SYSTEM

The Rose Hill Water District currently obtains all of its water from the Tolt Eastside Supply Line (TESSL No. 1). From its junction with the sixty-six inch diameter Tolt River pipeline (TRPL No. 1), north of Totem Lake, the forty-eight inch diameter Tolt Eastside Supply Line is routed southward toward Bellevue.

The forty-eight inch concrete pipe follows the 132nd Avenue N. E. right-of-way, south to the Redmond Way intersection. A forty-two inch diameter line is installed along Redmond Way (SR 903) to the 140th Avenue N. E. intersection. From this intersection, a thirty-six inch diameter line is routed south along the 140th Avenue N. E. right-of-way into Bellevue, past the N. E. 55th Street intersection which is the southern limit of Rose Hill's service area.

The total system head* normally maintained in the TESSL system varies from 650 feet to 525 feet. However, much of Rose Hill's service area lies at elevations between 200 and 500 feet above sea level. Hence, to ensure reliable service to the upper elevations of the service area, the District has had to install booster pump stations. These stations automatically cut-in when total system head falls below certain pre-set levels.

Over the past forty years or so, a pipeline network has been developed within the service area to supply a wide range of customer classes with adequate flows. In general, the minimum pressure requirement at a service connection is 45 psi (105 feet of head), whereas the maximum is 105 psi (245 feet of head). For service connections in excess of 105 psi, an individual pressure reducing valve (prv) is generally installed.

From its three active metered connections to the TESSL system, the District services five major and two minor pressure zones. These are:

650	590
545	425
395	350
285	

In addition to providing appropriate pressures at the service connections, there are corresponding fire flow requirements within each pressure zone. In terms of flow rate, these requirements totally dominate pipeline system design. For example, the minimum design flow/rate for a single family residence is only two gallons per minute, whereas the fire flow requirement at each hydrant in an industrial area may be as large as five thousand gallons per minute. This water is either transmitted directly from the TESSL system, or piped and/or pumped into storage reservoirs, or pumped directly from the SWD system.

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*1 psi = 2.309 feet head; therefore, for an 80 psi service pressure at a location (say) 450 feet above sea level would require a total head of about 635 feet.

285 Pressure Zone

This, the lowest pressure zone, serves primarily the Willows Road Industrial area along the easterly boundary of the District, and a small isolated residential area just off the West Lake Sammamish Parkway in the southeastern corner of the District. This entire pressure zone lies along the lower western slopes of the Sammamish Valley, within the corporate boundaries of the City of Redmond. Flows to this zone are provided by a number of pressure reducing stations from the adjacent 425 and 395 pressure zones to the west. Pumping stations are not required for this zone, nor are any storage facilities dedicated to its supply. The boundaries of this pressure zone are essentially the 40 foot and 180 foot elevation contours.

350 Pressure Zone

This very small minor pressure zone is located in the southeastern corner of the service area. Supply is via two pressure reducing stations from the 425 pressure zone immediately to the west. A mutual connection to supply the City of Redmond system is located at the eastern boundary of this pressure zone. This zone matches a similar small pressure zone supplied by the City of Redmond.

395 Pressure Zone

This pressure zone has been created to serve the northwestern portion of the service area near Totem Lake and that area north of N. E. 85th Street and immediately east of Interstate Highway 405. Supply to this zone is via a number of pressure reducing stations from the 545 pressure zone to the east. This zone presently has no storage, but pumping facilities are not required.

425 Pressure Zone

The pressure zone lies immediately west of the Willows Road - 285 pressure zone and extends from the northeast to southeast boundaries of the service area. The north-south boundaries of the pressure zone correspond to the 180-foot and 320 foot elevation contours. Supply to the pressure zone is via a number of pressure reducing stations located at the boundary with the 525 pressure zone which lies immediately to the west. The pressure zone has no storage, but again pumping facilities are not required to ensure reliable service.

545 Pressure Zone

This service zone extends virtually the length of the service area from north to south. It is bounded on the east by the 425 pressure zone and to the west by the 395 and 650 pressure zones. Supply to this zone is directly from the TESSL system via three metered connections and from the 11.2 MG south storage reservoir

located at 130th Avenue N. E. and N.E. 64th Street. The District's north tank, an old 1.4 MG standpipe located at N. E. 108th Street and 132nd Avenue N. E., also supplies this zone during peak demand periods through a pump. A pump station is also provided to serve the zone in the event that the pressures in the TESSL system fall below elevation 545. This particular pressure zone lies on either side of 132nd Avenue N. E. which will form the ultimate corporate boundary between the Cities of Kirkland and Redmond.

590 Pressure Zone

This minor prsssure zone is located along the western boundary of the service area south of N. E. 72nd Place. It was formerly part of the 650 pressure zone and is served via several pressure reducing stations from the 650 pressure zone. No dedicated storage is provided. Supply reliability is dependent upon pressures being maintained in the 650 pressure zone, either by the TESSL system or booster pumps. If both the City supply pressure falls and the pumps fail, a limited supply is available from the 545 pressure zone and reservoir.

650 Pressure Zone

The uppermost zone within the Water District is the 650 foot pressure zone. Supply is directly from the TESSL system which has a normal system head in the 640 to 680 foot range. When the SWD system pressure falls below 640 feet, a booster pump at the south reservoir site is activiated. Water is then pumped from the reservoir which has an overflow elevation of 545 feet. No storage reservoir is provided for the 650 pressure zone. The booster pump station consists of multiple pumps and a standby generator. In the event that the City of Seattle supply pressure head falls below 650 feet and all pumps fail, limited service is available from the 545 pressure zone.

5.8 EXISTING PRESSURE REDUCING STATIONS

The Spring, 1988, transmission/distribution system incorporates twenty-six pressure reducing valves (PRV's) which served the seven pressure zones within the District's service area. These PRV's are listed below and are grouped according to the pressure zone served.

650/590	N.E. 60th Street and 119th Avenue N.E.
SWD/650	N.E. 70th Street and 137th Avenue N.E.
545/425	N.E. 100th Street and 134th Avenue N.E.
545/425	N.E. 75th Street and 140th Avenue N.E.
545/425	N.E. 65th Street and 150th Place N.E.
545/425	Redmond Way and 140th Avenue N.E.
545/425	N.E. 80th Street and 140th Avenue N.E.
545/425	N.E. 70th Street and 148th Avenue N.E.
545/425	N.E. 51st Street and SR 520

545/395	N.E. 116th Street an 127th Place N.E.
545/395	N.E. 85th Street and 120th Avenue N.E.
545/395	N.E. 120th Street and 132nd Avenue N.E.
425/350	N.E. 51st Street and 162nd Avenue N.E.
425/350	N.E. 55th Way and 159th Place N.E.
545/285	N.E. 116th Street and 136th Avenue N.E.
425/285	Redmond Way and 152nd Avenue N.E.
425/285	N.E. 65th Street and 157th Avenue N.E.
425/285	N.E. 59th Place and 158th Place N.E.
425/285	N.E. 76th Street and 153rd Avenue N.E.
425/285	N.E. 68th Street and 155th Avenue N.E.
425/285	620' N and 825' E of SW Cor 2-25-5
425/285	360' N and 125' E of SW Cor 2-25-5
395/285	N.E. 128th Street and 140th Avenue N.E.
395/285	N.E. 124th Street and 135th Avenue N.E.

In addition, there are three metering stations from the City of Seattle TESSL system also equipped with PRV's.

Station 5	N.E. 116th Street and 132nd Avenue N.E.
Station 7A	Redmond Way and 132nd Avenue N. E. (electronic valve)
Station 8	N.E. 70th Street and 140th Avenue N.E.

Prior to undertaking this comprehesive water system plan update, we recommended the abandonment of one existing PRV station (N.E. 75th Street and 140th Place N.E.), the rebuilding of the meter and PRV at Station 5 (N.E. 116th Street and 132nd Avenue N. E.) and the construction of five additional new PRV stations. They were all constructed in 1988.

These five stations installed in 1988 are located as follows:

650/590	N.E. 67th Street and 117th Avenue N.E.
SWD/650	N.E. 85th Street and 132nd Avenue N.E.
SWD/545	N.E. 70th Street and 132nd Avenue N.E.
545/425	N.E. 73rd Street and 141st Avenue N.E.
545/395	N.E. 87th Street and 122nd Avenue N.E.

5.9 HYDRAULIC NETWORK ANALYSES

Over the years, a number of methods have been devised to carry out network analyses. Essentially, these techniques permit the pipeline designer to compute the precise rates of flow and head losses in any reticulated distribution system. Naturally, as the number of pipes, junctions, pumps, reservoirs, pressure reducing stations, et cetera, increases; the mathematical model of the pipeline network becomes more cumbersome and the analysis more arduous. However, as the corresponding physical network of water mains and appurtenances, as installed, becomes more complex; empirical rules of thumb regarding pipeline sizing fail to indicate which particular elements of the system are most critical.

From an economic viewpoint; with only limited resources for capital improvements within an existing, or expanding system, a reasonably sophisticated hydraulic analysis is essential. Mainframe computers and, more recently, micro-computers have taken much of the tedium out of long iterative computations by hand, permitting a very wide variety of scenarios to be quickly modeled and evaluated.

Since the last water system plan was adopted in November, 1982, the District has made considerable investments in microcomputer facilities and associated software. Although primarily intended for the District's business functions, some of the software acquired has direct engineering applications. The intention was that the District would undertake much of the preliminary water utility engineering using their own resources. In particular, a hydraulic network analysis program, suitable for micro-computer application, was among the items acquired. The Kentucky network analysis program was purchased. It was originally developed by Professor D. J. Wood of the University of Kentucky and has found relatively wide acceptance by the municipal engineering profession and water utilities.

The District has not yet completely modeled its existing and proposed systems. However, sufficient work has been completed by the District to enable their engineering consultant to carry out independent, detailed analyses of small sections of the transmission/distribution system. These sections were identified during the course of the District's own studies, as problem areas; that is, where realistic demands, either as short-term fire flows, or bulk deliveries of water to adjacent purveyors produced either unacceptably low pressures upstream, or more correctly, the transmission/distribution system was physically incapable of supplying the required volumes of water at sufficient pressure at those particular points in the system.

The principal purpose of subsequent micro-computer runs was to incrementally replace each apparent bottleneck (that is; pipeline sections showing the greatest head loss) with a larger diameter pipeline. In this fashion, not only can the relative advantages of twelve, sixteen and twenty-inch diameter pipelines, or pipeline segments, be compared directly, but comparisons between different improved transmission routes can also be evaluated.

Alternatively, in some cases, the effect of insertion of new pipelines to improve interconnection within comparatively long loops can be assessed. The resulting final scheme incorporated not only the hydraulic analysis, but an economic assessment and a practical evaluation, or constructability review.

Some possible hydraulic solutions may well be rejected due to likely protracted, acrimonious and possibly fruitless right-of-way, property acquisition or easement negotiations. In other cases, simple economics governed. An undersized and/or aging

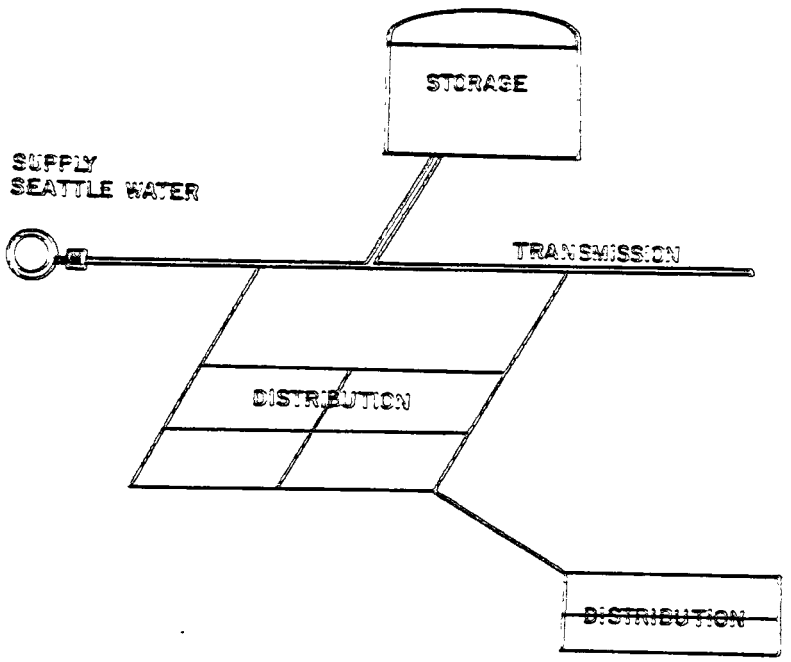
pipeline was scheduled for a similar size replacement, in any case, and the most cost-effective solution was upgrading the nominal distribution main to a transmission main. In general, all pipelines within the District larger than eight inches in diameter are designated as transmission mains. However, as this system has grown, some distribution mains which were perfectly adequate for their original purpose have, in fact, functioned as undersized transmission mains.

In general, the design of water transmission and distribution pipelines is dominated by the fire flow requirements. Although Rose Hill uses a minimum flow of 1,000 gpm, at a minimum of 20 psi in all single family residential areas, and a minimum flow of 2,500 gpm in multi-family residential areas, there are larger fire flow requirements which are established by the Fire Marshal's office having jurisdiction at the particular facility location. With domestic (single family residential) peak instantaneous flows only designed to 2.0 gpm per service, even the lowest hydrant requirement is higher by a factor of five hundred. Hence, hydraulic analysis of the Rose Hill system is relatively easily modeled by placing aggregate consumption demands at convenient points throughout the system and monitoring overall system behavior when large fire flow demands are placed at selected points. As a further transmission check, selected supply taps are assumed to be out of service and the ability of the system to function under these adverse conditions was also modeled.

For the Rose Hill system, the analysis also included placing the adjacent purveyor (Kirkland/Redmond) consumption demands at the metered interconnections. The system was also modeled placing adjacent municipal fire flow demands, in addition to the consumption demands, at these metered interties. The likelihood of near simultaneous fire flows being required in two areas supplied from the same metered tap from the TESSL system, and/or the same storage reservoir, is remote. Nevertheless, the consensus of technical opinion suggested that it would be negligent to design system upgrades that did not offer at least limited protection under such adverse circumstances.

Exhaustive modeling of portions of the water transmission/ distribution network of the two adjacent purveyors, who purchase water from Rose Hill was clearly well beyond the scope of this section of the water system study. The thrust of the recommended improvements, however, has been to ensure that Rose Hill's delivery obligations, at the external metering points, in terms of volume and head, can be met or exceeded. By inspection, we note that both of these adjacent purveyors may have to take steps to upgrade their transmission systems to take full advantage of the upgrades scheduled within Rose Hill.

In addition to the three active metered connections to the TESSL pipeline, the District has two inactive connections. These are situated at the intersections of 132nd Avenue N. E. and N. E. 108th Street and at 140th Avenue N. E. and Old Redmond Road/N. E. 70th Street. Because Rose Hill's taps to the City of Seattle supply are all on a uniform segment of pipeline, the three active service connections are considered as a single service for assessment of any demand surcharge. One problem with reactivating either of the inactive service connections is that if they are not hydraulically connected to a reservoir, near constamt flow control is difficult to maintain.



CHAPTER SIX

COMPREHENSIVE PLAN

CHAPTER SIX

COMPREHENSIVE WATER SYSTEM PLAN

6.1 GENERAL

The Rose Hill Water District's Comprehensive Water System Plan will be developed in this section. This plan includes improvements to the storage, transmission and distribution facilities presented in the form of a seven-year capital improvements program and tentative construction schedule. Basically, the District plans to spend at least one half million dollars in each of the next seven years. If, low interest, Public Works Trust Fund money is available, the implementation of some necessary improvements can be accelerated by undertaking one and a half million dollars worth of capital works during 1989 and perhaps other years in addition. To a certain extent, the level of expenditures over the next five to ten years is much higher than that expected in later years. This represents an element of catch-up on the twenty-year repair and rehabilitation program.

6.2 CAPITAL IMPROVEMENT PROGRAM

The proposed capital improvements for the years 1989 to 1995 inclusive, are shown in Table 6.1, which will be found on the following pages. These improvements are to the transmission, storage and distribution systems. In general, any water line twelve inches in diameter, or greater, is a transmission main, although some of these larger mains are used for both transmission and distribution. The District does not permit the use of ten-inch mains. The nominal minimum pipeline size in the distribution network is eight inches, unless special design-related circumstances justify the use of a smaller diameter pipeline.

Costs for the suggested improvements have been estimated in 1988 dollars, along with a tentative schedule for design and construction. This information has been assembled to permit the District to foresee the amount of financing required and the consequences of advancing, or delaying, implementation of various aspects of the plan.

The proposed implementation schedule has been largely based on our evaluation of system wide priorities. These considerations included:

- Hydraulic demands according to system growth;
- Maintenance costs of aging facilities; and
- Overall system reliability.

WATER LINE REPLACEMENT
PROPOSED IMPROVEMENTS

LOCATION	FROM	TO	EXISTING SIZE AND TYPE	AGE	NEW SIZE	LENGTH	1998 COST
YEAR: 1989							
NE 60TH ST	116TH AVE NE	132ND AVE NE	8" STEEL	1955	12	5,280	$264,000
					8	110	$4,400
150TH AVE NE	NE 70TH ST	350' N'LY NE 70TH ST	6" STEEL	>25 years	8	350	$14,000
132ND AVE NE	NE 85TH ST	ne 116th st	6" & 8" STEEL & AC	>25 years	16	9,110	$569,375
132ND AVE NE	NE 116TH ST	NE 117TH ST	8" STEEL	>25 YEARS	12	705	$35,250
134TH AVE NE	NE 100TH ST	NE 108TH ST	6" STEEL	1955	8	2,720	$108,800
NE 104TH ST	128TH AVE NE	132ND AVE NE	6" STEEL	1955	8	1,305	$52,200
NE 104TH ST	132ND AVE NE	136TH AVE NE	4"AC	1955	8	1,290	$51,600
NE 108TH ST	132ND AVE NE	380' W'LY 132ND AVE NE	---	---	16	380	$23,750
NE 108TH ST	132ND AVE NE	134TH AVE NE	4" STEEL	1955	8	530	$21,200
NE 120TH ST	SLATER AVE NE	NE 117TH ST	8" STEEL	1955	8	2,120	$84,800
SLATER AVE NE	470' W'LY NE 123RD ST	425' N'LY NE 116TH ST	8" STEEL	1956	12	2,375	$118,750
NE 116TH ST	E SIDE SR-405	135' E'LY E SIDE SR-405	---	---	12	135	$6,750
NE 116TH ST	W SIDE 124TH AVE NE	95' E'LY 127TH AVE NE	---	---	12	860	$43,000
					8	20	$800
124TH AVE NE	NE 116TH ST	600' S'LY NE 116TH ST	---	---	16	600	$37,500
124TH AVE NE	600' S'LY NE 116TH ST	60' N'LY NE 109TH PL	6"& 8" AC	1961	16	1,240	$77,500
				ESTIMATED PROJECT COST			$1,513,675
					16"	7,730	
					12"	9,355	
					8"	8,445	

ADDITIONAL GENERAL FACILITIES COSTS

12" FOR FUTURE USE ON NE 108TH STREET			
FROM 132ND AVE NE TO 134TH AVE NE	12	550	$27,500
2 - 12" X 4' PRV STATIONS			$60,000
8" SAN. SEWER FOR FLOOR DRAIN & OVERFLOW			
PRESENT & FUTURE RESERVOIR			$72,000
PRELIMINARY STUDY NORTH RESERVOIR			$50,000
UPGRADE SOUTH PUMP STATION			$50,000
			$1,793,175

TABLE 6.1

LOCATION	FROM	TO	SIZE AND TYPE	AGE	NEW SIZE	LENGTH	1988 COST
YEAR: 1990							
SLATER AVE NE	670' N'LY NE 108TH ST	NE 106TH ST	6" AC & 6" STEEL	1961 TO 1956	8	1,450	$58,000
NE 108TH ST	SLATER AVE NE	124TH AVE NE	6" AC	1961	8	550	$22,000
NE 97TH AVE	SLATER AVE NE	124TH AVE NE	6" AC	1961	12	1,230	$61,500
124TH AVE NE	NE 90TH ST	NE 107TH PL	6" STEEL & 6 AC	1955 & 1961	12	3,440	$172,000
124TH AVE NE	NE 107TH PL	80' N'LY NE 109TH PL	6" AC	1961	16	940	$56,750
NE 107TH PL & EASEMENT TO RESERVOIR	124TH AVE NE	RESERVOIR	-------	-------	16	2,510	$156,975
NE 104TH ST	124TH AVE NE	128TH AVE NE	6" STEEL	1955	8	1,300	$52,000
NE 73RD ST	126TH AVE NE	128TH AVE NE	6" STEEL	1955	8	690	$27,600
118TH AVE NE	NE 80TH ST	740' N'Y NE 80TH ST	6" STEEL	> 25 YEARS	8	745	$29,800
				ESTIMATED PROJECT COSTS	.....		$638,525
					16"	3,450	
					12"	4,670	
					8"	4,735	
NORTH RESERVOIR DESIGN							$100,000
				TOTAL			$739,525

LOCATION	FROM	TO	SIZE AND TYPE	AGE	NEW SIZE	LENGTH	1998 COST
YEAR: 1991							
NE 70TH ST	120TH AVE NE	132ND AVE NE	8" AC	1951 & 1963	12	4,150	$207,500
120TH AVE NE	NE 70TH ST	535' S'LY NE 70TH ST	6" AC	UNKNOWN	8	550	$22,000
124TH AVE NE	NE 70TH ST	NE 72ND ST	4" AC	1963	8	550	$22,000
130TH AVE NE	NE 61ST ST	NE 65TH ST	8" STEEL	>25 YEARS	8	950	$38,000
NE 61ST ST	128TH AVE NE	130TH AVE NE	8" STEEL	>25 YEARS	8	620	$24,800
128TH AVE NE	NE 61ST ST	NE 60TH ST	6" STEEL	1955	8	260	$10,400
122ND AVE NE	NE 60TH ST	NE 70TH ST	6" AC	1951	8	2,690	$107,600
NE 61ST ST, 120TH PL NE & NE 62ND ST	122ND AVE NE	122ND AVE NE	4" AC	1960	8	1,020	$40,800
NE 61ST ST, 123RD AVE NE & NE 62ND ST	122ND AVE NE	122ND AVE NE	4" STEEL	1955	8	1,205	$48,200
NE 64TH ST, 123RD AVE NE & NE 65TH ST	122ND AVE NE	122ND AVE NE	4" STEEL	1955	8	1,190	$47,600
NE 66TH ST, 123RD AVE NE & NE 67TH ST	122ND AVE NE	122ND AVE NE	4" AC	1967	8	1,320	$52,800
				ESTIMATED PROJECT COSTS			$621,700
						12" 4,150	
						8" 10,355	
PUMPING STATION & NORTH RESERVOIR CONSTRUCTION							$3,300,000
							$3,921,700

[redacted]	FROM	TO	EXIS[redacted] AND T[redacted]	AGE	NEW SIZE	LENGTH	1988 COST
YEAR: 1992							
140TH AVE NE	NE 80TH ST	NE 70TH ST	8" AC	1961	12	2,760	$138,000
NE 80TH ST	135TH PL NE	140TH AVE NE	6" AC	1951	12	1,500	$75,000
135TH PL NE	NE 80TH ST	NE 83RD ST	6" AC	1965	12	730	$36,500
NE 83RD ST	134TH AVE NE	135TH PL NE	6" AC	1968	12	500	$25,000
125TH AVE NE	NE 70TH ST	75' N'LY NE 64TH ST	6" AC	UNKNOWN	8	1,530	$65,600
128TH AVE NE	NE 61ST ST	NE 70TH ST	6" AC	1951	8	2,730	$109,200
126TH AVE NE	NE 60TH ST	NE 64TH ST	6" AC	1961	8	990	$39,600
NE 65TH ST	126TH AVE NE	128TH AVE NE	6" AC	1963	8	500	$20,000
NE 75TH ST	122ND AVE NE	130TH AVE NE	6" AC	1963 & 1967	8	2,645	$105,800
128TH AVE NE	NE 73RD ST	NE 75TH ST	6" AC	1963	8	470	$18,800
				ESTIMATED PROJECT COST	.....		$631,500
						12" 5,490	
						8" 8,925	
YEAR: 1993							
NE 61ST CT	147TH PL NE	148TH AVE NE	8" DI		12	200	$10,000
148TH AVE NE	NE 61ST CT	NE 51ST ST	8" AC	1961	16	2,600	$162,500
NE 51ST ST	148TH AVE NE	W LAKE SAMMAMISH BLVD	8" AC	1961	16	5,800	$362,500
(160TH AVE NE)	NE 51ST ST	1000' SLY OF NE 51ST ST	6" AC	1966	8	1,020	$40,800
156TH AVE NE	NE 51ST ST	NE 60TH ST	6" AC	1961	8	2,355	$94,200
159TH AVE NE	NE 51ST ST	159TH PL NE	6" AC	1961	8	580	$23,200
NE 156TH WY & 158TH PL NE	156TH AVE NE	159TH PL NE	6" AC	1961	8	1,270	$50,800
				ESTIMATED PROJECT COST	.....		$744,000
						16" 2,400	
						12" 200	
						9" 5,225	

[redacted]N	FROM	TO	[redacted]	AGE	NEW SIZE	LENGTH	1988 COST
YEAR: 1994							
116TH AVE NE	NE 57TH ST	NE 60TH ST	8" AC	1961	8	1,940	$77,600
NE 90TH ST	WILLOWS RD NE	151ST AVE NE	8" DI & AC	1967	12	720	$36,500
151ST AVE NE	NE 90TH ST	300' NLY OF NE 90TH ST	8" AC		12	700	$15,000
WILLOWS RD NE	400' NLY OF NE 90TH ST	NE 90TH ST	8" AC	1961 TO 64	12	3,500	$126,000
124TH AVE NE	200' SLY OF NE 85TH ST	NE 90TH ST	6" AC	1961	6	1,170	$46,200
124TH AVE NE	330' NLY OF NE 85TH ST	NE 90TH ST	6" AC	1961	8	820	$32,900
128TH AVE NE	355' NLY OF NE 85TH ST	NE 85TH ST	6" AC	1931	8	2,090	$83,600
NE 75TH ST	128TH AVE NE	132ND AVE NE	6" AC	1951 & 1952	8	1,370	$54,800
NE 126TH PL	SLATER AVE NE	900' ELY OF SLATER AVE	8" AC	1964	12	900	$45,000
SLATER AVE NE	NE 126TH PL	470' NLY OF NE 123 ST	8" AC	1956 TO 64	12	1,970	$98,500
NE 112TH ST	128TH AVE NE	132ND AVE NE	6" AC	1959	8	1,405	$56,200
NE 113TH ST	128TH AVE NE	132ND AVE NE	6" AC	1963	8	1,405	$56,200
				ESTIMATED PROJECT COST	.....		$729,000
						12" 6,490	
						8" 10,260	
YEAR:1995							
140TH AVE NE	NE 70TH ST	OLD REDMOND ROAD	12" AC		16	600	$37,500
OLD REDMOND ROAD	140TH AVE NE	148TH AVE NE	8" AC	1961	16	2700	$168,750
148TH AVE NE	NE 70TH ST	NE 61ST CT	8" AC	1961	16	2060	$128,750
				ESTIMATED PROJECT COST	.....		$335,000
						16" 5360	
			2 - 12" X 4" PRV STATIONS				$60,000
							$395,000

[redacted]TION	FROM	TO	[redacted]E AND TYPE	AGE	NEW SIZE	LENGTH	1988 COST
KIRKLAND REDMOND WAY	WILLOWS ROAD NE	600 S'LY OF WILLOWS ROAD NE	10" AC	UNKNOWN	12	600	$27,000
NE 100TH ST	132ND AVE NE	138TH AVE NE	6" AC	1951	8	1,930	$86,850
126TH AVE NE	NE 90TH ST	NE 95TH ST	6" AC	1951	8	1,315	$59,175
126TH AVE NE	N'LY NE 85TH ST	NE 90TH ST	6" AC	1951	8	1,110	$49,950
130TH AVE NE	NE 94TH ST	NE 100TH ST	6" AC	1951 & 1962	8	1,360	$70,200
NE 90TH ST	124TH AVE NE	126TH AVE NE	6" AC	1951	8	810	$36,450
NE 92ND ST	124TH AVE NE	550' W'LY	4" AC	1951	8	550	$24,750
NE 95TH ST	124TH AVE NE	129TH AVE NE	6" AC	1951	8	1,450	$65,250
128TH AVE NE	NE 80TH ST	NE 84TH ST	6" AC	1951	8	1,195	$53,775
136TH AVE NE	NE 100TH ST	NE 104TH ST	6" AC	1951	8	1,360	$61,200
NE 84TH ST	128TH AVE NE	670' E'LY	6" AC	1955	8	680	$30,600
NE 83RD ST	128TH AVE NE	CUL-DE-SAC E OF 128TH AVE NE	6" AC	1967	8	1,015	$45,675
SLATER AVE NE	200 FT N'LY OF NE 126TH PL	470' N'LY NE 123RD ST	8" AC	1964	12	2,000	$90,000
130TH AVE NE	NE 78TH ST	NE 80TH ST	6" AC	1958	8	670	$30,150
NE 91ST ST	126TH AVE NE	270' W'LY	4" AC	1960	8	270	$12,150
NE 65TH ST	122ND AVE NE	CUL-DE-SAC W	6" AC	1961	8	440	$19,800
NE 80TH ST	151ST AVE NE	WILLOWS ROAD NE	8" AC	1961	12	730	$32,850
NE 102ND ST	136TH AVE NE	CUL-DE-SAC E	6" & 4" AC	1961	8	380	$17,100
					2	175	$4,900
130TH AVE NE	NE 87TH ST	NE 88TH ST	6" AC	1961	8	310	$13,950
131ST AVE NE	NE 85TH ST	NE 87TH ST	4" & 6" AC	1961	8	480	$21,600
NE 87TH ST	130TH AVE NE	131ST AVE NE	6" AC	1961	8	280	$12,600
126TH PL NE	120' N'LY NE 112TH PL NE	126TH AVE NE	6" AC	1961	6	260	$11,700
126TH AVE NE	126TH PL NE	NE 107TH PL	6" AC	1961	8	1,650	$74,250
NE 111TH PL	127TH AVE NE	127TH PL NE	6" AC	1961	8	410	$18,450

TABLE 6.2

LOCATION	FROM	TO	EXISTING SIZE AND TYPE	AGE	NEW SIZE	LENGTH	1988 COST
127TH PL NE	NE 110TH	NE 109TH	6" AC	1961	8	440	$19,800
NE 108TH PL	124TH AVE NE	126TH AVE NE	6" AC	1961	8	590	$26,550
NE 109TH ST	127TH PL NE	126TH PL NE	6" AC	1961	8	410	$18,450
NE 110TH ST	300' W'LY 127TH PL NE	127TH PL NE	6" AC	1961	8	300	$13,500
NE 112TH PL	124TH AVE NE	126TH AVE NE	6" AC	1961	8	490	$22,050
NE 107TH PL	124TH AVE NE	126TH AVE NE	6" AC	1961	8	1,350	$60,750
128TH AVE NE	NE 107TH PL	170' N OF NE 107TH PL	6" AC	1961	8	130	$5,850
130TH AVE NE	NE 107TH PL	340' S OF NE 107TH PL	6"AC & 8" AC	1961	8	330	$14,850
135TH AVE NE	NE 80TH ST	250' S'LY	6" AC	1961	8	250	$11,250
155TH AVE NE	NE 52ND ST	NE 59TH ST	6" AC	1961	8	1,650	$82,250
					2	310	$8,680
155TH AVE NE	NE 59TH ST	CUL-DE-SAC N	4"AC	1961	2	295	$8,260
156TH DR NE	156TH AVE NE	NE 53RD ST	6" AC	1961	8	715	$32,175
					2	110	$3,080
157TH AVE\DR NE	NE 56TH WAY	NE 54TH WY	6" AC	1961	8	950	$39,250
159TH PL NE	158TH PL NE	NE 56TH WY	6" AC	1961	8	780	$35,100
NE 52ND ST	155TH AVE NE	156TH AVE NE	6" AC	1961	8	175	$7,875
NE 53RD ST	150' W OF 156TH DR NE	200' E OF 159TH AVE NE	6" AC	1961	8	600	$27,000
					2	385	$10,780
NE 54TH WY	157TH DR NE	158TH PL NE	6" AC	1961	8	300	$13,500
NE 55TH ST	155TH AVE NE	156TH AVE NE	6"AC	1961	9	320	$14,400
NE 59TH WY	159TH PL NE	160TH AVE NE	6" AC	1961 & 66	9	285	$12,825
NE 59TH ST	155TH AVE NE	156TH AVE NE	6" AC	1961	8	250	$11,250
119TH AVE NE	NE 73RD ST	NE 75TH ST	6" AC	1961	9	565	$25,425
122ND AVE NE	NE 80TH ST	200' S OF NE 83TH ST	6" AC	1961	8	1,235	$55,575
131ST AVE NE	NE 78TH ST	NE 80TH ST	6" AC	1961	9	640	$28,800
NE 74TH ST	118TH AVE NE	119TH AVE NE	6" AC	1961	8	450	$20,250
NE 73RD ST	116TH AVE NE	119TH AVE NE	6" AC	1961	9	900	$40,500
NE 78TH ST	130TH AVE NE	131ST AVE NE	4" AC	1961	8	330	$14,850
120TH AVE NE	NE 80TH ST	320' S OF NE 83TH ST	6" AC	1961	9	1,000	$45,000

LOCATION	FROM	TO	EXISTING AND TYPE	AGE	NEW SIZE	LENGTH	1988 COST
NE 83RD ST	120TH AVE NE	CUL-DE-SAC E OF 120TH AVE NE	4"AC	1961	2	210	$5,880
NE 72ND ST	124TH AVE NE	126TH AVE NE	6" AC	1961	8	615	$27,675
NE 73RD ST	124TH AVE NE	126TH AVE NE	6" AC	1961	8	615	$27,675
NE 68TH ST	130TH AVE NE	132ND AVE NE	6" AC	1961	8	710	$31,950
126TH AVE NE	NE 80TH ST	320' S OF NE 85TH ST	6" AC	1961	8	1,180	$53,100
NE 87TH ST	148TH AVE NE	GILLOMS RD NE	6" AC	1961	8	1,170	$52,650
128TH AVE NE	NE 104TH ST	NE 107TH PL	6" AC	1961	8	1,160	$52,200
NE 64TH ST	120TH AVE NE	122ND AVE NE	6" AC	1962	8	640	$28,800
129TH AVE NE	NE 100TH ST	NE 102ND PL	6" AC	1962	8	870	$39,150
NE 100TH ST	128TH AVE NE	132ND AVE NE	6" AC	1962	8	1,320	$59,400
NE 102ND PL	128TH AVE NE	132ND AVE NE	6" AC	1962	8	1,345	$60,525
NE 94TH ST	128TH AVE NE	CUL-DE-SAC E OF 130TH AVE NE	6" AC	1962	8	1,090	$49,050
129TH AVE NE	NE 94TH ST	CUL-DE-SAC S OF NE 94TH ST	4"AC	1962	2	195	$5,460
131ST PL NE	NE 80TH ST	270' N'LY	6" AC	1962	8	270	$12,150
137TH AVE NE	NE 70TH PL	NE 74TH ST	6"AC/4"AC	1962	8 2	1,140 145	$51,300 $4,060
137TH AVE NE	NE 76TH PL	NE 75TH ST	6" AC	1962	8	320	$14,400
138TH PL NE	NE 70TH PL	NE 72ND PL	6" AC	1962	8	510	$22,950
138TH PL NE	NE 74TH ST	NE 79TH PL	6" AC	1962	8	1,075	$48,375
139TH PL NE	NE 70TH PL	NE 73RD PL	6" AC	1962	8	640	$28,800
139TH PL NE	NE 74TH ST	CUL-DE-SAC N OF NE 74TH ST	4" AC	1962	2	225	$6,300
139TH PL NE	NE 76TH ST	NE 78TH PL	6"AC/4"AC	1962	8 2	695 90	$31,275 $2,520
NE 70TH PL	137TH AVE NE	140TH AVE NE	6"AC/4"AC	1962	8 2	870 145	$39,150 $4,060
NE 72ND PL	137TH AVE NE	138TH PL NE	6" AC	1962	8	495	$22,275
NE 73RD PL	137TH AVE NE	139TH PL NE	6" AC	1962	8	680	$30,600
NE 77TH PL	138TH PL NE	CUL-DE-SAC W	4" AC	1962	2	240	$6,720
NE 75TH PL	138TH PL NE	CUL-DE-SAC W	4" AC	1962	2	265	$7,420
NE 71ST PL	138TH PL NE	CUL-DE-SAC W	4" AC	1962	2	220	$6,160

[redacted]	FROM	TO	[redacted]/AN[redacted]	AGE	NEW SIZE	LENGTH	1988 COST
NE 76TH PL	137TH AVE NE	138TH PL NE	6"AC/4"AC	1962	8	460	$20,700
					2	160	$4,480
NE 76TH ST	138TH PL NE	139TH PL NE	6" AC	1962	8	230	$10,350
NE 78TH PL	CUL-DE-SAC N OF 138TH PL NE	139 PL NE	6" AC	1962	8	250	$11,250
					2	220	$5,440
130TH AVE NE	NE 104TH ST	CUL-DE-SAC N	4" AC	1963	2	235	$6,580
138TH AVE NE	NE 97TH ST	NE 100TH ST	6" AC	1963	8	630	$28,350
129TH AVE NE	NE 104TH ST	CUL-DE-SAC N	4" AC	1963	2	260	$7,280
NE 97TH ST	138TH AVE NE	200 ' W'LY OF 138TH AVE NE	6" AC	1963	8	200	$9,000
ESMT-125TH AVE NE	NE 60TH ST	450' S'LY	6" AC	1963	3	450	$20,250
128TH AVE NE	NE 75TH ST	NE 80TH ST	6" AC	1963	9	1,320	$59,400
130TH AVE NE	NE 73RD ST	NE 75TH ST	6" AC	1963	9	470	$21,150
NE 73RD ST	120TH AVE NE	124TH AVE NE	6" AC	1963	8	1,350	$60,750
127TH AVE NE	NE 75TH ST	CUL-DE-SAC S	4"AC	1967	2	180	$5,040
129TH AVE NE	NE 75TH ST	CUL-DE-SAC S	4"AC	1963	2	200	$5,600
NE 74TH ST	130TH AVE NE	CUL-DE-SAC E	4"AC	1963	2	210	$5,880
124TH AVE NE	NE 72ND ST	NE 75TH ST	6" AC	1963	8	730	$33,750
124TH AVE NE	NE 75TH ST	NE 80TH ST	6" AC	1963	8	1,300	$58,500
NE 72ND ST	126TH AVE NE	160' E'LY OF 127TH AVE NE	6" AC	1963	8	480	$21,600
127TH AVE NE	NE 72ND ST	CUL-DE-SAC S	4"AC	1963	8	205	$9,225
133RD AVE NE	NE 61ST ST	CUL-DE-SAC N	6" AC	1963	8	300	$13,500
					2	390	$10,920
135TH AVE NE	NE 61ST ST	NE 66TH ST	6" AC	1963	8	1,030	$46,350
136TH AVE NE	135TH AVE NE	SE'LY END 136TH AVE NE	6" AC	1963	8	830	$37,350
NE 61ST ST	132ND AVE NE	135TH AVE NE	6" AC	1963	9	940	$42,300
NE 66TH ST	132ND AVE NE	136TH AVE NE	6"AC/4"AC	1963	8	1,730	$77,850
					2	160	$4,480
133RD AVE NE	NE 66TH ST	CUL-DE-SAC S	4"AC	1963	2	405	$11,340
NE 124TH ST	124TH AVE NE	300 FT E'LY & W'LY OF 124TH AVE	8" AC	1963	12	610	$27,450
NE 70TH PL	140TH AVE NE	165' E OF NE 71ST PL	6" AC	1964	8	745	$33,525
NE 71ST ST	105' W OF 143RD AVE NE	135' E OF 143RD AVE NE	6" AC	1964	8	240	$10,800

[redacted]	FROM	TO	AN[redacted]	AGE	NEW SIZE	LENGTH	1988 COST
NE 71ST PL	NE 71ST ST	CUL-DE-SAC SW	6" AC	1964	6	370	$16,650
NE 72ND ST	NE 70TH PL	143RD AVE NE	6" AC	1964	8	895	$40,275
120TH AVE NE	NE 73RD ST	NE 75TH ST	6" AC	1965	9	635	$28,575
143RD AVE NE	CUL-DE-SAC S OF NE 71ST ST	NE 72ND ST	6"AC/4"AC	1965	8	280	$12,600
					2	150	$4,200
124TH PL NE	NE 75TH ST	640' N'LY	6" AC	1966	9	640	$28,800
160TH AVE NE	NE 55TH WY	NE 57TH ST	6" AC	1966	9	473	$21,150
151ST PL NE	NE 57TH ST	CUL-DE-SAC S	6" AC	1966	8	360	$16,200
					2	150	$4,200
162ND AVE NE	NE 51ST ST	NE 57TH ST	6" AC	1966	9	670	$30,150
NE 57TH ST	160TH AVE NE	170' E OF 162ND AVE NE	6" AC	1966	8	725	$32,625
146TH AVE NE	NE 62ND ST	NE 64 TH ST	6" AC	1966	8	440	$19,800
					2	110	$3,080
NE 63RD CT	143RD AVE NE	CUL-DE-SAC W	6" AC	1966	8	150	$6,750
					2	215	$6,020
NE 66TH ST	122ND AVE NE	CUL-DE-SAC W	6" AC	1967	6	450	$20,250
NE 67TH ST	122ND AVE NE	CUL-DE-SAC W	6" AC	1967	8	440	$19,800
NE 78TH PL,ESMT	128TH AVE NE	130TH AVE NE	6" AC	1967	8	720	$32,400
NE 91ST ST	128TH AVE NE	130TH AVE NE	6" AC	1967	8	705	$31,725
149TH AVE NE	NE 68TH ST	CUL-DE-SAC N	6" AC	1967	8	130	$5,850
					2	250	$7,000
150TH AVE NE	CUL-DE-SAC S OF NE 68TH ST	NE 70TH ST	6" AC	1967	8	450	$20,250
					2	260	$7,280
NE 68TH ST	150TH AVE NE	151ST AVE NE	6" AC	1967	8	270	$12,150
140TH PL NE	NE 74TH ST	NE 77TH ST	6" AC	1967	8	1,050	$47,250
					2	115	$3,220
141ST AVE NE	NE 73RD ST	NE 77TH ST	6" AC	1967	8	1,180	$53,100
142ND AVE NE	NE 77TH ST	CUL-DE-SAC S	6" AC	1967	8	110	$4,950
					2	210	$5,880
127TH PL NE	NE 80TH ST	370 S'LY	6" AC	1968	8	180	$8,100
					2	190	$5,320
135TH PL NE	NE 75TH ST	450' N'LY	6" AC	1968	8	450	$20,250
137TH AVE NE,ESMT	NE 81ST ST	KIRK-RED HWY	6" AC	1968	8	800	$36,000
NE 83RD ST	137TH AVE NE	CUL-DE-SAC E OF 137TH AVE NE	4"AC	1968	2	130	$3,640

LOCATION	FROM	TO	EXISTING SIZE AND TYPE	AGE	NEW SIZE	LENGTH	1988 COST
NE 82ND ST	137TH AVE NE	CUL-DE-SAC E OF 137TH AVE NE	4"AC	1968	2	120	$3,360
NE 81ST ST	137TH AVE NE	138TH AVE NE	6" AC	1968	8	385	$17,325
138TH AVE NE	NE 80TH ST	CUL-DE-SAC N	6" AC	1968	8	420	$18,900
					2	170	$4,760
NE 109TH PL	132ND AVE NE	130TH AVE NE	6" AC	1969	8	695	$31,275
130TH AVE NE	NE 109TH PL	180' S OF NE 109TH PL	6" AC	1968	8	190	$8,550
134TH PL NE	NE 83RD PL	300' S'LY	6" AC	1968	8	55	$2,475
					2	245	$6,860
				UN-SCHEDULED TOTAL.....		$90,990	$3,352,715

GRAND TOTAL S/R PLAN, 1989 TO COMPLETION $7,368,115

	FROM	TO	AND TYPE	AGE	NEW SIZE	LENGTH	1989 COST
NE 99TH ST	120TH AVE NE	210' W'LY 120TH AVE NE	6" AC	UNKNOWN	2	205	$9,225
NE 101 PL	124TH AVE NE	330' W'LY	6" AC	UNKNOWN	3 2	261 89	$11,790
OLD REDMOND ROAD	140TH AVE NE	300 FT W'LY OF 140TH AVE NE	12" AC	UNKNOWN	12	300	$13,500
OLD REDMOND ROAD	132ND AVE NE	136TH AVE NE	12" AC	UNKNOWN	12	1,450	$65,250
132ND AVE NE	NE 80TH ST	70' S NE 85TH ST	8" AC	1951	8	1,460	$65,700
NE 106TH ST	SLATER AVE NE	CUL-DE-SAC E	4" AC	1961	2	165	$4,620
NE 112TH ST	124TH AVE NE	150' E'LY	4" AC	1961	2	150	$4,200
NE 111TH PL	124TH AVE NE	150' E'LY	4" AC	1961	2	150	$4,200
NE 110TH PL	124TH AVE NE	150' E'LY	4"AC	1961	2	150	$4,200
NE 109TH PL	124TH AVE NE	150' E'LY	4" AC	1961	2	150	$4,200
NE 112TH PL	126TH PL NE	150' E'LY	4" AC	1961	2	160	$4,480
NE 100TH ST	SLATER AVE NE	124TH AVE NE	6" AC	1961	8	1,040	
SLATER AVE NE	350' N NE 90TH	NE 106TH ST	8" AC	1961	8	4,440	$199,800
NE 90TH ST	118TH AVE NE	124TH AVE NE	8" AC	1961	8	1,800	$81,000
NE 80TH ST	124TH AVE NE	132ND AVE NE	8" AC	1961	8	2,645	$119,025
130TH AVE NE	NE 100TH ST	220' N NE 100TH ST	4" AC	1962	2	2,420	$[illegible]
129TH AVE NE	NE 100TH ST	220' N'LY	4" AC	1962	2	220	$6,160
NE 54TH ST	155TH AVE NE	100' E'LY	4" AC	1963	2	100	$2,800
NE 53RD PL	155TH AVE NE	100' E'LY	4" AC	1963	2	100	$2,800
NE 57TH ST	155TH AVE NE	100' E'LY	4" AC	1963	2	100	$2,800
NE 58TH ST	156TH AVE NE	110' W'LY	4" AC	1963	2	110	$3,080
NE 75TH ST	119TH AVE NE	124TH AVE NE	8" AC	1963	8	1,740	$78,300
126TH AVE NE	NE 70TH ST	NE 75TH ST	8" AC	1963	8	1,285	$57,825
122ND AVE NE	NE 70TH ST	NE 80TH ST	8" AC	1963	8	2,590	$116,550
125TH AVE NE	NE 75TH ST	NE 80TH ST	8" AC	1963	8	1,310	$58,950
NE 124TH ST	124TH AVE NE	132ND PL NE	8" AC	1963	8	2,410	$108,450
WILLOWS ROAD NE	NE 90TH ST	NE 91ST ST	12" AC	1964	12	600	$27,000

TABLE 6.3

LOCATION	FROM	TO	EXISTING AND TYPE	[illegible]	NEW SIZE	LENGTH	1988 COST
143RD AVE NE	NE 70TH PL	CUL-DE-SAC S	4" AC	1965	2	150	$4,200
146TH AVE NE	NE 64TH ST	150' S OF NE 65TH ST	8" AC	1966	8	380	$17,100
NE 75TH ST	116TH AVE NE	119TH AVE NE	8" AC	1965	8	970	$43,650
132ND AVE NE	NE 70TH PL	NE 80TH ST	8" AC	1965	8	3,170	$142,650
NE 70TH ST & NE 70TH PL	120TH AVE NE	1200' W'LY 120TH AVE NE	8" AC	1965	8	1,200	$54,000
NE 80TH ST	132ND AVE NE	135TH PL	8" AC	1965	8	1,120	$50,400
143RD AVE NE	NE 62ND ST	OLD REDMOND RD	8" AC	1966	8	1,490	$67,050
NE 65TH ST	146TH AVE NE	148TH AVE NE	8" AC	1966	8	745	$33,525
NE 66TH ST	143RD AVE NE	130' E'LY OF 142ND AVE NE	8" AC	1966	8	430	$19,350
NE 64TH CT	143RD AVE NE	CUL-DE-SAC W	6" AC	1966	2	265	$7,420
147TH CT NE	NE 65TH ST	CUL-DE-SAC S	4" AC	1966	2	185	$5,180
149TH AVE NE	NE 64TH PL	NE 149TH PL	8" AC	1967	8	850	$38,250
152ND AVE NE	NE 68TH ST	110' S	8" AC	1967	8	110	$4,950
151ST AVE NE	NE 65TH ST	NE 68TH ST	8" AC	1967	8	1,080	$48,600
152ND AVE NE	NE 68TH ST	NE 70TH ST	8" AC	1967	8	415	$18,675
ESMT(148TH AVE NE)	WILLOWS RD NE	350' N'LY	8" AC	1967	8	350	$15,750
151ST PL NE	NE 65TH ST	CUL-DE-SAC S	8" AC	1967	8	110	$4,950
					2	205	$5,740
NE 64TH ST	149TH AVE NE	CUL-DE-SAC W	4" AC & 6" AC	1967	8	100	$4,500
					2	270	$7,560
NE 65TH ST	149TH AVE NE	151ST AVE NE	8" AC	1967	8	625	$28,125
150TH AVE NE	NE 64TH ST	CUL-DE-SAC S	4" AC & 6" AC	1967	8	120	$5,400
					2	230	$6,440
NE 68TH ST	151ST AVE NE	OLD REDMOND RD	8" AC	1967	8	950	$42,750
151ST AVE NE	NE 68TH ST	CUL-DE-SAC N	6" AC	1967	8	250	$11,250
					2	50	$1,400
NE 67TH PL	148TH AVE NE	149TH AVE NE	8" AC	1967	8	285	$12,825
141ST CT NE	NE 78TH ST	120' NE'LY	8" AC	1967	8	120	$5,400
153RD AVE NE	NE 68TH ST	CUL-DE-SAC NWLY	6" AC	1967	8	190	$8,550
					2	210	$5,880
143RD AVE NE	NE 74TH PL	NE 78TH ST	8" AC	1967	8	1,185	$53,325
					2	105	$2,940
NE 74TH ST	143RD AVE NE	CUL-DE-SAC W	6" AC	1967	8	210	$9,450

LOCATION	FROM	TO	EXISTING SIZE AND TYPE	AGE	NEW SIZE	LENGTH	1988 COST
NE 75TH ST	143RD AVE NE	CUL-DE-SAC W	6" AC	1967	8	210	$9,450
					2	180	$5,040
NE 74TH PL	140TH PL NE	143RD AVE NE	8" AC	1967	8	1,110	$49,950
NE 75TH ST	140TH AVE NE	140TH PL NE	8" AC	1967	8	185	$8,325
NE 78TH ST	140TH AVE NE	CUL-DE-SAC E	8" AC	1967	8	1,335	$62,325
NE 68TH PL	149TH AVE NE	CUL-DE-SAC W	4" AC	1967	2	290	$5,600
NE 67TH PL	149TH AVE NE	CUL-DE-SAC W	4" AC	1967	2	290	$7,540
NE 66TH PL	151ST AVENE	CUL-DE-SAC W	4" AC	1967	2	190	$5,320
NE 66TH ST	151ST AVE NE	CUL-DE-SAC W	4" AC	1967	2	250	$7,000
NE 75TH ST	134TH AVE NE	140TH AVE NE	8" AC	1962 & 1968	8	2,100	$94,500
NE 107TH PL	128TH AVE NE	130TH AVE NE	8" AC	1968	8	710	$31,950
NE 107TH PL	132ND AVE NE	134TH AVE NE	8" AC	1968	8	620	$27,900
NE 62ND ST	140TH AVE NE	200' E OF 143RD AVE NE	8" AC	1969	8	1,225	$55,125
				POSSIBLE FUTURE AC LINE REPLACEMENT TOTAL....		54,815	.....$2,288,210

Hence, it is important for the District to follow the outline of recommended improvements as closely as possible, unless there are compelling new reasons to reassess the priorities.

A strong case can be made for constructing the 6.7 MG plus new storage facility as soon as possible, particularly if the City of Kirkland and possibly the City of Redmond express an interest in financial participation. Preliminary work has been authorized by the Commissioners, with a view to construction commencing in early 1990. The 6.7 MG capacity is required by Rose Hill alone, but the north tank site could easily be developed to accommodate a much larger facility.

Depending on the criteria selected for computing total storage requirements, both municipalities could be considered to have insufficient storage now. Given likely growth patterns over the next few years, both cities will eventually be seeking additional storage capacity for fire flows and emergency (standby) storage. An opportunity exists now for their ultimate (buildout) requirements in selected pressure zones to be accommodated in this new facility.

6.3 FINANCIAL PLANNING

Rose Hill undertakes a number of capital improvement projects throughout the course of any year. In general, the costs of small projects that represent repair or upgrading of portions of the existing transmission and distribution system are accommodated in the annual operating budget. In other words, the costs of these particular types of improvement are covered by revenues from monthly service charges and from general facilities charges that are collected from new connections as they hook-up to the system.

In contrast, major capital improvement projects, which are usually associated with improvements to the system's general facilities, such as; transmission mains, metering stations, pressure reducing stations, pump stations and reservoirs are funded somewhat differently.

- These projects usually represent major construction activities that will directly impact the cost and efficiency of future District operations.

- These projects normally require such significant funding that the District must have a financial plan that will ensure adequate resources are available to undertake each individual project.

Where projections of existing District funds show that these will be insufficient to cover the planned capital improvements, the proceeds from the sale of revenue bonds can be used as a funding source. However, as a general condition of issuing such bonds, the District must dedicate future rate revenues to cover the necessary debt service. Frequently, to make these revenue bonds as attractive as possible, rate revenues are boosted to improve coverage beyond the minimums required. Total rate revenues collected must be at least 1.25 times the annual debt service payments, although a ratio of 1.40 is desirable.

If the District is required to increase revenues to at least meet these obligatory coverage ratios, or enhance their sales, the additional funds collected can be used to help pay for other capital improvements directly.

In addition, to expand the distribution network into areas not currently served, it is likely that over the planning horizon of the study, a number of water ULID's will be formed. However, their formation depends largely on local property owner interest. Although the magnitude, timing and location of these future ULID's is uncertain. Just as developers pay for extensions to the water distribution system, any ULID bonds issued will ultimately be repaid by assessments on the properties included in the ULID and thereby benefitting directly from the improvement.

Water System - Capital Improvements

The major component of the District's twenty-year capital improvement program is replacement and upgrading of the District's aging transmission and distribution mains. In addition to this on-going long term program, an almost immediate (1988/89) program of rationalizing the District's pressure zones has been identified. This will involve upgrading existing PRV stations, new PRV stations, upgrading selected transmission mains and installing new transmission mains. The other major improvement is construction, in the early 1990's, of a new, large capacity storage reservoir to replace the existing 1.5 MG standpipe.

It is anticipated that, in future years, the water main replacement program will be entirely funded by customer rates. For 1989, the program will only be partially funded from existing fund balances, which are essentially accumulations from previous rate contributions for water main replacement. The remainder will come from a low interest Public Works Trust Fund loan.

Revenues resulting from collection of general facilities charges (GFC) levied on new customers will be used to pay for the planned pressure reducing stations and transmission main improvements. The GFC fund, less these expenditures in 1988 and 1989, is projected to accumulate past the year 2000 and be available to help finance major capital improvements.

The accumulations in the GFC fund will, however, be insufficient to fund construction of the large capacity new storage reservoir in the early 1990's. Accordingly, a revenue bond issue, or Public Works Trust Fund loan, is planned to finance this project. In the event that GFC fund accumlations exceed current projections, due to more rapid than assumed new development, the District may be in a position to finance a larger part of the project using their own resources. This will, of course, reduce the magnitude of rate contributions required to provide the necessary debt servce coverage.

In general, ULID's are financed by revenue bond issues, backed by assessments against the improved properties. Since their formation depends largely on the interest of the particular group of property owners, no projections have been made. To minimize financing costs, most special purpose districts endeavor to combine a number of ULID financings into one bond issue. It is likely that the Rose Hill Water District will adopt a similar policy.

The three tables presented following Section 6.1, summarize the District's water utility capital improvement program.

- Table 6.1 shows the program for the years 1989 to 1995 inclusive.
- Table 6.2 shows other capital improvements that are currently unscheduled, but deemed necessary. For example, in the event that a municipal roadway improvement project is undertaken, or perhaps a new development is proposed, the opportunity should be taken to include these improvements in the proposed work.
- Table 6.3 lists the other older pipelines in the district which are either asbestos cement, or otherwise do not meet current District design standards. Again, if a convenient opportunity is present, they should be upgraded.

6.4 IMPROVEMENT COSTS AND IMPLEMENTATION

The purpose of developing construction costs, as part of this long range study of water system improvements, is to help develop an implementation strategy. Scheduling of these improvements becomes an important element in establishing a realistic financial plan. In some cases, financial restraints will determine the strategy to be adopted.

Costs for the system improvements, shown in Table 6.1 of this water system plan, have been estimated using present day construction costs. Reservoir costs were developed from recent bid prices in the metropolitan Seattle area, for similar type and size facilities. Pipeline costs are based on average unit prices per foot, also developed from recent bidding by contractors in the area.

It should be noted that these costs are given as total construction costs. They include; construction, land acquisition and other costs. These other costs contain an allowance of twenty per cent to cover engineering design, quality assurance and construction inspection. These costs are incurred even if the District intends to undertake most of this work using their own resources. Another allowance of ten to fifteen per cent is also included in other costs to cover; financing, legal, administration, taxes and other necessary, but unavoidable, miscellaneous implementation costs.

Construction costs vary over a wide range because of variable and intangible factors that are exceedingly difficult to predict. When current day construction cost estimates are extended to some future implementation date, these uncertainties compound. There can be no implied guarantee that the construction work will be contracted by the District for the estimated costs, as outlined in this water system plan.

Obsolete Main Replacement

Hydraulic analyses have been carried out by the District's consultants, modeling the existing system. These have confirmed the nature of a number of bottlenecks within the transmission and distribution system that have been suspected by District operations personnel. Continued growth and redevelopment within the existing service area boundaries will increase peak flow demands and thus the loss of pressure within the system. These pressure losses will continue to increase as additional service connections are added to the system.

Because of the very long service life expectancy of modern water supply pipe and appurtenances, all of the mains improvements are based on our assessment of the ultimate demand to be placed on the system. This includes peak instantaneous flow and fire flow at various critical locations within the system.

It is virtually impossible to predict when the presently unimproved lands within the District's existing eight square mile service area will be scheduled for development by private, or other, interests. The District's boundaries are currently fixed and there are no plans for annexation of new lands to increase the service area. Demand growth will come from infill development, re-development of existing improvements and from increases in the volumes transmitted to adjacent municipalities.

Current design standards call for a minimum distribution main diameter of eight inches. The former standard, for earlier developments within the service area, was only six inches. In addition, four-inch diameter dead-ended mains with fire hydrants were permitted. In dead-ended lines, where there is no fire flow requirement, a two-inch diameter main is allowed.

Except where the pipeline is part of the transmission system, the more recently installed mains have been eight-inches in diameter unless the particular development had a very high fire flow requirement, in which case they were larger. Thus, much of the obsolete main replacement program simply involves replacing an aging network of steel and asbestos cement six-inch lines with an eight-inch (minimum) diameter ductile iron pipeline. A few four-inch lines with hydrants will also be upgraded to eight-inch diameter.

The municipalities of Kirkland and Redmond have not adopted identical fire hydrant specifications. Consequently, the standards adopted for hydrants depend upon specific location and whether the particular parcel lies within an area already annexed, or likely to be annexed, by one or other municipality. An item specifically excluded from design consideration, however, is eventual assumption of the utility by the adjacent municipalities. Although the boundary between the two municipalities is well established, we have not laid duplicate lines along this boundary. In general, the higher elevation pressure zones (650 and 545) straddle the municipal boundary. Construction of two completely separate systems to facilitate future annexation, is unlikely to be undertaken without the financial participation of the interested other parties. To date, neither Kirkland nor Redmond have shown any interest in such expenditures.

6.5 TRANSMISSION SYSTEM IMPROVEMENTS

The proposed improvements to the transmission system comprise several different elements:

- Replacement of existing undersized and/or overage pipelines;
- New construction where no pipelines previously existed;
- Replacement/modification of existing PRV stations;
- Construction of new PRV stations;
- Replacement/modification of existing pumping stations;
- Construction of new pumping stations; and
- Construction of new storage facilities.

A seven-year capital improvement program has been developed, together with a construction schedule showing a prioritized, but orderly implementation of these improvements.

In general, the transmission system comprises a network or skeleton of pipelines twelve-inches in diameter or greater. The City of Seattle's forty-eight to thirty-six inch diameter TESSL system runs north-south through the center of Rose Hill's service area, and this particular route follows the high ground between Lake Washington and the Sammamish Valley. The transmission network within the Rose Hill service area is clearly not as well developed as would be the case if the supply corridor were located along one boundary, or outside of the service area. In fact, parts of the existing transmission network are 6-inch, 8-inch and 10-inch steel and asbestos cement pipelines. These were laid originally as part of the earlier distribution system, but with growth have been utilized more for transmission purposes than straightforward distribution.

This comprehensive plan identifies some nine miles of such pipelines that should be upgraded. In 1988, 6,180 lineal feet of old six-inch and eight-inch asbestos cement pipeline were replaced with eight-inch and twelve-inch diameter ductile iron. None of this mile or so of pipeline installation was new construction, in terms of laying a pipeline where none existed beforehand.

Over seven thousand feet of twelve-inch and sixteen-inch diameter new construction has been identified. However, much of this is associated with the new 6.7 MG plus storage reservoir planned for the north tank site at N. E. 108th Street and 132nd Avenue N. E.

When assessing the adequacy of the transmission system, it must be kept in mind that the District's system has been designed to function under two sets of supply conditions. For much of the year, under City of Seattle system-wide low demand conditions, the supply pressure head in the TESSL system is 650 feet. (Formerly, the TESSL system was operated at a maximum pressure head which varied from 640 to 680 feet.) As of June, 1988, the City of Seattle Water Department has modified its transmission system controls to give a normal (low demand season) head of 650 feet. This is sufficient to maintain service to all pressure zones within the District's service area. PRV's are utilized throughout the network to step down the pressure from a higher pressure zone to an adjacent lower one. The reservoirs can be filled by gravity and no pumping is required.

However, during the high demand period, the supply head in the TESSL system may fall below 650 feet and can fall below 545 feet. Under these conditions, pumping to the higher elevation pressure zones is necessary. Under these circumstances, both the north and south tanks are utilized as sumps to avoid pumping directly from the TESSL system.

Transmission to Adjacent Municipalities

Supply to the City of Redmond's 335 pressure zone (Viewpoint Lower Zone) is via a metering and pressure reducing station, located at the boundary of Rose Hill's 350 pressure zone. This

station, at the intersection of West Lake Sammamish Parkway and N. E. 51st Street, will remain in service even when the first phase of the TESSL No. 2 pipeline is complete and after construction of the new joint Redmond/Bellevue storage reservoir at 148th Avenue N. E. and N. E. 40th Street. This particular Redmond zone relies solely on Rose Hill for both consumption volumes and storage for fire protection.

Transmission main improvements are necessary to adequately serve this metering point. Hydraulic analyses indicate that peak demand with fire flows produce unacceptable pressure reductions in the higher elevation zones between the Redmond metering point and the Rose Hill tap to the TESSL No. 1 pipeline at N. E. 70th Place and 140th Avenue N. E. Likely developer extensions to the system, in presently unimproved lands, between N. E. 51st Street and N. E. 60th Street and between 148th Avenue N. E. and SR 520 will require sixteen-inch diameter lines.

Improved service to the southern portion of Rose Hill's 425 pressure zone will also require an extension of the proposed sixteen-inch line east of SR 520. Since other utilities are carried over SR 520 via the N. E. 51st Street overpass, it is possible that the new sixteen-inch diameter line could be supported in a similar fashion. Washington State DOT approval would be required. Our preliminary estimates suggest that a total of 13,500 lineal feet of ductile iron pipe will be required for the whole project. Completion of this construction will both increase service reliably in the southeastern portion of the service area and in the Redmond 335 pressure zone. Even if construction is phased over several years, there will be a marked improvement as each segment of aging eight and twelve-inch line is upgraded to sixteen-inch diameter.

6.6 PROPOSED PRESSURE ZONE MODIFICATIONS

The proposed pressure zone modifications affect only the former 425 and 395 pressure zones in the northwest part of the service area, as described in Section 5.4 of this water system plan. The other pressure zones and zone boundaries will remain largely unaltered.

285 Pressure Zone

This, the District's lowest pressure zone, lies wholly within the municipal boundaries of the City of Redmond. The entire zone lies along the lower western slopes of the Sammamish Valley, between elevation 40 and 180 feet above sea level. It includes the Willows Road industrial area and a residential area adjacent to the West Lake Sammamish Parkway. Flows to this zone are via pressure reducing stations from the adjacent 425 pressure zone. System reliability, including storage, will be enhanced with redevelopment of the north tank site. Redmond's 238 pressure zone is partially served by two metered PRV stations from this zone.

350 Pressure Zone

This small zone closely matches a much larger, but slightly lower, elevation 335 pressure zone operated by the City of Redmond. Supply is via two pressure reducing stations from the 425 pressure zone immediately to the west. A metering station is provided at the Rose Hill/Redmond service boundary. Up to 1.5 MGD (1,042 gpm) and perhaps 2.6 MGD may be required by Redmond, but the network of small diameter, aging pipelines upstream of the two PRV's, in the existing 425 pressure zone, poses severe limitations on any ability to meet this demand. Since this connection is scheduled to remain in service, transmission capacity can only be increased by over-sizing and looping selected transmission/distribution mains in the adjacent higher elevation pressure zones.

Revised 395 Pressure Zone

The 395 pressure zone is located in the northwestern portion of Rose Hill's service area, within the corporate limits of the City of Kirkland. This pressure zone was formerly part of the 425 (west) pressure zone, which will be upgraded to an elevation 450 zone to match an adajcent Kirkland zone. General reliability and emergency service (standby and fire protection) in the high value commercial area will be enhanced when the north tank site is redeveloped in the early 1990's. Supply will be from several pressure reducing stations from the new 450 (old 425 west) pressure zone.

425 Pressure Zone - East

This pressure zone lies on the westerly slopes of the Sammamish Valley, immediately west of the 285 pressure zone. The boundaries correspond to the 180-foot and 320-foot elevation contours. This pressure zone is served by a number of pressure reducing stations at the boundary between the 425 and 545 pressure zones. Storage is available from Rose Hill's 4.1 MG share of the 11.2 MG south tank, but will be enhanced when the north tank site is redeveloped. The distribution mains within the pressure zone also serve the 350 pressure zone located at the southeastern corner of Rose Hill's service area. Enhancement of service to the 350 pressure zone, and the corresponding 335 zone within Redmond's service area, must await selected upgrading of the existing network of six-inch and eight-inch distribution mains to sixteen-inch diameter.

New 450 Pressure Zone (requested by City of Kirkland)

This pressure zone has been created from the northwestern remnant of the old, much larger, 395 pressure zone. Service will be via a direct tap and pressure reducing station from the TESSL No. 1 supply line, or from the new large capacity storage reservoir to be constructed in the early 1990's. This zone will match an

identical pressure zone west of Interstate Highway 405 in the City of Kirkland water service area. The new 450 pressure zone will extend from near N. E. 85th Street in the south to N. E. 116th Street in the north and from Interstate 405 to the west, to 125th/126th Avenue N. E. to the east.

545 Pressure Zone

This pressure zone extends virtually the length of the water service area from north to south. Supply to this zone is via three metered pressure reducing stations with direct taps to the TESSL system and from the 11.2 MG south tank, which floats on the zone. During periods of peak demand, if TESSL pressures are low, this zone can also be supplied from a pumping station adjacent to the north tank and a booster pumping station adajcent to the TESSL line at Redmond Way.

590 Pressure Zone

This small pressure zone is located along the southwestern boundary of the service area. It is served by several pressure reducing stations from the 650 pressure zone. There is no dedicated storage for the pressure zone. This zone could be intertied to the City of Bellevue's 550 (Pike's Peak) pressure zone.

650 Pressure Zone

This is the highest pressure zone within the District. It is located largely within the corporate boundary of the City of Kirkland, south of N. E. 85th Street. However, a part of this zone lies east of 132nd Avenue N. E. within the corporate boundary of the City of Redmond. Supply can be directly from the TESSL pipeline when the system head is sufficient. Recent control valve modifications by the City of Seattle ensure that TESSL pressures will not exceed elevation 650 feet. In periods of high demand, or when TESSL system pressures are low, supply to this zone is maintained by booster pumps from the 11.2 MG, elevation 545, reservoir at the south tank site.

6.7 PROPOSED SYSTEM OF PRESSURE REDUCING STATIONS

Under the pressure zoning system as installed and operated in the Rose Hill service area during the early and mid-1980's, seven pressure zones were employed. These were as follows:

650	425/395*
590	350
545	285
425*	

*The 425 zone on the east side of the service area was indeed operated at an elevation head of 425 feet. However, the similar zone on the west side of the service area was in fact operated at only an elevation head of 395 feet. Under the capital improve

ments to be undertaken over the next five years, the number of pressure zones will be increased from seven to eight. A 395 pressure zone will be maintained generally north of N. E. 116th Street and the southerly portion of much of the old 395 pressure zone will be upgraded to a 450 pressure zone. The eight pressure zones will be as follows:

650	425
590	395
545 (Kirkland-545)	350 (Redmond-335)
450 (Kirkland-450)	285 (Redmond-238)

The 545, 450, 350 and 285 pressure zones will match adjacent, but much larger, similar (head) pressure zones in, respectively, Kirkland and Redmond. The new system of thirty-three pressure reducing stations (PRV's) is listed below. They have been grouped according to the pressure zone served. Also indicated is the approximate location of the pressure reducing station.

SWD/650	N. E. 70th Street and 137th Avenue N. E.
SWD/650	N. E. 85th Street and 132nd Avenue N. E.
650/590	N. E. 67th Place and 117th Avenue N. E.
650/590	N. E. 60th Street and 117th Avenue N. E.
SWD/545	N. E. 70th Street and 132nd Avenue N. E.
545/450	N. E. 85th Street and 120th Avenue N. E.
545/450	N. E. 85th Street and 122nd Avenue N. E.
545/450	N. E. 116th Street and 127th Avenue N. E.
545/425	N. E. 51st Street and SR-520
545/425	N. E. 65th Street and 150th Place N. E.
545/425	N. E. 70th Street and 148th Avenue N. E.
545/425	N. E. 73rd Street and 141st Avenue N. E.
545/425	N. E. 80th Street and 140th Avenue N. E.
545/425	Redmond Way and 140th Avenue N. E.
545/425	N. E. 100th Street and 134th Avenue N. E.
545/425	N. E. 108th Street and 135th Avenue N. E. (proposed)
545/395	N. E. 120th Street and 132nd Avenue N. E.
450/395	N. E. 116th Street and 127th Avenue N. E. (proposed)
450/395	N. E. 116th Street and 122nd Avenue N. E. (proposed)
425/350	N. E. 51st Street and 162nd Avenue N. E.
425/350	N. E. 55th Way and 159th Place N. E.
545/285	N. E. 116th Street and 136th Avenue N. E.

425/285	N. E. 59th Street and 158th Place N. E.
425/285	N. E. 65th Street and 157th Place N. E.
425/285	N. E. 68th Street and 155th Avenue N. E.
425/285	N. E. 76th Street and 153rd Avenue N. E.
425/285	Redmond Way and 152nd Avenue N. E.
425/285	620' N and 825' E of SW cor 2-25-5
425/285	360' N and 125' E of SW cor 2-25-5
425/285	N. E. 85th Street and 148th Avenue N. E. (proposed)
425/285	N. E. 110th Street and 137th Avenue N. E. (proposed)
395/285	N. E. 124th Street and 135th Avenue N. E.
395/285	N. E. 128th Street and 140th Avenue N. E.

The three metered connections to the TESSL system are currently equipped with pressure reducing valves. To a certain extent, some of these valves have been made obsolete, by the SWD's installation of control valves on the TESSL pipeline. These valves effectively limit the maximum TESSL pipeline pressure to elevation 650 feet. PRV's are also provided at the three metered connections to the City of Redmond system, and a PRV is installed at one of the four metered (supply) connections to the City of Kirkland.

When the new north tank is installed, with an overflow elevation of 450 feet, the two largest pressure zones in the Rose Hill service area will have associated large capacity reservoirs. Supply to the two highest pressure zones will remain by pump, if TESSL system pressures fall below elevation 650.

Supply to the 545 pressure zone can also be by booster pump if TESSL pressures fall below elevation 545 feet. All other zones can be supplied from the TESSL supply line, elevated storage and the system of pressure reducing valves described above. As can be seen, no zone is served by less than two pressure reducing stations and several large pressure zones have considerably more.

6.8 SUPPLY TO CITY OF REDMOND

The City of Redmond has been negotiating a purveyor contract with the City of Seattle Water Department. As part of these arrangements, the second TESSL pipeline will be routed through the City of Redmond. However, construction is not likely to be complete until mid-1990 at the earliest.

Construction of the first phase of TESSL No. 2 will benefit the northern half of the City of Redmond - that is the area north of SR 908 and west of Avondale Road N. E. It will have little or no effect upon supply in the southwestern portion of the municipality. Indeed, construction of the TESSL No. 2 pipeline southward, where it essentially parallels the existing line will have no immediate effect except increased reliability of supply. Overall transmission capacity will not be increased until all of the new TESSL line is completed. Even then, transmission capacity from the existing Cedar and Tolt reservoirs will be limited by the existing Tolt and Cedar pipelines.

The Seattle Water Department has agreed to supply the City of Redmond with Tolt/Cedar water by the end of June, 1990. This will be effected by constructing a small portion of the TESSL No. 2 pipeline northward from the existing TESSL No. 1 line at the intersction of 140th Avenue N. E. an Kirkland-Redmond Way. This supply line will extend northward along 142nd Avenue N. E. to the Puget Power sub-station. The pipeline will then parallel the transmision line right-of-way across Willows Road and the Sammamish River and up Education Hill to N. E. 104th Street.

This portion of TESSL No. 2, Phase I, will take its supply from TESSL No. 1. Later phases of construction will result in TESSL No. 2 running parallel to TESSL No. 1 southward along 140th Avenue N. E. to the 32.0 MG Eastgate reservoir and Eastgate Pump Station. Another subsequent phase will result in an extension to the northeast to connect with the existing Tolt River Pipeline (TRPL No. 1) in the vicinity of Welcome Lake. So, by mid-1990, Redmond will have direct taps to the TESSL system, but the overall transmission capacity of the TESSL system will not be increased until later phases of construction are complete. However, SWD's new Eastgate reservoir and pumping station will have increased the system's overall reliability and peak capacity such that the new Redmond demand will not be to the detriment of other Eastside purveyors. Part of this new demand will have previously been provided by the Rose Hill system and its taps to the same pipeline (TESSL No. 1).

The City of Redmond has also been negotiating an agreement to build a joint use 6.0 MG partially buried, concrete storage reservoir with the City of Bellevue with the likely split to be 44/56 (Redmond/Bellevue). The new facility will include a 20-inch direct connection to TESSL No. 1 and a pumping station. The reservoir, to be located at the northwest corner of 148th Avenue N. E. and N. E. 40th Street, will serve the 470 and 520 pressure zones within the Cities of Redmond and Bellevue.

The facility is in the design phase now and will likely be in-service by the end of 1990. However, the construction will have no effect on Redmond's 335 pressure zone which is currently served by a metered connection from the Rose Hill system.

So Redmond will continue to purchase water from the District, even when the TESSL No. 2 line is in service. The two metered connections to Rose Hill's 285 pressure zone will become non-operational. Nevertheless, they will probably remain installed as good neighbor emergency interties. These two metering stations R1 and R2 are located respectively at Leary Way N. E. and the Sammamish River and at N. E. 85th Street and the Sammamish River along the northeastern boundary of the District's service area.

The third metering station, Station 11, is located at N. E. 51st Street and West Lake Sammamish Roadway N. E.in Rose Hill's elevation 350 pressure zone. This is at the southeastern boundary of the District's service area. Although the average demand at this location is a relatively modest 0.5 MGD (350 gpm), the transmission/distribution system in this portion of the service area is a poorly developed network of six-inch and eight-inch asbestos cement pipes. Current peak demand is three times higher than the average and the projected peak is 2.7 MGD. Although the 350 pressure zone is comparatively small, there is some advantage in upgrading selected portions of the pipeline network transmitting water to and serving the area to include a sixteen-inch ductile iron transmission main. This would ensure adequate pressures and volumes throughout the 350 pressure zone, irrespective of City of Redmond demands at metering Station No. 11. It is unlikely that the City of Redmond would willingly participate in the costs of the necessary upgrading, as they presently pay a twenty per cent markup over the SWD rate for water supplies from Rose Hill.

6.9 DISTRIBUTION SYSTEM IMPROVEMENTS

In general, new additions to the distribution system will be by developer extensions to the existing transmission and distibution system. There are a number of areas within the District's service boundary that are presently undeveloped. Many of these areas are served but not yet connected, but some are presently not even served. Scheduling of distribution system extensions is not included as part of this plan, as this is largely a matter to be determind by individual property owners and development groups.

Conversely, replacement and rehabilitation (R&R) of the existing distribution system is a District responsibility. Assuming a nominal fifty-year service life and noting that the District has been in operation since the late 1940's, with system growth occurring in each of the four decades since that time, this is an on-going program that will never be completed. Ideally, the annual cost of any R&R program will be relatively constant, particularly if the water utility has been following a properly developed plan that has been subject to regular technical review and update.

Essentially, the R&R program is based on an assessment of the age, size and type of pipeline that has been installed. Each type of pipe; steel, cast iron, polyethylene, PVC, asbestos cement, concrete and ductile iron has an expected service life. Evidence that a given pipeline is nearing the end of its service life is generally given by operations and maintenance records. For example, frequent leak repairs to an eight-inch asbestos cement pipeline installed in 1956 might well indicate that all eight-inch asbestos cement lines laid during the 1950's may be nearing the end of their service lives.

Alternatively, leaks in (say) steel mains laid during the 1960's, in one particular area, may only indicate particularly aggresive local soil conditions. In this instance, other similar type and age lines may not be in jeopardy, but any replacement pipeline in the vicinity of the failing pipelines should take the aggressive soil conditions into account.

The broad criteria developed for District-wide water main replacement/rehabilitation are as follows:

- undersized by current design standards;
- undersized according to comprehensive plan analysis;
- steel mains;
- any other lines requiring disproportionate maintenance expense; and
- asbestos cement pipelines, mainly smaller than eight-inch diameter, all possibly having inherent problems.

There is no argument regarding the longevity, or service performance, of the steel pipelines laid within the District, or those laid in adjacent municipalities and special purpose districts. They are all failing.

There has been no mandatory obligation to take the asbestos cement pipelines out of service. The District has adopted a policy requiring all new and replacement transmission and distribution mains to be constructed using cement mortar lined, ductile iron pipe, encased with a polyethylene sleeve or sheet when directed by the District. Over time, all pipelines within the District will be upgraded to ductile iron.

A seven-year replacement and rehabilitation plan has been developed for the distribution system. This envisages the District spending an average of one-half million dollars every year, for the next seven years, on these scheduled improvements. As can be seen from the schedules, in terms of priority, the undersized steel mains have been scheduled for replacement first, followed by undersized asbestos cement lines. This particular program covers the seven-year period 1989 through 1995, by which time virtually all the existing steel mains will have been replaced.

A second schedule has been prepared showing the remaining undersized lines that should be replaced at some time. Some of these may be included in the 1989 to 1993 programs, or subsequent updates of these annual construction programs. The remainder will form the basis for detailed R&R programs to be developed covering the years 1992 through 1998. A third schedule has been prepared showing the existing network of asbestos cement lines that are currently deemed neither overage, nor undersized. Many of these

lines are less than twenty-seven years old. These do not presently form part of the proposed District-wide repair and rehabilitation plan. Unless the State or Federal government established some new guidelines requiring the early retirement of these asbestos cement transmission and distribution systems, these thirteen miles of pipeline are expected to remain in service.

6.10 STORAGE SYSTEM IMPROVEMENTS

Reservoirs serve at least four useful functions for every water system:

- Emergency storage;
- Fire suppression storage;
- Peak flow equalization; and,
- Suction/discharge level control for pump stations

The Rose Hill storage system was evaluated for its capability to continue to adequately serve these four functions in the future. This evaluation was made somewhat more complicated because of Rose Hill's role as a wholesale supplier to the City of Kirkland and the City of Redmond. The existing City of Seattle TESSL transmission line runs north-south through the Rose Hill franchise area and neither municipality currently has direct taps to the transmission line. Rose Hill has three active (and two currently inactive) connections to this line and has four meter (supply) connections to the Kirkland system and three metered connections to the Redmond system. The total demands of the two adjacent municipalities are significant (over 50 per cent) compared to the total demand of the Rose Hill system.

These demands influence not only the sizing of the distribution network within the Rose Hill franchise boundary, but also the capacity of the storage system. Kirkland has participated in recent transmission main and storage system improvements. Hence, Rose Hill's water sales to Kirkland are at cost. Currently, the City of Redmond has not participated in either transmission main or storage system construction. Hence, retail sales to Redmond are marked-up by twenty per cent. At present, there are only two reservoirs in the system; an 11.2 MG shared facility and a 1.5 MG standpipe that is not used for storage. A new 6.7 MG (minimum capacity) reservoir is planned to replace the small standpipe. This will serve the new 450 (upgraded 395/425) and new 395 pressure zones in the northwestern portion of the service area.

The general guideline for emergency storage, issued by the Washington State Department of Social and Health Services (DSHS), is a storage capacity equal to, or greater than, the peak-day demand. Two specific system failures could lead to reliance upon this emergency storage capability:

- o an inoperable transmission system; and
- o a major power outage

A transmission main break in the City of Seattle system (TESSL), or within the Rose Hill service area could necessitate a complete, or partial shut-down of the transmission (bulk supply) system. Alternatively, vandalism, sabotage, a major seismic disturbance, or other unforeseen circumstances could have a similar effect. The important criterion is total system storage; provided that pumping and/or gravity flow between reservoirs can maintain supply to all pressure zones, there is no particular requirement for a reservoir to be provided for each and every pressure zone.

A power outage would only affect that portion of the distribution system that requires pumping to maintain pressures within the zone, or levels in the standpipe reservoirs. Emergency standby power has not been provided. The criterion for provision of standby power is simply the trade-off between provision of additional elevated storage to meet peak-day demand and the cost of providing standby power to meet the demand from storage at a lower elevation. In this case, TESSL pressures are not expected to get so low that a problem could arise.

Rose Hill Water District currently has three active and two inactive metered connections to the Seattle Water Department's TESSL line at:

Station 5 - N.E. 113th St. and 132nd Ave. N.E. (SWD Sta. 74)

Station 7A - Redmond Way and 132nd Ave. N.E. (SWD Sta. 75)

Station 8 - N. E. 70th St. and 140th Ave. N.E. (SWD Sta. 72)

Station 6 - N.E. 108th St. and 132nd Ave. N.E. (deactivated)

Station 9 - Old Redmond Rd. and 140th Ave. N.E. (deactivated)

Pressures in this line are somewhat influenced by system demand (total purveyor and direct service area withdrawals), but meet the elevation 650 foot head criterion for a wide range of flows. A schematic diagram showing the relationship between flow rate and head at the junction between the TRPL No. 1 and the TESSL is given overleaf. This shows that, for total flow rates below 40,000 gpm (58 MGD), the hydraulic head is above elevation 650, but that for system withdrawals greater than 80 MGD, the head falls off rapidly.

The 1981/82 purveyor contract with the Seattle Water Department gives the following minimum hydraulic gradients at the three metered connections to the TESSL system:

Station No.	Minimum Head*
5	545 feet
7A	540 feet
8	535 feet

*These minimum head elevations are to the City of Seattle datum, and are rounded-off to the nearest five feet. Equivalent heads to the datum used by Rose Hill (King County aerial survey, 1929) would be approximately five (5.96) feet higher.

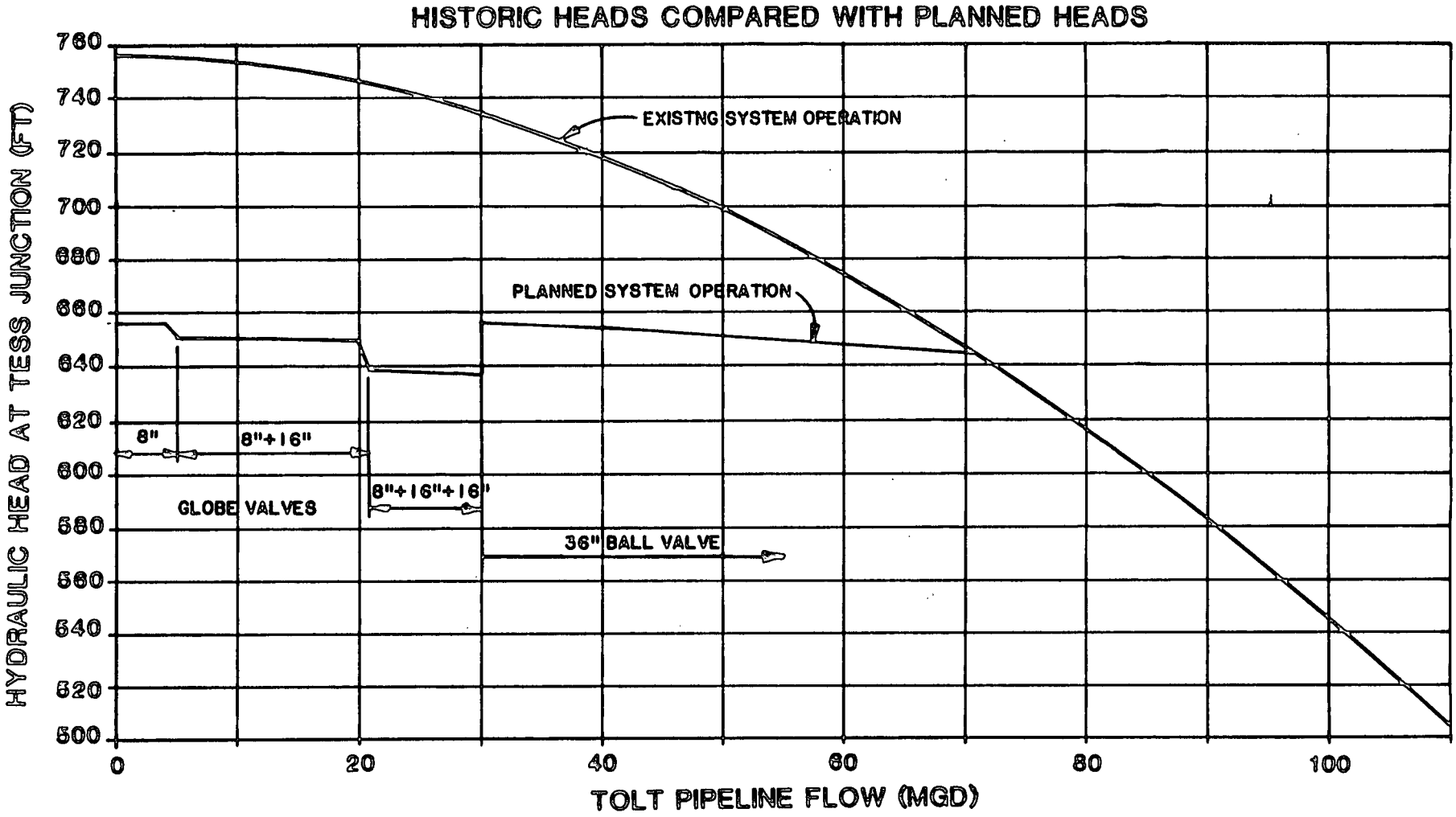
6.11 PROPOSED FIRE STORAGE CAPABILITY

Under this 1988 comprehensive water plan, additional storage (minimum 6.7 MG) will be constructed at the north tank site, replacing the existing 1.5 MG standpipe. The District will retain its 4.1 MG share of the 11.2 MG south tank. The transmission mains in the eight pressure zones will be modified to improve service within the franchise boundary and to provide adequate pressures to the northern part of Kirkland's 450 pressure zones and the western portion of Redmond's 350 pressure zone.

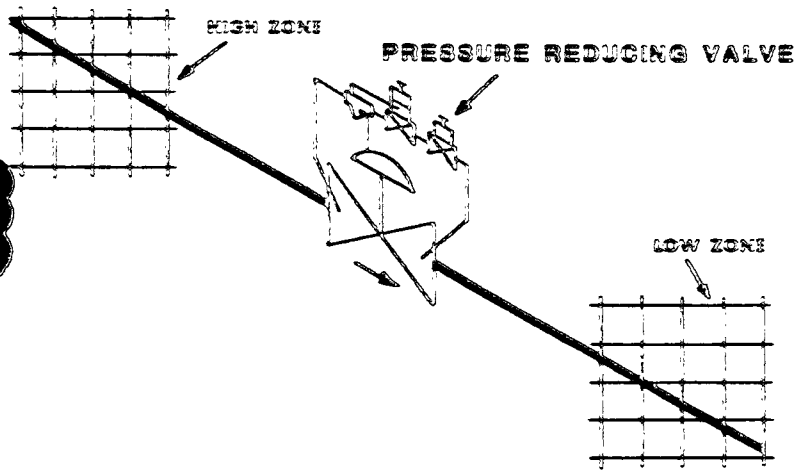
Elevated storage will still not be provided for the highest pressure zone in the District (elevation 650 feet) nor for the elevation 590 zone, which is supplied by PRV's from the 650 zone. The two largest pressure zones, in terms of numbers of equivalent connections and areal extent, the 545 and the 450, will each have a large capacity reservoir. The four lower elevation pressure zones, which are supplied via PRV stations from the TESSL pipeline, or from these reservoirs, will rely on fire storage volumes provided from these higher elevation zones. Under normal circumstances, however, the three metered connections to the Tolt Eastside Supply Line (TESSL No. 1) - which has a regulated head of 650 feet - will be available to provide the required volumes and pressures in all eight pressure zones.

Pressure Zone	Maximum FF in Zone	Comments
650	0.24 MG	TESSL or pumped from 545 tank
590	0.24 MG	PRV's from 650 zone
545	1.20 MG	11.2 MG tank on the zone (4.1 MG)
450	0.60 MG	6.7 MG tank on the zone
425	0.60 MG	PRV's from 545 zone
395	0.60 MG	PRV's from 425 zone
350	0.24 MG	PRV's from 425 zone
285	0.96 MG	PRV's from 425 zone
Total	4.68 MG	

HYDRAULIC HEAD AT TESS JUNCTION



As shown, summing the maximum requirement in each zone may be regarded as overly conservative. Alternatively, with two storage facilities, the minimum requirement would be given by the single maximum flow of all zones served by that storage facility; that is, 1.20 MG from the south tank and 0.96 MG from the new north tank. This would give a total fire storage requirement of 2.16 MG. However, this volume is only that minimum required for fire protection within the District's service boundary and does not take into consideration any fire storage requirements of Kirkland, or Redmond.



CHAPTER SEVEN
OPERATIONS PROGRAM

CHAPTER SEVEN

OPERATIONS PROGRAM

7.1 GENERAL

The existing Rose Hill water distribution system currently serves the following numbers and classes of customers:

5,893 single family residential
456 multi-family residential (3,496 units)
461 commercial, industrial, institutional, et cetera

Our analysis of ultimate development within the water service area suggests that, by the year 2010 or 2020, the District organization will have to respond to the needs of the following numbers and classes of customer:

11,184 single family residential
634 multi-family residential (4,470 units)
2,690 commercial, industrial, institutional, et cetera

In other words, the District operations, which are currently set up to serve the equivalent of 10,517 single family residential customers will ultimately serve the equivalent of almost twenty thousand.

The principal purpose of the Rose Hill Water District is to ensure that these customers have an uninterrupted, reliable and adequate supply of high quality water. Appropriate measures to achieve this purpose are a general requirement of Chapter 248-54-WAC.

7.2 SYSTEM MANAGEMENT

The personnel organization within the Rose Hill Water District is shown on the organization chart on the following page:

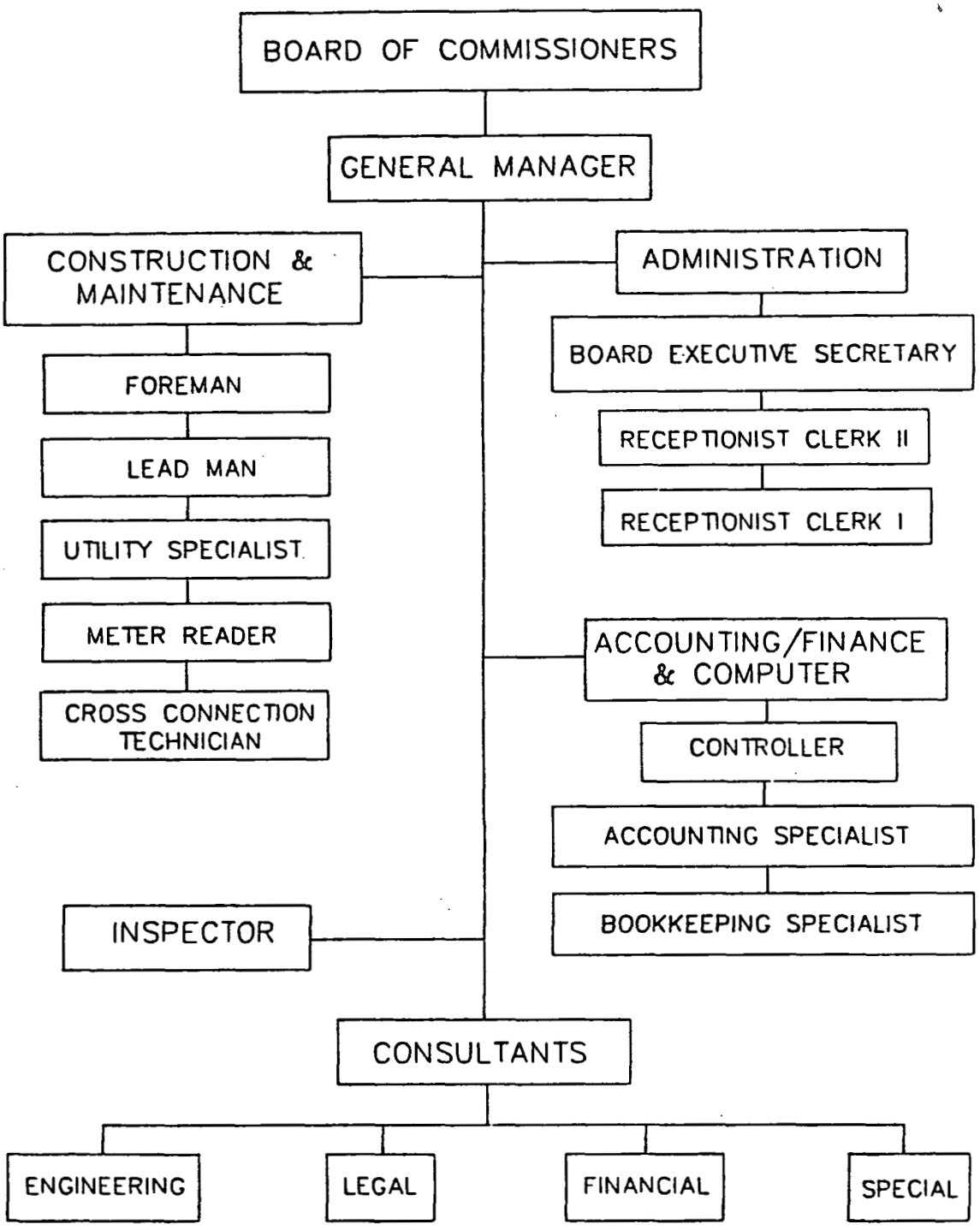
The activities within the Rose Hill Water District may be categorized as:

- Finance
- Administration
- Technical Consultation
- Operations and Maintenance

Responsibility for overall executive management of these activities is held by the General Manager who, in turn, reports directly to an elected Board of Commissioners. Rose Hill has traditionally always had three Commissioners, whose six-year terms of office are staggered to provide continuity, stability and accountability.

ROSE HILL WATER DISTRICT

ORGANIZATION CHART



The administrative division primarily provides general office support services which include: working with customer accounts, billing, receipting and other customer services.

The personnel of the finance, accounting/computer division perform the necessary accounting, budgeting and reporting functions to maintain District records to generally accepted accounting principles and standards.

Technical consultation has generally been provided on an on-going, as required basis by specialist, independent; legal, economic planning and engineering firms. These outside consultants attend the Board of Commssioners' meetings with the General Manager, Executive Secretary and Bookkeeping Specialist on a regular basis to assist in the Board's review of current activities. Under contract to the District, these and other technical specialists, upon request, undertake a variety of special studies and projects for review and approval by the Board.

Operations and maintenance responsibilities are carried out on a day-to-day basis by the District's full-time technical staff. Special assistance to the operations and maintenance division, if required, is obtained from a roster of contractors who have expressed an interest in small works projects.

The District's current Operations, Maintenance and Emergency Response Program is presented in Appendix F to this water system plan.

7.3 WATER QUALITY MONITORING

Federal and State regulations specify a minimum water quality monitoring program for community water systems. The State Department of Social and Health Services (DSHS) has the responsibility for enforcement of these regulations, whereas the water purveyor (the District) has primary responsibility for monitoring, reporting and maintaining potable water quality within its water service area.

Since wholesale supplies are purchased from the City of Seattle routine water quality analysis is also performed by the Seattle Water Department. The total number of samples taken per month by the District is based on the total population served directly, or indirectly, by the Seattle water system. By agreement, the Department takes a total of ten (10) samples each month at the following three sampling locations within the service area.

N. E. 65th Street and 130th Avenue N. E. (District office)
N. E. 82nd Street and 122nd Avenue N. E.
N. E. 104th Street and 128th Avenue N. E.

These locations are shown on the District map on the following page.

7.4 PREVENTATIVE MAINTENANCE

A schedule of inspection and routine maintenance has been implemented by the District. The schedule covers the major transmission, distribution, storage and pumping facilities within the service area. In addition to scheduled inspections, any facilities, or equipment, exhibiting some temporary problem or subject to other unusual conditions are monitored more frequently. The routine schedule is as follows:

Transmission/Distribution System

- Weekly - collect representative water samples
- Annually - flush mains
  - exercise all distribution system valves

Hydrants and PRV Stations

- Annually - check and operate all hydrants and hydrant valves, including removal of debris from valve boxes
- Annually - check operation of all PRV's and make any necessary adjustments

Meters

- Annually - calibrate all system flow meters (excluding customer service meters) and service according to manufacturer's recommendations.

Pump Stations

- Daily - check drive and locks
  - record flow meter reading
  - check pump operation, including:
    - lubricant levels
    - seals and gaskets
    - running amperage and pressure
    - pump control valve operation

Storage Reservoirs

- Weekly - inspect fences, gates, locks
  - check for obvious leaks
- Bi-annually - drain reservoir
  - clean interior walls and bottom
  - inspect interior surfaces for cracks, leaks and condition of paint
  - disinfect, flush and refill

7.5 CROSS CONNECTION CONTROL

The Rose Hill Water District has an on-going cross connection control program. The District has adopted WAC 248-54-285 and the AWWA-Pacific Northwest Section's Cross Connection Control Manual as the minimum guidelines to be followed by developers. An approved backflow prevention device is required on all cross connections, or possible cross connections. Each device is required to be inspected and tested prior to commissioning and on an annual basis thereafter. Both the City of Redmond and the City of Kirkland have similar, but not quite identical requirements for backflow prevention devices.

The Rose Hill Water District and the Northeast Lake Washington Sewer and Water District have entered into a joint cross-connection abatement program. A team comprised of an experienced waterworks technician from each District is now responsible for implementation of the program throughout the two service areas. Both Districts find this joint agreement a cost-effective way to upgrade specific employee skills and implement a proper control and abatement program. The two Districts are currently exploring other ways to share personnel and equipment to economically enhance customer service and system reliability.

APPENDIX B – SEPA COMPLIANCE AND CHECKLIST

EXISTING ENVIRONMENTAL CONDITIONS

1.0 EARTH RESOURCES

Topography:

The topography of the Rose Hill Water District is comprised of features typical of the glaciated Puget Sound region. The majority of the district service area is an upland area characterized by gently sloping, rolling topography. The undulating character of the upland is the result of post-glacial stream erosion and surface depressions left by the receding glacier which are now occupied by small lakes and bogs. Forbes Lake occupies the largest of these depressions within the District. Elevations in the upland area range between 200 and 500 feet MSL (Mean sea level). The highest locations are located in Bridle Trail State Park at the southern end of the District service area. Elevations gradually decrease to the north and east of the State park.

The District extends into adjoining lowlying valley areas north and east of the upland region. The larger of these lowlands is the broad valley of the Sammamish River and Lake Sammamish along the eastern edge of the uplands. Both valley floors are relatively flat and featureless. The valley floors are separated from upland areas by bluffs ranging in heights between 100 to 200 feet. The slopes along these bluffs are steep to very steep, often exceeding 40 per cent. Spring-fed creeks and upland streams have created numerous steep-sloped ravines along the bluffs. These ravines are particularly notable along bluffs between SR 908 and N. E. 124th Street.

Geology:

The geological features of the district service area have resulted from processes that occured during the most recent glacial epoch and the post-glaciation period. The upland areas of the Disrict lie atop a glacial drift plain, a feature that is a composite of several different glacial depositional processes (Liesch, et al, 1963). These processes include lacustrine deposits, which consist predominantly of silt and clay deposited in glacial lakes; glacial till, a mixture of sand, gravel, clay, silt and boulders deposited directly by the glacier; and advance and recessional drift, largely sand and gravel deposits made by glacial meltwater. The deposits made by these various processes are layered, with the deposits of later glacial processes (recessional outwash, till), overlying older deposits (advance outwash, lacustrine, consolidayed material from previous glacial epochs). Within the Rose Hill Water District, surface exposures of most of these glacial materials have been identified. Surface exposures of clay (lower clay

unit, upper clay unit, are found at lower elevations along the bluffs and ravines of the service area (Figure 1). Exposures of advance outwash sand deposits can be found along hillsides atop clay deposits, and till deposits cover most of the higher terrain above the bluffs and ravines. Large deposits of the recessional outwash sand deposits are located in outwash stream valleys (e.g., the valley traversed by N.E. 124th Street and in terraces along the hillsides between the drift plain and the Sammamish River Valley lowland.

Post-glacial deposits are limited to those parts of the District service area within the Sammamish River Valley or in depressions atop the drift plain. The surface geology of the Sammamish River Valley largely consists of alluvium deposited by post-glacial rivers. Peat deposits are also found in poorly drained depressions of the flat-floored valley. Poorly drained depressions created by the receding glacial in the upper reaches of the drift plain have also become ares of peat deposition. The area around Forbes Lake is one such peat bog.

Soils:

The soils of the District service area are closely related to the underlying surface geological material which serves as the "parent material" from which the soil develops. The soils of the Sammamish River Valley floor, the uplands, and the bluffs along the interface between the valley floor and the uplands are distinct from one another. The predominant soil types located on the floor of the Sammamish River Valley are of the Earlmont and Snohomish series. These soils are derived from river alluvium, and are nearly level, poorly drained and generally subject to flooding. The soils of the rolling uplands of the drift plain are predominantly Alderwood series soils, derived from the underlying Alderwood series soils, derived from the underlying glacial till deposits. These soils tend to be moderately well drained in near surface layers, although the underlying till hardpan can contribute to seasonal high water levels. A greater divesity of soils is found along the upland bluffs since more types of geological materials are exposed in these areas. In addition to Alderwood series soils, the principal soil types located in bluff areas include the Kitsap series, associated with lacustrine deposits (silt loam), and Indianola series, which correspond to recessional outwash deposits (loamy, fine sand). Tukwila series soils, which are highly organic, poorly drained soils associated with upland depressions and stream bottoms, are located around Forbes Lake and in scattered areas of the Sammamish River Valley floor.

Geologic Hazards:

The different physical properties of the various geological strata, soil and topographic features, particulalry slopes, influence the type of geological hazards existing within the District service area. Most geological hazards within the service area are found in the bluff araas along the northern and eastern perimeter of the upland region. In these areas, it is not uncommon to find deposits of comparatively impermeable materials (lacustrine deposits, older consolidated deposits) underlying more permeable strata, particularly recessional outwash materials (Liesch, et al, 1963). These surface contacts of permeable sand and gravel outwash deposits over impermeable till, lacustrine and older consolidated deposits have been found to be the major cause of past landslide activity in the Seattle area, primarily in areas with slopes exceeding 15% (Tubbs, 1974, 1975). Slopes in excess of 40 per cent are common along the bluffs of the service area.

The soils of the study area may also present potential hazards of impose development constraints. Erosion potential is the principal hazard presented by local soils. Moderate to severe and severe erosion hazard potential soils are also concentrated in the steeper slope areas of the bluffs within the District service area (Figure 2). Most service area soils impose "severe" limitations for shallow excavations (USDA 1973). Seasonal high water tables are the principal cause of these limitations, although soil texture may also present a hazard in sandy loams such as the Indianola soils series.

Most of the bluff area within the District service area fall within either the corporate boundaries of the City of Redmond or its planning area. The City has identified this area as imposing moderate to very severe development limitations (Redmond, 1985). Areas with very severe development limitations, in which no development is permitted, include areas with slopes exceeding 40 per cent and areas with slopes between 25 to 40 per cent that also are identified as Class 3 landslide and earthquake hazard areas and also present severe erosion hazard potential. Severe and moderate development limitation areas also reflect some combination of steep slope, landslide, earthquake or erosion hazards, but not to the degree of the very severe development limitation areas. Limited development is permitted in the severe and moderate development limitation areas. The floor of the Sammamish River Valley is also recognized as a moderate development limitation area as a consequence of flood fringe and seismic hazards. The area around Forbes Lake is recognized by King County as having severe seismic hazards due to the presence of peat deposits.

2.0 WATER RESOURCES

Surface Water Resources:

The Rose Hill Water District servie area falls within two general surface water drainge systems. These drainage systems are roughly defined by 132nd Avenue N. E. Surface drainage west of this roadway is the north and west. The majority of the western part of the District service area drains ito Forbes Lake (King County, 1985). Forbes Lake, which is approximately eight acres in size, is the only local water body in this area. The lake performs an important function in the area-wide drainage system; providing storage for surface stormwater runoff and acts as a trap for sediment carried by this runoff. The lake discharges into Forbes Creek, which flows in a northwesterly direction and eventually discharges into Juanita Bay.

The District service area east of 132nd Avenue N. E. generally drains eastward toward Lake Sammamish and the Sammamish River. Surface drainage in this area occurs via a number of small, spring-fed streams that are found along the bluffs overlooking the Sammamish River Valley. Within the bluffs, many of these streams are defined by narrow, steeply sloping ravines. The largest of these ravines are located just north of SR-908. Most streams are intermittant, flowing primarily during the winter peak precipitation period (Redmond, 1985). These seasonal streams tend to "fan-out" on the valley floor and dissipate before reaching Willows Road, entering the subsurface flow witin the river alluvium. Perennial (year-round) stream flow occurs in a couple of streams just north of SR-90 and also in two streams jut south of N. E. 124th Street.

Peters Creek is an exception to the general character of surface drainage in the eastern part of the District service area. Peters Creek is a large, year-round stream that drains the southeastern part (roughtly east of 148th Avenue N. E. and south of SR-908) of the service area. The stream drains in a northern direction until it reaches Willows Road north of SR-908. After the creek passes under Willows Road, it is directed eastward by an artificial flood-control channel to the Sammamish River.

Groundwater:

Groundwater resources within the Rose Hill Water Distict service area are closely related to local geologic conditions. In general, the most substantial supplies of groundwater resources are associated with highly permeable subsurface geological strata, particularly those largely comprised of sand and gravel materials. In the service area, the advance outwash strata underlying till deposits in the drift plain (and also within the Sammamish River Valley beneath

alluvium and till strata) contains the largest groundwater aquifer. Recessional outwash deposits provide significant sources of groundwater in localized areas of the service district. Alluvium in the Sammamish River Valley also contains locally unusable groundwater volumes. The higher elevations of the uplands are probably the principal source of groundwater recharge within the service district. Subsurface groundwater movement from this area may contribute to aquifers within the Sammamish River Valley and the numerous springs that contribute to surface flow of the small streams originating at the interface of permeable/ impermeable geological strata along the edge of the uplands produces.

Impermeable strata, such as till and clay deposits, do not contain significant groundwater resources. Occasionally, "lenses" of sand and gravel deposits are found within these impermeable strata that will yield groundwater. Groundwater may also be perched within the more permeable, near-surface part of glacial till. Unlike the deeper aquifers, this near-surface water table is subject to significant seasonable water level fluctuations.

3.0 WATER SERVICE AREA

3.1 PLANNING AREA

3.1.1 General

The Rose Hill Water District service area encompasses an area of approximately 8.6 square miles. Service area boundaries are defined by the Sammamish River Valley on the east, I-405 on the west, a small valley (corresponding to N.E. 124th Street) on the north and the City of Bellevue on the south (Figure 1). Although once largely serving an unincorporated area of King County, large parts of the district now fall within the incorporated boundaries of the Cities of Kirkland and Redmond. A small section within the City of Bellevue is also within the district, with the balance being unincorporated areas of the County.

The Rose Hill Water District is adjoined by several municipal and special district water purveyors. East of the district is the City of Redmond water service area. The service area of the City of Bellevue lies south of the district and that of the City of Kirkland is located to the west. Along the northern edge of the service area, the district adjoins Water District 104, which largely serves the unincorporated Woodinville area and the Northeast Lake Washington Water and Sewer District, which services the Juanita and Kenmore areas of the County.

3.1.2 Relationship of the Rose Hill Water District Service Area to Contract Agreements with Adjoining Districts and Municipalities

Introduction: The service area of the Rose Hill Water District is adjacent to five other municipal corporations providing water service. Except for that part of the district presently within the City of Bellevue, the service area lies entirely within the planning area boundaries of the Cities of Redmond and Kirkland. Planning area boundaries define municipal "spheres of influence", or adjoining unincorporated County areas which are logical areas of municipal annexation. The Kirkland/Redmond planning area boundary is generally defined by 132nd Avenue N. E.

NELWSWD/Water District No. 104: The service areas of these two utility districts are located north of the Rose Hill Water District. The Northeast Lake Washington Water and Sewer District services the general area west of 124th Avenue N. E. while Water District

104 serves the area to the east. Rose Hill Water District and NELWSWD once proposed an intertie at N. E. 124th Street to increase service dependability in the northern part of the Rose Hill District and increase emergency flow to the NELWSWD service area. This intertie has presently been dropped from plans as unnecessary at this time.

Redmond: The water service area of the City of Redmond is generally located to the east of the Sammamish River. Although municipal corporate boundaries presently extend as far west as 132nd Avenue N.E., the river has presented a natural physical division between the two service areas. The City of Redmond maintains its own water supply source (principally well water) while the Rose Hill Water District purchases its supply from the City of Seattle system. Plans are presently underway to provide Seattle Water Department service to Redmond and other communities east of the Sammamish River Valley to accommodate existing and future growth.

Bellevue: On the southern boundary of the Rose Hill Water District service area, both the district and the City of Bellevue have small water service areas with operational problems. West of Bridle Trails State Park, the District has a narrow service area extending south from N. E. 60th Street between the Park and the State Highway. Bellevue has a similar service area extending north from N. E. 34th Street. Problems in these areas are attributable to their single feed, dead-end configuration. Rose Hill operates this area in the 545 foot pressure gradient while Bellevue operates the area out of their 550-pressure gradient. Both purveyors could benefit if reciprocal emergency connections in these areas were provided. These connections would probably be pressure reducing metering stations for automatic emergency service.

Rose Hill and Bellevue also have joint use facilities. The District supplies Bellevue at 140th Avenue N. E. and N. E. 60th Street with a 16-inch connecting line, providing the City with access to the joint facility reservoir. The City of Bellevue controls 1.5 million gallons capacity at the 11.2 million gallon reservoir at N. E. 65th Street. Bellevue also serves the residential area east of Bridle Trails State Park, which is an extension of the northeasterly sloping residential part of the District.

Kirkland: The City of Kirkland water service area lies west of I-405. The Rose Hill Water District contracts for supply with the City of Seattle on behalf of the City of Kirkland. The District provides supply to

Kirkland at N. E. 60th Street, N. E. 85th Street and at N. E. 116th Street. The District also provides necessary storage and transmission facilities as a part of the 1968 Joint Facilities Agreement. Kirkland's share of the south reservoir is 5.6 million gallons, or approximately one-half of the capacity. Kirkland has implemented a program to reduce system water losses, which has reached 30 per cent.

3.2 SERVICE AREA CHARACTERISTICS

3.2.1 Earth Resources

Topography: The topography of the Rose Hill Water District is comprised of features typical of the glaciated Puget Sound region. The majority of the district service area is an upland area characterized by gently sloping, rolling topography. The undulating character of the upland is the result of post-glacial stream erosion and surface depressions left by the receding glacier which are now occupied by small lakes and bogs. Forbes Lake occupies the largest of these depressions within the District. Elevations in the upland area range between 200 and 500 feet MSL (mean sea level). The highest elevations are located in Bridle Trail State Park at the southern end of the District service area. Elevations gradually decrease to the north and east of the State Park.

The District extends into adjoining lowlying valley areas north and east of the upland region. The larger of these lowlands is the broad valley of the Sammamish River and Lake Sammamish along the eastern edge of the uplands. Both valley floors are relatively flat and featureless. The valley floors are separated from upland areas by bluffs ranging in heights between 100 to 200 feet. The slopes along these bluffs are steep to very steep, often exceeding 40 per cent. Spring-fed creeks and upland streams have created numerous steep-sloped ravines along the bluffs. These ravines are particularly notable along bluffs between SR 90 and N.E. 124th Street.

Geology: The geological features of the district service area have resulted from processes that occurred during the most recent glacial epoch and the post-glaciation period. The upland areas of the district lie atop a glacial drift plain, a feature that is a compositive of several different glacial depositional processes (Liesch, et al., d1963). These processes include lacustrine deposits, which consist predominantly of silt and clay deposited in glacial lakes; glacial till, a mixture of sand, gravel, clay, silt and boulders deposited directly by the glacier; and advance

and recessional drift, largely sand and gravel deposits made by glacial meltwater. The deposits made by these various processes are layered, with the deposits of later glacial processes (recessional outwash, till) overlying older deposits (advance outwash, lucustrine, consolidated material from previous glacial epochs). Within the Rose Hill Water District, surface exposures of most of these glacial materials have been identified. Surface exposures of clay (lower clay unit, upper clay unit) are found at lower elevations along the bluffs and ravines of the service area (Figure 1). Exposures of advance outwash sand deposits can be found along hillsides atop clay deposits, and till deposits cover most of the higher terrain above the bluffs and ravines. Large deposits of recessional outwash sand deposits are located in outwash stream valleys (e.g., the valley traversed by N.E. 124th Street and in terraces along the hillsides between the drift plain and the Sammamish River valley lowland.

Post-glacial deposits are limited to those parts of the district service area within the Sammamish River valley or in depressions atop the drift plain. The surface geology of the Sammamish River Valley largely consists of alluvium deposits by post-glacial rivers. Peat deposits are also found in poorly drained depressions of the flat-floored valley. Poorly drained depressions created by the receding glacier in the upper reaches of the drift plain have also become areas of peat deposition. The area around Forbes Lake is one such peat bog.

Soils: The soils of the district service area are closely related to the underlying surface geological material which serves as the "parent material" from which the soil develops. The soils of the Sammamish River Valley floor, the uplands, and the bluffs along the interface between the valley floor and the uplands are distinct from one another. The predominant soil types located on the floor of the Sammamish River Valley are of the Earlmont and Snohomish series. These soils are derived from river alluvium, and are nearly level, poorly drained and generally subject to flooding. The soils of the rolling uplands of the drift plain are predominantly Alderwood series soil, derived from the underlying glacial till deposits. These soils tend to be moderately well drained in near surface layers, although the underlying till hardpan can contribute to seasonal high water levels. A greater diversity of soils are found along the upland bluffs since more types of geological materials are exposed in these areas. In addition to Alderwood series soils, the principal soil types located in bluff areas include the Kitsap series, associated with lacustrine deposits

FIGURE 1 SOIL HAZARDS

Severe Erosion Potential

Moderate to Severe Erosion Potential

(silt loam), and Indianola series, which correspond to recessional outwash deposits (loamy fine sand). Tukwila series soils, which are highly organic, poorly drained soils associated with upland depressions and stream bottoms are located around Forbes Lake and in scattered areas of the Sammamish River Valley floor.

Geologic Hazards: The different physical properties of the various geological strata, soils and topographic features, particularly slopes, influence the type of geological hazards existing within the district service area. Most geological hazards within the service area are found in the bluff areas along the northern and eastern perimeter of the upland region. In these areas, it is not uncommon to find deposits of comparatively impermeable materials (lacustrine deposits, older consolidated deposits) underlying more permeable strata, particularly recessional outwash materials (Liesch, et al, 1963). These surface contacts of permeable sand and gravel outwash deposits over impermeable till, lacustrine and older consolidated deposits have been found to be the major cause of past landslide activity in the Seattle area, primarily in areas with slopes exceeding 15 per cent (Tubbs, 1974, 1975). Slopes in excess of 40 per cent are common along the bluffs of the service area.

The soils of the study area may also present potential hazards or impose development constraints. Erosion potential is the principal hazard presented by local soils. Moderate to severe and severe erosion hazard potential soils are also concentrated in the steeper slope areas of the bluffs within the district service area (Figure 2). Most service area soils impose "severe" limitations for shallow excavations (USDA 1973). Seasonal high water tables are the principal cause of these limitations, although soil texture may also present a hazard in sandy loams such as the Indianola soils series.

Most of the bluff area within the district service area falls within either the corporate boundaries of the City of Redmond or its planning area. The City has identified this area as imposing moderate to very severe development limitations (Redmond, 1985). Areas with very severe development limitations, in which no development is permitted, include areas with slopes exceeding 40 per cent, and areas with slopes between 25 to 40 per cent that also are identified as Class 3 landslide and earthquake hazard areas and also present severe erosion hazard potential. Severe and moderate development limitation areas also reflect some combination of steep slope, landslide, earthquake or erosion

hazards, but not to the degree of the very severe development limitation areas. Limited development is permitted in the severe and moderate development limitation areas. The floor of the Sammamish River is also recognized as a moderate development limitation area as a consequence of flood fringe and seismic hazards. The area around Forbes Lake is recognized by King County as having severe seismic hazards due to the presence of peat deposits.

3.2.2 Water Resources

Surface Water Resources: The Rose Hill Water District service area falls within two general surface water drainage systems. These drainage systems are roughly defined by 132nd Avenue N. E. Surface drainage west of this roadway is the north and west. The majority of the western part of the district service area drains into Forbes Lake (King County, 1985). Forbes Lake, which is approximately eight acres in size, is the only local water body in this area. The lake performs an important function in the areawide drainage system; providing storage for surface stormwater runoff and acts as a trap for sediment carried by this runoff. The lake discharges into Forbes Creek, which flows in a northwesterly direction and eventually discharges into Juanita Bay.

The district service area east of 132nd Avenue N. E. generally drains eastward toward Lake Sammamish and the Sammamish River. Surface drainage in this area occurs via a number of small, spring-fed streams that are found along the bluffs overlooking the Sammamish River valley. Within the bluffs, many of these streams are defined by narrow, steeply sloping ravines. The largest of these ravines are located just north of SR-908. Most streams are intermittent, flowing primarly during the winter peak precipitation period (Redmond, 1985). These seasonal streams tend to "fan-out" on the valley floor and dissipate before reaching Willows Road, entering the subsurface flow within the river alluvium. Perennial (year-round) stream flow occurs in a couple of streams just north of SR-908 and also in two streams just south of N. E. 124th Street.

Peters Creek is an exception to the general character of surface drainage in the eastern part of the district service area. Peters Creek is a large, year-round stream that drains the southeastern part (roughly east of 148th Avenue N. E. and south of SR-908) of the service area. The stream drains in a northern direction until it reaches Willows Road north of SR-908. After the creek passes under Willows Road, it is directed eastward by an artificial flood-control channel to the Sammamish River.

FIGURE 2 GEOLOGY

Till

Lower Clay

Alluvium

Advance Outwash

Recessional Outwash

Peat

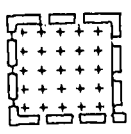
Upper Clay

The City of Kirkland Land Use Policies is more restrictive in the distribution of more intensive land uses within the district service area than the proposed County plan. The Rose Hill Water District falls within three Kirkland neighborhood planning areas: Rose Hill, the largest; the Juanita/Par Mac/Totem Lake; and Bridle Trails, which partially overlaps the City's Rose Hill neighborhood. As with the proposed County plan, Kirkland's Rose Hill Neighborhood Plan seeks to maintain the existing character of the residential community. Much of the upland area of the district that is in the Kirkland planning area (both the Rose Hill and Bridle Trail neighborhoods) is designated for single-family residential or residential estate use. The Kirkland plan, however, maintains single-family residential densities (six du/acre or less) in most of the areas the proposed County plan would have permitted multi-family residential uses (Figure _____). Higher density residential uses may be feasible, within standards, in areas where topography, traffic patterns and existing land uses would make it practical. Multi-family residential and commercial uses are allowed along N. E. 85th Street, although within a more restricted area than the proposed County plan allowed. The lowland area around Totem Lake is designated for commercial and industrial activities.

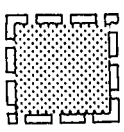
Kirkland's current Rose Hill Neighborhood Plan is approximately ten years old. The City has initiated an effort to update this plan subsequent to the annexation of the community in 1987. This planning effort may result in some changes to designated land uses within the district service area.

The majority of the Rose Hill Water District service area is located in the City of Redmond planning area. The district includes part of four City neighborhoods: Willows, Grass Lawn, Overlake and Sammamish Valley. The Willows Neighborhood is the only one of these four areas with an adopted neighborhood plan. This plan permits high-tech business park and light industrial uses in much of the valley floor area of the neighborhood, while reserving hillside and upland areas for urban residential and single-family residential uses. Community Development Guide land use designations for the other neighborhood areas within the district service area essential maintain the basic pattern of existing uses: single-family residential and estate residential uses in upland areas, business park and industrial uses in valley floor areas, and commercial and multi-family residential uses along principal streets or at busy intersections, Development between Willows Road and the Sammamish River north of the power

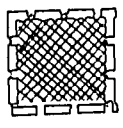
FIGURE 3 PLANNED LAND USE



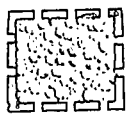
Single-Family Residential



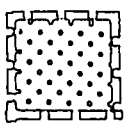
Multiple Residential



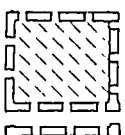
Commercial



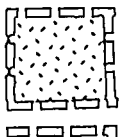
Recreation



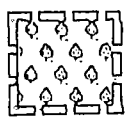
Estate Residential



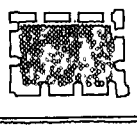
Urban Residential



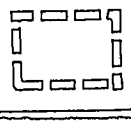
Business Park



Agriculture



Industrial



Mixed-Use Development

transmission facilities is limited to agriculture uses. A portion of the district adjoining the Sammamish River includes part of Redmond's shoreline district, designated as an Urban Environment.

Zoning: Zoning with the Rose Hill service area is consistent with the land use designations incorporated into the various comprehensive land use plans. The following is a summary of the general zoning categories within the District exclusive of the general facilities listed at the end:

Zoning	Acres
Single Family Residential	3,495
Multi-Family Residential	398
Commercial/Industrial	1,219
Agriculture	52
Sub Total	5,164
Special Facilities:	
Bridle Trails State Park	470
Bellevue Municipal Golf Course	48
Sub Total	518
TOTAL ROSE HILL WATER DISTRICT	5,682

Most land within the District is zoned for either low or medium density single-family residential development. Multi-family residential, business park, industrial and commercial districts comprise much of the remaining zoning within the district service area. The State Park and Bellevue Municipal Golf Course are facilities that are not expected to need water services from the district. The distribution of zoned land uses is comparable to the pattern of planned land uses.

Groundwater: Groundwater resources within the Rose Hill Water District service area are closely related to local geological conditions. In general, the most substantial supplies of groundwater resources are associated with highly permeable subsurface geological strata, particularly those largely comprised of sand and gravel materials. In the service area, the advance outwash strata underlying till deposits in the drift plain (and also within the Sammamish River Valley beneath alluvium and till strata), contains the largest groundwater aquifer. Recessional outwash deposits provide significant sources of groundwater in localized areas of the service district. Alluvium in the Sammamish River Valley also contains locally usable groundwater volumes. The higher elevations of the uplands are probably the principal source of groundwater recharge within the service district. Subsurface groundwater movement from this area may contribute to aquifers within the Sammamish River Valley and the numerous springs that contribute to surface flow of the small streams originating at the interface of permeable/impermeable geological strata along the edge of the uplands produces.

Impermeable strata, such as till and clay deposits, do not contain significant groundwater resources. Occasionally, "lenses" of sand and gravel deposits are found within these impermeable strata that will yield groundwater. Groundwater may also be perched within the more permeable, near-surface part of glacial till. Unlike the deeper aquifers, this near-surface water table is subject to significant seasonal water level fluctuations.

3.2.3 Plant and Animal Resources

Plants: The predominant types of vegetation found within the Rose Hill Water District include both natural and introduced communities. Although located within an urbanizing region, the district service contains a significant number of large lots that are either undeveloped or used for non-urban land uses (King County, 1985). Stands of second or third growth native forest communities (mixed coniferous/broad leaf forest) are common on many of these lots. Predominant species in native forests include Douglas fir, red alder, big leaf maple, western red cedar and western hemlock. Forest composition, however, varies locally depending on factors such as topography, soil conditions and water conditions. Much of the upland area of the service district has retained native forest coverage, although the largest uninterrupted stands are found in the steep bluff areas of Bridle Trails State Park.

Introduced plant communities can also be found throughout the service district where native vegetation has been removed for human activity. The most common type of introduced vegetation is ornamental vegetation included within suburban residential subdivisions, and multi-family residential, commercial and industrial developments. Occasionally, landscaping in developed areas may include some retained native vegetation (e.g., trees kept for aesthetic purposes), but in a significantly altered form from natural communities. Another important type of introduced vegetation is associated with agricultural and rural residential activities. Pasture and cropland is found in many parts of the service district, with the largest expanses found along the Sammamish River Valley floor.

Animals: The extensive modifications that have occurred within the service area as a result of urban development have greatly reduced habitat productivity. Modified habitat, whether it be attributable to pastures or urban development, support a less numerous and diverse array of wildlife than undisturbed habitat. Species more tolerant of these changes tend to be favored over less tolerant species. Therefore, wildlife most commonly found in the area is most likely to be a variety of songbirds and small mammals, such as rodents.

The service area does retain some areas of important habitat value. The large areas of second growth woodland in the steep terrain along the northern and eastern edges of the service area probably supports a more diverse wildlife population. In addition, wetlands within the district are another important habitat for wildlife. Three wetlands are identified by the County within the district, all of them adjoining Forbes Lake and Forbes Creek. With the exception of Forbes Lake, these wetlands are in the lowest quartile, Countywide, of wetland habitat productivity.

3.2.4 Land Use and Zoning

Land Use: The Rose Hill Water District is a predominantly single-family residential community. In the upland part of the district, single-family residential housing is the principal land use, with smaller areas devoted to uses ancillary to residential uses, such as public and quasi-public uses (schools, parks, churches). In the single-family residential neighborhoods, residential densities range from one-acre residential estates to suburban densities of five to six dwelling units per acre. Larger rural residential uses, commonly on lots exceeding one acre and including pastures, barns and stables are also located in this

general area. More intensive commercial and multi-family residential uses are concentrated along the Kirkland-Redmond Road (N.E. 85th Street). Commercial centers oriented to the local neighborhood may also be found at the intersections of busier streets.

Land uses in lowland areas of the water district tend to be more intensive than the predominantly residential upland areas. Developed land uses in the small valley along N. E. 124th Street are largely comprised of commercial and manufacturing activities. The district part of the Sammamish River Valley lowlands includes high tech business parks and other business parks usually consisting of a mix of commercial, wholesale and light manufacturing activities. Office uses for business and professional service establishments are intermixed with these other uses. Power line rights-of-way, agriculture and public/quasi-public uses are also found in the lowland areas.

Land Use Plans: King County and the Cities of Kirkland and Redmond are the public agencies largely responsible for land use planning within the Rose Hill Water District. With the annexation of a substantial part of the Rose Hill area by the City of Kirkland in 1987, County land use planning responsibilities have been related to a minor role within the district. South of N. E. 124th Street, County jurisdiction is limited to the few remaining islands of unincorporated territory primarily located in the Redmond planning area east of 132nd Avenue N. E. The transfer of jurisdiction from King County to the City of Kirkland could have a significant effect on planned uses within the Rose Hill Water District.

The County never adopted a community plan for the Rose Hill area. A Rose Hill Proposed Land Use Plan and Area Zoning was drafted by the Planning Division in December, 1985, but was not adopted by the County Council. A principal objective of the plan was to maintain the single-family residential character of the community by directing growth to areas along major roadways, adjacent to intensive uses or unsuitable for low density residential uses. The proposed plan would have permitted multi-family residential uses, ranging in densities from 7 to 12 dwelling units per acre to more than 24 du/acre, in the northern part of the service area south of N.E. 124th Street and between I-405 and Simonds Road north of Kirkland-Redmond Road. Intensive office, commercial and multi-family residential uses would also be allowed along the Kirkland-Redmond Road between 126th Avenue N. E. and 132nd Avenue N. E.

The City of Kirkland Land Use Policies is more restrictive in the distribution of more intensive land uses within the district service area than the proposed County plan. The Rose Hill Water District falls within three Kirkland neighborhood planning areas: Rose Hill, the largest; the Juanita/Par Mac/Totem Lake; and Bridle Trails, which partially overlaps the City's Rose Hill neighborhood. As with the proposed County plan, Kirkland's Rose Hill Neighborhood Plan seeks to maintain the existing character of the residential community. Much of the upland area of the district that is in the Kirkland planning area (both the Rose Hill and Bridle Trail neighborhoods) is designated for single-family residential or residential estate use. The Kirkland plan, however, maintains single-family residential densities (six du/acre or less) in most of the areas the proposed County plan would have permitted multi-family residential uses (Figure 3). Higher density residential uses may be feasible, within standards, in areas where topography, traffic patterns and existing land uses would make it practical. Multi-family residential and commercial uses are allowed along N. E. 85th Street, although within a more restricted area than the proposed County plan allowed. The lowland area around Totem Lake is designated for commercial and industrial activities.

Kirkland's current Rose Hill Neighborhood Plan is approximately ten years old. The City has initiated an effort to update this plan subsequent to the annexation of the community in 1987. This planning effort may result in some changes to designated land uses within the district service area.

The majority of the Rose Hill Water District service area is located in the City of Redmond planning area. The district includes part of four City neighborhoods: Willows, Grass Lawn, Overlake and Sammamish Valley. The Willows Neighborhood is the only one of these four areas with an adopted neighborhood plan. This plan permits high-tech business park and light industrial uses in much of the valley floor area of the neighborhood, while reserving hillside and upland areas for urban residential and single-family residential uses. Community Development Guide land use designations for the other neighborhood areas within the district service area essential maintain the basic pattern of existing uses: single-family residential and estate residential uses in upland areas, business park and industrial uses in valley floor areas, and commercial and multi-family residential uses along principal streets or at busy intersections, Development between Willows Road and the Sammamish River north of the power

DETERMINATION OF NON-SIGNIFICANCE

Description of Proposal: 1989 Comprehensive Water System Plan

Proponent: Rose Hill Water District

Location of Proposal, including Street Address, if any: Refer to attached Checklist.

Lead Agency: Rose Hill Water District

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

/ / There is no comment period for this DNS.

/X/ This DNS is issued under 197-11-340(2); the lead agency will not act on this proposal for 15 days from the date below. Comments must be submitted by _____.

Responsible Official: William T. Skahan

Position/Title General Manager Phone 827-0681

Address Post Office Box 539, Kirkland, Washington 98083-0539

Date _____ Signature _____

PART ELEVEN — FORMS

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:

1989 Water System Comprehensive Plan

2. Name of applicant: Rose Hill Water District

3. Address and phone number of applicant and contact person:

Mr. W. T. Skahan, General Manager, (206) 827-0681
Post Office Box 539, Kirkland, Washington 98033-0539

4. Date checklist prepared: March, 1989

5. Agency requesting checklist: Department of Social and Health Services

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

Proposed improvements over period 1989 to 1994 inclusive.

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

Refer to Section 6 of 1989 Comprehensive Water System Plan.

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

Checklists will be prepared for approval of individual projects before being sent out for bids.

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.

City of Kirkland and City of Redmond have initiated studies regarding ultimate take-over of the water utilities at some future date.

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

State of Washington - Department of Social and Health Services' approval

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.)

Adoption of a comprehensive water system plan with improvements as shown on the attached maps and as indicated in Tables 6.1, 6.2 and 6.3.

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.

See attached vicinity map. Rose Hill Water District is bordered by Kirkland on the west, Redmond to the east and Bellevue to the south.

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 _____. See 1989 Comprehensive Water Plan - Appendix B.

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

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.

See 1989 CWSP - Appendix B.

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

See 1989 CWSP - Appendix B.

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.

Short-term increase in erosion potential due to water line excavations during construction.

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

N/A - generally no change.

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

N/A

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.

N/A

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

N/A

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.

See 1989 CWSP - Section B.

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.

See 1989 CWSP - Section B.

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.

N/A

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

District purchases wholesale supplies from City of Seattle Water Department.

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

No

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.

No

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.

N/A

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.

The project will not affect existing storm drainage or runoff.

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

No

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

N/A

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
__ other types of vegetation

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

Native grasses and/or shrubs may be disturbed.

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

There are no rare or endangered species known to inhabit the area within the Rose Hill Water District boundaries.

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

Restoration of any disturbed grasses and/or shrubs.

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: .....
fish: bass, salmon, (trout,) herring, shellfish, other: .....

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

None

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

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

Not known

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.

Minor amounts of hydrocarbon fuels utilized during construction.

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

No

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.

1) Describe special emergency services that might be required.

None

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

N/A

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.

Temporary, short-term noise will occur from construction equipment.

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

3) Proposed measures to reduce or control noise impacts, if any:
Limit construction work to normal daylight hours.

8. **Land and Shoreline Use**

a. What is the current use of the site and adjacent properties?
Generally street right-of-way in residential neighborhoods.

b. Has the site been used for agriculture? If so, describe.
Not recently, see 1989 CWSP.

c. Describe any structures on the site.
N/A

d. Will any structures be demolished? If so, what?
No

e. What is the current zoning classification of the site?
Generally street right-of-way - residential.

f. What is the current comprehensive plan designation of the site?
See 1989 CWSP attached maps.

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

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?
N/A

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

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

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:
The improvements suggested in the CWSP were to increase reliability of water supply to residential and commercial customers in the area.

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.

N/A

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

N/A

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

N/A

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?

N/A

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

No impact from underground water mains

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

Water reservoirs will be visible and may impact some views within area. This can be mitigated by landscaping, painting and earth berms to reduce intrusion.

11. **Light and Glare**

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

N/A

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

N/A

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

No

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

N/A

12. **Recreation**

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

N/A

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

No

TO BE COMPLETED BY APPLICANT

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:

N/A

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.

None known

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

None known

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

N/A

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 1989 CWSP.

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?

N/A

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).

Water line replacement projects include restoration of paved surfaces and road shoulders disturbed by construction.

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

No

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur. None

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

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

N/A

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.

No, the CWSP provides enhanced public services. Water supply is for consumption and fire protection.

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

N/A

16. **Utilities**

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.

N/A

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.

1989 - CWSP recommendations, if implemented, will involve construction activities which will be addressed on an individual, project by project, basis.

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: .....

Date Submitted: .....

APPENDIX C - DEVELOPER EXTENSIONS TO THE SYSTEM

DEVELOPER EXTENSIONS TO THE SYSTEM

Summary

The District's current water system design standards are contained in the June, 1988, edition of the Rose Hill Water District - Developer Extension Manual. A copy of the current manual is submitted in conjunction with the water system plan update. We have elected not to incorporate the current manual into the comprehensive water system plan update for a number of reasons:

- In general, the developer extension manual is subject to more frequent technical update than the water system plan;
- The developer extension charges are subject to review on an annual basis; and
- The technical requirements of the Cities of Redmond and Kirkland, which are also subject to change, are not identical, although the District in general meets, or exceeds these requirements.

Precise details regarding fire flows and fire protection requirements come under the jurisdiction of the fire marshal's office providing service in that area. Since several different fire marshals have jurisdiction within the Rose Hill water service area, developers must obtain their approvals from the appropriate office.

As part of their coordinated water system plan (CWSP), the East King County - Regional Water Association has been attempting to develop a mutually agreed, comprehensive set of design standards for water systems. However, to date, this has not been successful. The Rose Hill Water District bases its minimum standards on those promulgated by the APWA and AWWA and will continue to update its standards to conform to recent technical advances and in response to local conditions.

Included in Appendix E are copies of Resolutions No. 630 and No. 643, adopting the current developer extension conditions and standards, together with copies of the relevant forms to be completed and submitted by the developer. Also included is a listing of current developer charges and a copy of Resolution No. 598 adopting these charges.

Design Standards

The current water system design standards are contained in the June, 1988, edition of the Rose Hill Water District -Developer Extension Manual. A copy of this manual is submitted separately with this comprehensive water system plan. The current manual will likely undergo significant revision over the next few years, particularly as a proportion of the service area which was formerly within unincorporated King County voted to annex to the City of Kirkland in the elections held in October, 1987. The District has, over the years, ensured that its design standards were at least equal, if not superior, to those required by the adjacent municipalities of Kirkland and Redmond. Since a number of other authorities will make revisions to their requirements, from time to time, a general update of the manual will also become necessary. Since the water system plan update must be reviewed by a number of agencies before formal approval and adoption, there is some advantage in keeping the two documents separate, at least for the time being. Some authorities now have conflicting design standards and these must be satisfactorily resolved over the course of the proposed review and approval process.

Design Criteria - General

It is impossible to predict with any degree of certainty the precise sequence, timing or nature of future improvements to undeveloped properties within the District. The present zoning and existing topography give some indication of what should be expected and, although the former may be revised by a local government agency, the physical characteristics cannot be so easily modified. Local distribution mains will only be designed and constructed once the desired development and actual physical layout has been finalized. Minimum main size will normally be eight-inch diameter. However, there are cases where these local distribution mains will form part of a larger transmission main network and a larger diameter main can be justified on technical grounds.

The location and size of these mains should be determined by a proper engineering analysis of the fire flow and consumption requirements in the immediate area. This analysis is important as the demand impact of each development, on the system as a whole, must be assessed.

In general, these transmission/distribution mains will be constructed by individual property developers. After commissioning, the installation is deeded to the District for operation and maintenance. Some difficulty has been experienced with a number of privately-owned, temporary service connections that, at one time, were permitted by the District. These cannot be easily upgraded to District design standards and adopted as part of them without formation of a utility local improvement district (ULID). Since the ULID formation may be contentious and essentially represents the property owners paying twice for service, the

District will no longer permit such temporary installations. There are a number of ways in which the developer/contractor can be reimbursed for design and construction of a distribution system that was beyond the minimum pipeline necessary for service.

Distribution System Design Criteria

This section outlines the engineering design criteria used for evaluation of the existing transmission/distribution system and the assessment of proposed improvements to the overall system. Under State and County regulations, water systems must in general be designed to provide an ample quantity of water at a minimum pressure of at least 30 psi. These regulations also state that, under normal peak flow conditions, the pressure should not fall below 20 psi throughout the system.

Although not mandated by State or County regulations, a wide variety of distribution system design criteria are commonly adopted by municipal consultants as standard engineering practice. Although partly empirical in nature, any departures from such standard practice must generally be justified or otherwise noted.

- Water mains should be sized so that the normal maximum velocity does not exceed ten feet per second during peak demand with fire flow conditions.
- Lines are generally sized so that head losses in the pipeline due to friction under average flow conditions do not exceed three feet per 1,000 feet of pipeline.
- Grid distribution mains in residential districts should be at least eight-inch diameter unless hydraulic conditions fully justify the use of a smaller diameter main.
- Two-inch diameter dead-ended mains may be used in cul-de-sacs where the length of main is less than 300 feet and no hydrant is required.
- Fire hydrants must be served by an 8-inch main unless hydraulic conditions fully justify the use of a smaller diameter main.
- In high value areas, such as commercial, industrial, or multiple family developments, the minimum size of main should be eight-inches in diameter, when arranged with regular intersection points.
- Where intersection points are widely spaced (over 500 feet), or where fire flow requirements are high, mains larger than eight inches should be installed.
- Auxiliary valves should be installed on each hydrant branch.

- Valves should be installed at all intersections with a normal maximum spacing of 800 feet.

- Valve spacing in commercial, industrial and multiple family residential areas should not normally exceed 500 feet.

- The normal minimum and maximum service pressures within the District should be 40 psi and 100 psi, respectively,

- Hydrant spacing in all single-family detached residential areas within the District should be a maximum of 700 feet.

- Hydrant spacing in all commercial, industrial and multiple family residential areas should be a maximum of 300 feet.

- Any hydrant branch exceeding 50 feet in length shall be eight inches in diameter.

- No more than one hydrant should be installed on any dead-ended branch.

Fire Flow Criteria

In general, the sizing of all transmission/distribution pipelines within the District was dominated by the fire flow requirement.

The fire flow requirement is generally given by the Fire Marshal's office having jurisdiction over the particular area. Rose Hill Water District formerly served a large area of unincorporated King County. Over the years, the Cities of Kirkland and Redmond have annexed portions of the water service area up to respectively 132nd Avenue N. E., the north-south boundary between the two cities. Currently, the water service area includes large portions of the City of Redmond and the City of Kirkland and only a few relatively small, isolated portions of unincorporated King County. Neither municipality has over fifty per cent of Rose Hill's water service area within its own corporate boundaries.

In simplified terms, the fire flow requirement is a function of building construction type, ground floor area and height, but is also related to occupancy, the provision of automatic fire suppression systems and the exposure to adjacent buildings. The capital cost of the large diameter mains and storage facilities required to provide for large fire flows is very high. One objective, or result, of current fire flow codes has been to encourage developers to take advantage of those provisions that reduce the fire flow requirement. Required fire flows are now calculated by the Fire Marshal's office on an individual, or development by development, basis.

When a developer approaches the District for water service, part of the submissions include the fire flow requirement for his particular development. Thus, irrespective of whether the property is already served, or in an area where service has not been provided, the District is able to quickly assess the impact of the proposed development on their system. Frequently, it is in the community's interest to oversize the proposed lines, reimbursing the developer for any additional costs over the minimum eight-inch installation for which he is responsible.

APPENDIX D - WATER SERVICE BOUNDARY

LEGAL DESCRIPTION

ROSE HILL WATER DISTRICT

WATER SERVICE BOUNDARY

That portion of Sections 27, 28, 33 and 34 of Township 26 North, Range 5 East, W.M., and that portion of Section 2, all of Section 3, portion of Sections 4, 8 and 9, all of Section 10, portion of Sections 11, 14, 15, 16 and 17 of Township 25 North, Range 5 East, W.M., in King County, Washington described as follows:

Beginning at the southeast corner of the NE 1/4 of Section 17, Township 25 North, Range 5 East, W.M.;

Thence westerly along the south line thereof to its intersection with the centerline of Interstate Highway 405;

Thence generally northerly along said centerline through Sections 17, 8, 9 and 4, Township 25 North, Range 5 East, W.M., and through Sections 33 and 28, Township 26 North, Range 5 East, W.M., to its intersection with the west line of the E 1/2 of the SW 1/4 of Section 28, Township 26 North, Range 5 East, W.M.;

Thence northerly along said west line to its intersection with the centerline of Totem Lake Boulevard (Kingsgate Way N. E.);

Thence southeasterly along said centerline to its intersection with the centerline of Burlington Northern Railroad right-of-way;

Thence northeasterly along said centerline to its intersection with the southerly extension of the west line of Block D, Totem Valley Business Center, as recorded in Volume 126, Pages 86 through 91, records of King County, Washington;

Thence northerly along said southerly extension and said west line to the northerly line thereof;

Thence northeasterly along said northerly line and the northerly line of Block E of said Plat to the west line, Block F, of said Plat;

Thence northerly along said west line and the west line of Block F of said Plat to the north line of the SE 1/4 of the NE 1/4 of Section 28, Township 26 North, Range 5 East, W.M.;

Thence easterly along said north line and the north line of the S 1/2 of the NW 1/4 of Section 27, Township 26 North, Range 5 East, W.M., to the east line of the west 570 feet of the south 408.44 feet of the NE 1/4 of the NW 1/4;

Thence northerly along said east line to the north line thereof;

Thence westerly along said north line to the east line of the west 450 feet of the north 326.75 feet of the south 735.19 feet of the NE 1/4 of the NW 1/4 of said Section 27;

Thence northerly along said east line, 326.75 feet to the south line of the north 570.87 feet of the west 670 feet of the NE 1/4 of the NW 1/4 of said Section 27;

Thence easterly to the east line thereof;

Thence northerly along said east line to the north line thereof;

Thence easterly along said north line and the north line of the NW 1/4 of the NE 1/4 of said Section 27 a distance of 1,077 feet, more or less, to its intersection with the centerline of Burlington Northern, Inc., Railroad right-of-way;

Thence southwesterly, southerly and southeasterly along said centerline to its intersection with the north line of the SE 1/4 of the SW 1/4 of said Section 27;

Thence westerly along said north line to the west line thereof;

Thence southerly along said west line to the north line of NE 1/4 of Section 34, Township 26 North, Range 5 East, W.M.;

Thence easterly along said north line to its intersection with the westerly margin of Willows Road N. E.;

Thence southeasterly along said westerly margin to its intersection with the north line of the S 1/2 of the S 1/2 of the SE 1/4 of said Section 34;

Thence easterly along said north line to the east line thereof;

Thence southerly along said east line to the north line of the NW 1/4 of Section 2, Township 25 North, Range 5 East, W.M.;

Thence easterly along said north line to its intersection with the westerly margin of Sammamish River Channel;

Thence generally southerly along said westerly margin through said Sections 2 and 11 of Township 25 North, Range 5 East, W.M., to its intersection with the north line of the S 1/2 of the SE 1/4 of said Section 11;

Thence westerly along said north line to its intersection with the centerline of West Lake Sammamish Parkway N. E.;

Thence southeasterly along said centerline to its intersection with the northeasterly extension of the northwesterly boundary of Marymoor Hill Division 1, as recorded in Volume 140 (8903211024) of plats, page 84-85, records of King County, Washington;

Thence southwesterly, southeasterly, southwesterly and southeasterly along said northeasterly extension and generally the northerly and westerly boundary of said plat to the southeast corner of Marymoor Hill, Division 2, to be recorded in 1989 with Records Division of King County, Washington;

Thene southwesterly and southeasterly along generally the easterly boundary of said plat to the south line of the NE 1/4 of said Section 14;

Thence westerly along said south line to the westerly line of Lot 1, Kamauchmi Addition, as recorded in Volume 115, page 68, records of King County, Washington;

Thence southwesterly along said westerly lot line to the northerly line of Lot 2 of said Plat;

Thence northwesterly along said northerly lot line to the west line of said Lot 2;

Thence southerly along said west line to the south line of the NW 1/4 of the NE 1/4 of the SE 1/4 of Section 14, Township 25 North, Range 5 East, W.M.;

Thence westerly along said south line to the east line of Tamarack Lane as recorded in Volume 101, pages 39 and 40, records of King County, Washington;

Thence southerly, westerly, northerly and northwesterly along the boundaries of said Plat to its intersection with the south line of the N 1/2 of said Section 14;

Thence westerly to the west line thereof;

Thence northerly along said west line to the south line of the N 1/2 of the N 1/2 of Section 15, Township 25 North, Range 5 East, W.M.;

Thence westerly along said south line to the east line of the S 1/2 of the S 1/2 of the NW 1/4 of the NW 1/4 of said Section 15;

Thence northerly along said east line to the north line thereof;

Thence westerly along said north line to the east line of Parkshire as recorded in Volume 111, pages 31 and 32, records of King County, Washington;

Thence northerly along said east line to the north line thereof;

Thence westerly along said north line to the east line of Section 16, Township 25 North, Range 5 East, W.M.;

Thence southerly along said east line to the south line thereof;

Thence westerly along said south line to the west line of the SE 1/4 of the SW 1/4 of said Section 16;

Thence northerly along said west line to the south line of the NW 1/4 of the SW 1/4 of said Section 16;

Thence westerly along said south line to the west line thereof;

Thence northerly along said west line to the Point of Beginning.

APPENDIX E - BOARD OF COMMISSIONERS

RESOLUTIONS

SELECTED LIST OF RESOLUTIONS

Number	Date	Title
505	01/10/85	New Connections Surcharge
598	11/10/87	Connection Charge for General Facilities
599	11/10/87	Water Rates for 1988
610	01/26/88	Local Facility Connection Charges
630	06/28/88	Developer Extensions to the Water System
642	11/08/88	Transfer of Sanitary Sewer System
643	12/13/88	Amendments to Developer Extension Standards
647	12/27/88	Changing the Name of the District
649	12/13/88	Service Area Agreement

RESOLUTION NO. 505

A RESOLUTION OF THE BOARD OF COMMISSIONERS
OF KING COUNTY WATER DISTRICT NO. 81
AMENDING NEW CONNECTIONS SURCHARGE

WHEREAS, the Board of Commissioners adopted Resolution 483 establishing a new connection surcharge to defray the cost of "new water" charges imposed by the City of Seattle for additional consumption; and

WHEREAS, the Manager of the District and his staff have conducted studies of water consumption within the classes of customers based on meter sizes to determine whether the new connection surcharge should be modified to more equitably assess the impact of the "new water" charge imposed by the City of Seattle; and

WHEREAS, the Board has reviewed the study conducted by the Manager and his staff; and

WHEREAS, the Board finds that it would be more equitable to modify the "new water" surcharge as set forth in Section 1 below;

NOW, THEREFORE, BE IT RESOLVED by the Board of Commissioners of King County Water District No. 81 as follows:

Section 1. Section 1 of Resolution 483 is hereby amended to read as follows:

> The following schedule of charges is hereby adopted for a "new water" surcharge to be charged to each new connection of water service to the District's system as a condition of service for purposes of funding the payment of future "new water" charges under the District's contract with the City of Seattle, or to fund capital improvement programs and conservation programs designed to reduce the District's

consumption levels so that "new water" charges may be reduced or avoided:

Single Family Residential Connection	$435
Multi Family Residential Connection	$225 per residential unit

Commercial & Industrial Connections

5/8 in. and 3/4 in. meter	$1,200
1 in. meter	$1,650
1-½ in. meter	$4,000
2 in. meter	$6,700
3 in. and 4 in. meter	$9,300
6 in. meter	$30,000
8 in. meter	$50,000
Hotel and Motel	$75 per lodging room

Section 2. The foregoing changes in rates charged for the new water surcharge shall take effect as of January 10, 1985.

Section 3. Except as expressly amended herein, Resolution No. 483 shall remain in full force and effect.

Adopted at the regular meeting of the Board of Commissioners of the 10 day of January, 1985.

Lee Thomas

Roger A Crocker

RESOLUTION NO. 598

RESOLUTION OF THE BOARD OF COMMISSIONERS
OF ROSE HILL WATER AND SEWER DISTRICT
ADOPTING CONNECTION CHARGE FOR GENERAL FACILITIES

WHEREAS, the Board of Commissioners commissioned its consulting engineer, ST Engineering Inc., to perform an in-depth study and to make recommendations concerning a fair and equitable connection charge to be paid by water customers upon connecting to the District's system, which would charge said customers their fair share of the cost of the general facilities of the District's water system, and

WHEREAS, ST Engineering Inc. has periodically reviewed its methodology and the progress of its study with the Board, and

WHEREAS, ST Engineering Inc. has submitted to the Board its final conclusion and recommendations as well as supporting data and calculations, and

WHEREAS, the Board finds that the recommended connection charge for general facilities proposed by ST Engineering constitutes a fair and equitable charge to new customers for their fair share of the cost of general facilities of the District's water system,

NOW, THEREFORE, BE IT RESOLVED by the Board of Commissioners of Rose Hill Water & Sewer District as follows:

Section 1. The Board of Commissioners hereby establishes a connection charge for general facilities of the water system to be charged to each new water customer of the District in the amount set forth in Sections 2 and 3 below to be paid by the new water customer as a condition of connecting to the District's water system and for purposes of charging that customer for its fair share of the general facilities of the District's water system.

Section 2. The connection charge for general facilities for property zoned for single-family use shall be $0.061 per square foot of parcel area.

Section 3. The connection charge for general facilities for all properties zoned for purposes of other than single-family residential use shall be a charge per square foot of parcel area based on the rating of the structures constructed

or to be constructed on the property for fire flow demand and pursuant to the following table:

Total Fire Flow Demand in Gallons Per Minute	Charge Per Square Foot of Parcel Area
Minimum to 2,500	$ 0.123
2,500 to 2,750	$ 0.135
2,750 to 3,000	$ 0.147
3,000 to 3,250	$ 0.160
3,250 to 3,500	$ 0.172
3,500 to 3,750	$ 0.184
3,750 to 4,000	$ 0.197
4,000 to 4,250	$ 0.209
4,250 to 4,500	$ 0.221
4,500 to 4,750	$ 0.233
4,750 to 5,000	$ 0.246
5,000 to Over	To be established by the Board case by case.

Section 4. The term "parcel area" shall mean the gross area of property within the legal description of the property owned by the customer to be served. The total parcel area shall be based upon the records of the King County Assessors, unless the customer provides the District with a recorded survey by a licensed surveyor establishing a different gross square footage.

Section 5. Fire flow demand shall be based upon fire flow rating given the project by the fire department having jurisdiction over the property.

Section 6. The connection charge shall be due at the earlier of the following events: (1) the time of connection of the property to be served to the District's water system or (2) time of final acceptance of a developer's extension to the District's water system for all property of the applicant served by the privately constructed extension to the District's system.

Section 7. The connection charges established hereunder shall be effective immediately, provided that applicants for developer extensions for single family property who filed their applications prior to the adoption of Resolution No. 583 shall be exempt from such charge.

Section 8. The connection charge for general facilities herein shall supercede the connection charges set forth in Resolution Nos. 408, 414, 476 and 583. The connection charge shall be in addition to the District's "new water" surcharge set forth in Resolution No. 505.

Adopted at the regular meeting of the Board of Commissioners on November 10, 1987.

Lee Rasmus

Richard Ogden

RESOLUTION NO. 599

RESOLUTION OF THE BOARD OF COMMISSIONERS
OF ROSE HILL WATER AND SEWER DISTRICT
ADOPTING WATER RATES FOR 1988

WHEREAS, the Board of Commissioners has commissioned CCA Inc. to perform a cost allocation and rate study for its water utility, and

WHEREAS, CCA Inc. has regularly met with the Board of Commissioners and staff of the District to conduct a rate study to develop a water rate structure which raises sufficient revenue to meet the District's projected expenses of operation in 1988 and subsequent years, and to insure that utility charges are equitably allocated among the District customer classes, and

WHEREAS, CCA Inc. has submitted its "Rose Hill Water Cost Allocation and Rate Study" dated November 9, 1987, which the Board has reviewed, and

WHEREAS, the Board finds that the recommendations of CCA Inc. with respect to rate schedules fairly and equitably allocates the water utility's charges among the District's customer classes and will generate revenue, which when combined with other income and sources of funds, will provide anticipated annual cash requirements of the District's water utility, and

WHEREAS, the Board finds it in the best interest of the District to adopt the recommendation of its consultant, CCA Inc., with respect to 1988 water rates,

NOW, THEREFORE, BE IT RESOLVED by the Board of Commissioners of Rose Hill Water & Sewer District as follows:

Section 1. Effective January 1, 1988, the water customers of the District shall be charged for water service pursuant to the following schedule of rates by customer class:

Class of Customer	Base Rate	Volume Charge
Single-Family Residence	$ 8.50/month	$0.60/ccf
Mutli-Family Units	$ 6.00/month	$0.60/ccf
Commercial/Industrial		
Meter Size		
5/8 or 3/4 inch	$ 8.50/month	$0.60/ccf
1 inch	$ 11.75/month	$0.60/ccf
1-1/2 inch	$ 19.00/month	$0.60/ccf
2 inch	$ 28.50/month	$0.60/ccf

3 inch	$ 54.00/month	$0.60/ccf
4 inch	$ 83.00/month	$0.60/ccf
6 inch	$168.25/month	$0.60/ccf
8 inch	$323.75/month	$0.60/ccf

Section 2. Customers shall be billed bi-monthly for the base rate as set forth above plus a volume charge for their actual water consumption. The class of Single-Family Residence shall include all residential structures zoned for and primarily used as a residence of a single household. The class of Multi-Family Units shall include each unit within a residential structure containing multiple households and classified under local zoning laws as a multi-family structure. The base rate for Multi-Family Units shall be charged for each unit in a Multi-Family structure, regardless of whether a separate water meter has been designated for each unit. The Commercial/ Industrial customer shall include retail and industrial businesses, schools, churches, hotels, motels, offices, governmental entities and any other customer not included in the Single-Family Residence and Multi-Family Unit classes. Commercial/ Industrial customers shall be billed bi-monthly for the base rate based on the size of the meter serving the customer and in addition shall be billed a volume charge for actual use.

Section 3. The foregoing rates shall supercede the District's prior schedule of rate charges for its retail customers for water service, but all other rates, charges and assessments of the District shall remain in full force and effect. The foregoing rates shall be charged for retail water service until modified or amended by the Board of Commissioners.

Adopted at the regular meeting of the Board of Commissioners on November 10, 1987.

Lee Hussman

Richard Ogden

RESOLUTION NO. 410

RESOLUTION OF THE BOARD OF COMMISSIONERS
OF ROSE HILL WATER AND SEWER DISTRICT
ESTABLISHING LOCAL FACILITY CONNECTION CHARGES

WHEREAS, the District has previously established connection charges to assess new customers for their equitable share of the cost of the general facilities of the District, and

WHEREAS, the Board of Commissioners desires to also establish connection charges to assess new customers for their equitable share of the cost of local facilities serving the new customers' properties,

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COMMISSIONERS OF ROSE HILL WATER AND SEWER DISTRICT AS FOLLOWS:

Section 1. As a condition for connecting to the District's water and/or sewer system(s), each new customer shall be charged and shall pay prior to connection a local facility connection charge for the customer's property to be served, which has not previously contributed to the cost of the local facilities serving the property.

Section 2. The local facility connection charge shall be calculated and charged by the Manager, or his designee, based on the historic cost per lineal foot of the local facilities serving the property, provided that where the local facilities are substandard or have been included in the District's Main Replacement Program, then the local facility connection charge shall be based on the District's replacement cost per lineal foot. The local facility connection charge shall be equal to one-half of the applicable historic or replacement cost multiplied by the number of front feet of the property served which borders on the local facilities. Where property is bounded on two or more sides by local facilities, the charge shall be assessed for the front footage of local facilities on the side of the property where the connection is made.

Where a property is served by a transmission main, then the local facility connection fee shall be based upon the equivalent cost of local facilities necessary to serve the property.

Section 3. The following definitions shall apply to terms used herein:

A. "Local facilities" shall mean local distribution lines for sewer or water of the size necessary to serve the property bordering on the distribution lines under the District's regulations, standards and comprehensive plan.

B. "Not previously contributed" shall mean that the property owner or his predecessor in title has not previously paid for the property's share of the cost of the local facilities serving the property through any assessment, latecomer's fee or other arrangement to share in the cost of construction of the local facilities.

C. "Customer's property" shall mean the entire property owned by the customer which fronts on the local facilities, whether or not said property may be divided into lots or parcels.

D. "Serving the property" shall mean local facilities within 150 feet of the property which are capable of providing utility service to the property under the District's regulations and comprehensive plan.

E. "Historic cost" shall mean the actual total cost per lineal foot of constructing the local facilities based on the District's records of the cost of construction, provided that where the District has insufficient records to establish the actual historic cost, then the historic cost shall be based upon the year of construction of the local facilities and the schedule of historic cost attached hereto. Said schedule shall be updated annually by the Manager based on his determination of the average cost of construction of local facilities for that year.

F. "Replacement cost" shall mean the District's estimated replacement cost of the local facilities based upon the Manager's determination of the average cost of construction of such local facilities in the calendar year preceding the application for connection by the customer.

G. "Substandard" shall mean that the local facilities do not conform to the District's comprehensive plan or regulations, or are otherwise not capable of providing utility service to the

property for its intended use in conformance with District standards.

Section 4. The purpose of the local facility connection charge is to assess each property its equitable share of the cost of the local facilities serving the property. The Board delegates to the Manager authority to initially determine the local facility connection charge to be assessed to each property connecting to the District's water and/or sewer system. Should a new customer object to the Manager's determination, then he or she shall set forth the objections in writing directed to the Board of Commissioners, and the determination shall be then reviewed by the Board of Commissioners.

Section 5. The local facility connection charge established hereunder is in addition to the general facility connection charges established under Resolution No. 586 and Resolution No. 598.

Section 6. Any customer may apply for a deferral of the local facility connection charge in the manner allowed by law. The Board will consider such requests on a case-by-case basis.

Section 7. The local facility connection charge established hereunder shall be effective immediately, provided that properties for which developer extension applications have been submitted prior to the date of the adoption of this resolution shall be exempt from said charge so long as the developer extension is completed pursuant to said application and within the time period allowed under District regulation.

Adopted at the regular meeting of the Board of Commissioners on January 26, 1988.

Timothy V. Murphy

Lee Thurman

Richard Ogden

RESOLUTION NO. 630

RESOLUTION OF THE BOARD OF COMMISSIONERS
OF ROSE HILL WATER AND SEWER DISTRICT
ADOPTING NEW REGULATIONS FOR
CONSTRUCTION OF DEVELOPER EXTENSIONS
TO THE DISTRICT'S WATER SYSTEM

WHEREAS, the District's staff and consulting engineers have recommended changes to the District's regulations for the construction of extensions to the District's water system by developers and other private parties, and

WHEREAS, the Board has reviewed the draft of the "conditions and standards for construction of developer extensions to the water system" prepared by ST Engineering and dated June 1988 and found said regulations to be in the best interest of the District,

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COMMISSIONERS OF ROSE HILL WATER AND SEWER DISTRICT AS FOLLOWS:

Section 1. The "Conditions and Standards for Construction of Developer Extension to the Water System" dated June 1988 and attached hereto are hereby adopted as the regulations of the District governing the construction of extensions to the District's water system by developers or other private parties.

Section 2. Said regulations shall supersede all other regulations for privately constructed extensions to the District's water system immediately.

Adopted at the regular meeting of the Board of Commissioners on June 28, 1988.

Timothy D. Murphy

Lee Thomson

Richard Ogden

RESOLUTION NO. 642

RESOLUTION OF THE BOARD OF COMMISSIONERS
OF ROSE HILL WATER AND SEWER DISTRICT
ADOPTING CONTRACT FOR THE TRANSFER OF
THE SANITARY SEWER SYSTEM

WHEREAS, the City of Kirkland operates and maintains a sanitary sewer system, and

WHEREAS, the City of Kirkland has annexed the entire service area of the District's sanitary sewer system into the territorial corporate limits of the City of Kirkland, and

WHEREAS, the Board has determined that economies of scale make it more economical for the City of Kirkland to administer the sanitary sewer system operated by the District and that it is in the best interests of the public health and welfare that the City of Kirkland assume jurisdiction over the District's sanitary sewer system, and

WHEREAS, the Board has reviewed the Agreement attached hereto and incorporated herein by reference for the assumption of the District's sewer system by the City of Kirkland.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COMMISSIONERS OF ROSE HILL WATER AND SEWER DISTRICT AS FOLLOWS:

Section 1. The Agreement attached hereto for the assumption of the District's sanitary sewer system by the City of Kirkland is hereby approved and adopted.

Section 2. The president and secretary of the Board are authorized to execute said agreement on behalf of the District. The Manager is authorized to take all steps necessary to carry out the provisions of said agreement.

Adopted at the regular meeting of the Board of Commissioners on November 8, 1988.

Timothy V. Murphy

Richard Ogden

Lee Hussman

AGREEMENT

BETWEEN THE CITY OF KIRKLAND, AN OPTIONAL CODE CITY OF THE STATE OF WASHINGTON, AND THE ROSE HILL WATER AND SEWER DISTRICT

This Agreement entered into, pursuant to RCW Chapter 35.13A, to provide for assumption by the City of Kirkland of the sanitary sewer system of the Rose Hill Water and Sewer District, all of which sewer system, including customers, facilities and equipment, lies within the territorial limits of the City of Kirkland.

WITNESSETH:

In consideration of the mutual promises, terms and conditions hereinafter set forth, the City of Kirkland, hereinafter called "City", and the Rose Hill Water and Sewer District, hereinafter called "District", agree as follows:

Section 1. Declarations

1.1 The entire service area as described by its comprehensive sewer plan and including all sewer trunks, mains and other sewer lines, facilities, equipment and service customers of the sanitary sewer system owned and operated by the District lies within the territorial corporate limits of the City.

1.2 The City operates and maintains a sanitary sewer system within and without the City.

1.3 Chapter 35.13A, Revised Code of Washington, authorizes City to assume "jurisdiction of the District's responsibilities, property, facilities and equipment within the corporate limits of the City."

1.4 City has adopted an ordinance to provide for its assumption of jurisdiction of District's responsibilities, property, facilities and equipment within the corporate limits of City with respect to District's sewer system, and neither that ordinance nor this agreement shall have any effect upon the continued ownership and operation of the Rose Hill Water System owned and operated by District.

Section 2. Takeover and Assumption of District Sewer System

2.1 City shall take over and assume jurisdiction of the District's sanitary sewer responsibilities, property, facilities and equipment, all of which lie within the corporate limits of City, as soon as the City may legally do so after review of said assumption by the King County Boundary Review Board, as required by RCW Chapter 36.93. Notice of assumption or transfer shall also be given to the Municipality of Metropolitan Seattle (METRO) and to the Washington State Department of Social and Health Services (DSHS). The anticipated assumption date is January 1, 1989, which may be changed by agreement between the Kirkland City Manager and the District Manager.

2.2 In order to facilitate an orderly assumption of said jurisdiction, the City Manager for City and/or the Director of Public Works for City as his designate, and in consultation with the Manager for District, shall:

2.2.1 File notice of assumption of the District Sanitary Sewer System by City with the King County Boundary Review Board as required by RCW Chapter 36.93. Notice of assumption or transfer shall also be given to the Municipality of Metropolitan Seattle (METRO) and to the Washington State Department of Social and Health Services (DSHS).

2.2.2 Take all steps necessary and/or advisable to:

Complete the transfer of the District Sewer System to the City of Kirkland, and operate same as an extension of the City sanitary sewer system.

Receive and accept the equipment, sewer lines and other properties of the District Sewer System, all as set forth in the inventory thereof previously supplied to City by Manager of the District, a copy of which is attached to this agreement as Exhibit A.

Provide for reimbursement by City to District of the cost of the engineering and design of the proposed Slater Avenue trunk sewer, in the total amount of not to exceed $47,562.00, which

shall be due and payable on or before January 1, 1989.

Provide for the orderly transfer and incorporation into the City sewer utility accounting system, all District Sewer utility accounts and customers.

Direct the transfer and assignment of all developer sanitary sewer extension or facilities agreements and reimbursement agreements in which District appears as the governmental party, and that by virtue of the transfer of responsibility will be required to be administered by City, together with all files, records and information in the hands of the District pertaining to said agreements.

To take any and all steps necessary or desirable to facilitate the assumption of jurisdiction and transfer of service so that it may be accomplished in an orderly and timely fashion, and as soon as possible.

Section 3. Obligations and Responsibilities of District Not to be Assumed by City and Indemnification.

3.1 No employees of District shall be transferred to or become employees of the City of Kirkland as a result of this agreement and the assumption of sewer system jurisdiction provided for by this agreement. All employees of District shall continue and remain as employees of District.

3.2 District shall continue to be responsible for the collection of all outstanding ULID assessments, including sewer assessments previously levied by District, together with the payment in accordance with their terms of all outstanding ULID or other bonds issued by District, including those issued to pay for construction of the sanitary sewer system lines and facilities being transferred by this agreement to City. Said assessments shall be retained by the District as reimbursement for costs and expenses advanced or incurred by the District in the construction of additions and betterments to the sanitary sewer system.

3.3 City shall not assume, nor be responsible for any other debts of said District, including debts previously incurred by District and associated with the sanitary sewer utility, except those debts and obligations specifically referred to in Section 2 of this Agreement.

3.4 District shall indemnify, defend and save harmless the City from any claims, real or imaginary, which may be made by any person and arising out of any action taken or not taken by District at any time prior to the effective date of this agreement with respect to District's sanitary sewer system and/or its transfer to City by this agreement, provided that this indemnification provision shall not apply to claims arising out of acts or omissions of King County in its construction and administration of the sewer system prior to the transfer of the system to the District.

3.5 City will indemnify, defend and save harmless District from any claims made against District and arising out of any action or non-action of city taken after the effective date of this agreement with respect to the operation and maintenance of the sanitary sewer system transferred to City by this agreement. Provided, that this paragraph shall not apply to any continuing contractual agreements of District except as to those contractual agreements specifically identified in Section 2 of this agreement as being assumed by City.

Section 4. Accounts Receivable and General Facilities Connection Charges.

4.1 The District shall bill for all sewer services rendered to customers within the sewer service area prior to the date of assumption of the sewer system by the City, and shall be entitled to collect and retain all such sewer service charges. The City shall be entitled to charge and collect sewer service charges within the sewer system area commencing with the date of assumption of the sewer system. Should the parties find it not possible and practical to coordinate the close-out of the District's billings and the commencement of City billings exactly on the assumption date, one party may include in its billing sewer service before or after the assumption date and shall turn over to the other party sewer service charges which accrued to the other party prior to or after the assumption date, as the case may be.

4.2 The District has charged a general facilities connection charge to certain properties within the sewer system. The District shall provide the City with a listing of all properties which have paid general facilities connection charges. Said properties shall not be subject to connection charges levied by the City which are levied for the purpose of collecting the property owners' equitable share of the cost of general or

system-wide sewer facilities and improvements. The District has entered an agreement with certain property owners for deferred payment of general facility connection charges, and the District shall be entitled to collect and retain such general facilities charges. The District has collected or has entered agreements to collect general facilities connection charges, the total of which exceed the amount the District has expended on sewer general facilities by $5,351. Therefore, the City shall receive a credit for the benefit of the sewer system of $5,351 against the reimbursement for engineering and design costs of $47,562 as required under Section 2.2.2 above.

4.3 The District has entered into an agreement for reimbursement of sewer construction costs with Overlake Church, a copy of which is attached hereto as exhibit B and incorporated by reference. The City shall assume the obligation of the District to collect assessments against the other benefited property described therein. The City may deduct and retain the administration charges provided for in said agreement. The City shall forward to the District due the District under paragraph ____ of the agreement, and when all obligations owed the District under said paragraph have been paid, shall forward the remainder of the net proceeds collected to Overlake Church.

Section 5. Pending Developer Extensions.

5.1 The District has given preliminary approval to an application for a privately constructed extension to the sanitary sewer system for a fourteen lot subdivision known as Spring Walk. The City has reviewed said application and the plans for the privately constructed extension. The City shall honor the District's preliminary commitment to accept this privately constructed extension to the sewer system when it has been constructed pursuant to the approved plans and the District's regulations governing privately constructed extensions to the sewer system. The District has received $5,188 from the owner of the property as an application fee. The District will deduct from said sum its expenses in reviewing and giving preliminary approval to the plans and will transfer the balance of said fees to the City. The City will accept fees as compensation for its costs in inspecting and improving the improvements and shall assume responsibility for the inspection and final approval of the extension to the sewer system.

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Section 6. Inspection, Representations, and Warranties.

6.1 The City has had the opportunity to inspect the sanitary sewer system, including recently constructed extensions to the sewer system. The City accepts the sanitary sewer system in its present condition.

6.2 The District transfers the sanitary sewer system to the City without any warranties, express or implied. The District has made no representations concerning the system except for those set forth herein.

This Agreement made and entered into this 6th day of December, 1988, and signed by District under the authority of District Commissioner's Resolution No. 642, and City of Kirkland Ordinance No. 3116, adopted the 20th day of September, 1988.

CITY OF KIRKLAND

Terrence L Ellis

City Manager

ROSE HILL WATER AND SEWER DISTRICT

Timothy V. Murphy

President of the Board of Commissioners

Lee Hinman

Secretary of the Board of Commissioners

Exhibit A

ROSE HILL WATER AND SEWER DISTRICT

SEWER EQUIPMENT

1 - Manhole Cage with Retiever #00383

1 - 3" Diaphram Pump with Hose #00443

2 - 1 Ton Chain Hoists for pulling Pumpmotors (in stations)

1 - Telemetry Equipment; Hi, Low, Intrusion, Power, phone line failure Alarm.

1 - Stead-Baggerely Pump Run & Hour Meters

RESOLUTION NO. 643

RESOLUTION OF THE BOARD OF COMMISSIONERS
OF ROSE HILL WATER AND SEWER DISTRICT
AMENDING THE CONDITIONS AND STANDARDS FOR
CONSTRUCTION OF ITS DEVELOPER EXTENSIONS
TO THE WATER SYSTEM

WHEREAS, the District's consulting engineers, ST Engineering, Inc., have recommended certain modifications to the District's regulations governing privately constructed extensions to its water system, and

WHEREAS, the Board of Commissioners has reviewed the recommendations and finds it to be in the best interests of the District to adopt such changes,

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COMMISSIONERS OF ROSE HILL WATER AND SEWER DISTRICT that the Conditions and Standards for Construction of Developer Extensions to the Water System of the District are hereby amended by adding the following provisions:

Section 1. The Developer shall comply with all requirements of the Washington Industrial Safety and Health Act, RCW 49.17, for trench excavation exceeding a depth of four feet, including required safety systems.

Section 2. To remove existing asbestos cement pipe from the trench, fee and permit are required from the Puget Sound Air Pollution Control Agency. In addition, Washington State Department of Labor and Industries requires the operators removing asbestos to be certified.

If asbestos cement pipe is saw-cut and removed from the trench, the Developer shall be responsible for all fees and permits and work performed in accordance with requirements of the various agencies.

It will be the Developer's responsibility to ensure that a certified operator be present whenever asbestos pipe is cut or removed and all pipe handlers are in compliance with the Washington State Department of Labor and Industry safety requirements.

Section 3. Hydrants installed in the City of Redmond shall be equipped with stortz connections.

Section 4. All pipes shall be Ductile Iron-Class 52 unless otherwise specified. The pipes shall be encased with polyethylene encasement, if required by the District.

Section 5. Except as expressly modified herein, the Conditions and Standards for Construction of Developer Extensions to the Water System of the District as previously adopted shall remain in full force and effect.

Adopted at the regular meeting of the Board of Commissioners on December 13, 1988.

Timothy V. Murphy

Lee Hunman

Richard Iglesias

RESOLUTION NO. 647

A RESOLUTION OF THE BOARD OF COMMISSIONERS OF ROSE HILL WATER & SEWER DISTRICT CHANGING THE NAME OF THE DISTRICT

WHEREAS, the District is in the process of transferring to the City of Kirkland the sanitary sewer operated within the city limits of the City of Kirkland as established by the City's recent annexation and

WHEREAS, upon completion of that transfer the District will no longer have a sewer operation.

NOW, THEREFORE, BE IT RESOLVED by the Board of Commissioners of Rose Hill Water & Sewer District as follows:

Section 1. The name of the district shall be changed "Rose Hill Water District", subject to approval of the new name by the King County Council.

Section 2. The change of the District's name shall be effective as of the date of approval of the new name by the King County Council.

ADOPTED at the regular meeting of the Board of Commissioners on December 27, 1988.

Timothy J. Murphy
Timothy J. Murphy

Lee Husman
Lee Husman

Richard J. Ogden
Richard J. Ogden

RESOLUTION NO. 649

A RESOLUTION OF THE BOARD OF COMMISSIONERS OF ROSE HILL WATER & SEWER DISTRICT APPROVING SERVICE AREA AGREEMENT

WHEREAS, under the Coordinated Water Supply Act the District is required to enter an agreement defining its service area, and

WHEREAS, the Water Utility Coordinating Committee for East King County has submitted an agreement for execution by the District and other utilities within its critical water supply area, a copy of which is attached hereto and incorporated by reference, and

WHEREAS, the District engineers have drawn a map of the District's service area to be incorporated in said agreement and submitted the same to the Water Utility Coordinating Committee. Said map is incorporated herein by reference and a reduced copy of said map is attached hereto.

NOW, THEREFORE, BE IT RESOLVED by the Board of Commissioners of Rose Hill Water & Sewer District as follows:

Section 1. The Service Area Agreement attached hereto is adopted and the Manager of the District is authorized to execute the same, provided that the service area map, which was redrafted by ST Engineering, shall be incorporated therein by reference.

ADOPTED at the regular meeting of the Board of Commissioners on December 13, 1988.

Timothy V. Murphy

Timothy V. Murphy

Lee Husman

Lee Husman

Richard J. Ogden

Richard J. Ogden

AGREEMENT
FOR ESTABLISHING WATER UTILITY SERVICE AREA BOUNDARIES
AS IDENTIFIED BY THE EAST KING COUNTY
COORDINATED WATER SYSTEM PLAN

PREAMBLE

The Agreement for the water utility service area boundary identifies the external boundary of the service area for which the designated water purveyor has assumed direct retail water service responsibility. The responsibilities accepted by the water purveyor are outlined in the East King County Coordinated Water System Plan (CWSP), and as defined by the adopted rules and regulations of the Department of Social and Health Services (DSHS). This agreement does not give new authorities or responsibilities to the water purveyor 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. East King County Critical Water Supply Service Area Map shall mean the map referenced in the Agreement as Attachment A for the retail service area, except as amended in accordance with the CWSP procedures and with the concurrence of the affected water purveyors.

2. Retail Service Area shall mean the designated geographical area in which a purveyor shall supply water either by direct connection, by a satellite system, or through interim service by an adjacent utility or Satellite System Management Agency under agreement with the designated utility.

3. Wholesale Service Area shall mean the designated geographical area in which a purveyor, a group of purveyors, or another organization provides water to other water purveyors on a wholesale basis. A wholesale water supplier shall not provide water to individual customers in another purveyor's retail service area except with the concurrence of the purveyor responsible for the geographical area in question.

4. Lead Agency for administering the Agreement For Establishing Water Utility Service Area Boundaries shall be the King County Parks, Planning, and Resources Department, Building and Land Development Division, 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 WAC 248-56-730, Service Area Agreements-Requirement, of the Public Water System Coordination Act; and

WHEREAS, 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 service areas will facilitate efficient planning for, and provision of, water system improvements within East King County as growth occurs; and

WHEREAS, Definite retail and wholesale service areas will help assure that water reserved for public water supply purposes within East King County will be utilized in the future in an efficiently planned manner,

NOW, THEREFORE, the undersigned party, 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 party acknowledges that the East King County Critical Water Supply Service Area Map, included as Attachment A to this Agreement and as may be subsequently updated, identifies the utility's future water service area. The undersigned further acknowledges that there are no service area conflicts with adjacent water utilities, or, where such conflicts exist, agrees that no new water service will be extended within disputed areas until such conflicts are resolved.

Section 2. Common Service Area Transfer. It is understood that utilities may initially continue existing water service within the boundaries of neighboring utilities, as defined in Section 1 hereof. Such common service areas, if they exist, are described in Attachment B to this agreement. Also included in Attachment B are copies of, or a list of, all resolutions, ordinances, or agreements enabling these uncontested overlays. The undersigned party agrees that any water line for retail service extending outside of the retail 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.

Economic basis considerations may include, 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.

The terms of the transfer of service area described in this Section shall be established in a separate agreement among the adjacent utilities whose boundaries are affected.

Section 3. Boundary Streets. Unless separate agreements exist with adjacent utilities concerning water services or other utility services, this party agrees that the water utility which is located to the north and/or east of boundary streets between this party and adjacent utilities will be entitled to provide future water service on both sides of those streets. Depth of service on boundary streets shall be limited to one platted lot or as otherwise agreed 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. These provisions do not disallow the placement of mains in the same street by adjacent utilities where geographic or economic constraints require such placement for the hydraulic benefit of both utilities.

Section 4. Boundary Adjustments. If, at some time in the future it is appropriate for the undersigned party to make service area boundary adjustments, such modifications must receive written concurrence (which shall not be unreasonably withheld) of all utilities that would be directly affected by such a boundary adjustment and the proper legislative authority(ies). This provision does not apply where boundary adjustments are made as a result of municipal annexations or incorporations, nor is it intended to modify the provisions of state law. These written modifications must be noted and filed with the designated King County lead agency and DSHS. It is understood by the undersigned party that if, as provided by RCW 70.116.040, it is unable to provide service within its designated service area boundary it may decline to do so. But, in that case, an applicant may be referred to other adjacent utilities, to a prequalified Satellite System Management Agency (SSMA), or a new utility may be created and the original service area boundary will be adjusted accordingly.

Section 5. Service Extension Policies. The undersigned party agrees that in order to expand its water service area, other than by addition of retail customers to existing water mains, or to serve in the capacity of a pre-qualified SSMA, it shall have adopted design standards and Utility Service extension policies. The design standards shall meet or exceed the East King County Minimum Design Standards.

Municipalities further agree that if they identify a service area outside of their existing municipal corporate boundaries, the municipality will assume full responsibility for providing water service equivalent to (excluding rates and charges) the level of service provided for their inside-city customers. This will be in conformance with applicable land use policies.

This agreement by reference includes the following attachments:

Attachment A - East King County Critical Water Supply Service Area Map. (see Section 1)

Attachment B - Common Service Area Agreement - Optional - Utility may attach copies or list such agreements if relevant. (see Section 2)

IN WITNESS WHEREOF, the undersigned party has executed this Agreement as of January 9, 1989.

Rose Hill Water District
Water Utility

Representative

General Manager
Title

Receipt Acknowledged:

King County Parks, Planning, and Resource Department

Date

APPENDIX F - DISTRICT OPERATIONS MANUAL

OPERATIONS

MAINTENANCE

RESPONSE PROGRAM

ROSE HILL WATER DISTRICT
1989

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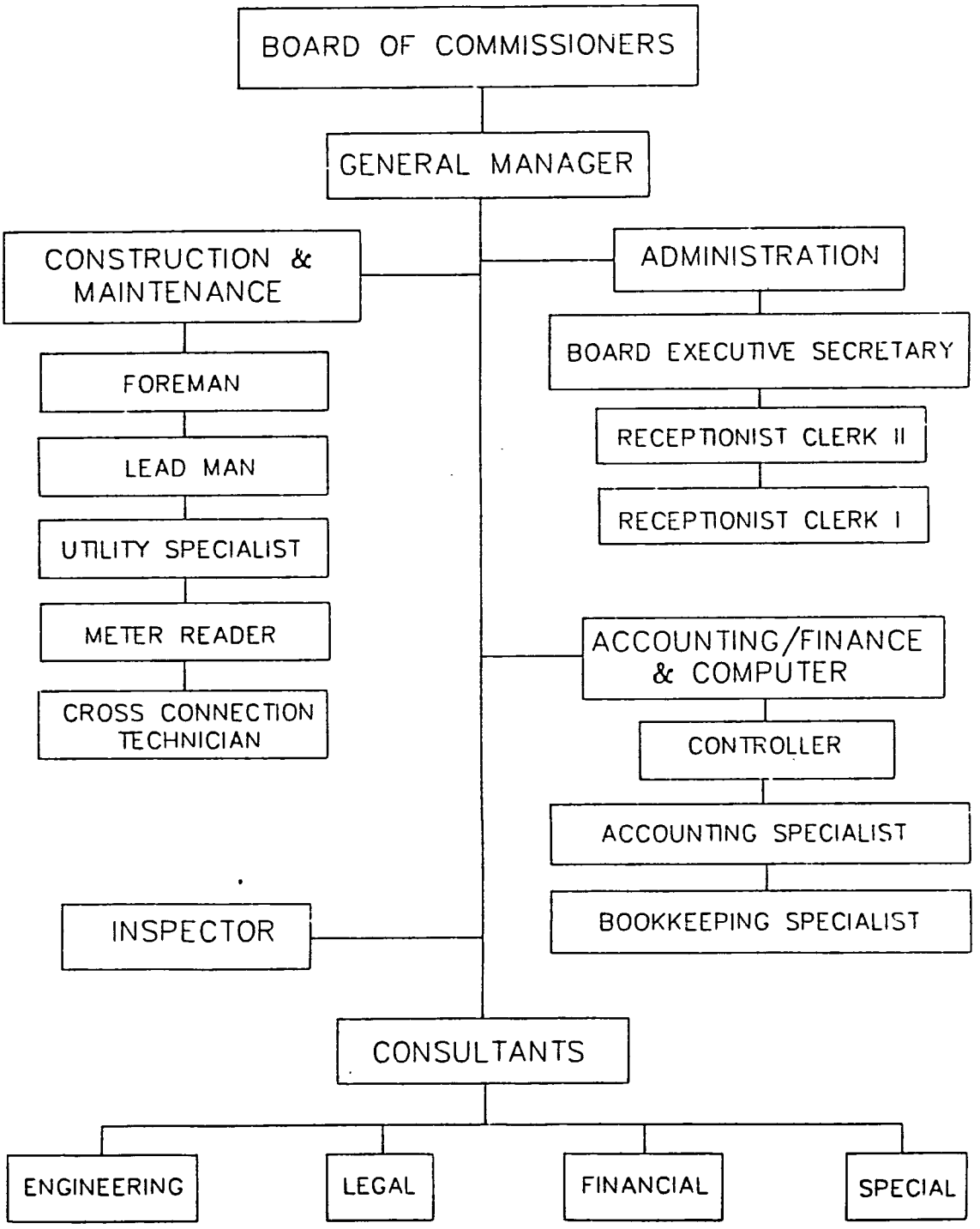
ROSE HILL WATER DISTRICT

ORGANIZATION CHART



OPERATIONS MANUAL

ROSE HILL WATER DISTRICT

1. WATER SYSTEM RESPONSIBILITY AND AUTHORITY

A. ORIGINATION

The General Manager is in charge of all day to day operations and will delegate authority to staff members on an assigned basis, due to the size of the staff. During the General Manager's absence an acting manager will be designated to assume responsibility.

The District maintains a rotating standby roster for 24 hour emergency calls and the standby person coordinates emergency responses. The City of Seattle Water Department provides water quality monitoring on a contract basis and continues without further supervision.

B. TRAINING AND EDUCATION

The District finds that the continuing education of the employees of the District is an important element of the good management of the District's operations.

It is the policy of the District to encourage its employees to further their education and self improvement through approved courses of study seminars and conferences.

Upon satisfactory completion of any approved course seminar, or conference the employee shall be reimbursed by the District for the employee's tuition fees and costs incurred in taking the course including books, travel expense, and, if the course seminar or conference is over 100 miles from the District, food and lodging.

WATER WORKS CERTIFICATIONS

Rose Hill Water District encourages it's employees to become certified water system operators.

The General Manager as official in responsible charge is certified in accordance with Department of Social and Health Service Regulations.

All maintenance division personnel are required to attain the level of water distribution specialist within one year of employment.

Listed below is the current status of employee certifications.

Anderson, Bob; Utility Inspector	WDS-1, CCS-1
Andrew, Larry; Utility Specialist	WDM-2, CCS-1, WWO-1
Bates, Brant; Utility Specialist	WDM-2, CCS-1
Hodgin, Rocky; Utility Specialist	WDS-1
Perkins, Corina; Meter Reader	WDS-1
Skahan, William; General Manager	WDM-3, CCS-1, CET,
Shonka, Robert; Utility Specialist	WDM-2, CCS-1, WWO-2
VanIterson, Dan; Forman	WDM-2, CCS-1

WDS = Water Distribution Specialist

CCS = Cross Connection Specialist

WDM = Water Distribution Manager

BDT = Backflow Device Tester

WWO = Waste Water Operator

CET = Certified Engineering Technician

2. OPERATIONS AND MAINTENANCE AND GENERAL DESCRIPTION

A. MAINTENANCE

Routine operations and maintenance of the District facilities is performed by the personnel in the construction and maintenance division under the direction of the General Manager. Telemetering equipment and recording devices are checked daily. Pressure reducing stations and pumps are checked daily. Distribution system valves are checked and operated annually. Flushing of the District's distribution system is done annually during the month of October through the end of March. Additional flushing is done on an as needed basis.

Routine hydrant maintenance, cleaning and painting is normally done during the months of April through September because weather conditions dictate painting during this period. The local fire departments annually check hydrants and report any out of order hydrants to the District immediately. Damaged, or out of order hydrants, are given priority for repair and when repaired, the fire department is notified when hydrant is back in service.

Flow controlling of the District's distribution system is done on a daily basis during the months of June, July and August to maximize use of storage reservoirs for peak demands because of the City of Seattle's demand charge levied for deficient storage to meet peak system draws.

When maintaining, repairing, operating and flushing hydrants, valves, pressure reducing valves and large meters, the information is recorded on the appropriate record card on file in the District office. System pressure and fire flow tests are done on an ongoing basis and district records are updated or initiated.

Reservoirs and reservoir sites are checked weekly for proper operation and security. Reservoirs are drained, cleaned and inspected bi-annually.

Daily administrative accounting and finance functions are performed by the personnel in the administration and accounting, finance/computer divisions under the direction of the General Manager. The functions include answering the telephone, assisting with customer inquiries, billing customer accounts, receipting of customer payments, inputting customer service information into District computer, preparing bank deposit, receipt and distribution of incoming and outgoing mail, record keeping and filing, budget preparation and administration, all accounting and bookkeeping functions to conduct District business, inventory control, receipt of incoming and preparing outgoing correspondence as necessary, prepare and transmit Board of Commissioner's agendas and informational packet for any regular and special commissioner's meetings and any other administrative and accounting function as deemed necessary.

District emergency conditions policy dictates an immediate dispatch during regular work hours of District personnel to the scene of emergency, to make an assessment of conditions and to take immediate action to isolate affected area and to radio in for any additional personnel, material and equipment to conduct repair. Office is notified by radio of area affected so office personnel can respond to customer calls, or to call local police, or fire departments, if there is or may be life threatening situations, or to assist in traffic control to prevent an accident, or injury to the public.

Emergency calls at night, on weekends and holidays are received by the District answering service and routed to the emergency standby person by phone, or by page boy, if not available by phone. The standby person responds, makes an assessment of the situation, takes immediate action to correct or repair and calls for additional assistance as needed. In the event a routine or emergency situation arises where it will require shutting off service to a critical area that may affect fire sprinkler systems or ADT detection systems, all personnel have been instructed to notify local fire departments that a shut down is required and when service is restored. Records of critical areas, commercial buildings, rest homes, etc., are kept on file in the District office. A record of customers who must utilize a dialysis machine is kept in the District office and there customers are notified if a shut down is required for any reason.

B. CROSS CONNECTION CONTROL

Department of Social and Health regulations (WAC 248-54-285) prohibit the connection of public water system with any other non-approved, non-potable water system. The District has primary responsibility to prevent or eliminate any connection to the District's water system that would pose a threat to public health. The District has embarked on a program to prevent and eliminate cross connections. This is accomplished by a review of all new construction plans at the time service applications are submitted.

On site inspections are conducted to ensure compliance prior to water service being granted. All facilities, where a suspected cross connection exists, are identified and the owner is notified by letter that the cross connection specialist will be contacting them by telephone. An appointment is set up to inspect the premises for any cross connection, to discuss the purpose of the program and to give assistance to insure compliance with State Health and District regulations. The District maintains a cardex record of all backflow devices installed on file in the district office. It is the intent of the district to ensure all backflow devices are inspected and tested annually by a certified tester.

If an immediate health hazard is caused by a cross connection, water service to the premise will be terminated until the cross connection has been discontinued and verified by the cross connection specialist.

Failure of the customer to cooperate in the installation, maintenance, testing, or inspection of backflow prevention devices or the requirement of an air gap separation is cause for immediate termination of water service to the premises. Authority to terminate water service is contained in State Health Regulations (WAC 248-54-285) and the District's cross connection regulations.

C. SYSTEM OPERATION

Supply is obtained from the Tolt Eastside Supply line. The pressure is recorded at Sta. 7A. The Rose Hill Water District's system is supplied from three connections to the Tessl station 5 N.E. 116th and 132 Ave N.E., station 7 132 Ave N.E. and N.E. 85th Street and Station 8 140 Ave. N.E. and N.E. 70th Street and there are flow records and P.R.V.'s at each station. Sta. 5 & 7A supply the 545 zone. Sta. 8 supplies the 650 zone. During winter operations the Tolt pressure will normally supply all zones without pumping when Tolt pressure is 550' or higher.

The District has 12.7 M.G. of storage available to meet peak demands and provide emergency reserve.

The 11.2 M.G. south reservoir, at elevation 545, supplies the system's major zone directly to the lower zone by P.R.V.'s. Reservoir supply is from Sta. 7A by gravity except during summer peaks. The reservoir level is controlled by the altitude valves. These valves can also be controlled manually from the console.

The 1.5 M.G. north tank and pumping station normally function only in summer to meet peak hour demands but is available for emergency. Zones 425 and 285 are fed by P.R.V.'s from higher zones with multiple feeds to each zone.

The Water District is fully automated and functions without manual aid to ensure District customers uninterrupted supply. All major functions are telemetered and alarms are provided, such as system pressure, reservoir level, etc. All functions are labeled with normal settings and tolerance. All crew members are familiar with the telemetering console, and rotate the daily duty of checking and preparing the daily system log and report.

D. ROUTINE MAINTENANCE

1. Record all actions

a. Telemetering equipment and recordings. Check and log daily - 9:00 A.M.

b. Pressure reducing and automatic valves - check and service semi-annually.

c. Pump station - check daily.

d. Distribution valves - check annually

e. Hydrants, checked by Fire Department annually - repair as ordered.

f. Flush mains - winter months and as needed in problem areas.

g. Reservoirs - check weekly. Drain, clean and check interiors bi-annually.

h. Meters - test master meters annually. Check and repair residential meters as required.

i. Trucks and equipment - per manufactures's recommendations.

E. INVENTORY CONTROL - (Log all changes)

a. Check inventory of equipment and materials weekly.

b. Check service trucks equipment and inventory weekly.

3. WATER QUALITY CONTROL PROGRAM

The District's water quality program objective is to protect and maintain the quality of the water in it's water supply system in conformance with Washington State Board of Health regulations through a program of inspection and laboratory analysis.

Rose Hill Water District has established a cross connection control program as provided by (WAC 248-54-285). Several District employees are certified cross connection specialists. All new installations are reviewed and checked for compliance and to ensure that R.P. devices are installed as required. Inspections of R.P. devices are made on an annual basis as provided by (WAC 248-54-285). The District has established a program to inspect existing installations to ensure compliance. Suspected high hazard installations are given first priority. No charge is made for these inspections.

Rose Hill Water District has a main flushing program to remove accumulations of silt and sediments from the distribution system. Flushing is done on a year round basis as required, however, programmed flushing is limited to winter months. The reservoirs are drawn and cleaned bi-annually.

Routine water quality analysis is performed for Rose Hill Water District by the City of Seattle Water Department in conformance with State Board of Health minimum water quality standards. The City of Seattle submits copies of all water sample test results to the District for filing. Seattle, under terms of agreement, will notify the District if the water supply is not meeting the requirements. The District is responsible for public notifications, if required. The Notification Procedure is detailed in the District's Operation Manual. The total number of samples taken per month is based on the population served by the entire City of Seattle Water System. By agreement with the State Board of Health, Seattle takes a total of 10 samples each month at three locations within Rose Hill Water District. Water sample locations are as follows:

13013 N.E. 65th Street, Kirkland (District Office)
N.E. 82nd & 122nd Ave. N.E., Kirkland
N.E. 104th & 128th Ave. N.E., Kirkland

Water District personnel collect water samples for all new construction. Testing of these samples is done by a certified testing laboratory.

4. EMERGENCY PLAN

Vulnerable areas within the District are pump stations, reservoirs, source of water and the distribution system. Major types of emergencies and what account should be taken have been identified. In cases where loss of water service is for more than 24 hours or where quality is degraded and public health threatened, the District will notify the Washington State Department of Social and Health Services or the Local Health Officer, as required by (WAC 248-54-255). In the event of this type of emergency situation, the District will also contact local radio stations and newspapers to inform their customers of the appropriate action that should be followed. District wide loss of supply of contamination notification will be coordinated with the Seattle Water Department. If an isolated area is affected, the District may contact each customer by telephone, or by house to house notification. A compilation of emergency telephone numbers are listed in this plan.

To aid in dispatching District personnel to the scene of an emergency, District vehicles are equipped with mobile radios and District maps showing locations of valves and fire hydrants. To aid in combating against or preventing emergency situations from occurring, the District has employed stringent design criteria. Such criteria in the case of pump station requiring two pumps.

EMERGENCY ACTIONS

1. IDENTIFICATION Seattle Tolt Supply

   AFFECTS All District plus Kirkland, Redmond

   TYPE OF EMERGENCY
   a) Loss of pressure & flow
   b) Contamination

   ACTION
   a) Confirm duration of outage with Seattle. Take action to reduce flow if protracted. Monitor reservoir levels. Advise Kirkland and Redmond.

   b) Shut off supply. Coordinate media notifications with Seattle. Notify Health Officers, City of Redmond and Kirkland. Assist arranging alternate supply.

2. IDENTIFICATION South Pump Station

   AFFECTS 650 zone (Low Tolt condition only)

   TYPE OF EMERGENCY
   a) Pump or control failure

   b) Power outage

   ACTION Determine cause of failure

   a) If control use manual mode
   If pump use alternate pump (5 available)

   b) If power outage, contact Puget Power
   If outage persists start Pump 7A and use high pressure mode.

   NOTE: If South Reservoir is full all customers will have some pressure.

3. IDENTIFICATION — All District plus Kirkland, portions of Redmond, Bellevue Reservoirs

a) Physical damage

b) Contamination

ACTION

a) Ascertain extent of damage. Check for damage to property if leaking. Control leakage if possible.

b) Isolate reservoir. Notify Health Officer Determine extent of contamination by sampling Notify media, Kirkland, Redmond, and Bellevue

4. IDENTIFICATION — Distribution System

ACTION — By use of shut off valves any portion of the distribution system can affect a limited area and limited number of customers

TYPE OF EMERGENCY

a) Main Break
b) Contamination

ACTION

a) Immediately isolate broken portion. Make repairs.

PUBLIC NOTIFICATION

Many of the emergency plans which follow call for notifying the public of emergency conditions and of required demand curtailment measures. Sample announcements are presented below in increasing order of severity. The District should contact newspapers and several local radio and television stations who broadcast in the service area and make prior arrangements concerning emergency announcements. Coordinate all District wide notifications with the City of Seattle (electronic media).

SAMPLE I

For Immediate Release

Rose Hill Water District is experiencing an unusually high water demand making it difficult to maintain adequate reservoir reserve. Customers of the District are requested to reduce water consumption and to avoid wasting water. It will be particularly helpful if homeowners will make every effort to reduce lawn irrigation. The problem is expected to be temporary in nature, and a public announcement will be make when normal water consumption can be resumed.

SAMPLE II

For Immediate Release

Rose Hill Water District has experienced a major loss of its water source capacity. The District's customers are directed to stop all irrigation and to make every effort to conserve valuable water. The District is doing everything possible to correct the situation, and will make a public announcement as soon as the problem has been rectified.

SAMPLE III

For Immediate Release

This is a Community Emergency Announcement. The Rose Hill Water District has experienced a major loss of its water source capacity and therefore, is unable to maintain normal water deliveries. It is mandatory that all irrigation, industrial, and commercial use be discontinued. Water must be conserved for sanitary and potable use only. Your cooperation is urgently requested. The District is doing everything possible to restore the water system to normal operations. You will be notified of any change in the situation. Note: repeat of above message.

SAMPLE IV

For Immediate Release

Rose Hill Water District has experienced a total loss of its water source capacity; as a result, the water mains have been shut off and normal water deliveries have been discontinued. The District has made arrangements to deliver water by tank truck to residential areas for potable and sanitary uses only. The following is a schedule of tank truck deliveries and locations:

(List Locations)

SAMPLE V

For Immediate Release

On (_____), a water sample taken from Rose Hill Water District's system was submitted for bacteriological analysis as required by Washington State Health Regulations. This water sample exceeded the maximum bacteria count which is prescribed by State Law. This notice will serve to inform users of water in Rose Hill Water District system that the water on this day was impure according to Washington State Health Regulations.

SAMPLE VI

For Immediate Release

The Rose Hill Water District is required by Washington State Health Regulations to collect 10 water samples per month for bacteriological analysis. This notice will serve to inform users of water in the Rose Hill Water District system that these analyses were not performed during the period of (_____) as required by Washington State Health Regulations.

In addition to public announcements, communication with emergency services is vital. Important phone numbers are included on Table 8-3 and should be posted at all phones.

TELEVISION AND RADIO

EMERGENCY REPORTS

KING.....	333 Dexter N. Seattle, WA 98109 448-5555
KIRO.....	2807 3rd Street Seattle, WA 98109 728-7777
KOMO.....	100 4th Ave N. Seattle, WA 98109 443-4000
KCPQ TV (Channel 13)...	4400 Steilacoom Blvd. Tacoma, WA 1-625-1313
KTZZ TV (Channel 22)...	945 Dexter Ave NE Seattle, WA 282-2202

ROSE HILL WATER DISTRICT

EMERGENCY PHONE NUMBERS

Rose Hill Water District Office (24 hours)..... 827-0681

POLICE AND FIRE EMERGENCY 911

POLICE BUSINESS NUMBERS

Bellevue	881-7552
Kirkland.....	828-1143
Redmond.....	882-6405
King County Sheriff.	344-4080

FIRE BUSINESS NUMBERS

Bellevue	881-7552
Kirkland.....	828-1143
Redmond.....	882-6511

UTILITIES

Puget Sound Power and Light....	822-8212
General Telephone.....	823-8845
Pacific N.W. Bell - U.S. West.....	747-7444
Washington Natural Gas	447-0770 746-3633
Viacom Cable Vision.....	526-8400

ONE CALL

Utilities Location Service.....1-800-424-5555

ROSE HILL WATER DISTRICT

PREPARED BY

ST ENGINEERING, INC.
Municipal Engineering Consultants

1000 0 1000 2000
scale feet

EXISTING WATER SYSTEM

DECEMBER, 1988

ROSE HILL WATER DISTRICT

PREPARED BY

ST ENGINEERING, INC.
Municipal Engineering Consultants

800 0 800 1600
scale feet

PROPOSED WATER LINE CONSTRUCTION

WATER LINE 8" D.I. UNLESS OTHERWISE SHOWN

PRV△

1989
1990
1991
1992
1993
1994
1995
UNSCHEDULED

DECEMBER 1988

ROSE HILL WATER DISTRICT

PREPARED BY

ST ENGINEERING, INC.
Municipal Engineering Consultants

733 - 7th AVE
KIRKLAND, WASHINGTON 98033
206/822-8038

800 0 800 1600
scale feet

PRESSURE ZONING MAP

LEGEND

- EXISTING METER AND PRV STATION
- EXISTING PRV STATION
- FUTURE PRV STATION
- EXISTING PIPE (12" AND LARGER) (12" UNLESS OTHERWISE SHOWN)
- FUTURE 12" AND LARGER PIPE
- IN / OUT — WATER SERVICE BOUNDARY
- WATER SERVICE OUTSIDE DISTRICT BOUNDARY
- WATER SERVICE BY OTHERS INSIDE DISTRICT BOUNDARY
- PRESSURE ZONE DIVISION LINE
- ZONE SEPARATION VALVE

CITY OF KIRKLAND METER

CITY OF SEATTLE METER
PRV TO 545
STATION C

STANDPIPE 1.4 MG
O.F. 454
PUMP STATION
1200 GPM TO 545

1990 MIN. 8 MG
RESERVOIR
O.F. 425
OR 460
PUMP STATION
2800 GPM
TO 545

CITY OF SEATTLE METER
PUMP STATION
8000 GPM AT 42' TDH TO 545
10" & 12" BALL VALVE
PRV TO 650
STATION A

CITY OF SEATTLE METER
PRV TO 545
12" BALL VALVE
STATION B

RESERVOIR 11.2 MG
O.F. 545
PUMP STATION
4000 GPM TO 650

CITY OF BELLEVUE METER

CITY OF REDMOND METER

CITY OF REDMOND METER
STATION F

395
(425 OR 450)
545
285
425
650
590
350

DECEMBER 1988