



City of Kirkland

2008 Sewer Comprehensive Plan Update

AGENCY REVIEW DRAFT

Prepared By

City of Kirkland
and
Roth Hill Engineering Partners, LLC



March 2009



CITY OF KIRKLAND

SEWER COMPREHENSIVE PLAN UPDATE 2008

City Consulting Engineers



Roth Hill Engineering Partners, LLC
2600 116th Avenue NE, # 100
Bellevue, Washington 98004
Telephone: (425) 869-9448 and (206) 682-7426
Fax: (425) 869-1190



FCS Group, Inc.
7525 – 166th Avenue NE, Suite D-215
Redmond, WA 98052
Telephone: (425) 867-1802
Fax: (425) 867-1937

CERTIFICATION

This Sewer Comprehensive Plan for the City of Kirkland was prepared by Roth Hill Engineering Partners, LLC, under the direction of the following Registered Professional Engineers:



Erik L. Brodahl, P.E.



Charles Michael Nolan, P.E.



APPROVAL

Reviewed by Washington State Department of Ecology in accordance with the provisions of WAC 173-240-050 and approved on _____.

Approved by the City of Kirkland on _____ by .Ordinance No. _____.

TABLE OF CONTENTS

	<u>Page No.</u>
CHAPTER 1 – INTRODUCTION	
PURPOSE AND SCOPE.....	1.1
AUTHORIZATION.....	1.1
PLAN ORGANIZATION.....	1.2
APPROVAL PROCESS.....	1.2
ENVIRONMENTAL ASSESSMENT.....	1.3
DEFINITIONS.....	1.3
ABBREVIATIONS.....	1.5
CHAPTER 2 – BACKGROUND	
INTRODUCTION.....	2.1
HISTORY.....	2.1
Previous Comprehensive Sewer System Plan.....	2.2
SEWER SERVICE AREA.....	2.2
GEOLOGY, SOILS, AND TOPOGRAPHY.....	2.2
WATER QUALITY.....	2.5
DRAINAGE BASINS.....	2.6
Drainage Basin Descriptions.....	2.8
RELATIONSHIPS WITH OTHER PLANS.....	2.10
Adjacent Systems.....	2.10
Other Sewerage Plans.....	2.11
Other Relevant Planning Documents.....	2.12
CHAPTER 3 – GOALS AND POLICIES	
POLICIES AND STANDARDS.....	3.1
Introduction.....	3.1
Service Area, Extension, and Service Ownership.....	3.3
System Reliability and Emergency Management Plan.....	3.4
Coordination and Cooperation with Other Agencies.....	3.5
System Planning, Design and Construction.....	3.5
Environmental Stewardship.....	3.7
Human Resources.....	3.7
Financial.....	3.8

CHAPTER 4 – PLANNING CONSIDERATIONS

INTRODUCTION.....4.1
 PLANNING AREA4.1
 LAND USE AND ZONING.....4.1
 Existing Land Use and Zoning4.1
 Future Land Use and Zoning.....4.2
 Potential Annexation Areas (PAA)4.2
 GROWTH PROJECTIONS4.5
 Population4.5
 Employment Forecasts.....4.5
 Future Growth Rates4.11

CHAPTER 5 – EXISTING SEWERAGE SYSTEM

INTRODUCTION.....5.1
 DESCRIPTION OF FACILITIES.....5.1
 General.....5.1
 Telemetry System5.3
 Lift Stations.....5.3
 LIFT STATION IMPROVEMENTS COMPLETED SINCE 1993 PLAN5.4
 Lake Plaza Lift Station Replacement5.4
 Waverly Park Lift Station Replacement.....5.4
 10th Avenue South Lift Station Elimination5.4
 Juanita Lift Station Elimination5.4
 Lake Avenue West Lift Station Elimination.....5.5
 Rose Hill Lift Station Elimination5.5
 Rose Point Lift Station Improvements5.5
 NE 90th Street Lift Station Elimination5.5
 South Bay Lift Station.....5.5
 Yarrow Bay Lift Station.....5.5
 COLLECTION AND CONVEYANCE SYSTEM.....5.6
 GRAVITY SEWER IMPROVEMENTS COMPLETED SINCE 1993 PLAN5.8
 Service Basin 15.8
 Service Basin 25.9
 Service Basin 35.9
 Service Basin 45.9
 Service Basin 55.9
 Service Basin 65.11
 KCWTD FACILITIES5.11

INFILTRATION AND INFLOW5.12
 Background5.12
 King County Regional I/I Study5.12
 Wastewater Quality5.13

CHAPTER 6 – SEWER SYSTEM ANALYSIS

INTRODUCTION.....6.1
 MODEL DEVELOPMENT6.1
 BASIN FLOW ANALYSIS.....6.2
 Overview6.2
 Sanitary Flows.....6.3
 Population Assignment.....6.5
 Infiltration and Inflow Analysis6.8
 Results of Analysis6.9
 CONVEYANCE SYSTEM ANALYSIS.....6.12
 Method of Analysis6.12
 Lift Station Analysis6.13

CHAPTER 7 – CAPITAL FACILITIES PLAN

INTRODUCTION.....7.1
 OVERVIEW OF CAPITAL FACILITIES PLAN7.1
 Cost Estimating Methodology.....7.2
 System-Wide Improvements7.3
 Telemetry and Control System Program7.5
 Sewer System Extension Program.....7.6
 RECOMMENDED PROJECTS7.6
 System-Wide Improvements7.7
 Pipeline Replacement and Rehabilitation.....7.7
 Pipe Replacements/Upgrades.....7.8
 Lift Station Abandonment/Upgrades7.13
 Project Costs and Schedule7.14

CHAPTER 8 – FINANCIAL

HISTORICAL FINANCIAL CONDITIONS8.1
 CURRENT FINANCIAL STRUCTURE.....8.4
 Funds8.4
 Financial Policies.....8.5
 Funding and Financing the CIP8.7
 Available Funding Assistance and Financing Resources.....8.7

Capital Financing Strategy8.14

FINANCIAL FORECAST8.15

 Cash Test.....8.15

 Coverage Test.....8.15

 Financial Forecast.....8.16

CURRENT AND PROJECTED RATES8.19

 Affordability.....8.20

 Conclusion.....8.21

CHAPTER 9 – MAINTENANCE AND OPERATIONS PROGRAM

INTRODUCTION.....9.1

MANAGEMENT AND OPERATIONS RESPONSIBILITY9.1

 City Council9.1

PUBLIC WORKS DEPARTMENT9.2

 Personnel Responsibilities9.2

 Administration.....9.3

 Engineering9.3

 Operations and Maintenance Division.....9.4

PROFESSIONAL DEVELOPMENT9.4

 Employee Training9.4

 Maintenance Personnel.....9.5

 Employee Certification9.5

ROUTINE OPERATION AND PREVENTATIVE MAINTENANCE9.5

 Daily Facility Maintenance.....9.5

 Weekly Facility Maintenance.....9.5

 Monthly Facility Maintenance9.5

 Quarterly Facility Maintenance.....9.6

 Annual Facility Maintenance9.6

 On-Going or Periodic Facility Maintenance.....9.6

EQUIPMENT, SUPPLIES AND CHEMICAL INVENTORY9.6

EMERGENCY RESPONSE PROGRAM.....9.7

 Emergency Call-Up List.....9.8

 Sewage Spills.....9.8

 King County Right-of-Way Emergencies.....9.8

 Material Suppliers.....9.8

 Emergency Management Plan9.10

LIST OF TABLES

Table 4.1 Population Forecast4.6

Table 4.2 Employment Forecast4.10

Table 4.3 Future Growth Rates, 2007 to 2022.....4.11

Table 5.1 Lift Station Information5.2

Table 5.2 Existing Sewer System5.7

Table 5.3 Summary of Sewer Pipe Ages5.8

Table 6.1 Current Conditions (2007) Per Capita Flow Rates (Sanitary Flow Only) 6.6

Table 6.2 Future Conditions (2027) Per Capita Flow Rates (Sanitary Flow Only) ..6.7

Table 6.3 Current Conditions (2007) Mini-Basin Net Flow Results6.10

Table 6.4 Future Conditions (2027) Mini-Basin Net Flow Results6.11

Table 7.1 Capital Facilities Plan.....7.15

Table 9.1 Public Works - Sewer Vehicles9.7

Table 9.2 Material Suppliers9.8

LIST OF FIGURES

Figure 2.1 Vicinity Map2.3

Figure 2.2 Adjacent Sewer Purveyors Planning Area Boundary, Urban Growth
Boundary, and Franchise Boundary Map2.4

Figure 2.3 Topography and Drainage Basins2.7

Figure 4.1 Zoning.....4.3

Figure 4.2 Land Use Map4.7

Figure 4.3 TAZ Boundaries and Sewer Mini-Basins4.9

Figure 5.1 Frequent Grease Accumulation Locations.....5.15

Figure 6.1 Sewer System Mini-basin Schematic6.6

Figure 6.2 Sewer System Analysis6.15

Figure 7.1 Recommended Improvements.....7.9

APPENDICES

Appendix A State Environmental Policy Act (SEPA) Determination

Appendix B Approvals

Appendix C Agency Comments/Responses

Appendix D Existing Service Agreements

Appendix E Sanitary Sewer Pre-Approved Notes, Design Criteria and Plans

Appendix F TAZ Planning Data Workbook

Appendix G Rodding Schedules

PURPOSE AND SCOPE



The City of Kirkland’s Sewer Comprehensive Plan Update has been prepared according to the Washington Administrative Code (WAC) 173-240. These regulations require that all formed sewer utilities prepare a Sewer Comprehensive Plan outlining the City’s present and reasonable foreseeable need in the future. The Plan is intended to supersede the 1993 Sewer Comprehensive Plan. This Plan was prepared in 2006 and 2007 and the date, 2008, reflects the issuance year.

This Plan establishes the sewer system policies and criteria in accordance with the City’s framework, analyzes the existing sewer system and its operations, and recommends improvements to correct deficiencies and meet future service needs. This Plan provides the City with a guide to evaluate the impacts of future proposed development and land use on the sewer system. The scope of the Plan is as follows:

- Review and update the sewer system policies and criteria to ensure future improvements are consistent with adjacent jurisdictions’ comprehensive plans.
- Estimate the effect of future land uses on population and household trends within the sewer service area.
- Document the existing sewer system.
- Analyze key system components such as lift stations and connecting piping.
- Assess the capability of the existing sewer system to meet existing and future demands.
- Identify existing sewer system deficiencies and develop the Capital Facilities Plan, including priorities for construction.
- Summarize financing methods for recommended facility improvements.
- Document the City’s maintenance and operations program for the sewer facilities.

AUTHORIZATION

The City Council, recognizing the obligation to provide for the needs of its present and future customers, directed Roth Hill Engineering Partners, LLC to analyze and prepare an updated Sewer Comprehensive Plan. Authorization to proceed was given on August 9, 2006. This Plan has been prepared in compliance with the state law and county ordinances.

PLAN ORGANIZATION

The subsequent sections of this Plan are organized as follows:

Chapter 2 reviews planning considerations that are pertinent to the City's sewer system. Included are descriptions of the City's sewer service area, sewer system history, adjacent purveyors, related plans, and physical features.

Chapter 3 includes sewer system policies and criteria for design and planning parameters of the City's sewer system.

Chapter 4 summarizes the existing and future land use, zoning, employment and population data.

Chapter 5 summarizes existing sewer system facilities and major components, including the telemetry system, lift stations, and the conveyance system. Additionally, included are descriptions of sewage disposal facilities, Infiltration and Inflow (I/I) information and sewage quality.

Chapter 6 summarizes the hydraulic analysis of the sewer system facilities. Additionally, included is an analysis of the system operations and capacity for current and future flows, identification of any system deficiencies, and the improvements required to resolve those deficiencies.

Chapter 7 outlines the Capital Facilities Plan necessary to meet the City's future sewer system needs.

Chapter 8 describes the general financial framework that addresses the City's overall financial status.

Chapter 9 summarizes the City's sewer operation program. Included therein is an overview of sewer system responsibility and authority, system operation and maintenance plan, equipment supplies and inventory and emergency response.

The Appendices include: the State Environmental Policy Act Determination; Agency Comments/Responses; Sanitary Sewer Pre-Approved Notes, Design Criteria and Plans; Existing Service Agreements, TAZ Planning Data; and Rodding Schedules.

APPROVAL PROCESS

This Plan is required to meet state, county, and local requirements. The Plan complies with the requirements of the Department of Ecology (DOE) as set forth in the Washington Administrative Code (WAC) 173-240-050,

the Department of Health (DOH) as set forth in WAC 271-040, and the Revised Code of Washington (RCW) as set forth in RCW 57.16.010. This Plan is also consistent with King County Code (KCC) Title 13.24 with respect to sewer system planning.

The City will submit this document to adjacent utilities and local governments having jurisdiction to assess consistency with their ongoing and adopted planning efforts. Additionally, King County, DOE, and DOH must review and approve the Plan. The King County approval is accomplished through the Utilities Technical Review Committee (UTRC) which reviews all proposed comprehensive plans prior to a recommended submission to the County Council.

The City Council will approve the final Sewer Comprehensive Plan Update after all other approvals have been obtained.

ENVIRONMENTAL ASSESSMENT

The City has determined this Plan does not have a probable significant adverse impact on the environment and has issued a Determination of Non Significance under WAC 197-11-340(2). This decision was made after review of the completed State Environmental Policy Act checklist and other information on file with the lead agency. The environmental determination issued by the City for the Sewer Comprehensive Plan is provided in **Appendix A**.

It should be noted, however, that each Capital Facilities Plan project presented in this Plan will undergo subsequent project-specific environmental review as part of the preliminary and final design process.

DEFINITIONS

The following terms are used in this Plan.

Collector Sewer - A sewer that discharges into a main or trunk sewer and has no other tributary sewers.

Gravity Sewer Capacity - The maximum capacity for a gravity sewer is the volume of flow that can be carried in a sewer at a depth to diameter ratio of 0.80.

Hydraulic Analysis - A computer simulation of a sewer system to determine its conveyance capacity and the demands on the system.

Infiltration - Infiltration is the entrance of groundwater into the sanitary sewer system through cracks, pores, breaks and defective joints in the sewer-piping network.

Inflow - Inflow refers to direct flow of stormwater into sanitary sewer systems through hookups from stormwater collection facilities and illegal connections.

Interceptor Sewer - A sewer that receives flows from a number of trunk sewers and conducts such wastewater to a point for treatment or disposal.

Lift Station - A sewage pumping facility which consists of a wet well for collecting wastewater; mechanical equipment such as pumps, valves and piping; electrical and control equipment, and a force main. In this Plan, synonymous with “Pump Station”.

Lift Station Capacity - The maximum capacity for a lift station is equal to the peak, wet weather flow that the largest pump within the lift station has been designed to convey.

Main or Trunk Sewer - The principle sewer to which collector sewers are tributary is called a main or trunk sewer. A main or trunk sewer receives many collectors' branches and serves a subbasin.

Planning Area - A geographic area as specifically defined on a map in a comprehensive plan that is a logical area for expansion of the system. Conversion of a planning area to a service area requires King County approval of an amendment to a comprehensive plan.

Purveyor - A purveyor is an agency, subdivision of the state, municipal corporation, firm, company, mutual or cooperative association, institution, partnership, person or other entity owning or operating a public sewer system. Purveyor also means the authorized agents of such entities.

Sanitary Sewer - A sewer that carries liquid and waterborne wastes from residences, commercial buildings, industrial plants and institutions, together with minor quantities of ground, storm and surface waters.

Service Area - A geographic area within which service to customers is available as specifically defined on a map in a comprehensive plan and approved by King County, as required.

ABBREVIATIONS

AC	Asbestos-Cement (Pipe)
API	Annual Percentage Increase
APR	Annual Percentage Rate
APWA	American Public Works Association
ASTM	American Society for Testing and Materials
AWC	Association of Washington Cities
AWWA	American Water Works Association
BRB	Boundary Review Board
cf	Cubic Feet
CFP	Capital Facilities Plan
CI	Cast Iron (pipe)
CIP	Capital Improvement Program
Conn.	Service Connection
CPA	Certified Public Accountant
CPP	Countywide Planning Policies
d/D	Depth/Diameter
DI	Ductile Iron (pipe)
DNR	(King County) Department of Natural Resources and Parks
DOE	(Washington State) Department of Ecology
DOH	(Washington State) Department of Health
DOT	(Washington State) Department of Transportation
Du/ac	Dwelling Units Per Acre
ECY	(Washington State) Department of Ecology (a.k.a. DOE)
EPA	US Environmental Protection Agency
EPP	Environmental Protection Agency
ERU	Equivalent Residential Unit
ESA	Endangered Species Act
FAZ	Forecast Analysis Zones
FC	Fecal Coliform
FIU	Field Interface Unit
FM	Force Main
FPS	Feet Per Second
FT	Feet
FT2	Square Feet
FT3	Cubic Feet
FTE	Full Time Equivalent

GFC	General Facilities Charge
GIS	Geographic Information System
GMA	Growth Management Act
GP	Grinder Pump
gpad	Gallons Per Acre Per Day
gpcd	Gallons Per Capita Per Day
gpd	Gallons Per Day
gpm	Gallons Per Minute
HDPE	High-Density Polyethylene (pipe)
HP	Horsepower
I/I	Infiltration and Inflow
IE	Invert Elevation
IN	Inches
KC	King County
KCAS	King County Aerial Survey
KCCP	King County Comprehensive Plan
KCWTD	King County Department of Natural Resources and Parks Wastewater Treatment Division
KW	Kilowatt
LID	Local Improvement District
LF	Linear Feet
LS	Lift Station
M&O	Maintenance and Operations
Metro	King County Department of Natural Resources and Parks Wastewater Treatment Division (formerly the Municipality of Metropolitan Seattle)
MG	Million Gallons
MGD	Million Gallons Per Day
NE	Northeast
NW	Northwest
NUD	Northshore Utility District
NSF	Non-sufficient Funds
O&M	Operations and Maintenance (same as M&O)
OFM	Office of Financial Management (Washington)
PAA	Potential Annexation Area
PS	Pump Station
PSRC	Puget Sound Regional Council
PVC	Polyvinyl Chloride
PWTF	Public Works Trust Fund
R/W	Right-of-Way

RCP	Reinforced Concrete Pipe
RCW	Revised Code of Washington
RPM	Revolutions Per Minute
RTU	Remote Terminal Unit
RWSP	(King County) Regional Wastewater Services Plan
SDG	Small Diameter Gravity (pipe)
SDR	Standard Dimension Ratio
SE	Southeast
SEPA	State Environmental Policy Act
SF	Square Feet
SFR	Single-Family Residential
STEP	Septic Tank Effluent Pump
SW	Southwest
TAZ	Transportation Analysis Zone
TBD	To Be Determined
TDH	Total Dynamic Head
TV	Television
UGA	Urban Growth Area
UGB	Urban Growth Boundary
UL	Underwriters Laboratory
ULID	Utility Local Improvement District
UTRC	(King County) Utilities Technical Review Committee
V	Voltage
WASWD	Washington Association of Sewer and Water Districts
WAC	Washington Administrative Code

THIS PAGE INTENTIONALLY BLANK

INTRODUCTION

This chapter summarizes the City's history, service area topography, sewer service area (existing and projected), and service area agreements. It also includes a brief summary of the sewer system basins and facilities and the City's relationship with adjacent jurisdictions and other related plans.

HISTORY

The City of Kirkland first constructed sanitary sewer facilities in the downtown area in the early 1940s as part of the federal government war housing projects. Before then, the common practice was to dispose of wastewater on-site or to discharge it directly into Lake Washington. As part of the war housing projects, a primary treatment plant was constructed with an outfall to Lake Washington. By 1950, approximately 30% of the existing system was constructed.

In 1958, the Municipality of Metropolitan Seattle (METRO), now known as the King County Department of Natural Resources and Parks, Wastewater Treatment Division (KCWTD), was formed to solve the growing problem of pollution in Puget Sound, Lake Washington, and surrounding waters. METRO developed a regional plan for wastewater collection and treatment facilities in 1959 and assumed operating responsibilities for the regional interceptors and wastewater treatment systems in 1962, including Kirkland's primary treatment plant, which was located at the old City Hall site (near the intersection of 3rd Street and Central Way). The Kirkland treatment plant was eventually abandoned and a KCWTD-owned and operated lift station was constructed to convey flows to the new interceptor. Today, all of the City's wastewater discharges to these KCWTD facilities.

The City's facilities have gradually extended to meet growth demands. In 1989, the City of Kirkland assumed the operation and maintenance of the sewer system of the Rose Hill Water and Sewer District. After the assumption, the City constructed improvements in this area to integrate the Rose Hill system into the City's system.

Presently, the City serves approximately 56,986 persons within 8.24 square miles. Under the Growth Management Act (GMA), future sewer service, with few exceptions, will only be allowed in designated Urban Growth Areas (UGA).

Previous Sewer Comprehensive System Plan

The City's most recent Sewer Comprehensive System Plan was adopted in 1993. No amendments have been prepared since then.

SEWER SERVICE AREA

The City lies generally in King County directly east of and adjacent to Lake Washington and north of and adjacent to the City of Bellevue. It is bordered to the east by the City of Redmond and unincorporated King County, and to the north by unincorporated King County. The location of the City is shown on the Vicinity Map, **Figure 2.1**. Adjacent sewer purveyors include: the cities of Bellevue and Redmond, and Northshore Utility District.

The corporate boundary is the legal boundary of the City as a municipal corporation. Those areas outside the corporate boundary and inside the planning area and Urban Growth Area have the option to annex to the City and receive sewer service.

The City's sewer service area is based on boundaries and criteria established by King County, existing agreements with neighboring municipalities and adjacent purveyors, topographical limitations, existing utility boundaries, and practical limitations of service. The location of the sewer planning area (service area) is shown on **Figure 2.2**.

The existing sewer service area is within the City limits. The service area is not anticipated to increase as all adjacent areas already have sewer service provided through other purveyors. Properties currently served by on-site septic systems may connect to the City's sewer system if they are within the City's existing or future service area.

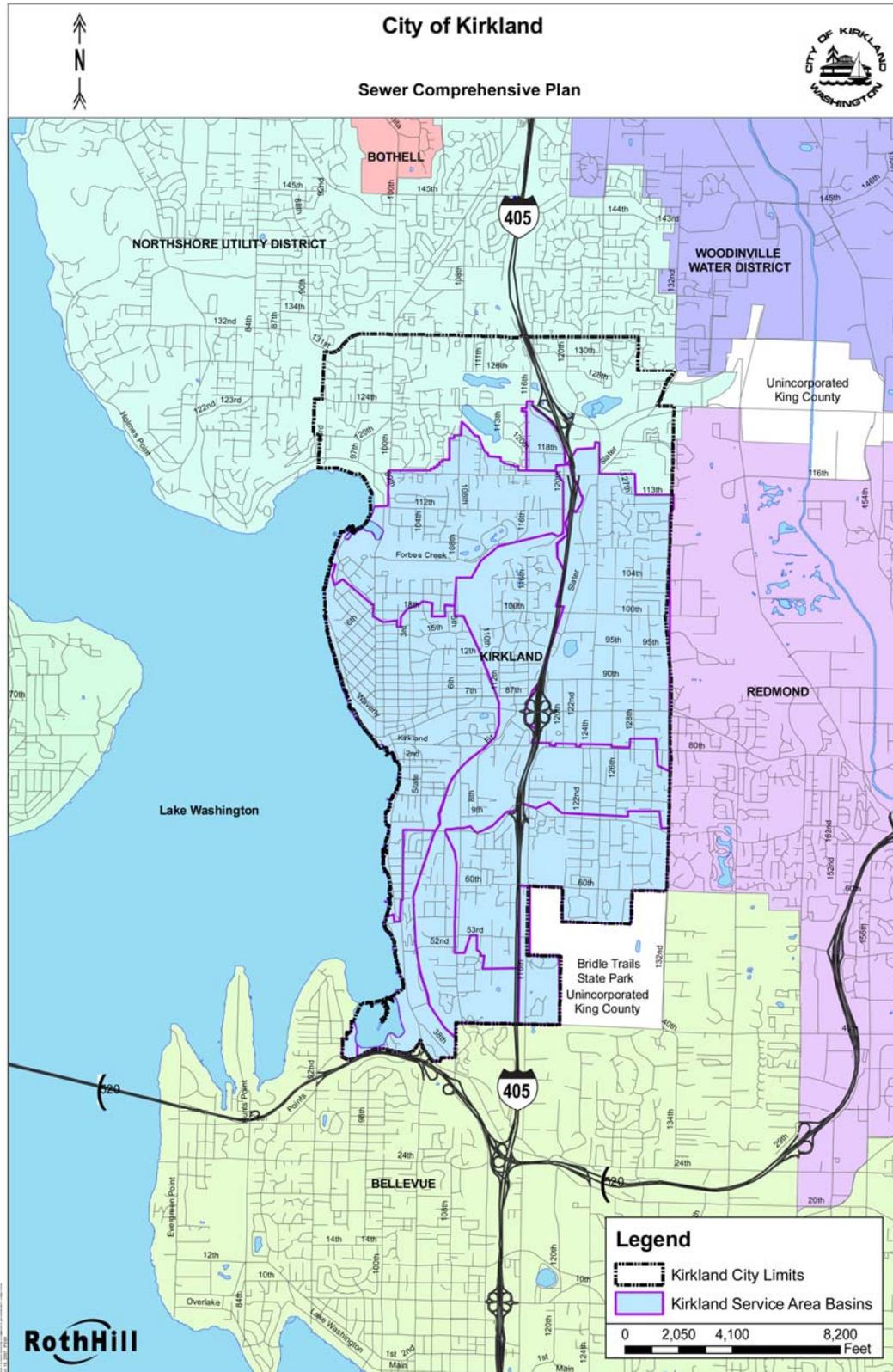
GEOLOGY, SOILS, AND TOPOGRAPHY

The geology of the City is largely the result of prehistoric glacial activity and subsequent ice retreats. The United States Department of Agriculture has mapped and analyzed the soils in the area in the Soil Survey of King County. The most common soil type in the area is known as the Alderwood series, which includes moderately well-drained gravelly sandy loams 24 to 40-inches deep over consolidated glacial till. The next most common type, but much less prevalent than the Alderwood series, is the Everett series. Everett soils are gravelly and are underlain by sand and gravel. In certain areas, principally basins and lowlands, organic materials such as peat and muck occur in depths up to 10 feet.

Figure 2.1
Vicinity Map



Figure 2.2
Adjacent Sewer Purveyors Planning Area Boundary, Urban Growth Boundary,
and Franchise Boundary Map



Soil properties and characteristics are important factors in determining the continued utilization of septic tanks in the Urban Growth Area. Some soil types are more suitable for septic tanks and drain fields than others. Soil suitability varies within the City. In recent years, concerns about soils that are too gravelly and percolate too rapidly have grown. The concern is the underlying groundwater aquifer may risk contamination, particularly with denser development, especially after years of septic tank use.

Soil properties may also impact the design and location of sewer facilities. Detailed soil testing is often performed early in the design of proposed facilities to identify design parameters and to minimize construction costs. Soil evaluations of this type are beyond the scope of this Plan. Prior to the implementation of any elements of the Plan, appropriate soils testing may be required on a project-by-project basis.

Topography of an area is one of the principal factors in the design of sewage facilities. Every effort should be made to utilize the natural drainage basins in the design to take maximum advantage of gravity flow and minimize the need for constructing additional lift stations. The Drainage Basins Map, **Figure 2.3**, shows overall topography of the study area and the breakdown into drainage patterns. As part of the Plan preparation, detailed topographic maps were updated from aerial photographs. The topography of the area served by the City varies greatly in elevation. The east side of the service area is the highest with the land generally sloping downward from 132nd Avenue NE to Lake Washington. The ground elevations vary from approximately 500 feet above mean sea level in the Bridle Trails area to approximately 20 feet along Lake Washington. Valleys and lowlands have been carved into the terrain by several watercourses, including Juanita Creek, Forbes Creek, and Cochran Springs. Glacially created basins and depressions are occupied by lakes such as Lake Washington, Forbes Lake, and Totem Lake, as well as their associated wetlands. The varied terrain has required a combination of gravity sewers and pump stations to serve the area.

WATER QUALITY

The City of Kirkland's sewer services lies within the Cedar River - Lake Washington Watershed (Water Resources Inventory Area 8 (WRIA 8)) is the land area in which rainwater drains to Lake Washington and out through the Hiram Chittenden Locks. WRIA 8 includes the Cedar River and its tributaries, May Creek, Coal Creek, Mercer Island, Mercer Slough, Kelsey Creek, Fairweather Creek, Yarrow Creek, Juanita Creek, Forbes Creek, Lyon Creek, McAleer Creek, Thornton Creek, and Ravenna Creek. The Sammamish River drainage is also part of the greater watershed.

Lake Washington is the largest of the three major lakes in King County, and the second largest natural lake in the State of Washington. Lake

Washington's two major influent streams are the Cedar River at the southern end. The majority of the immediate watershed is highly developed and urban in nature with 63% fully developed. The upper portion of the watershed is the headwaters of the Cedar River that lie in the closed watershed governed by Seattle Public Utilities. Lake Washington is perhaps the best example in the world of successful lake restoration by the diversion of sewage, and has been extensively studied and researched. Lake Washington remains on the Washington Department of Ecology's (Ecology) 303(d) list for various pollutants including ammonia, fecal coliform (FC), total polychlorinated biphenyl (PCB).

The main stem of Juanita Creek originates east of Interstate 405, and flows approximately five miles west and south entering Lake Washington on the west side of Juanita Beach Park. Juanita Creek drainage basin is roughly 4,000 acres with three main tributaries flowing into Juanita Creek, an upper West (Simonds Tributary), a lower West, and a lower East (Totem Lake Tributary). Juanita Creek is considered a Class AA water body. Juanita Creek is listed on Ecology's 303(d) list for violation of dissolved oxygen (DO), temperature, and fecal coliform (FC).

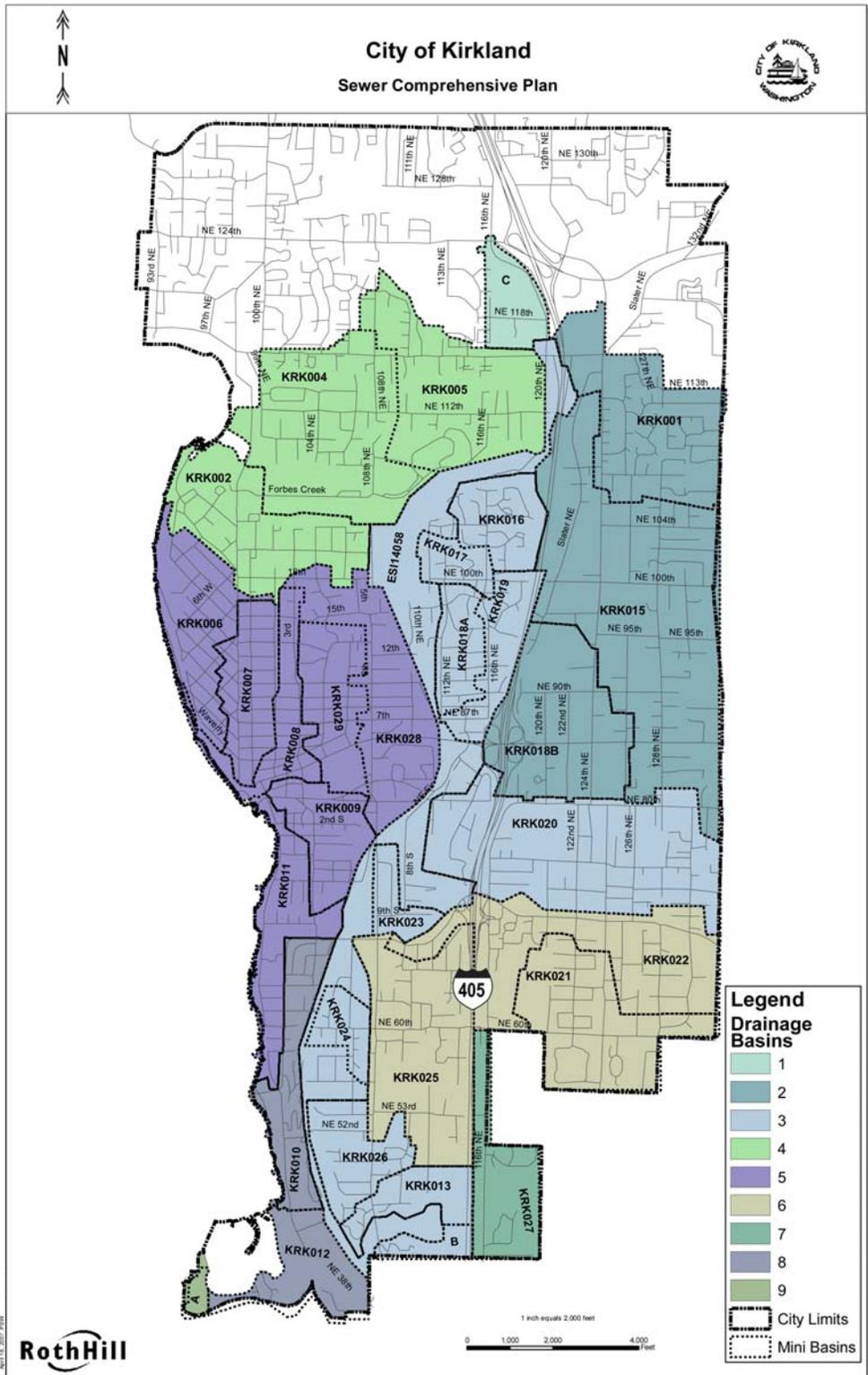
The Forbes Creek basin comprises approximately 1,000 acres. Forbes Creek originates at an elevation of 240 feet above sea level and flows roughly 1.8 miles through the City of Kirkland and a wetland area before entering the north east corner of Lake Washington. As a tributary to Lake Washington, Forbes Creek is considered a Class AA water body. It is also listed on Ecology's 303(d) list for violation of DO, temperature, and FC.

(Source: <http://dnr.metrokc.gov/wlr/watersheds/cedar-lkwa.htm>)

DRAINAGE BASINS

The planning area consists of nine drainage basins. The drainage basins of varying sizes span the entire City and are described in the following section. The Drainage Basins Map, **Figure 2.3**, illustrates the boundaries of the basins.

Figure 2.3
Drainage Basins



Drainage Basin Descriptions

Drainage Basin 1

Drainage Basin 1 is comprised of Mini-basin C. It is located in the northern portion of the sewer service area and includes portions of the Totem Lake neighborhood. It consists of approximately 65 acres of commercial and office development. Flows from this area discharge to the north into Northshore Utility District facilities at the intersection of NE 124th Street and 116th Avenue NE.

Drainage Basin 2

Drainage Basin 2 is comprised of Mini-basins KRK001, KRK015, and KRK018B. It is located in the northeastern portion of the sewer service area and serves a large portion of the North Rose Hill neighborhood and a small amount of the South Rose Hill neighborhood. It consists of approximately 1,050 acres. Land use is largely residential, but includes commercial, office, parks, and multifamily development. This basin drains to the north and west and discharges into the KCWTD interceptor at two locations along the I-405 corridor.

Drainage Basin 3

Drainage Basin 3 is comprised of Mini-basins ESI4058, KRK013, KRK016, KRK017, KRK018A, KRK019, KRK020, KRK023, KRK024, KRK026, and Subbasin B and serves the Highlands and Everest neighborhoods, and portions of the South Rose Hill, and Central Houghton neighborhoods. It encompasses approximately 1,350 acres, and is largely residential, with some commercial, office, parks, multifamily and industrial development. The KRK subbasins discharge directly to the KCWTD interceptor at nine locations along the Burlington-Northern Santa Fe Railroad (BNSF) right-of-way. Subbasin ESI4058 discharges to the KCWTD interceptor at multiple locations along the BNSF Railroad right-of-way. Subbasin B drains from the service area to a KCWTD interceptor just north of the intersection of NE 39th Street at approximately NE 39th Place.

Drainage Basin 4

Drainage Basin 4 is located in the northwest portion of the sewer service area, and is comprised of Mini-basins KRK002, KRK004, and KRK005. It serves the South Juanita neighborhood and a small portion of the Market neighborhood, and consists of approximately 790 acres. Land use is primarily residential, but includes a large amount of park/open space, as well as office development in the eastern portion of the basin. This basin drains to the north and west via gravity main to a KCWTD's Juanita Bay

Lift Station via a Northshore Utility District trunkline, which discharges to a KCWTD interceptor that flows to the southeast.

Drainage Basin 5

Drainage Basin 5 is located in the western portion of the sewer service area, and consists of Mini-basins KRK006, KRK007, KRK008, KRK009, KRK011, KRK028, and KRK029. It serves the Norkirk and Moss Bay neighborhoods, and portions of the Market and Lakeview neighborhoods. Service Basin 5 contains approximately 900 acres of residential, commercial, park, office, multifamily and industrial development, and includes most of the downtown business district. This basin discharges to the City's Lake Plaza Lift Station located at Central Way and 3rd Street, which pumps the sewage to a KCWTD interceptor that drains to the east.

Drainage Basin 6

Drainage Basin 6 is comprised of Mini-basins KRK021, KRK022, and KRK025, and is located in the southeastern portion of the sewer service area. It encompasses approximately 760 acres. Land use is primarily residential, but includes significant amounts of institutional development and park, and a small amount of commercial, office, and multifamily development. This basin serves portions of the Bridle Trails, Central Houghton, and South Rose Hill Neighborhoods. Service Basin 6 drains to the north and the west and discharges to a KCWTD interceptor at a location along the BNSF Railroad right-of-way.

Drainage Basin 7

Drainage Basin 7 is comprised of Mini-basin KRK027, and is located at the south end of the sewer service area. It consists of approximately 120 acres of residential development, and serves a portion of the Bridle Trails neighborhood. This basin drains to the south and discharges to City of Bellevue facilities in 116th Avenue NE at NE 39th Street.

Drainage Basin 8

Drainage Basin 8 is located in the southwestern portion of the sewer service area, and includes Mini-basins KRK010 and KRK012. It serves a portion of the Lakeview neighborhood and consists of approximately 120 acres, and is largely residential, with commercial, parks, office, and multifamily development. This basin drains to the KCWTD-owned Yarrow Bay Lift Station, which discharges to a KCWTD force main that flows to the KCWTD interceptor.

Drainage Basin 9

Drainage Basin 9 consists of Subbasin A and is located at the southwestern edge of the sewer service area. It serves a portion of the Lakeview neighborhood, and consists of approximately 10 acres of residential development. This basin drains to the south and discharges to City of Bellevue facilities located in Points Drive NE just east of 92nd Avenue NE.

RELATIONSHIPS WITH OTHER PLANS**Adjacent Systems**

The City of Kirkland's sewer system does not function in isolation. Some areas within the City limits are sewered by adjacent cities and special purpose districts, and the City provides sewer service to some areas within adjacent systems' service areas.

Adjacent sewer systems, such as the City of Redmond, impact sewer planning for the City of Kirkland in several ways. These systems not only impact the study area, but may also impact the extent and size of proposed improvements. This section will evaluate existing relationships between the City of Kirkland's sewer system and adjacent systems, as well as areas which may potentially be best served by joint use facilities. Furthermore, all planned improvements are based upon KCWTD continuing to provide conveyance and treatment of sewage generated within the City of Kirkland study area.

City of Redmond General Sewer Plan

The City of Redmond adopted its most recent General Sewer Plan in 1997. Some areas adjacent to the Kirkland/Redmond boundary (132nd Avenue NE) may be best served by either system. Currently, the City of Redmond's sewer system is concentrated further east with few facilities adjacent to the City of Kirkland. Similarly, the City of Kirkland's sewer system does not extend in all locations to 132nd Avenue NE. Ideally, as development occurs adjacent to 132nd Avenue NE and sewers become necessary, sewer extensions will be constructed within 132nd Avenue NE. Design of the extensions should be coordinated with the City of Redmond, when necessary, to provide service to areas which would be difficult for the City of Redmond to serve.

City of Bellevue Sewer Plan

The City of Bellevue's sewer system abuts the southern boundary of Kirkland's service area. Currently, all areas adjacent to the

Kirkland/Bellevue service area boundary are sewerage, with the exception of the Yarrow Bay Wetlands adjacent to Points Drive. It is unlikely that this area will develop because of the sensitive nature of the environment. The City of Kirkland discharges into the City of Bellevue's facilities at approximately 116th Avenue NE and NE 39th Street, and Points Drive NE just east of 92nd Avenue NE, which is ultimately transported into KCWTD facilities.

Northshore Utility District Wastewater Comprehensive Plan

Northshore Utility District (NUD) provides sewer service to more than 69,000 customers, including portions of Lake Forest Park, Kenmore, Bothell, Woodinville, Kirkland and unincorporated King County. NUD's service area within the Kirkland City limits generally lies north of NE 116th Street and is best served by NUD due to the topography in the area. NUD's 2006 Wastewater Comprehensive Plan indicates it will serve more than 124,000 people at buildout. The City of Kirkland discharges into the NUD facilities at approximately NE 124th Street and 116th Avenue NE which is ultimately transported into the KCWTD facilities.

Other Sewerage Plans

Northshore Community Plan

Between 1973 and 1994 King County prepared community plans for 12 subareas of unincorporated King County. The first generation of community plans, substantially completed by 1984, were used to implement the County's 1964 Comprehensive Plan, and consisted of detailed land use policies, area zoning, and lists of capital projects for each planning area. The second generation of community plans, from 1985 to 1994, implemented many concepts of the 1985 King County Comprehensive Plan that were subsequently carried to the 1994 King County Comprehensive Plan.

The Northshore planning area has been one of King County's fast-growing planning areas. The first Northshore Communities Development Plan began in 1972-1973 and was adopted in 1977. Almost immediately the Northshore Community Plan Revision Committee was established and the Plan was revised and adopted in 1981. The Plan covers an area that includes unincorporated King County north of Kirkland and south of Bothell. Although the community plans are no longer in effect as separately adopted plans, in many cases the published plan documents contain valuable historical information.

King County Regional Wastewater Services Plan

In December 1999, as part of the Regional Wastewater Services Plan (RWSP), the King County Council approved the development of a Regional Infiltration and Inflow (I/I) Control Program. The purpose of the program is to reduce the risk of sanitary sewer overflows and the cost of adding capacity to facilities that convey wastewater to County treatment plants.

In 2000, the County's Wastewater Treatment Division, in cooperation with the local component agencies that it serves launched an I/I Program. Ten pilot projects were selected, the City of Kirkland being one of them. These projects tested the effectiveness of various sewer rehabilitation technologies in reducing I/I in local agency collection systems. The City's pilot project occurred in the Basin KKK011 and included pipe bursting, 78 laterals replaced through open excavation, and restoration. The project costs were more than \$838,000 and resulted in an overall reduction in I/I. The completion of the ten pilot projects in January 2004 marked a major milestone in the King County study. The projects demonstrated that I/I can be effectively reduced, depending on the location and method of rehabilitation. The results of the pilot projects, along with other information, were used to prepare a long-term regional plan for reducing I/I in local agency systems.

Other Relevant Planning Documents

Joint Use and Service Agreements

The City has entered into several joint use and service agreements with neighboring districts, cities, and private customers that have been economically beneficial to the City. A summary of these joint use and service agreements is presented below. Copies of the agreements are in **Appendix D**, Existing Service Agreements.

Resolution No. 2687 (1979) – City of Bellevue

Resolution No. 2687 is a cooperative agreement allowing the City of Kirkland to deliver sewage flows to the City of Bellevue's sewer system near 108th Avenue NE. Allowable sewage flows are limited to the area as noted in Exhibit A of the Resolution, which included Watershed Park residences.

Costs borne by the City of Kirkland for the intertie were 1.6 cents per square foot of area of each property. In addition, the City of Kirkland must pay a monthly service charge of 12 cents per month per residential customer within the subject area. Either party can terminate the

agreement by providing a six-month written notice. The cost of termination is borne by the party requesting the termination.

Resolution No. R-3118 (1984) – City of Bellevue

Resolution No. R-3118 (September 19, 1984) is a cooperative agreement allowing sewage flows from the City of Kirkland to the City of Bellevue’s sewer system at 116th Avenue NE. Allowable sewage flows into the City of Bellevue are limited by the topography of the property adjacent to 116th Avenue NE, south of 60th Street, west of Bridal Circle Homes, and north of NE 40th Street.

Costs borne by the City of Kirkland for the intertie were 2 cents per square foot per customer, plus a monthly service charge of 12 cents per customer. Termination of the agreement can take place by a six-month written notice by either party. The cost of termination is borne by the party who initiates the termination.

Resolution No. R-2492 (1978) – Northshore Utility District (formerly Northeast Lake Washington Sewer District)

Resolution No. R-2492 is a cooperative agreement for sewage discharge via an 8-inch gravity sewer line from the City of Kirkland’s sanitary sewer system into NUD’s sewer system at NE 116th Street/100th Avenue NE. Flows are limited by a maximum service area boundary defined as the Northwest quarter of the Northwest quarter of Section 32, Township 26, North Range 5, E.W.M.

The cost of this intertie was 2 cents per square foot for each property in the service area, plus a monthly charge of 40 cents per customer for sewer fees. The agreement can be terminated by a 12-month written notice. Termination costs are borne by the party that initiates the termination.

Ordinance 3767 (2000)- Northshore Utility District

The City of Kirkland granted NUD a franchise to provide sewer service within the City. The franchise is effective for 10 years and can be extended on a five-year basis for an additional five years.

As part of this agreement the City agrees to not exercise its statutory authority to assume jurisdiction over NUD or any NUD responsibilities, property, facilities or equipment within the City’s corporate limits, including future annexed areas. The conditions and terms can be found in Section 9 of the agreement.

Juanita Lift Station – Northshore Utility District and METRO (Now KCWTD) (1982)

The Juanita System Improvement Agreement (November 1982) outlines the agreement among KCWTD, the City of Kirkland, and NUD to construct the following facilities: (1) connecting a force main from the City's lift station to the District's 21-inch diameter gravity sewer on 98th Avenue NE, approximately 500 feet south of NE Juanita Drive, with a maximum allowable flow of 1,500 gpm; (2) modifications to the City's pumping station to ensure compatibility with new facilities; (3) construction of a 12-inch diameter gravity sewer line between KCWTD's Juanita Heights lift station and the City's pumping station; and (4) connection of the City's sewer main currently tributary to KCWTD's Juanita Heights pumping station to the gravity sewer described in item (3).

KCWTD bore the costs of the new facilities. The City is responsible for maintaining the facilities located within its service area. The agreement allowed for discharge of sewage from the Juanita Lift Station to the District's 21-inch gravity line, with a maximum allowable flow of 1,500 gallons per minute. In 2004, the City removed this station and installed an 18-inch gravity interceptor sewer, which was a more cost-effective solution to replacing the existing station. There are no provisions for termination of the agreement.

Resolution No. 2655 (1979) – Northshore Utility District (Formerly Northeast Lake Washington Sewer District)

Resolution No. 2655 is a cooperative agreement for sewage discharge from the City of Kirkland's sanitary sewer system to the District's sewer system near the intersection of 116th Avenue NE and NE 124th Street NE. The allowable service area is limited by the geographic area that can be directly served by gravity sewers.

The initial cost of the connection was \$35,633.89, plus a monthly charge of 40 cents per customer for trunkage fees. The initial cost was calculated based on a connection charge of \$750 per acre.

Termination of the agreement can take place within 12 months by a written notice from either party. The cost of termination will be borne by the City. The City is required to provide records of total connections to the District on a monthly basis.

King County Wastewater Treatment Division (Formerly METRO) Agreement

City of Kirkland Ordinance No. 835 (May 1961) authorizes the City to contract for sewage disposal with KCWTD.

The Resolution No. 87 (April 1961) authorizes execution of the contract between KCWTD and the City of Kirkland for sewage disposal. Exhibit “A”, Section 4, of Resolution No. 87, stipulates how the City’s sewerage facilities shall be connected to KCWTD sewerage system.

KCWTD is planning to continue providing sewage disposal service. This contract requires the City to pay a sewage disposal charge based on metered water use records. However, the component agencies are negotiating new contracts with King County.

THIS PAGE INTENTIONALLY BLANK

POLICIES AND STANDARDS

Introduction

The City of Kirkland manages and operates its sewer system in accordance with all known state, local and federal regulations. These policies guide the development and financing of the infrastructure required to provide sewer service. While the City has discretion in setting performance and design criteria and standards for its sewer system, the criteria must meet or exceed the minimum standards for public sewers as set forth by the Washington State Department of Ecology (DOE) through Chapters 90.48, 90.52, and 90.54 RCW. Used together, policies and criteria provide the desired level of service to sewer utility customers.

Policies established by the City provide the framework for planning, design, operation, and management of the system. In addition, the City has a compilation of substantial rules of general applicability and statements of general policy or interpretations adopted by the City Council by ordinances. These policies seek to provide goals of uniform treatment to all its customers and to provide documentation of the City's commitments to current and future sewer system customers. These policies are limited to the sewer system's design, maintenance, and operation.

It is important to focus on planning, design parameters, and other details that have been developed to establish consistency and to ensure that adequate levels of service are provided throughout the system. Other publications, such as the City's Municipal and Zoning Codes and Sanitary Sewer Pre-Approved Notes, Design Criteria and Plans, document design standards and procedures for development of the sewer system. The Sanitary Sewer Pre-Approved Notes, Design Criteria and Plans are included in **Appendix E**.

The City controls land use policies and goals for its system. Providing essential services to the City is a top priority. These policies are designed to enhance existing policies and help guide the City to provide sewer services to its existing and future customers.

The Plan establishes the following goals for sewer service.

Goal 1: Provide safe, reliable, and timely sewer service to its customers at a fair and reasonable rate.

Goal 2: Ensure sewer services are available to support development that is consistent with City land use plans, development regulations, policies, and standards. These will also be consistent with the State of Washington and King County.

Goal 3: Protect the natural environment by providing reliable levels of service and ensuring adequate capacity within the system.

In order to achieve these goals, the City has previously adopted or developed the policies presented herein. Each set of policies was been segregated into the following categories:

Service Area, Extensions, and Service Ownership. Service area and extension policies define the sewer service area and conditions for service extension within those boundaries. The customer service policies define the level of service provided to sewer utility customers, as well as public and private ownership and responsibility for sewer system components.

System Reliability and Emergency Response Plan. Service reliability policies and criteria define the City's standards to construct and maintain reliable sewer system infrastructure and equipment. The emergency action policies state the City's responsibility to maintain an updated Emergency Response Plan and to take reasonable action in case of emergencies.

Coordination and Cooperation with Other Agencies. These policies summarize the City's willingness to coordinate and cooperate with other agencies, as well as to enter into interlocal agreements with neighboring jurisdictions for the provision of sewer service.

Sewer System Planning, Design, and Construction. Planning policies define the methods and procedures the City uses to determine the facilities that are needed to meet anticipated growth within the City's service area as well as the Urban Growth Area. The sewer system design policies and criteria detail the City's design standards for sewer mains, force mains, lift stations, and other necessary facilities required to provide safe, continuous sewer service.

Environmental Stewardship. These policies outline the City's dedication to develop and implement facilities and programs that will protect the environment.

Human Resources. These policies summarize the City's commitment to providing a safe work environment, training, and certification opportunities for its employees.

Financial. This category summarizes the City's general financial policies and criteria and includes sewer rate structures, development charges, capital improvement financing, and reserves.

Service Area, Extension, and Service Ownership

Sewer Service Area

The City will plan for and provide sewer service to all customers within the City's sewer service area.

Service Area Agreements

The City will establish agreements with neighboring utility districts, cities and King County for provision of sewer service. These agreements will establish a permanent sewer service area.

Service Extensions

Sewer system service extensions will be allowed to provide sewer service in the City's sewer service area if the development is consistent with adopted Zoning and Municipal Codes and sewer utility policies.

Sewer Main Extension

Prior to connection of any property to the City sewer system, the sewer main lines must be extended to the subject property's furthest property line by way of public right-of-way or easement.

Emergency Sewer Main Extension

Owners of an existing single or multi family dwelling within the City's sewer system that have a septic system that is failing or has failed may request to connect to the City sewer system even if such property may be located more than 330 feet from an existing sewer main (requiring construction of a sewer main extension in order to be connected).

Whenever construction of a sewer main extension is required to make such connection possible, the City shall plan, design and construct such extension within a reasonable time pursuant to the criteria for sewer main extension projects and construction priorities in accordance with applicable City Municipal Codes.

Acceptance of Application Deemed a Contract

If written application for service is approved by the City, the application shall be considered as a contract in which the applicant agrees to abide by such rates, rules and regulations in effect at the time of signing the application or as may be adopted thereafter by the City and to pay all charges, rates, and fees promptly.

Service Ownership

The sewer main shall be owned and maintained by the City. The property owner shall own and maintain the side sewer service line and any associated appurtenances from the main to the building. (15.28.135)

System Reliability and Emergency Management Plan

System Reliability

The City shall invest the resources necessary to construct, maintain, operate and rehabilitate its sewer system infrastructure and equipment to ensure its customers are provided consistent, reliable service.

Security

The City will make reasonable attempts to protect the security of its sewer system. The City shall determine the information about its system that will remain unavailable to the general public. Said determination shall comply with applicable public disclosure laws.

Response Planning

The City shall update, on a regular basis, its Emergency Response Plan. This plan focuses on problems created by major disasters (such as earthquakes, floods, winter storms) as part of the City's operations program. The Plan will ensure that adequate emergency provisions and procedures are in place to operate the sewer system.

Hazard Mitigation Emergency Response Plans

The City shall update, as necessary, its Hazard Mitigation and Emergency Response Plans. These Plans include natural and manmade hazards and identify how people and property may be damaged when a hazardous situation occurs. These Plans will be available to the public as provided for by existing regulations.

Emergency Back-Up Power

The City will equip each lift station with provisions for emergency power generation, unless the wet well and tributary main capacity above the high-water alarm is sufficient to hold the peak flow expected during the maximum power outage duration as experienced during the last 10 years. The emergency power generation may consist of a connection for portable generation or an in-place generator set. The emergency generator will provide power to the lift station in the event of a power failure. Lift stations with wet wells that have insufficient storage to provide adequate response time to repair a facility failure will be equipped with an onsite

emergency generator, or additional storage will be installed to provide adequate response time.

Coordination and Cooperation with Other Agencies

Regional Participation

The City will support and participate in applicable regional plans to provide and maintain a reliable and adequate sewer system.

Coordination with Other Agencies

The City will coordinate closely with adjacent jurisdictions to determine applicable regulatory requirements, growth projections and opportunities for joint projects. Interlocal agreements will be prepared between the pertinent parties on all joint projects.

Mutual Aid Agreement

The City will participate in mutual aid agreements with adjacent jurisdictions, King County, and the State of Washington.

System Planning, Design and Construction

Planning Objections

The City's objective is to plan and design sewer system facilities that can collect and convey sanitary sewage from its customers in a safe and environmentally friendly manner, consistent with all applicable federal, state, and local requirements.

Sewer System Planning

Future capacity requirements will be estimated by using existing customer connections, a geographic information system (GIS) parcel based analysis and projected future household, population, and employment data as provided by the Puget Sound Regional Council (PSRC).

Sewer System Design

In accordance with all applicable federal, state, and local regulations, the City will design its sewer system facilities with sufficient capacity to handle the anticipated peak daily flow under normal conditions without any overflows to the environment. If the sewer system facilities must be installed or upgraded as a result of a developer's impacts, the new facilities or upgrades shall conform to the City's policies, criteria and standards and shall be accomplished at the developer's expense. The City, however, shall be responsible for any portion of the costs that are

attributable to general facilities such as over-sizing or over-depth requirements and offer latecomers to developers.

Construction Contract Standards

The City shall establish the construction contract standards by which its facilities shall be built. See **Appendix E** for the City's Sanitary Sewer Pre-Approved Notes, Design Criteria , and Plans.

Lift Station Design

All lift stations will be designed to meet the minimum requirements as set forth in the most recent edition of the *Criteria for Sewage Works Design* prepared by the Washington State Department of Ecology.

All lift stations will consist of electrical and mechanical equipment which maintenance staff can easily understand and diagnose for problems. Maintenance staff responsible for lift stations operation will be educated about lift station mechanical and electrical systems. All information necessary for lift station maintenance will be located onsite.

Information and Control Policy

Information and control will be available to optimize lift station operations, diagnose impending equipment failure, analyze sewage flow rates, reduce operating costs, and centrally monitor and control all lift station facilities.

Manhole Requirements

All manholes shall conform to Washington State Department of Transportation (WSDOT) and American Public Works Association (APWA) standards. See the City's Sanitary Sewer Pre-Approved Notes, Design Criteria and Plans (**Appendix E**) for specific criteria.

Side Sewers

Side sewers shall be constructed in accordance with all applicable, City, local, and State regulations. See the City's Municipal Code and Sanitary Sewer Pre-Approved Notes, Design Criteria and Plans (**Appendix E**) for specific criteria.

Record Keeping

Written records and reports will be maintained on each facility and item of equipment showing operation and maintenance history.

Parts and Tools

Spare parts and tools will be stocked for all equipment items whose failure will impact the ability to meet other policy standards.

Environmental Stewardship

Inflow and Infiltration

No one shall discharge or cause to be discharged any stormwater, surface water, ground water, roof run-off, subsurface drainage, cooling water or unpolluted industrial process water to any sewer which is built solely for sanitary sewage.

Wastewater Reuse and Rainwater Reclamation

The City is committed to wastewater reuse and rainwater reclamation. These can serve as cost-effective and environmental beneficial sources of water for industrial processes, sanitation, and irrigation; thereby increasing the security and reliability of the regions' drinking water supply.

Water Resource Protection

The City shall protect groundwater within its service area from degradation related to its actions, facilities, or programs.

Facility Abandonment

Facility abandonment will be done in a safe and environmentally sound manner, consistent with all applicable federal, state, and local regulations at the time of abandonment.

Human Resources

Employee Training

All maintenance personnel will be trained in the procedures and techniques necessary to efficiently perform their job descriptions. The City encourages employee participation in workshops, seminars, and other education program to improve job skills.

Maintenance Personnel

Maintenance will be performed by the sewer maintenance staff and will be supervised by the Field Superintendent.

Personnel Working Conditions

Dry, heated shop space will be available to all.

Employee Safety Management

The City is committed to provide safe and healthy working conditions at all facilities in compliance with all applicable rules, laws and regulations pertaining to safety and health of the employees. The City will update its Safety Manual as required by Federal and state laws.

Employee Certification

The City will pay fees and employee labor for the required certification testing, as well as required annual renewal fees.

Financial

Rate Structure

The City shall establish rates, charges, and fees to maintain sufficient funds to operate, maintain and upgrade its sewer system as necessary to provide safe reliable sewers service to its customers. These rates will be evaluated as part of the annual budget process to ensure that forecasted expenses and impacts of regulations are reflected in the rate structure.

Sewer Service Charge

Each lot or parcel of real property required to be connected with the sewer system of the City shall be subject to a monthly sewer charge whether such lot or parcel of real property is actually connected to the sewer system or not; provided, however, the monthly sewer charge will be waived if the property owner can establish to the satisfaction of the City Engineer that the lot or parcel is connected to a septic system approved by the County.

Sewer Capital Facility Charges

The sewer connections charge(s) must be paid prior to issuance of the permit and shall be determined as to each requested connection by the applicant in accordance with the City’s Municipal Code.

Main Extension Charge

The City shall collect sewer extension charges for owners of properties that individually benefit from publicly built sewer extensions facilities, except from those property owners who previously paid their fair share of such an extension through a LID or ULID.

Cost of Modifications

The cost of any modification to the system shall be borne by each property abutting upon or benefiting from such modifications or by the owners such property.

Fees for Special Services

In addition to all other user rates and service connection fees required to be paid to the City, service call fees may apply when made at the request of the owner or occupant of the premises for assistance in locating and/or repairing a plugged sanitary sewer drain in accordance to the City's Municipal Code.

Fiscal Stewardship and Self-Sufficient Funding

The City shall manage its income and expenses in a self-supporting manner in compliance with applicable laws, regulations, and its own financial policies.

Capital Facilities Plan

The City shall establish a Capital Facilities Plan that describes the anticipated improvements or modifications to the sewer system, planned replacement of aging facilities, upgrades to existing facilities to provide additional capacity for projected growth, and construction of general facilities to aid growth. The Capital Facilities Plan will be completed on a biennium basis.

THIS PAGE INTENTIONALLY BLANK

INTRODUCTION

This chapter summarizes the zoning, land use, population, employment, and education data that are utilized to predict future growth needs for the sewer system.

Future sewer system requirements for the City will be based upon future growth projections performed by the City's Planning Department consistent with land use, zoning capacity and historic sewer data for the established sewer service area. The future sewer demands are used to establish criteria for the hydraulic analysis of the sewer system and for development of the Capital Facilities Plan.

PLANNING AREA

The City's current service area boundary is not anticipated to change. The planning area boundaries are determined by service area agreements between the City, King County, Northshore Utility District and the Cities of Bellevue and Redmond. Potential Annexation Areas (PAAs) are already served by other purveyors. The sewer planning area (service area), and adjacent purveyors is shown on **Figure 2.2**. Future service is restricted to within the City limits.

LAND USE AND ZONING

Land use and zoning designations and regulations are an important factors in determining future sewer requirements. Land use and zoning determines the area available for various types of development including both single-family and multifamily residential development, as well as commercial and other types of land use that provide the economic base necessary to support residential development.

Existing Land Use and Zoning

The existing land use and zoning within the planning area is designated entirely by the City of Kirkland. The land use designations are predominately low-density residential (generally one to six dwelling units per acre). Other land use designations include medium to high density residential, commercial, industrial, office, and schools, including a private university. There are also many parks and open spaces in and around the City.

The sewer service area includes several mixed use commercial and high residential density areas, primarily located along Central Way in the Moss Bay Neighborhood, along the waterfront at Carillon Point, along NE 85th Street, and in the south part of the Totem Lake neighborhood. Even though the City is predominately low-density residential, as of 2006 the City ranked sixth state wide in density for cities and towns at 4,538 people per square mile. This is due to the number and density of the medium and high density residential developments, particularly in the City's mixed use centers.

The north end of the City is served by Northshore Utility District. Their plan continues to provide for service; therefore there is no service area adjustment foreseeable. In all other areas, the service area boundaries coincide with the City limits, and no boundary changes will be necessary.

The following growth and annexation policies, adopted by the City Council, were incorporated into the Kirkland Comprehensive Plan.

Future Land Use and Zoning

Future land use and zoning patterns for the planning area are expected to correspond to existing uses. They were developed based on the projected needs of the area for the next 20 years. The Comprehensive Plans for the cities of Bellevue and Redmond, as well as King County, used similar approaches for the portions of the service areas within their boundaries. This consistency of approach is encouraged by the Washington State Growth Management Act and should result in predictable and stable land uses over longer planning periods.

Future land use for the planning period should conform to the Comprehensive Plan's Zoning Map, **Figure 4.1**, and Land Use Map, **Figure 4.2**.

Potential Annexation Areas (PAA)

Future land use and zoning patterns for the PAA planning area are expected to correspond to existing uses. They were developed based on the projected needs of the area for the next 20 years. The Comprehensive Plans for the cities of Bellevue and Redmond, as well as King County, used similar approaches for the portions of the service areas within their boundaries. This consistency of approach is encouraged by the Washington State Growth Management Act and should result in predictable and stable land uses over longer planning periods.

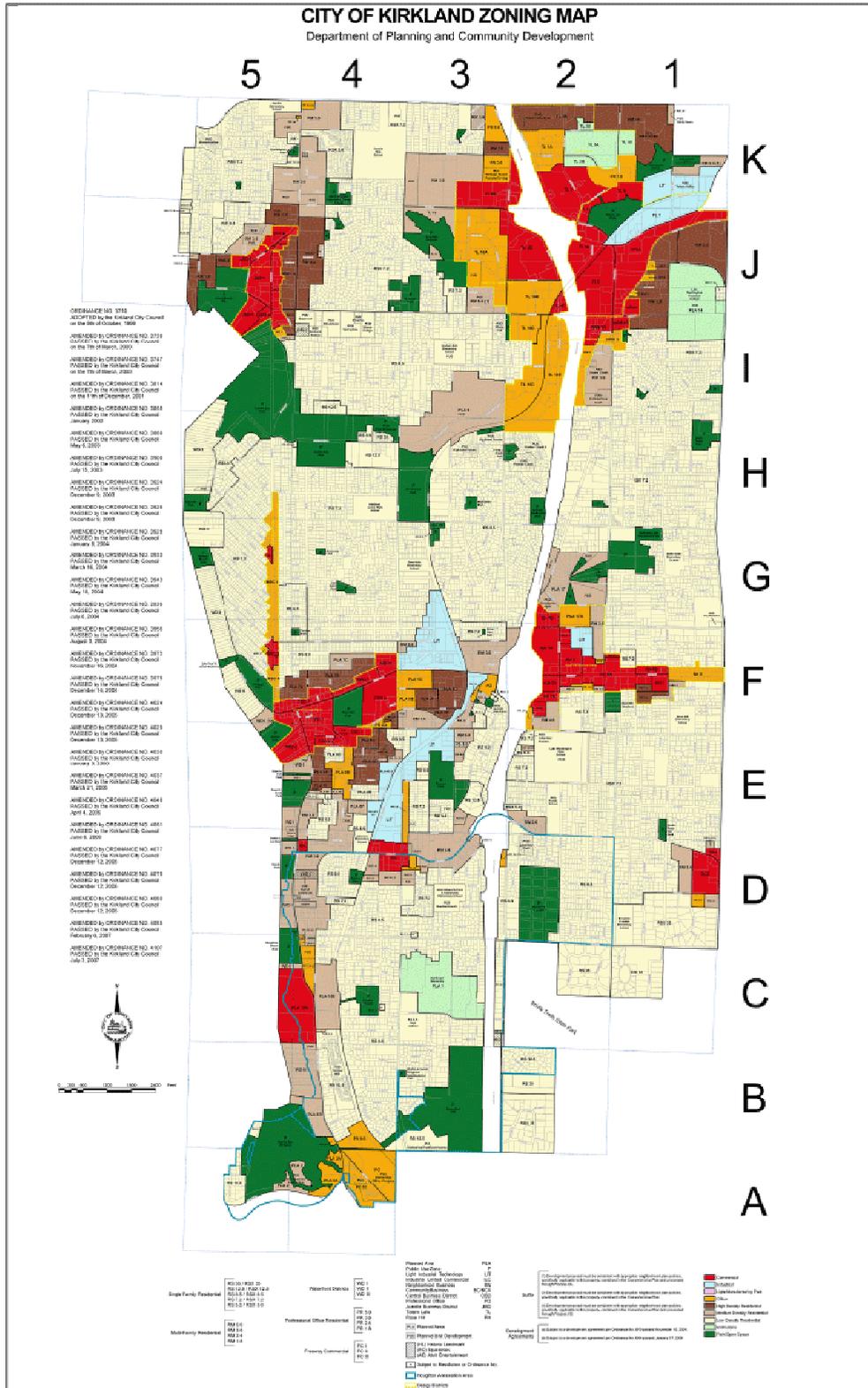


Figure 4.1
Zoning

THIS PAGE INTENTIONALLY BLANK

THIS PAGE INTENTIONALLY BLANK

GROWTH PROJECTIONS

Population and employment figures are based on the projections prepared for the 2022 Comprehensive Land Use Plan. This data was prepared to meet the requirement of the Growth Management Act. **Figure 4.3** illustrates the TAZs and Kirkland city limits. Employment data for 2007 was based on 2006 employment estimates from PSRC. 2022 employment projections were prepared by the City planning department based on estimates of space available to businesses.

Many factors including the state of the economy, interest rates, demands for annexation by neighboring cities and rezones that increase residential densities and commercial intensity influence new development and population growth. The growth management policies, along with coordination between local governments and the PSRC should make development more predictable and growth projections more accurate than they have been historically. However, significant changes to the regional economy will continue to affect growth timing and patterns. Additionally, land use and development policies of other adjoining jurisdiction may also affect growth patterns.

Population

Data used to evaluate the existing and future population within the planning area were provided by the PSRC (2006 TAZ Planning Data). The PSRC data was provided in geographic subdivisions designated as Transportation Analysis Zones (TAZ). The TAZ population projections were allocated to the sewer service area using an area-allocation procedure and then further divided by sewer drainage basins. There are 32 sewer mini-basins in the City. The mini-basins vary in size and span the entire sewer service area. This procedure used the City of Kirkland Zoning Map, **Figure 4.1**, to allocate growth projections based on the percentage of each TAZ within the sewer service area. The resulting population growth projections can be seen in **Table 4.1**.

Employment Forecasts

Similar to population and household data, the employment data is also available by TAZ shown in **Appendix F**, TAZ Planning Data Workbook. The procedure used to allocate population and households to the geographic working areas was used with the detailed employment data. The employment forecasts, which consider population growth and regional economic trends, provide a useful estimation of future trends. A summary of employment forecasts is shown in **Table 4.2**.

Figure 4.3
TAZ Boundaries and Sewer Mini-Basins

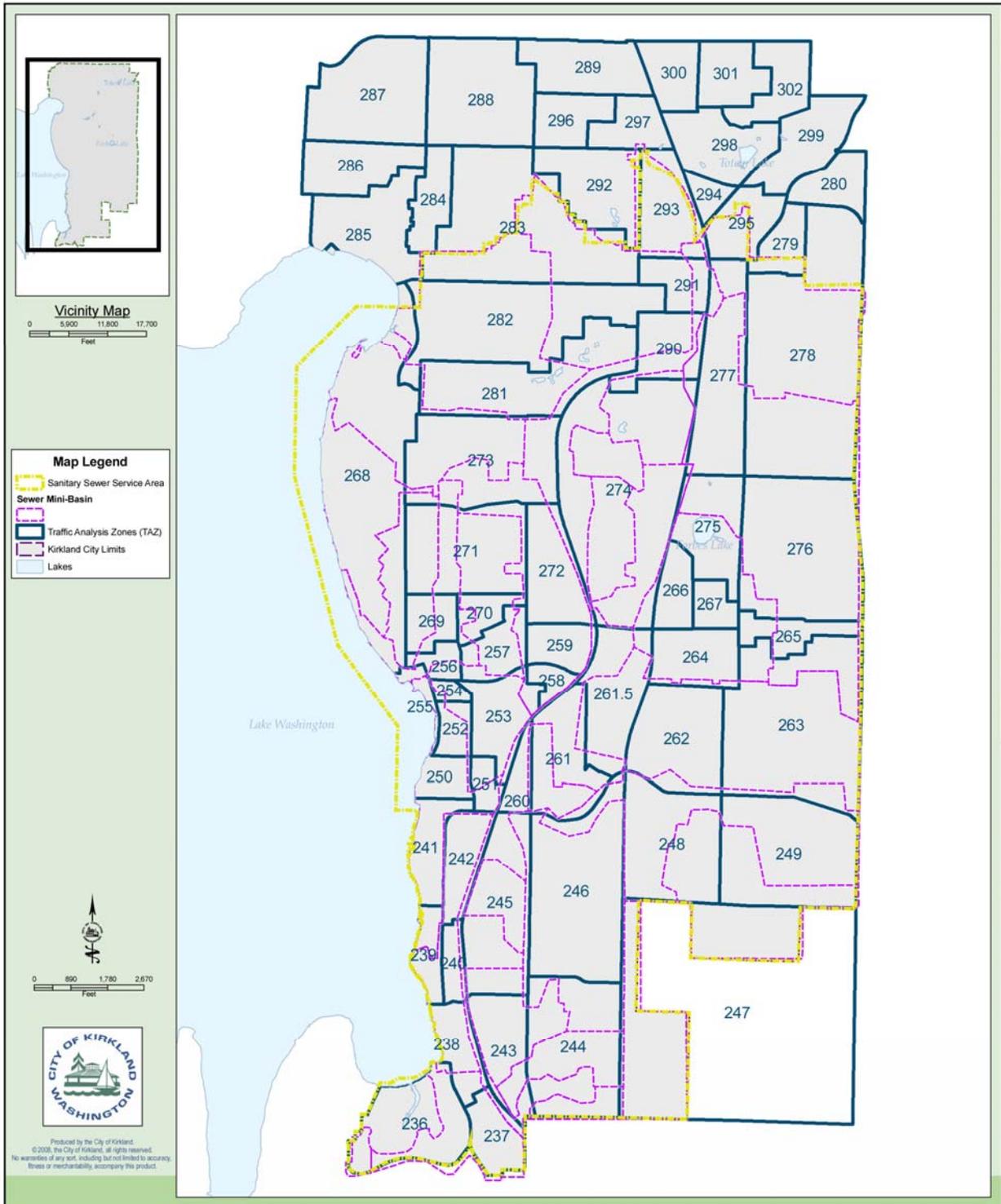


Table 4.1
Population Forecast

Basin	2007	2022	Total Increase	% Increase
A	130	115	-15	-11.5%
B	78	84	6	7.7%
C	25	87	62	248.0%
ESI14058	2,012	2,199	187	9.3%
KRK001	1,590	1,662	72	4.5%
KRK002	1,333	1,299	-34	-2.6%
KRK004	1,786	1,881	95	5.3%
KRK005	1,489	1,649	160	10.7%
KRK006	1,143	1,126	-17	-1.5%
KRK007	954	938	-16	-1.7%
KRK008	1,080	1,081	1	0.1%
KRK009	1,516	1,621	105	6.9%
KRK010	1,090	1,022	-68	-6.2%
KRK011	2,035	1,997	-38	-1.9%
KRK012	480	432	-48	-10.0%
KRK013	208	242	34	16.3%
KRK015	3,240	3,869	629	19.4%
KRK016	551	583	32	5.8%
KRK017	284	288	4	1.4%
KRK018A	460	468	8	1.7%
KRK018B	1,132	1,261	129	11.4%
KRK019	587	597	10	1.7%
KRK020	2,171	2,543	372	17.1%
KRK021	795	836	41	5.2%
KRK022	1,413	1,493	80	5.7%
KRK023	377	384	7	1.9%
KRK024	278	307	29	10.4%
KRK025	1,594	1,490	-104	-6.5%
KRK026	602	735	133	22.1%
KRK027	232	246	14	6.0%
KRK028	1,674	1,605	-69	-4.1%
KRK029	1,297	1,383	86	6.6%
Total	33,636	35,523	1,887	5.6%

Table 4.2
Employment Forecast

Basin	2006	2022	Total Increase	% Increase
A	421	425	4	1.0%
B	1	1	0	0.0%
C	1,033	1,152	119	11.5%
ESI14058	2,293	2,425	132	5.8%
KRK001	544	592	48	8.8%
KRK002	227	251	24	10.6%
KRK004	10	10	0	0.0%
KRK005	1,114	1,136	22	2.0%
KRK006	449	496	47	10.5%
KRK007	188	231	43	22.9%
KRK008	766	1,046	280	36.6%
KRK009	812	1,299	487	60.0%
KRK010	2,142	2,162	20	0.9%
KRK011	2,307	2,513	206	8.9%
KRK012	3,413	3,506	93	2.7%
KRK013	2	2	0	0.0%
KRK015	785	941	156	19.9%
KRK016	143	146	3	2.1%
KRK017	0	0	0	0.0%
KRK018A	0	0	0	0.0%
KRK018B	1,373	1,529	156	11.4%
KRK019	3	5	2	66.7%
KRK020	650	655	5	0.8%
KRK021	221	225	4	1.8%
KRK022	399	366	-33	-8.3%
KRK023	620	426	-194	-31.3%
KRK024	42	57	15	35.7%
KRK025	262	268	6	2.3%
KRK026	19	26	7	36.8%
KRK027	76	76	0	0.0%
KRK028	2,130	2,339	209	9.8%
KRK029	905	1,211	306	33.8%
Total	23,350	25,517	2,167	9.3%

Future Growth Rates

As previously discussed, future population, household, and employment projections are based on data provided by the PSRC. It is not uncommon for actual growth rates to vary from those predicted. In addition, based on the availability of land use services, growth rates will vary between different parts of the City. Although these factors were considered in developing the information included within this Plan, it should be noted that the rates of future growth would likely vary from the Plan and between the adjoining jurisdictions. The average citywide yearly increase and total growth over the planning period is shown in the future growth rates **Table 4.3**.

Schools Forecasts

Similar to population and household data, the schools have been forecasted and the growth rates were included into the data. The forecast is based on the 2022 Comprehensive Land Use Plan. A summary of school growth rates are shown in **Table 4.3**.

Table 4.3 Future Growth Rates, 2007 to 2022		
	Compound Annual Growth Rate	Total Growth Percentage
Population	0.4%	5.6%
Employment	0.6%	9.3%
Schools	1.2%	20.0%

THIS PAGE INTENTIONALLY BLANK

INTRODUCTION

This chapter describes the City's telemetry system, existing facilities, collection and conveyance system, infiltration/inflow programs, and odor control facilities.

DESCRIPTION OF FACILITIES**General**

The City of Kirkland is a medium-size, primarily residential city, located on the east side of Lake Washington. It is bordered on the south by the City of Bellevue, to the east by the City of Redmond, and to the north by Northshore Utility District (NUD). The existing sewer service area boundary is located within the existing city limits.

The City's wastewater is treated by KCWTD's treatment plant in Renton, with deep-water disposal in Puget Sound. Some of this flow is delivered through the intermediary flow facilities of other utilities. Presently, wastewater is discharged to the KCWTD interceptor along the Burlington Northern and Santa Fe Railway (BNSF) at 32 locations within the city. There are also three discharge connections to NUD, and one to the City of Bellevue.

Presently, the City serves a 33,636 residential population and an additional employment population of 23,350 for a total of 56,986 people.

The City currently maintains approximately 116 miles of sewer main and six functioning lift stations. **Table 5.1**, Lift Station Information, includes data on the number and size of pumps, pump rates, design heads, motor electrical information, emergency power presence, types of stations, discharge main sizes and relevant invert elevations. There are approximately 11 miles of KCWTD gravity trunk sewers within the City.

Table 5.1
Lift Station Information

Name and/or Location	No. of Pumps	Pump Size (inch)	Pump Rate (gpm)	Design Head (feet)	Power (h.p.)	Speed (rpm)	Power (volts) (phase)	Emergency Power	Type of Station	Pump Manufacturer (Model No.)	FM Size (Inch)	Lowest Elevation	Discharge Elevation	Remarks
Lake Plaza Lift Station, 80 Kirkland Avenue	3	2 - 4" 1 - 6"	4" - 600 6" - 750	45	15	1770	3PH 460V	G	Dry, WW Lift	2 - PACO 1-WEMCO	8"	13.8'	52.2'	Lift station was replaced in 1997
Rose Point Lift Station, 20th Avenue W/10th Street W	2	2 - 6"	250	66	15	1750	3PH 230V	R/B	Dry, WW Lift	2-CRAME DEIMING	6"	20.3'	86.3'	
Yarrow Bay Lift Station, NE 37th Ct / 101st Way NE	2	2 - 4"	125	46	7.5	1200	3PH 460V	G	Dry, WW Lift	CORNELL	4"	17.4'	63.4'	
South Bay Lift Station, NE 38th Street/97th Avenue NE	2	2 - 4"	150	190	22	1760	3PH 460V	R	Dry, WW Lift	CORNELL	4"	28.8'	218.8'	3-day storage
Waverly Park Lift Station, Waverly Way/6th Street W	2	2 - 4"	331	71	19.6	1750	3PH 460V	G	Submersible Pump	HYDROMATIC	6"	18'	122.0'	Lift station is being replaced, scheduled for completion in 2007
Trend Lift Station, NE 112th Street/132nd Avenue NE	2	2 - 4"	120	25	7.5	1745	3PH 460V	R	Dry, WW Lift	CORNELL	4"	326.7'	351.7'	

The code on the emergency power is:
 "No" for no emergency power of hookup
 "G" for on-site generator
 "R" for Receptacle for a portable generator
 "B" for portable bypass pump hose connection

A station may have a combination of these items. Where capacities are given, they represent station capacities except where values are given for multiple pumps in which case this number represents individual pump capabilities.

Telemetry System

Successful operation of any municipal sewer system requires the collection and management of accurate sewage flow rate information. Comprehensive telemetry and control systems are the means by which the City obtains this information and then uses it to ensure maintenance needs are met. The City also uses the information collected by its telemetry system to estimate flow rates within its system and to identify potential capacity issues.

A Lift Station Study performed for the 1993 Sewer Comprehensive Plan recommended that the City should implement a new comprehensive telemetry and control system to reduce vulnerability to overflows. The City installed a RUGID and SCADA Frame-Relay-based Telemetry system, located at the City of Kirkland SCADA Telemetry Operations Room, with the RUGID system now being phased out in favor of the SCADA system. The switch to an all SCADA system is expected to be completed by 2009 with all Remote Terminal Units compatible with the new system being installed, on an ongoing basis, at all existing and new (if any) lift stations.

Lift Stations

Lift stations are used to convey wastewater from a lower elevation to a higher elevation through the use of pumps and pressurized force mains and are the most vulnerable component of a sewer system due to the use of mechanical equipment and its dependence on electrical power. Permanent lift stations are constructed when it is physically or financially infeasible to construct gravity sewers to serve the area. Several different lift station configurations can be used successfully to convey sewage.

The City of Kirkland has six sewage lift stations within its sanitary sewer system. Five of those stations have a wet well/dry well configuration in which the mechanical and electrical equipment is located underground in a sealed enclosure adjacent to a large manhole from which the wastewater is pumped. The remaining lift station consists of submersible pumps installed directly in the wet well. The lift station locations are shown in **Figure 7.1**.

In the stations with only two pumps, each pump is capable of handling the expected maximum flow for the station's design life. In the station with three pumps, the pumps are sized to handle the expected maximum flow with the largest pump out of service. In addition, the pumps must be capable of passing at least 3-inch diameter spheres. All of the City's lift stations have automated controls to operate the station and are monitored

at the City's central office by the telemetry system as described in the previous section.

In addition, the lift stations have been designed with consideration given to maintaining operation during a power outage. To accomplish this goal, stations without on-site generators each have a receptacle for connecting a portable generator. City crews monitor each station and respond accordingly, using the City's portable generator as needed.

LIFT STATION IMPROVEMENTS COMPLETED SINCE 1993 PLAN

Improvements to individual lift stations since the 1993 Plan are as follows:

Lake Plaza Lift Station Replacement

The new Lake Plaza Lift Station was constructed in 1997. This station replaced the old Lake Plaza Station and resulted in the elimination of the Lake Avenue Lift Station through the lowering of inverts at the new station and providing a new trunk sewer line between Lake Avenue West and the new Lake Plaza Station. The new lift station was sized for anticipated build-out conditions within the tributary basins.

Waverly Park Lift Station Replacement

The existing lift station was nearing the end of its design life and was targeted for replacement in the City's Lift Station Study. Construction of the new lift station, which is compatible with the park site was completed in May 2007. The new station has been sized to pump the anticipated build-out conditions within the tributary basins.

10th Avenue South Lift Station Elimination

In 1994, the Phase I - Lake Street Sewer Main was replaced with a new main with lowered pipe invert elevations and in 1996 the Phase II - Lake Washington Boulevard Sewer Main Replacement Project continued the lowered invert elevations, which resulted in the elimination of the 10th Avenue South Lift Station.

Juanita Lift Station Elimination

The Juanita Lift Station was removed from service through the construction of approximately 2,300 lineal feet of 18-inch diameter gravity interceptor sewer along 98th Avenue NE. After the station was removed from service, the existing above-grade facilities were removed

and the below-grade facilities were abandoned in place and the site was restored to be consistent with the surrounding wetlands.

Lake Avenue West Lift Station Elimination

The Lake Avenue West Lift Station was removed from service after the Lake Avenue West trunk line was constructed to route flow to the new Lake Plaza lift station. Construction of the trunk line and the elimination of the lift station were completed in 2000.

Rose Hill Lift Station Elimination

The 128th Avenue NE trunk line was extended across NE 85th Street in 1993 allowing the lift station to be removed from service.

Rose Point Lift Station Improvements

An electrical connection for an emergency power source was installed at the existing lift station. This point of connection allows the City's portable generator to be readily used on an as-needed basis.

NE 90th Street Lift Station Elimination

This lift station was removed from service in 2003 through coordination with a development action and City efforts in the installation of approximately 2,100 lineal feet of 12-inch diameter polyvinyl chloride (PVC) sewer along Slater Avenue NE from NE 97th Street to the intersection of NE 90th Street and 120th Avenue NE.

South Bay Lift Station

This lift station was installed through new development activity. It was completed as part of the privately developed Southbay Park Short Plat, and turned over to the City in 2001.

Yarrow Bay Lift Station

This lift station was installed through new development activity. It was completed as part of the privately developed Yarrow Bay Village, and turned over to the City in 2004.

COLLECTION AND CONVEYANCE SYSTEM

The purpose of a sanitary sewer system is to convey wastewater from its source to a point of treatment. The City uses two methods for conveying sewage: by gravity flow or by pressure main. The City's gravity sewer system is made up of collector sewers, which collect wastewater from the various sources. These collector sewers convey the wastewater to interceptor sewers, which then transport the sewage to lift stations, adjacent jurisdictional facilities, or King County facilities. The lift stations pump the sewage through pressurized force mains to other interceptors, adjacent jurisdictional facilities, or King County facilities. The adjacent jurisdictional or King County facilities then transport the sewage to the KCWTD's South Treatment Plant in Renton.

The sanitary sewer system must be capable of transporting all of the constituents of the wastewater stream, which include suspended solids, floatable solids and liquids. In general, most of the floatable materials are carried along with the flow stream; however, suspended solids may settle out of the waste stream if velocities are too low. In order to avoid settlement issues, minimum sewage velocities of 2.5 feet per second should be maintained within the pipes.

The City's existing sewer service area consists of 32 wastewater collection subbasins based on King County flow data studies. The subbasins have been combined into nine service basins with approximately 114 miles of sewer pipe, 1.2 miles of force mains, six sewage lift stations and approximately 3,000 manholes. Wastewater is discharged to Bellevue, NUD, and to the King County interceptor along the BNSF at 32 locations within the City. The existing sanitary sewer system basins are shown on **Figure 2.3, Drainage Basins**.

The City of Kirkland's sewer system contains a variety of pipe sizes and pipe materials. The existing sewer system is summarized in **Table 5.2**. This table gives lengths of each size of pipe for gravity and force main lines. The majority of pipe in the City is 8-inch pipe, which is consistent with the Department of Ecology criteria for minimum sanitary sewer sizing.

Pipe Size	City of Kirkland Gravity System (feet)	City of Kirkland Force Main (feet)	KCWTD Gravity System (feet)
4	-	2,157	-
6	64,676	3,113	-
8	465,647	1,177	26
10	16,265	-	-
12	25,541	-	-
14	-	-	3,281
15	11,135	-	1,333
16	28	-	-
18	8,612	-	9,981
20	1,344	-	-
21	8,786	-	46
24	2,107	-	9,830
30	-	-	2537
36	306	-	-
48	-	-	2,544
72	-	-	11,321
78	-	-	1,869
84	-	-	13,177
Unknown	-	-	63
Total	604,447	6,447	56,009

Approximately 8% of the sewer system is more than 55 years old. For the most part, the older system is located along the lake front and in central Kirkland. The majority of these aging pipes have no gaskets and are made of concrete. A smaller number are made of asbestos concrete and vitrified clay. **Table 5.3** summarizes pipe age in 10-year increments. Interviews with City maintenance staff verified that areas with pre-1950 pipe have numerous structural deficiencies, such as cracked and broken pipes and root intrusion. These structural deficiencies require frequent maintenance and contribute significant I/I.

Table 5.3
Summary of Sewer Pipe Ages

Year Range	Pipe Length (feet)	Percent of System
Pre-1950	47,384	7.8
1951-1960	7,095	1.2
1961-1970	94,126	15.4
1971-1980	101,732	16.6
1981-1990	88,620	14.5
1990-2000	96,677	15.8
2000-Present	47,494	7.8
Unknown	127,762	20.9

Force mains are defined as pressure sewers joining the pump discharge at a lift station with a point of gravity flow. Force mains are designed to provide a minimum velocity of at least 2 feet per second in order to be self-cleaning. Also, in order to avoid high friction losses and consequent waste of energy, velocity should not exceed 8 feet per second. Minimum pipe size should not be less than 4 inches in diameter in order to allow passage of a 3-inch diameter solid.

GRAVITY SEWER IMPROVEMENTS COMPLETED SINCE 1993 PLAN

The City has completed several public works contracts that improve the reliability and increase the capacity of its sewer system. The following paragraphs describe these projects and are organized by their respective basins. System-wide improvements include the purchase of a video inspection truck for use in the City's on-going Pipeline Improvement Program.

Drainage Basin 1

None

Drainage Basin 2

NE 104th Street Sewer Extension

Approximately 700 lineal feet of new 12-inch diameter pipe was installed as a part of the City's Emergency Sewer Program in 2003.

NE 100th Street Sewer Extension

Approximately 1,000 lineal feet of new 12-inch diameter pipe was installed as a part of the City's Emergency Sewer Program in 2003.

Drainage Basin 3

Maplewood Lane/111th Avenue NE Sewer Extension

An 8-inch PVC main was installed with a minimum slope of 0.010 and a max slope of 0.0338 – two new manholes with its tie-in at an existing manhole just north of NE 116th Street

NE 80th Street Trunk Line Replacement (Phase 1)

Approximately 3,000 lineal feet of existing pipe from was replaced or rehabilitated with 10- to 12-inch diameter pipe. Construction began in 2007 and is scheduled to be completed in 2008/2009.

126th Avenue NE Sewer Extension

Approximately 1,300 lineal feet of new 12-inch diameter pipe was installed as a part of the City's Emergency Sewer Program in 2001.

Drainage Basin 4

NE 112th Street Sewer Extension

Approximately 1,000 feet of 8-inch diameter pipe was placed. Construction was completed in 1997.

Drainage Basin 5

Lake Street Trunk Line Replacement

Approximately 3,000 lineal feet of existing 12-inch diameter concrete pipe from 10th Avenue S to the Lake Plaza Lift Station was replaced with 21-inch diameter PVC pipe. This trunk sewer intercepted flows going to the

10th Avenue Lift Station, allowing it to be removed from service. Construction was completed in 1994.

Lake Avenue West Trunk Line Replacement

This project was completed in 2000 and included the replacement of approximately 2,000 lineal feet of 12-inch diameter pipe that was in poor condition with new 12-inch diameter PVC pipe.

Lake Shore Plaza Sewer Line

This project was completed in 1994 as a part of the Lake Street Trunk Line Replacement, as previously described.

Waverly Way Sanitary Sewer Replacement

Approximately 4,000 linear feet of existing 10-inch diameter concrete sewer was replaced with 15-inch diameter PVC pipe. Construction was completed in 2001.

Central Way West Trunk Line Replacement

Approximately 1,800 lineal feet of existing pipe from Market Street to the KCWTD lift station was replaced with 21-inch to 36-inch diameter pipe. Construction was completed in 2006.

7th Street West Sewer Line Replacement/Rehabilitation

Approximately 2,100 lineal feet of existing pipe from 17th Avenue W to 6th Street W was replaced or rehabilitated with 10- to 12-inch diameter pipe. Construction was completed in 2005.

Market Street Trunk Line Replacement/Rehabilitation

Approximately 4,000 lineal feet of existing pipe from 15th Avenue to Central Way will be replaced with 8- to 10-inch diameter PVC pipe. Design efforts started in 2007 with construction beginning in 2007. The project will be completed in 2009.

Central Way East Trunk Line Replacement

Approximately 1,600 lineal feet of existing pipe from 3rd Street to 5th Street was replaced with 12- to 21-inch diameter pipe. Construction was completed in 2006.

Lake Front Trunk Line Replacement/Rehabilitation

Approximately 4,100 lineal feet of existing pipe along the Lake Washington lake front from approximately 4th Street W to 18th Avenue W was replaced or rehabilitated with 12-inch diameter PVC pipe. Construction was completed in 1999.

Lake Washington Boulevard Trunk Line Replacement

Approximately 3,800 lineal feet of the existing trunk line from approximately 4th Street W to 18th Avenue W was replaced with 12- to 21-inch diameter PVC pipe. Construction was completed in 1996.

North Lake Avenue W Trunk Line Replacement/Rehabilitation

Approximately 1,000 lineal feet of the existing trunk line was replaced with 12-inch diameter pipe. Construction was completed in 2000.

Drainage Basin 6***NE 70th Street Sewer Improvements***

Approximately 3,000 lineal feet of existing pipe from was replaced with 12-inch diameter pipe. Construction was completed in 1993.

KCWTD FACILITIES

KCWTD owns, operates, and maintains sewage disposal facilities within the City of Kirkland. These facilities include three sewage pumping stations and the KCWTD 72-inch interceptor. The Kirkland sanitary sewer system discharges wastewater to the KCWTD sewer interceptor at 32 locations. The KCWTD interceptor is located within the Burlington Northern Santa Fe Railroad (BNSFRR) right-of-way. The wastewater flow rate into each of these connections varies considerably, depending on the area served by the particular collection system.

KCWTD's Kirkland Lift Station serves the Basin 5, currently the largest basin within the City. The lift station is located near the intersection of 3rd Street and Park Lane. KCWTD's Yarrow Bay Lift Station serves the Lake Washington Boulevard basin, which is located adjacent to Lake Washington Boulevard near Yarrow Bay. KCWTD replaced the Juanita Lift Station in 2004 with 2,300 feet of 18-inch gravity interceptor sewer. Since the last Plan, KCWTD has also completed the York force main, which connects the interceptor from its end point near NE 116th Street along the BNSF right-of-way to Willows Road in Redmond and the KCWTD York Pump Station.

INFILTRATION AND INFLOW

Background

A portion of the flow in any sanitary sewer system consists of I/I. Infiltration is attributed to groundwater entering into the sewer system and inflow is storm water flowing directly into the system as the result of a “storm incident” or illegal connections such as a direct connection of storm sewers, downspouts or foundation drains. Infiltration can enter the system through leaking pipe joints, structural cracks or other physical defects.

Prior to 1962, stormwater drains were commonly connected to the sewer system. In addition, older pipes typically did not have joints with gaskets. Consequently, the system suffers from excessive I/I. Infiltration and inflow increases the volume of flow a sewer system must convey, causing facilities to be sized larger than necessary. Infiltration and Inflow also increases the cost of treating the wastewater at KCWTD facilities, a cost which is assessed according to the volume of wastewater. If I/I can be located and reduced, the size and cost of improvements and operations and maintenance may also be reduced.

In the City of Kirkland’s sewer system, excessive I/I has caused collection system failures, permit violations, and is indirectly affecting the available capacity of KCWTD’s treatment plant in Renton.

King County Regional I/I Study

The City of Kirkland participated in a study being conducted by King County to address the I/I issue. The Regional Wastewater Services Plan (RWSP) identified four steps to achieve its goal:

- Meter and identify I/I in the overall system
- Conduct pilot I/I control projects in order to identify cost-effective I/I removal techniques in this region
- Evaluate financial options and solutions
- Ultimately design a long-term control program for the local agencies and King County

King County uses six methods to identify and meter I/I in the system. Smoke testing utilizes a smoke bomb that is dropped in a sanitary sewer pipe. The area can then be monitored for any smoke that appears. Broken pipes, leaky manhole covers, connected catch basins or connection of roof and foundation drains may be detected. Dye testing uses a flourizine dye to look for inappropriate connections. The dye can be introduced to a

catch basin to see if it appears in a sanitary sewer downstream. TV inspection uses a small camera to find root intrusion breaks or water infiltration. Observation detects I/I by noting where backups occur in the system at manholes, homes, businesses or treatment facilities.

The County's flow monitoring program used over 800 flow meters to measure flows throughout the County. The flow meters monitor depth of flow from an ultrasonic depth meter mounted at the crown of the pipe and from a pressure sensor mounted at the bottom. The velocity of the flow is measured using Doppler Peak Velocity technology, which uses a shift in the frequency of the returning ultrasonic sound to determine the speed of the water. Early flow monitoring data between late 2000 and early 2001 was considered unrepresentative because of drought conditions which lowered the groundwater table and therefore reduced I/I to the system. Consequently, King County performed additional flow monitoring from late 2001 to early 2002. This effort proved more productive as data from several storms was captured.

Rainfall in the region was also monitored by King County. The system (CALAMAR) used a combination of 73 rain gauges throughout the region, as well as the National Weather Service radar, to generate rainfall quantities to an accuracy of +/- 10%. The combination of knowing the measured amount of rain that fell and the monitored flow in the region allows for the detection of I/I, as well as keeping track of the effectiveness of I/I projects in a particular area.

Wastewater Quality

The quality of wastewater transported in the Kirkland sanitary sewer system varies considerably depending on the wastewater source, detention time within the sewer system and the volume of I/I. This section discusses the two major wastewater quality problems within the City's sewer system: grease and hydrogen sulfide. Recommendations on measures to control or eliminate these issues are also provided.

Domestic Wastewater Quality

The quality of domestic wastewater varies and is a direct result of the type of water used within the home. One household appliance, the garbage disposal, can greatly impact the quality of wastewater and most new homes have them installed. The use of garbage disposals increases the amount of suspended solids and the biochemical oxygen demand (BOD) of the sewage, two common factors tested for when measuring contaminant concentrations. A second major determinant of quality of wastewater is the volume of I/I into the sewer system. High rates of I/I tend to dilute the contaminant concentration of the wastewater.

Grease Problems and Recommendations

Grease is usually a component of the wastewater generated by food processing operations, the majority of which are restaurants. Grease clings to the sides of pipe, reducing the capacity of pipes and creating maintenance problems. Sections of the Kirkland sewer system that are downstream of restaurants suffer from accumulated grease. The numerous locations where significant accumulations of grease occur frequently are illustrated in **Figure 5.1**. To reduce accumulations of grease, the City adopted Ordinance 3778 in 2001, which requires the installation and maintenance of grease traps in all restaurant and food processing type facilities.

Hydrogen Sulfide

Hydrogen sulfide is generated as sewage ages. Hydrogen sulfide is produced by anaerobic bacterial reduction of the sulfate ions. Hydrogen sulfide poses three serious problems: it is highly corrosive, has an obnoxious odor, and as a gas is toxic to humans and has been known to cause death to sewer maintenance workers. The production of hydrogen sulfide is directly related to the BOD and the age of the wastewater. Wastewater exhibiting a high BOD will tend to generate more hydrogen sulfide than wastewater exhibiting a lower BOD; therefore, excessive I/I will tend to reduce the production of hydrogen sulfide in the wastewater by diluting the BOD and increasing flow rates.

Hydrogen sulfide is very corrosive to both sewers and pumping facilities. It is the primary cause of the poor structural conditions of the pre-1950 pipelines. Hydrogen sulfide released from the wastewater will tend to dissolve in condensation. The hydrogen sulfide retained in the condensation is converted to sulfuric acid through oxidation by aerobic bacteria. The sulfuric acid then reacts with the cement bonding material within concrete pipes, or iron within steel pipes, and may corrode a pipe to the point of structural failure. The crowns of sanitary sewer pipes are most susceptible to this type of corrosion since that is where most condensation occurs. Manholes are also susceptible due to condensation on their walls.

Figure 5.1
Frequent Grease Accumulation Locations

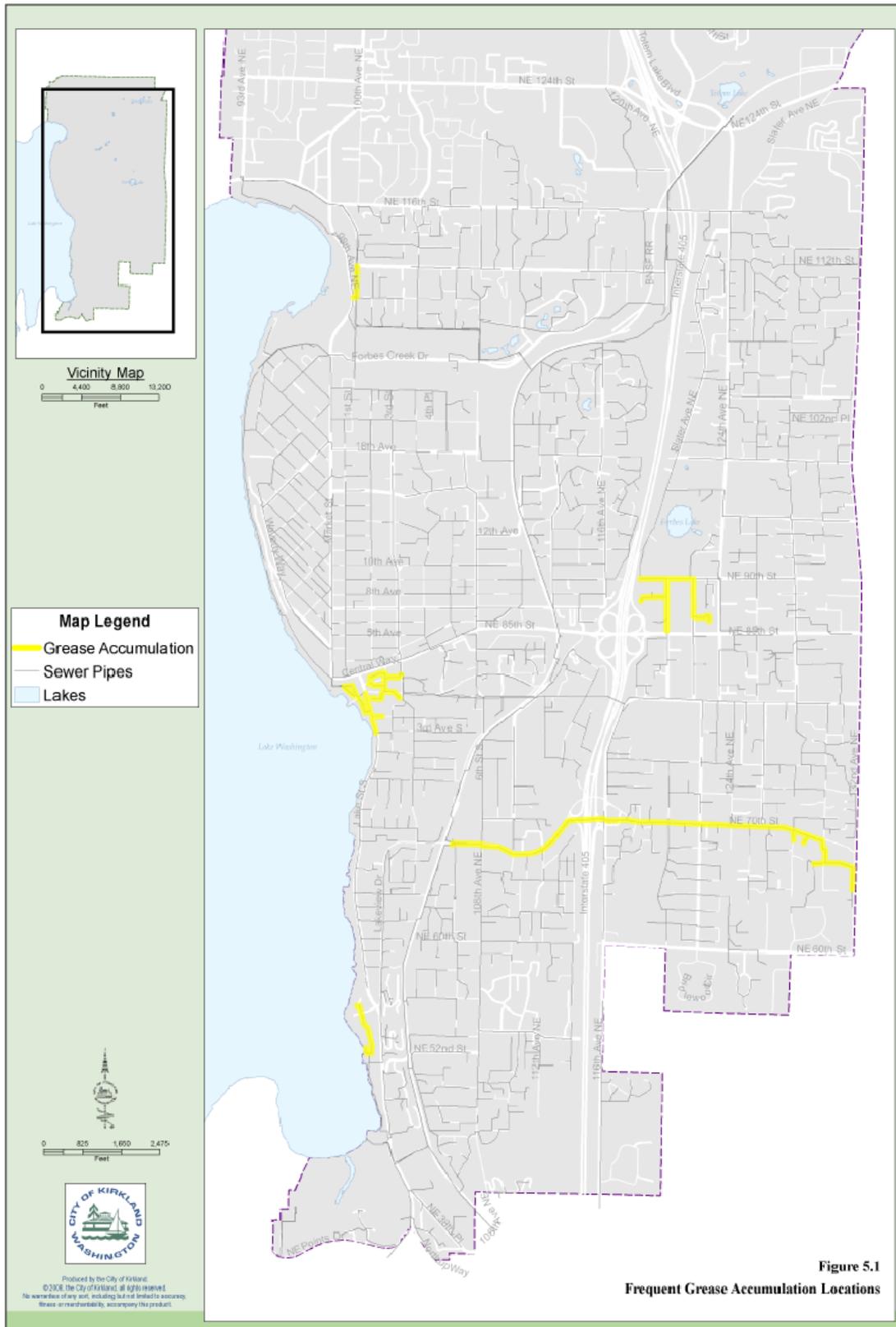


Figure 5.1
Frequent Grease Accumulation Locations

THIS PAGE INTENTIONALLY BLANK

Hydrogen sulfide buildup can be controlled by aeration and periodic cleaning. Its impact to the sewer system may also be mitigated by using corrosion resistant pipe materials such as PVC. If excessive hydrogen sulfide production is evident at a lift station, aeration of the wet well should be considered to reduce the anaerobic bacteria. Periodic cleaning of the sanitary sewers will also remove the biological slime that forms on the pipe walls and produces the hydrogen sulfide. To battle the corrosive effects of hydrogen sulfide, corrosion resistant pipe materials, such as PVC, or high density polyethylene (HDPE), should replace corrosion vulnerable pipe materials such as concrete. Existing pipes experiencing severe corrosion can be rehabilitated through the use of various slip liners or fiberglass resin liners.

In order to control the generation of hydrogen sulfide, maintenance crews should routinely flush and clean sewer pipes with inadequate slopes. See **Chapter 9, Maintenance and Operations Program**, for specific cleaning recommendations.

THIS PAGE INTENTIONALLY BLANK

INTRODUCTION

A thorough hydraulic analysis of the sewage system facilities is an integral part of the comprehensive planning process. This chapter provides an understanding of how the City's system was analyzed. The chapter concludes with a listing of system deficiencies found for existing and future conditions.

The purpose of the hydraulic analysis is to evaluate the ability of the existing system to effectively transport wastewater through the City to adjacent jurisdictions' sewer systems in accordance with the City's Goals and Policies, as described in Chapter 3. The results of this analysis are then used to identify deficiencies in the existing system, as well as improvements required to resolve those deficiencies. The analysis was performed for current flow conditions as well as flow conditions anticipated in 20 years. The hydraulic analysis was used to identify projects included in the Capital Facilities Plan (Chapter 7).

MODEL DEVELOPMENT

An Excel spreadsheet analysis was performed using population data and flow monitoring data to estimate per capita flow rates as well as peak flows and I/I at each basin outlet under current conditions. The results of this analysis were then used to predict future flows. The hydraulic capacity of the system was evaluated using Excel spreadsheets and Manning's equation for current and future flow conditions to identify capacity problems and to evaluate proposed solutions to those capacity problems. Proposed solutions included increased pipe sizes and pump station upgrades.

During the winter of 2000/2001 and 2001/2002, the King County Department of Natural Resources Wastewater Treatment Division collected significant amounts of flow monitoring data as part of its Regional I/I Control Program. The data collected by King County and referenced in its Wet Weather Technical Memorandum dated June 2002 was used to perform a basin analysis for the City of Kirkland. The flow monitoring data was incorporated into the analysis and adjusted to the Year 2007 to reflect actual approximate conditions within the existing sanitary sewer system. Results of this analysis were then used to predict future flows as described later in this chapter.

BASIN FLOW ANALYSIS

Overview

King County's I/I program identified six model basins for the Kirkland sewer service area. These model basins were further subdivided into mini-basins based on existing topography and the conveyance patterns of the existing sewerage system. The mini-basins vary in size and span the entire City and are distributed throughout the City. As part of its 2000/2001 and 2001/2002 flow monitoring efforts, King County gathered flow data from the outlet point of each mini-basin.

The County's mini-basin boundaries were modified as needed to more accurately represent the City's current service area. These modifications included adjusting boundaries to exclude non-developable areas and to more accurately represent the specific pipes within the system. Additionally, Mini-basin KRK018 was divided into two mini-basins (KRK018A and KRK018B), since the City of Kirkland constructed new sanitary sewers after the flow-monitoring period, which re-routed approximately 75% of the area in Mini-basin KRK018 to Mini-basin KRK015. In addition, three small drainage areas (Mini-basins "A", "B", and "C") that were not included in King County's I/I study were identified and delineated. Piping within Mini-basins A and B drains to facilities owned by the City of Bellevue and Mini-basin C drains to facilities owned by Northshore Utility District. King County did not monitor flows in Mini-basins A, B, or C as part of its study.

The flow monitoring data was used in conjunction with the current and future population data described in Chapter 4 to determine per capita flow rates and I/I parameters within the City. Because the flow monitoring data was collected in 2000/2001 and 2001/2002, the current population data contained in Chapter 4 was reduced to reflect assumed conditions in 2000, 2001, and 2002, to correlate sanitary sewer flow rates and I/I. The data was then adjusted to represent 2007 conditions and assigned to each sewer mini-basin. Sanitary sewage flow rates and I/I were adjusted forward for the projected 2022 scenario. The population was not carried out to 2027 due to the City predicting an ultimate buildout to be reached by 2022.

The conveyance analysis relied upon sanitary sewer system data contained within the City of Kirkland's GIS system. This database contains information on the pipe diameters, lengths, functions (gravity or force main) materials, ownership (City or King County) and installation year. The manhole data includes the depth from rim to invert and the diameter of each manhole. Pipe invert elevations or manhole rim elevations were not identified. This information was used to evaluate the pipes for existing or future capacity issues as discussed later in this chapter.

Sanitary Flows

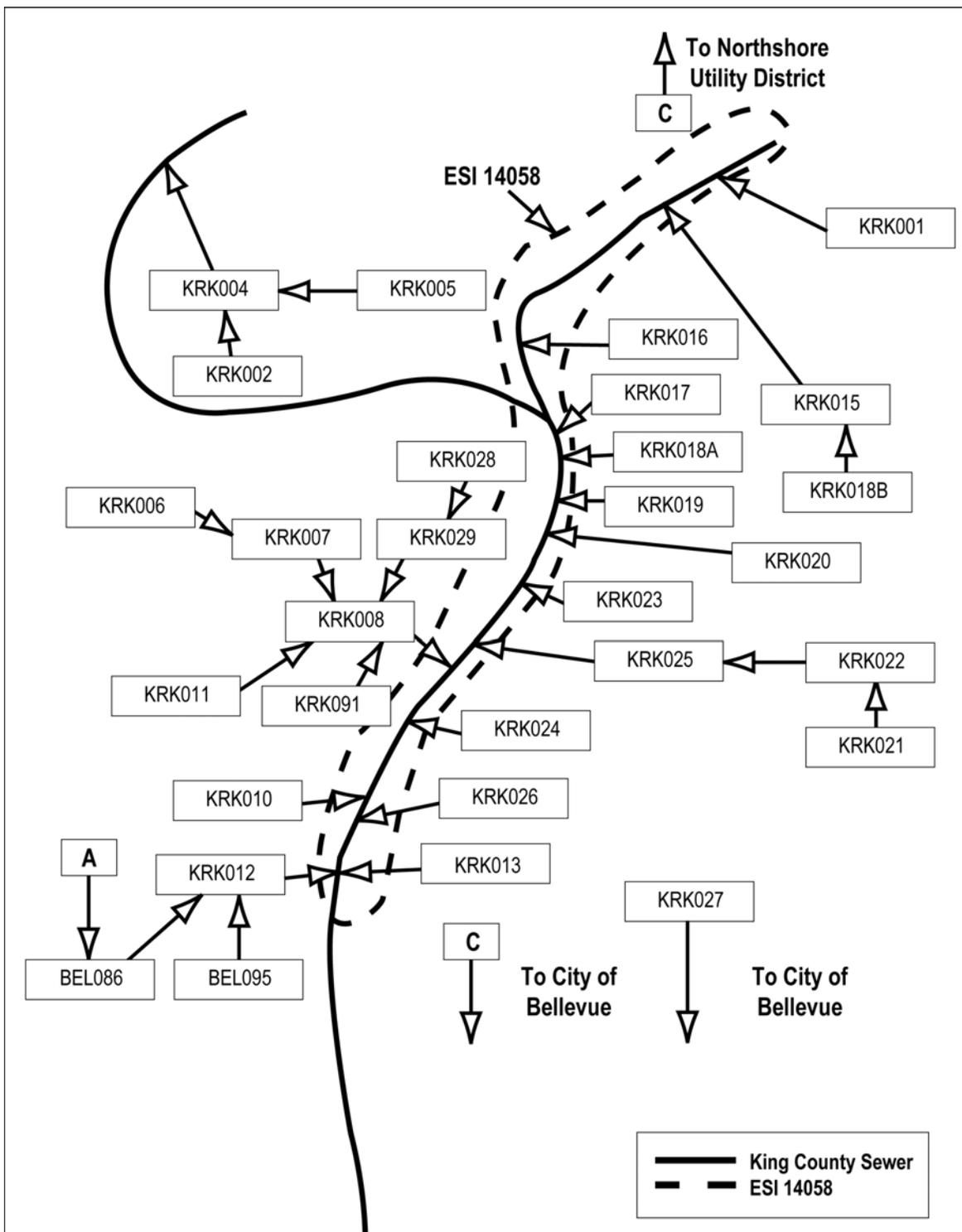
The flow analysis divided the data into sanitary flows and I/I flows in order to allow future developments to more accurately identify their flow contributions to the overall system. The sanitary flows were determined using dry day flows for each mini-basin. A dry day is defined as a day during which prior rains have minimal influence on the flow per King County's regional I/I study. Dry day flows are comprised of two components; sanitary flow and base I/I. Sanitary flow is wastewater that has been generated by the ratepayers of the City. Base I/I is related to groundwater that enters the system and is generally present, even on dry days. Base I/I remains relatively steady over weeks and months.

Dry weather flow data from the 2000-2001 flow monitoring season was generally used to determine the total average sanitary sewage flows for each mini-basin. King County identified the specific days that met their criteria for "dry days" in their Wet Weather Flow Monitoring Technical Memorandum. These dry days included November 3rd, 13th, 14th, 15th, 16th, 17th, 20th, 21st, and 22nd in 2000. These are all weekdays. Weekend flows were not used in the analysis.

The raw dry weather data supplied by King County for those days was converted into gallons per minute (gpm) and the respective 15-minute time intervals for each day were averaged to develop an average dry weather flow day. The resultant diurnal curve was further smoothed by converting the average 15-minute interval data to 30 minute interval data by averaging the flows from the preceding and proceeding 15-minute time interval. Flows from any upstream mini-basins were also subtracted during this process to provide net flows for the subject mini-basin. **Figure 6.1** is a schematic drawing that shows how the mini-basins relate to each other for purposes of subtracting the upstream flows. As part of the subtraction process, the flows from upstream mini-basins were shifted forward in time, as necessary, to account for travel times from one mini-basin to the next.

The base I/I was then calculated for the average weekday flows using a formula supplied by King County as part of its I/I study. The base flows were subtracted from the total measured flows to obtain the isolated sanitary flow, in 30-minute time-steps. These flows were then graphed and the peak sanitary flow rates for each mini-basin were determined, using a peaking factor of 2.0, which is consistent with King County's methodology.

Figure 6.1
Sewer System Mini-basin Schematic



Population Assignment

Once the average dry day flows were calculated for each mini-basin, per capita flow rates were computed for residential, employment and school categories based on the population data contained in Chapter 4. The per capita flow rates were determined through an iterative process of assuming per capita flow rates for each population category; multiplying the assumed rates by their respective populations; then summing the results for comparison with the measured flows. The assumed per capita flow rates were then adjusted as needed until the computed flows closely matched the actual measured flows.

For the employment category, typical sanitary flows were assumed to be approximately 10 gallons per capita per day (gpcd). Schools were assumed to be about 7 to 10 gpcd per Table 2-4 of Wastewater Engineering by Metcalf and Eddy (1991). These numbers were applied to the respective populations to determine the daily flow contribution from those sources. In a few circumstances, these per capita flow rates were increased slightly, but this only occurred where additional information was available regarding higher demands for these categories.

The daily sanitary flow contribution for employment and schools was then subtracted from the total daily sanitary flow and the remaining balance was divided by the residential population in that mini-basin. The results were then compared to other basins with similar zoning and development criteria. Typical values for sanitary flows from residential development are usually in the range of 60 to 100 gpcd. If the computed values were outside this range or significantly different from similar mini-basins, then the per capita flow rates for schools and employment were adjusted and the process repeated until reasonable values were determined.

In some circumstances, shifts in the population from one basin to an adjacent basin were required in order to achieve consistent results within reasonable ranges. These population shifts were kept consistent with the population data contained in Chapter 4. In order to maintain consistency, these population shifts were carried forward to the 2007 and 2027 population assignments. Based on discussions with City staff, the 2027 growth projections are the same as 2022 because it is assumed the City would reach buildout by 2022. The per capita flow rates determined for the 2000-2001 conditions in each mini-basin were then applied to the 2007 populations and the projected 2027 populations to determine the future mini-basin dry day flows. **Table 6.1** and **Table 6.2** show the results of the sanitary sewer analysis.

Table 6-1 Current Conditions (2007) Per Capita Flow Rates (Sanitary Flow Only)

Model Basin	Residential					Employment					Education					Total Daily Flow (gpd)	Peaking Factor	Peak Flow (gpm)
	Mini Basin	Population	Per Capita Flow (gpd)	Daily Flow (gpd)	Weighted Per Capita Flow (gpd)	Population	Per Capita Flow (gpd)	Daily Flow (gpd)	Weighted Per Capita Flow (gpd)	Population	Per Capita Flow (gpd)	Daily Flow (gpd)	Weighted Per Capita Flow (gpd)					
M_ESI1405	ESI14058	2,312	100	231,200		2,293	10	22,930		0	0	0		254,130	2.0	353		
	KRK013	208	96	19,889		2	10	20		0	0	0		19,909	2.0	28		
	KRK016	1,451	74	107,457		243	10	2,430		0	0	0		109,887	2.0	153		
	KRK017	334	107	35,893		0	0	0		0	0	0		35,893	2.0	50		
	KRK018A	410	60	24,530		0	0	0		0	0	0		24,530	2.0	34		
	KRK018B	832	60	49,779		1,373	5	6,865		0	0	0		56,644	2.0	79		
	KRK019	1,487	70	104,251	85.50	103	10	1,030	9.80	0	0	0		105,281	2.0	146		
	KRK020	2,171	70	151,482		650	10	6,500		1,851	8	13,883	8.64	171,865	2.0	239		
	KRK021	495	75	37,330		221	10	2,210		487	8	3,653		43,192	2.0	60		
	KRK022	1,413	67	94,222		399	10	3,990		0	0	0		98,212	2.0	136		
M_KRK001	KRK023	677	94	63,328		620	10	6,200		0	0	0		69,528	2.0	97		
	KRK024	278	70	19,409		42	10	420		0	0	0		19,829	2.0	28		
	KRK025	1,594	109	173,921		262	30	7,860		1,782	10	17,820		199,601	2.0	277		
	KRK026	902	147	132,556		19	30	570		188	10	1,880		135,006	2.0	188		
	KRK027	232	74	17,140	73.88	76	10	760	10.00	0	0	0	0.00	17,900	2.0	25		
M_KRK001	KRK001	1,990	94	186,121	81.87	644	10	6,440	7.85	0	0	0	5.00	192,561	2.0	267		
	KRK015	1,040	60	61,957		485	5	2,425		540	5	2,700		67,082	2.0	93		
M_KRK004	KRK002	933	67	62,856	81.31	227	8	1,703	17.83	500	5	2,500	7.10	67,059	2.0	93		
	KRK004	1,786	75	133,504		10	10	100		0	0	0		133,604	2.0	186		
	KRK005	1,489	98	145,801		1,114	20	22,280		361	10	3,610		171,691	2.0	238		
M_KRK008	KRK006	1,143	61	69,597		449	5	2,245		0	0	0		71,842	2.0	100		
	KRK007	954	78	74,100		188	10	1,880		0	0	0		75,980	2.0	106		
	KRK008	1,680	99	166,866		766	30	22,980		0	0	0		189,846	2.0	264		
	KRK009	916	65	59,268	83.39	812	5	4,060	19.23	0	0	0	10.00	63,328	2.0	88		
	KRK011	2,035	70	141,652		2,307	10	23,070		367	10	3,670		168,392	2.0	234		
	KRK028	1,674	96	161,111		2,130	30	63,900		495	10	4,950		229,961	2.0	319		
	KRK029	1,697	100	169,512		905	30	27,150		0	0	0		196,662	2.0	273		
	M_KRK010	KRK010	1,090	91	99,294	92.36	2,142	20	42,840	14.61	0	0	0	0.00	142,134	2.0	197	
		KRK012	180	100	18,000		3,413	11	38,308		0	0	0		56,308	2.0	78	
Other	A	130	100	13,000	N/A	421	10	4,210	N/A	0	0	0	N/A	17,210	2.0	24		
	B	78	100	7,800		1	10	10		0	0	0		7,810	2.0	11		
	C	25	100	2,500		1,033	10	10,330		0	0	0		12,830	2.0	18		

Table 6-2 Future Conditions (2027) Per Capita Flow Rates (Sanitary Flow Only)

Model Basin	Residential			Employment			Education			Total Daily Flow (gpd)	Peaking Factor	Peak Flow Rate (gpm)			
	Population	Per Capita Flow rate (gpd)	Daily Flow (gpd)	Weighted Per Capita Flow rate (gpd)	Population	Per Capita Flow rate (gpd)	Daily Flow (gpd)	Weighted Per Capita Flow rate (gpd)	Population				Per Capita Flow rate (gpd)	Daily Flow (gpd)	Weighted Per Capita Flow rate (gpd)
M_ES11405	ES114058	2,499	100	249,900		2,425	10	24,250		0	0		274,150	2.0	381
	KRK013	242	96	23,140		2	10	20		0	0		23,160	2.0	32
	KRK016	1,483	74	109,827		246	10	2,460		0	0		112,287	2.0	156
	KRK017	338	107	36,323		0	0	0		0	0		36,323	2.0	50
	KRK018A	418	60	25,009		0	0	0		0	0		25,009	2.0	35
	KRK018B	961	60	57,497		1,529	5	7,645		0	0		65,142	2.0	90
	KRK019	1,497	70	104,952	85.12	105	10	1,050	9.72	0	0	7.80	106,002	2.0	147
	KRK020	2,543	70	177,439		655	10	6,550		2,163	8	16,223	200,211	2.0	278
	KRK021	536	75	40,422		225	10	2,250		602	8	4,515	47,187	2.0	66
	KRK022	1,493	67	99,557		366	10	3,660		0	0	0	103,217	2.0	143
	KRK023	384	94	35,920		426	10	4,260		0	0	0	40,180	2.0	56
	KRK024	307	70	21,434		57	10	570		0	0	0	22,004	2.0	31
	KRK025	1,490	109	162,573		268	30	8,040		372	10	3,720	174,333	2.0	242
	KRK026	1,035	147	152,102		26	30	780		0	10	0	152,882	2.0	212
M_ES19032	KRK027	246	74	18,174	73.88	76	10	760	10.00	0	0	0.00	18,934	2.0	26
M_KRK001	KRK001	2,062	94	192,855	78.34	592	10	5,920	7.40	0	0	5.00	198,775	2.0	276
	KRK015	1,669	60	99,430		641	5	3,205		859	5	4,295	106,930	2.0	149
M_KRK004	KRK002	1,299	67	87,514		251	8	1,883		624	5	3,120	92,516	2.0	128
	KRK004	1,881	75	140,605	80.68	10	10	100	17.68	0	0	7.44	140,705	2.0	195
	KRK005	1,649	98	161,468		1,136	20	22,720		596	10	5,960	190,148	2.0	264
	KRK006	1,126	61	68,562		496	5	2,480		0	0	0	71,042	2.0	99
	KRK007	938	78	72,857		231	10	2,310		0	0	0	75,167	2.0	104
M_KRK008	KRK008	1,681	99	166,965		1,046	30	31,380		0	0	0	198,345	2.0	275
	KRK009	1,021	65	66,062	83.34	1,299	5	6,495	19.08	0	0	10.00	72,557	2.0	101
	KRK011	1,997	70	139,007		2,513	10	25,130		540	10	5,400	169,537	2.0	235
	KRK028	1,605	96	154,470		2,339	30	70,170		0	10	0	224,640	2.0	312
	KRK029	1,783	100	178,103		1,211	30	36,330		0	0	0	214,433	2.0	298
	KRK010	1,022	91	93,099	92.11	2,162	20	43,240	14.57	0	0	0	136,339	2.0	189
KRK012	132	100	13,200		3,506	11	39,352		0	0	0	52,552	2.0	73	
Other	A	115	100	11,500	N/A	425	10	4,250		0	0	0	15,750	2.0	22
	B	84	100	8,400		1	10	10		0	0	N/A	8,410	2.0	12
	C	87	100	8,700		1,152	10	11,520		0	0	0	20,220	2.0	28

Infiltration and Inflow Analysis

Prior to 1962, stormwater systems were commonly connected to the sewer system. In addition, older pipes typically did not have joints with gaskets. Consequently, the system suffered from excessive I/I. Infiltration and inflow increases the volume of flow a sewer system must convey, causing facilities to be sized larger than otherwise necessary. Infiltration and inflow also increases the cost of treating the wastewater at King County facilities, a cost which is assessed according to the volume of wastewater. Consequently, if I/I can be located and reduced, the size and cost of improvements and operations and maintenance can also be reduced. With this in mind, the City's sanitary sewer conveyance system was analyzed using King County's 2000 through 2002 flow monitoring data to determine peak I/I flows for each mini-basin. The results of the analysis were then reviewed to determine any basins with excessive I/I. The following paragraphs summarize the evaluation that was performed and the results that were found.

As previously stated, the County's 2000 through 2002 flow monitoring data was used to determine peak I/I flows for each mini-basin. There were a few significant storms over this period, including the November 13/14, 2001 storm, which produced rainfall of approximately 3.7 to 4.1 inches over a 36-hour period, which roughly translates to a 10-year recurrence 24-hour storm, based on our assumptions and data from the King County Drainage Manual rainfall isopluvial maps. Flow data for this storm along with the flow data from the preceding two days (November 15th and 16th) was used to evaluate the "wet weather" flows and peak I/I at each mini-basin outlet after adjusting the rainfall event to approximately a 20-year, 24-hour storm using rainfall ratios. These days represent weekday flows.

The raw flow data (15-minute time interval flow data) for those "wet weather" days was plotted and examined to determine the peak wet weather flows for each mini-basin. The average dry day flow diurnal curves that were developed for the sanitary flow analysis for each mini-basin were then subtracted from the "wet weather" flow curves to determine the I/I portions of the flows. The difference between the peak wet weather flow and the corresponding sanitary flow at that time interval represents the peak I/I for that storm event. These I/I flows were then manipulated to approximate a 20-year storm event.

The peak I/I for each mini-basin was then converted to gallons per acre per day (gpac) using the total tributary area of each mini-basin. The peak I/I in gpac for each mini-basin was then used to determine the model basin I/I rates through an area weighted averaging process. This process was repeated for each model basin.

In cases where the wet weather flow monitoring data was not available for a mini-basin or the flow monitor yielded errant data, the area-weighted peak model basin I/I rate was applied at the mini-basin level to determine peak I/I flows at the mini-basin outlet.

For the future planning conditions, the peak I/I rates from the current (2007) conditions were increased by 14% (7% per decade) to account for degradation of the sewer system over time. Similarly, the 2001/2002 I/I rates were adjusted forward by 3.5% for the 2007 conditions. This process was consistent with King County's methodology for computing future I/I increases due to system degradation.

The results of the preceding analysis were then compared to the results from King County's I/I Study. The analysis performed for the City generally resulted in lower peak flows than predicted by the County's analysis. The main reason for the discrepancy is that King County's I/I study used its MOUSE software to develop a hydraulic model of the region that was calibrated to the data obtained during the flow monitoring period. Sixty years of rainfall data was then run through the model and a statistical analysis was performed to determine the resultant flows that could be expected to occur at any given frequency. For its design criteria, the County selected a 20-year flow event, which signifies the design flow rate that could be expected to occur on an average interval of 20 years.

Conversely, the analysis performed for the City did not use a sophisticated hydraulic model and was based on limited flow data. Based on the available information and discussions with the County, the most conservative peak flow rates (between the values obtained from the November 2001 storm versus the County's analysis) were used for each mini-basin. As a result, most of the capacity analysis was performed using King County values, although the values were very similar for several of the basins, and a few of the mini-basins used the City values as the more conservative flow rates.

Results of Analysis

The flow analysis indicated that excessive I/I appears to exist with Model Basins M_KRK008 and M_KRK010 as well as within Mini-basins KRK019, KRK023 and KRK002. These model basins and mini-basins showed I/I in excess of 3,000 gpad, which is almost three times the historical industry standard goal of 1,100 gpad. Most of the other mini-basins also exceed the 1,100 gpad standard but not significantly. Excessive I/I can cause collection system failures, permit violations and impacts the available capacity of King County's Renton Treatment Plant. Therefore, the City will continue to pursue I/I abatement options for the mini-basins with high I/I. The results of the peak flow rate analysis for the 2007 and future conditions are shown in **Table 6.3** and **Table 6.4**.

Table 6-3 Current Conditions (2007) Mini-Basin Net Flow Results

Model Basin	Mini Basin	Upstream Mini Basins	Mini-Basin Area (acres)	Sanitary Flows		Roth Hill Analysis			King County Analysis			K.C. v. RHEP Ratio			
				Gross (gpm)	Net (gpm)	Mini-Basin I&I (gpad)	Model Basin I&I (gpad)	Peak Design Flow (gpm)	Mini-Basin I&I (gpm)	Model Basin I&I (gpad)	Peak Design Flow (gpm)	Mini-Basin I&I	Model Basin I&I		
M_ESI14058	ESI14058		393	353	353	1518	414		767	1576	430		783	1.04	
	KRK013		70	28	28	1518	74		102	1576	77		105	1.04	
	KRK016		88	153	153	1518	93		246	1576	97		249	1.04	
	KRK017		42	50	50	1515	44		94	2759	80		129	1.82	
	KRK108A		67	34	34	1518	71		105	1576	74		108	1.04	
	KRK018B		239	79	79	1518	262		331	1576	262		340	1.04	
	KRK019		86	146	146	3484	209	1518	355	2361	141	1576	288	0.68	1.04
	KRK020		389	239	239	586	158		397	643	174		412	1.10	
	KRK021		212	60	60	1990	294		354	2626	387		447	1.32	
	KRK022	KRK021		275	196	136	1518	290		780	761	145		729	0.50
KRK023			42	97	97	3724	108		205	7270	211		308	1.95	
KRK024			45	28	28	1518	47		75	1576	49		77	1.04	
KRK025			273	474	277	1518	288		1345	1609	306		1312	1.06	
KRK026	KRK022		100	188	188	1518	105		292	1576	109		296	1.04	
M_ESI9032	KRK027		118	25	25	1518	124	1518	149	1576	129	1576	154	1.04	1.44
M_KRK001	KRK001		242	267	267	1404	236		504	3802	639		907	2.71	
	KRK015		570	93	93	473	187	750	280	609	241	1561	334	1.29	2.08
M_KRK004	KRK002		205	93	93	3679	524		617	6010	856		949	1.63	
	KRK004	KRK002	319	517	186	1906	423	1906	1556	817	181	2224	1740	0.43	1.18
	KRK005		260	238	238	508	92		330	1026	185		424	2.02	
M_KRK008	KRK006		148	100	100	7873	810		910	13601	1399		1499	1.73	
	KRK007	KRK006	106	205	106	7541	556		1572	8378	618		2223	1.11	
	KRK008	KRK007	94	1295	264	6232	407		5118	8880	580		6454	1.42	
	KRK009		98	88	88	5485	375	6722	463	7327	501	9064	589	1.34	1.35
	KRK011		130	234	234	7046	637		871	8851	801		1034	1.26	
	KRK028		204	319	319	6077	862		1181	9127	1295		1614	1.50	
M_KRK010	KRK029	KRK028	118	593	273	6722	549		2004	5698	466		2353	0.85	
	KRK010		118	197	197	8419	687	4681	885	8625	704	4689	902	1.02	1.00
Other	KRK012	BEL086	BEL095	112	558	78	769	60	1225	571	45		1225	0.74	
	A			12	24	24	4681	38	62	4689	38		62	1.00	
	B			29	11	11	1518	31	42	1576	32	N/A	43	1.04	N/A
C				66	18	18	1906	87	105	2244	102		120	1.18	

Table 6-4 Future Conditions (2027) Mini-Basin Net Flow Results

Model Basin	Mini Basin	Upstream Mini Basins	Mini-Basin Area (acres)	Sanitary Flows		Roth Hill Analysis			King County Analysis			K.C. v. RHEP Ratio	
				Gross (gpm)	Net (gpm)	Mini-Basin I&I (gpm)	Model Basin I&I (gpad)	Peak Design Flow (gross) (gpm)	Mini-Basin I&I (gpad)	Model Basin I&I (gpad)	Peak Design Flow (gross) (gpm)	Mini-Basin I&I	Model Basin I&I
M_ESI14058	ESI14058		393	381	381	1510	472	853	1724	491	871	1.14	
	KRK013		70	32	32	1730	84	117	1797	88	120	1.04	
	KRK016		88	156	156	1730	106	262	1797	110	266	1.04	
	KRK017		42	50	50	1727	50	100	3145	91	141	1.82	
	KRK108A		67	35	35	1730	81	116	1797	84	119	1.04	
	KRK018B		239	90	90	1730	287	378	1797	298	389	1.04	
	KRK019		86	147	147	3972	238	385	2691	161	308	0.68	1.04
	KRK020		389	278	278	668	180	458	733	198	476	1.10	
	KRK021		212	66	66	2269	335	400	2994	441	507	1.32	
	KRK022	KRK021	275	209	143	1730	330	874	868	166	816	0.50	
	KRK023		42	56	56	4245	123	179	8288	241	296	1.95	
	KRK024		45	31	31	1730	54	84	1797	56	86	1.04	
	KRK025	KRK022	273	451	242	1730	329	1445	1834	348	1407	1.06	
	KRK026		100	212	212	1730	120	332	1797	124	337	1.04	
M_ESI9032	KRK027		118	26	26	1730	142	168	1797	147	173	1.04	1.04
M_KRK001	KRK001		242	276	276	1600	269	545	4334	729	1005	2.71	2.08
	KRK015		570	149	149	539	213	362	694	275	423	1.29	
M_KRK004	KRK002	KRK005	205	128	128	4194	598	726	6851	976	1105	1.63	1.18
	KRK004	KRK002	319	588	195	2173	482	1772	931	207	1982	0.43	
	KRK005		260	264	264	579	105	369	1169	211	475	2.02	
M_KRK008	KRK006	KRK006	148	99	99	8975	923	1022	15505	1595	1694	1.73	
	KRK007	KRK007	106	203	104	8597	634	1761	9551	705	2503	1.11	
	KRK008	KRK007	94	1324	275	7105	464	5681	10123	661	7205	1.42	
	KRK009	KRK029	98	101	101	6253	428	528	8352	571	672	1.34	1.35
	KRK011		130	235	235	8032	727	962	10090	913	1148	1.26	
	KRK028		204	312	312	6927	983	1295	10405	1476	1788	1.50	
	KRK029	KRK028	118	610	298	7663	626	2219	6496	531	2617	0.85	
M_KRK010	KRK010	BEL086	118	189	189	9598	784	973	9832	803	992	1.02	1.00
	KRK012	BEL095	112	566	73	876	68	1327	651	51	1327	0.74	
Other	A		12	22	22	5336	43	65	5346	43	65	1.00	N/A
	B		29	12	12	1730	35	47	1797	36	48	1.04	N/A
	C		66	28	28	2173	99	127	2558	117	145	1.18	

CONVEYANCE SYSTEM ANALYSIS

Method of Analysis

Once the basin flows were determined, attention was shifted to determining if the City's conveyance system could adequately transport the peak flows. The City's GIS database contains information on the lengths, diameters and materials of the sanitary sewer pipes within the City as well as the depth and diameter of all the manholes. However, invert and slope information was not available. Therefore, the capacity analysis was based on a review of the full-flow capacity of the existing pipes versus the anticipated flows. The following paragraphs describe the process that was used to identify any potential capacity issues.

The first step in determining if the system had adequate capacity to convey the peak flow rates was to determine if the minimum allowable slope for the pipe diameters per the Washington State Department of Ecology Criteria for Sewage Works Design could adequately convey the total projected flow rates for each mini-basin under the 2027 scenario discussed earlier in this chapter. For the mini-basins in which this was true, the conveyance system was deemed adequately sized and further analysis of the pipes within that mini-basin was unnecessary.

The mini-basins for which the minimum allowable pipe slopes were inadequate to convey the projected peak flow rates required further analysis. To accomplish this, the City's conveyance system was reviewed to determine the main trunk lines in each basin along with any significant connectors or interceptors.

The anticipated peak flow rates in each connector and trunk line were then determined by developing a ratio of the upstream tributary area to each connector or trunk line versus the total mini-basin area. This ratio was then multiplied by the total mini-basin flow to determine the projected flow for each upstream component. The upstream flow rates were compared to the full-flow capacity of the pipes at the minimum slopes for each diameter to determine if further analysis was required.

If the minimum slope full flow capacity was insufficient to convey the projected flow rates without surcharging the system, then the slope needed to convey the flows was determined. This information was provided to the City for comparison against their as-built records and knowledge of the system to determine if the actual slopes of the pipes exceeded the computed slopes necessary to convey the projected flow rates. Based upon this approach, the majority of the City's conveyance system appears to have sufficient capacity. **Figure 6.2** shows the pipes that were found to have insufficient capacity. These deficiencies are described as follows:

- The existing 8-inch diameter PVC pipe in 124th Avenue NE between NE 112th Street and NE 116th Street is undersized to convey the projected peak flow rates. Upsizing the pipe to provide adequate capacity is recommended.
- The existing 8-inch diameter pipe in Kirkland Avenue from Railroad Avenue to I-405 is undersized to convey projected peak flow rates. Upsizing the pipe to provide adequate capacity is recommended.
- The existing 8-inch diameter pipe in 108th Avenue NE from NE 53rd Street to NE 68th Street is undersized to convey projected peak flow rates. City personnel have observed significant surcharging in the pipe during large storm events. Upsizing the pipe to provide adequate capacity is recommended.

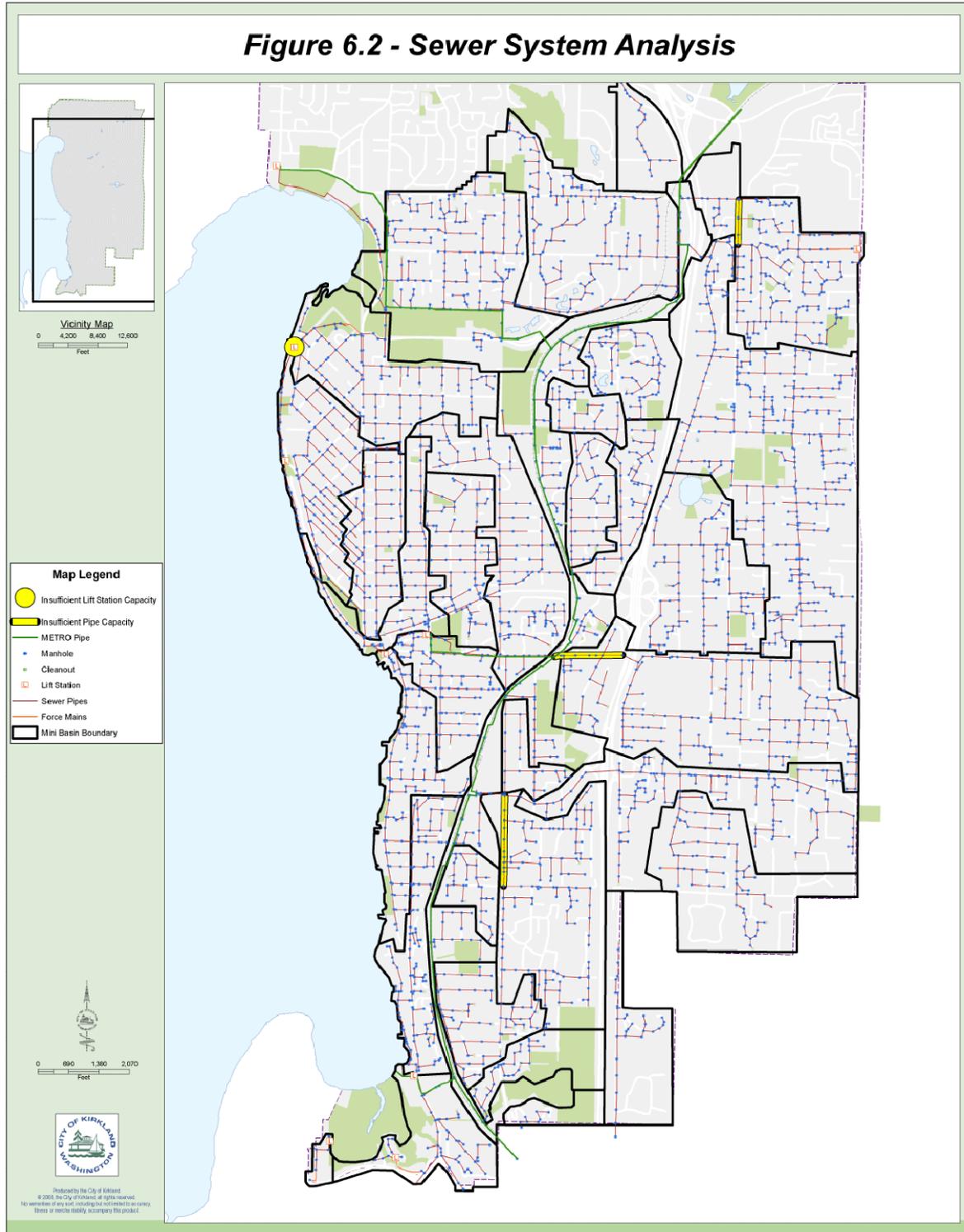
Lift Station Analysis

The City has six existing lift stations conveying sewage within its sanitary sewer system. These stations were evaluated to determine if they have sufficient pumping capacity to convey the projected peak flow rates. With the exception of the Rose Point Lift Station, the City's lift stations appear to have adequate pumping capacities.

The Rose Point Lift Station has a current pumping capacity of about 250 gpm. Peak flows under current design conditions are approximately 620 gpm and are anticipated to increase to about 730 gpm under the 2027 scenario discussed earlier. Consequently, this station appears to be severely undersized. In fact, surcharging within the existing wet well has been observed during significant storm events. This surcharging can lead to overflows of the sewer system into Lake Washington or the basements of residential homes. Therefore, upgrading the pumping capacity or replacing the lift station with a larger lift station to accommodate the projected peak flows is recommended. **Figure 6.2** shows the location of this lift station.

THIS PAGE INTENTIONALLY BLANK

Figure 6.2
Sewer System Analysis



INTRODUCTION

This chapter describes the improvements necessary for meeting the City's future sewer system needs. Planned system improvements are primarily based on the City's policies and criteria described in Chapter 3.

It should be noted that the specific needs of the sewer system must be evaluated on an ongoing basis. Significant effort has gone into the analysis of improvements in order to select the most cost-effective plan of action meeting the City's future needs. However, as growth and land use patterns are likely to vary from neighborhood to neighborhood over the planning period, the size and timing of necessary projects may differ from the recommendations in the program. Additional facility requirements should be identified as part of ongoing facility planning efforts.

OVERVIEW OF CAPITAL FACILITIES PLAN (CFP)

The system analysis described in Chapter 6 revealed that about 25% of the City's sewer system is experiencing significant I/I based on area. This issue was discussed in the City's previous sewer comprehensive plan and the City has actively worked towards reducing I/I through pipe and manhole replacement and rehabilitation programs. To determine which pipelines were most in need of replacement, the previous comprehensive plan recommended two ongoing investigations: I/I source investigations (video inspection and smoke testing) and flow monitoring. The smoke testing and video inspection programs are on-going with 20% of the entire system inspected to date—additional video inspections will be performed annually on an as-needed basis until all system sewer pipes have been inspected. As part of its system maintenance, the City monitors the pump run times at its lift stations. This allows its maintenance staff to identify abnormal or excessive flows and then investigate the cause of such flows, if needed.

The data from the City's ongoing investigations was used to prioritize pipeline replacement and rehabilitation projects within specific mini-basins in order to meet the City's policies and criteria. The recommended improvements also include any facilities necessary to provide the level of service required by DOH, King County, and other agencies. The overall goal of the annual CFP is to replace or rehabilitate approximately one mile of sewer main per year.

For purposes of CFP planning, three other kinds of capital improvements have been identified: improvements to the telemetry and control system, sewer system extensions arising out of the Emergency Sewer Construction

Program and sewer improvements that should be constructed due to deficiencies with prioritization considerations being given to coordination with other non-sewer CFP projects.

City maintenance staff also provided information about specific pipelines and lift stations that led to recommendations for improving those systems. These improvements have been included in the Capital Improvement Plan.

Cost Estimating Methodology

The planning-level cost estimates prepared as part of this CFP are provided for guidance in evaluating, funding and implementing projects. In 2007, the City completed a comprehensive evaluation of the project costs of the every project on its then current (CFP). A review of the March 2008 Seattle Construction Cost Index from the Engineering News Record (ENR) revealed that construction cost increases have been flat since at least January 2007 so no inflationary adjustments were needed in order to bring those costs into today's dollars. Therefore, the costs included in **Table 7.1** at the end of this chapter may be considered in terms of March 2008 dollars.

Construction costs for projects within the CFP were estimated by:

- Relying upon previous cost projections provided by the City as discussed above.
- Researching average pipe costs from other comprehensive plans, cost estimating guides, and project bid tabulations. These costs were then adjusted to March 2008 dollars using the ENR index to estimate the probable construction cost of each project. The probable construction cost only includes construction labor, materials, and equipment.
- Estimating probable allied costs: Probable allied costs include planning, surveying, design, permitting, construction administration and observation, preparation of construction record drawings, 9.0% sales tax, and legal costs. The total of all these costs were generally assumed to be about 40% of the probable base construction cost. This percentage was adjusted as needed to include project specific costs such as geotechnical explorations, land acquisition, wetland impact studies, etc., if any such costs were identified as being necessary.
- Total project costs are the sum of the probable base construction costs and probable allied costs.

The costs of the projects presented in **Table 7.1** are based upon the average constructed costs per foot from recent, similar projects and represent planning-level estimates of average project costs for similar types of sewerage system improvements. Construction was generally

assumed to occur within existing standard roadway paved areas. Actual project costs may deviate significantly from the costs represented in **Table 7.1** due to non-standard conditions such as wetlands, high traffic counts, increased public awareness or opposition, or changes in the regulatory environment. More detailed cost projections should be prepared prior to initiating any specific project in order to address these variables. Additionally, capital costs estimated for the various projects should be adjusted in the future as needed to account for inflation. As a result, final project costs will vary from the planning-level costs projected herein.

System-Wide Improvements

As previously mentioned, about 25% of the City's sewer system appears to be experiencing significant degrees of I/I. To address the issue, the City will continue its replacement and/or rehabilitation of aging and damaged sewer pipe through its annual CFP, using additional smoke testing, video inspections, and flow monitoring, as needed, to identify the sources of I/I.

The pipe replacement and/or rehabilitation process involves two investigation methods for determining which pipelines are most in need of replacement: I/I source investigations (video inspection and smoke testing) and flow monitoring. These methods are described as follows:

Video Inspection

The benefits of a video inspection program are multifold. The use of root cutting equipment can be optimized if locations of root intrusion problems are known. Old sewer pipe experiencing structural failure can be located and replaced. Illicit storm sewer connections can also be located. In conjunction with planned roadway and other CFP improvements, sewers can be inspected to determine if they should be replaced ahead of or in conjunction with other construction projects. The inspection process requires hydraulic jet cleaning of the pipeline only if needed before the video inspection occurs. In 2006, the City purchased its own video inspection truck and equipment and continually inspects its conveyance piping, performing additional work when conditions warrant further investigation.

To determine a priority for video inspections, the following criteria were developed: structural deficiencies, I/I, aging pipe, corresponding CFP project, and maintenance frequency. This criterion is further described as follows:

- Structural deficiencies consist of cracked and deteriorating pipes, root intrusion, structural failures (pipe breaks) and blockages or any combination of these issues.

- I/I was considered excessive if it exceeded 2,000 gallons per acre per day (gpad). Based on the system analysis performed for Chapter 6, the basins that currently appear to have excessive I/I problems (in descending order) are as follows:

<u>Mini-Basin</u>	<u>I/I (gpad)</u>
KRK010	8420
KRK006	7870
KRK007	7540
KRK011	7050
KRK029	6720
KRK008	6230
KRK028	6080
KRK009	5490
KRK023	3720
KRK002	3680
KRK019	3480

These basins coincide with the Rose Point, Lake Avenue West, Lake Washington Boulevard (north sub-basin), Central Way, Waverly Park, 10th Avenue South, and Lake Plaza basins described in the City’s 1993 Comprehensive Sewer System Plan

- Aging pipe was defined as any pipe that is more than 50 years old. Most of basins with excessive I/I shown above consist almost entirely of pre-1950 pipe.
- Pipe condition issues that are located in areas that coincide with the City of Kirkland’s Street Improvement Plan or other CFP projects would meet the corresponding criterion.
- Inspections that occur as a part of routine maintenance of the system may reveal issues that warrant video inspection. This routine maintenance occurs: Semi-annually, quarterly six times per year, monthly, weekly, and in some instances daily.

Per the recommendations in the City’s 1993 Comprehensive Sewer System Plan, an annual video inspection program was adopted. The goal was to inspect approximately 4 miles of pipe each year. Since the program was adopted, the City has implemented a process of inspecting its entire system and review the resultant video to determine priority repairs and or replacement. This inspection program should continue in the future as it will allow the City to monitor the condition of its sewer system.

Smoke Testing

Per the recommendations in the City’s 1993 Comprehensive Sewer System Plan, smoke testing was performed in certain areas of the City, most

specifically in LID 1 and the neighborhood west of Market Street. The smoke tests consisted of blocking off manholes between pipe sections and then filling the pipe sections with smoke. Since the smoke cannot escape through the manholes, it escapes through illicit connections to the storm system such as roof drains or yard drains, or it escapes through cracks in the pipe and filters up through the ground.

The results of the smoke testing program along with the video inspections and flow monitoring were used to recommend and prioritize I/I reduction improvements. As I/I sources were identified, the order of improvements was adjusted in order to address the most serious I/I problems. This process should continue until I/I within the City is lowered to more reasonable rates.

Flow Monitoring

The City should continue monitoring flows in several basins. The flow monitoring plan should include open-channel flow metering within gravity basins and monitoring of flows within the lift station basins using the telemetry system. The flow monitoring assists in determining the effectiveness of I/I reduction improvements in each basin and quantifies I/I in basins that are not listed but suspected of having I/I problems.

Pipeline Replacement and Rehabilitation

The City should rehabilitate or replace approximately one mile of pipe per year for the next 30 years in order to address the aging and deteriorating pipe in its sewer system. This approach would result in the repair or replacement of most of the sewer pipe that was installed prior to 1970, which would otherwise be about 50 years old or more by the end of the program period. The previously described investigations will assist the City in determining which pipelines should be replaced first.

In summary, the data from the investigations should be used in an ongoing way to prioritize pipeline replacements and rehabilitations within specific mini-basins according to criteria developed in this Plan. The City has completed the smoke testing portion and continues to perform video inspections on its system. The video inspections should continue as an ongoing maintenance operation to identify problem areas as they develop. Smoke testing can also be used in the future to identify I/I sources in areas that continue to show excessive I/I.

Telemetry and Control System Program

Parts of the existing telemetry and control system are outdated and do not provide all of the information needed for maintenance or engineering purposes. With those issues in mind, criteria were established as part of

the 1993 Comprehensive Sewer System Plan and have been partially implemented. The Telemetry and Control System Improvement Program involves improving all of the City's lift station facilities, which would be economically infeasible for the City to accomplish in one year. Consequently, the program was designed to address improvements on a regular basis.

The 1993 Comprehensive Sewer System Plan identified eight lift stations that had telemetry and control system deficiencies: Lake Plaza, Juanita, 10th Avenue South, Waverly Park, Lake Avenue West, NE 90th Street, Rose Point, and Trend. Most of those stations have either been replaced or removed from service since the 1993 Comprehensive Sewer System Plan was adopted. Chapter 5 describes those improvements. However, the following stations still need telemetry and control system upgrades.

- Rose Point: This station had an electrical connection for an emergency power source installed to allow the City's portable generator to operate the station on an as-needed basis. However, it still needs upgrades to its telemetry and control system. This station also has capacity issues as discussed later in this chapter, so a comprehensive upgrade or replacement of the entire station is recommended.
- Trend: This station also has an outdated telemetry and control system. However, the station is slated to be eliminated when the sewer service on 132nd Avenue NE is extended. The Trend Lift Station is a small station with a pumping capacity of about 120 gpm. Therefore, improvements to this lift station's telemetry and control system should only be considered if the 132nd Avenue NE sewer extension is delayed.

Sewer System Extension Program

Sewer system extensions provide service to unsewered areas. A sewer routing plan (the *Rose Hill Study*) was developed for extending sewers in the Rose Hill area. Sewer extensions will be funded primarily by developer and local homeowners and are not prioritized. Such extensions will be constructed as development or redevelopment occurs and as a part of the Emergency Sewer Construction Program with local area residents paying for the service improvements through individual property assessments. These extensions are also being coordinated with street improvements identified in the City's street improvement CFP.

RECOMMENDED PROJECTS

All recommended projects belong to one of three categories: system wide improvements, piping replacements/upgrades, or lift station replacement/upgrades. Each recommended project has been assigned an

identification number and is listed in **Table 7.1**. The table also provides a preliminary opinion of probable cost for each recommended project based on March 2008 dollars. These cost projections are for the total cost of the project including design and construction. The methodology used to estimate the costs associated with this plan were described in further detail earlier in this chapter.

Figure 7.1 shows the recommended improvements necessary to provide adequate sewer conveyance within the existing system. Specific project details and requirements are not identified in the Capital Facilities Plan since the timing and extent of the future growth cannot be predicted with certainty. Proposed facilities may change configuration as development occurs and as land use policies change. These recommended improvements are meant as a guide to planning. All specific details including pipe size and length should be verified prior to proceeding with a project.

System-Wide Improvements

The system-wide improvements are shown in this Capital Facilities Chapter, however, they are not part of the Capital Facilities Budget as the City includes these in its operation and maintenance budget.

Video Inspection

As previously mentioned, the City should continue its annual video inspection program in order to monitor the condition of its sanitary sewer system. Once the City has completed a video inspection of its entire system, the annual video inspection program may be limited to areas where problems appear such as surcharging that hadn't previously occurred or where maintenance staff suspect pipes may have developed structural deficiencies or root intrusion issues. Annual costs for this program are estimated at approximately \$1.00 per foot of pipe inspected.

Smoke Testing

The City should consider implementing a smoke testing program as part of its efforts to reduce I/I in its system. Periodic smoke testing can be used to identify new sources of I/I that have occurred since the last test.

Flow Monitoring

The City should also consider monitoring flows in its sewer basins, especially the ones with excessive I/I. The flow monitoring plan should include open-channel flow metering within gravity basins and monitoring of flows within the lift station basins using the telemetry system. The flow monitoring will determine the effectiveness of I/I reduction

improvements in each basin. The flow monitoring will also assist in determining if any pipes or lift stations are nearing their conveyance capacities.

Pipeline Replacement and Rehabilitation

About 25% of the City's sewer infrastructure includes pipes that are old (pre-1970) and are reaching the end of their design life as evidenced by excessive I/I in several basins. Therefore, the City should continue to rehabilitate or replace approximately 1 mile of pipe per year until the all of the old pipe is removed or repaired. The pipe replacement and rehabilitation program is estimated to cost about \$1 million dollars per year.

Pipe Replacements/Upgrades

In some of the projects below, a pipe is upgraded to different sizes. The City provided the range of pipe sizes it would be replaced or upgraded to, but the specific lengths of the sizes were not provided.

West of Market Sewer Main Replacement (ID-1)

Most of the pipe in the Market Neighborhood is composed of pre-1950 concrete pipe which has exceeded its design life and is experiencing excessive I/I. This project is located west of Market Street between Waverly Way and Forbes Creek Drive, and will replace or rehabilitate approximately 45,000 linear feet of existing 6-inch to 12-inch diameter sewer pipe. The projected project costs are about \$20,265,000.

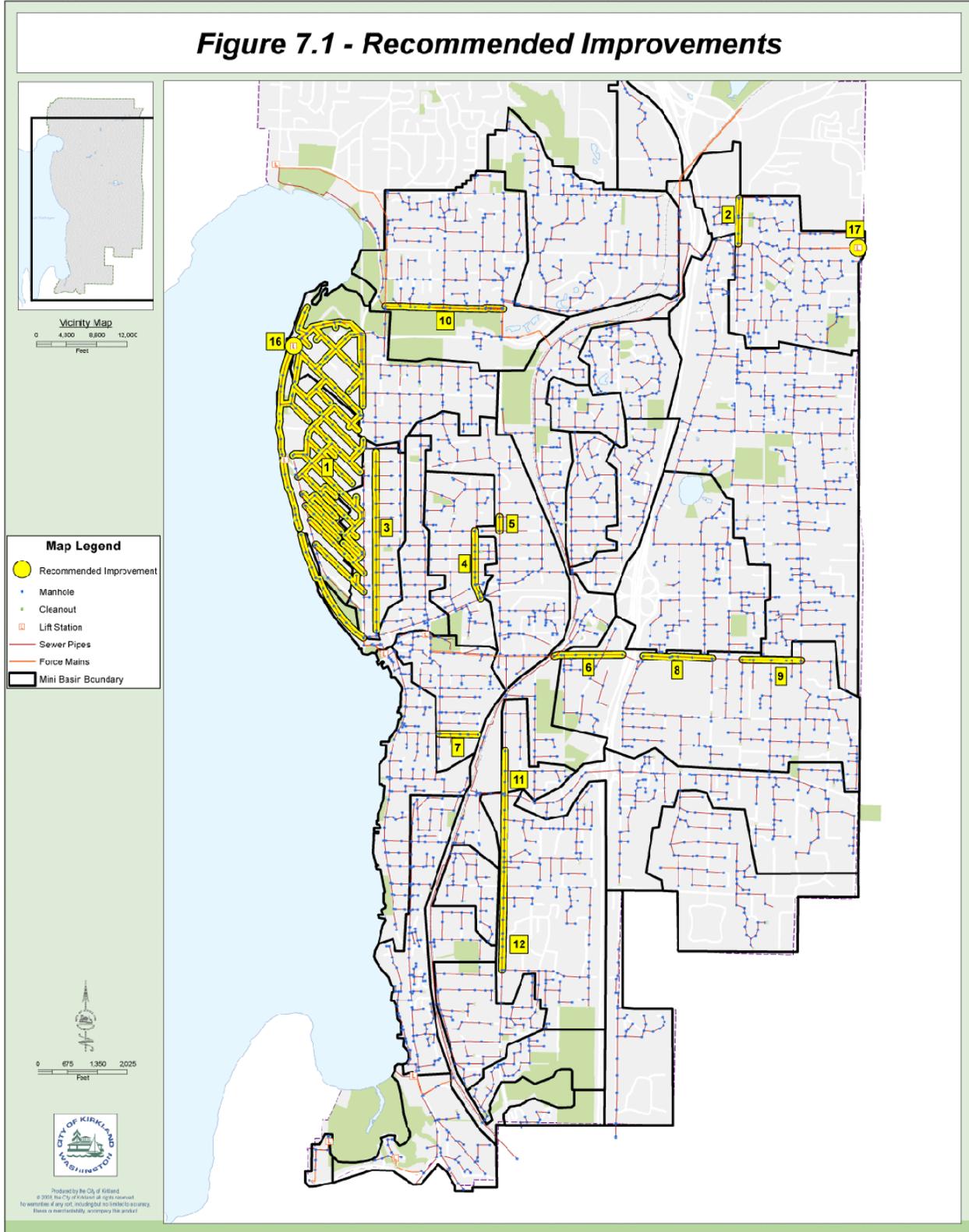
124th Avenue Sewer Main Replacement (ID-2)

This project is located on 124th Avenue NE between NE 112th Street and NE 116th Street and consists of roughly 1,030 lineal feet of 8-inch PVC pipe that has insufficient capacity to accommodate projected peak flow rates. Therefore, the existing 8-inch pipe will be replaced with 12-inch PVC pipe for an estimated project cost of \$975,000.

1st Street Sewer Main Replacement (ID-3)

The project is located on 1st Street between 16th Avenue and Central Way and consists of the replacement of approximately 4,170 lineal feet of pre-1950 concrete sewer pipe that has exceeded its design life and is deteriorating. The existing 8-inch concrete pipe will be replaced with 8-inch PVC pipe for an estimated project cost of \$2,922,000.

Figure 7.1
Recommended Improvements



THIS PAGE INTENTIONALLY BLANK

5th Street Sewer Main Replacement (ID-4)

The project is located on 5th Street between 9th Avenue and Central Way and consists of the replacement of about 1,430 linear feet of pre-1950 concrete sewer pipe that has exceeded its design life and is deteriorating. The existing 8-inch concrete pipe will be replaced with 8-inch PVC pipe for an estimated project cost of \$1,002,000.

6th Street Sewer Main Replacement (ID-5)

This project is located on 6th Street between 10th and 11th Avenue and consists of the replacement of about 325 lineal feet of 6-inch concrete sewer pipe. The existing six-inch pipe has capacity limitations and will be replaced with 8-inch PVC sewer pipe. The estimated project costs are \$228,000.

Kirkland Avenue Sewer Main Replacement (ID-6)

This project is located on Kirkland Avenue from Railroad Avenue to I-405 and consists of approximately 1,550 lineal feet of 8-inch concrete sewer pipe that has insufficient capacity to accommodate projected peak flow rates. The 8-inch concrete pipe will be replaced with 12-inch PVC pipe for an estimated project cost of \$1,466,000.

7th Avenue South Sewer Main Replacement (ID-7)

This project is located on 7th Avenue South from State Street to 5th Street South and consists of the replacement and upsizing of approximately 850 linear feet of 6-inch diameter concrete pipe with 8-inch PVC pipe. The existing sewer main downstream of the former PACE chemical plant is severely corroded due to caustic chemicals that were dumped in the sewer system. Redevelopment of the PACE chemical site may replace portions of this main; however, any remaining sections would still need to be replaced. The project is estimated to cost \$1,319,600.

NE 80th Street Sewer Main Replacement Phase 2 (ID-8)

The existing concrete pipe in NE 80th Street has structural deficiencies and significant root intrusion that requires increased maintenance to control. In addition, the existing system does not meet current design criteria for pipe slopes and alignment.

In the 1993 Comprehensive Sewer System Plan, this project was part of a larger project. Subsequent to that plan, however, the existing AC watermain within a portion of the project area had to be replaced. Therefore, the project was divided into three phases. Phase 1, which will

be completed in 2008 goes from 122nd Avenue NE to 124th Avenue NE. Phase 3 is part of this plan and listed below.

This project, phase 2, is located on NE 80th Street from I-405 to approximately 122nd Avenue NE and will consist of the replacement of about 1,150 lineal feet of 10-inch concrete sewer pipe with 10-inch and 12-inch PVC pipe. The project is estimated to cost \$1,088,000.

NE 80th Street Sewer Main Replacement Phase 3 (ID-9)

This project is located on NE 80th Street from 124th Avenue NE to approximately 128th Avenue NE and will consist of the replacement of about 1,000 lineal feet of 10-inch concrete sewer pipe with 10-inch and 12-inch PVC pipe. The project is estimated to cost \$1,859,400.

NE 108th Street Sewer Main Replacement/Rehabilitation (ID-10)

The project is located along NE 108th Street from 108th Avenue NE to approximately Forbes Creek at 100th Avenue NE and will consist of the replacement and/or rehabilitation of approximately 3,000 lineal feet of 12-inch concrete pipe that has insufficient capacity to convey the projected peak flow rates and experiences significant I/I. Video inspection will be conducted to determine the extent of pipe that can be rehabilitated versus replaced. The existing pipe will be replaced with 12-inch to 18-inch PVC pipe and is estimated to cost about \$4,523,300. The project is scheduled to begin in 2009.

6th Street South Sewer Main Replacement (ID-11)

This project is located on 6th Street South from NE 68th Street to approximately 8th Avenue South and will consist of the replacement and/or rehabilitation of approximately 950 lineal feet of 10-inch concrete pipe that has insufficient capacity to convey the projected flows. A preliminary design investigation will examine the feasibility of slip-lining the existing sewer line versus replacing the existing 10-inch concrete sewer line with 12-inch to 15-inch PVC pipe. The project is estimated to cost \$900,000.

108th Avenue NE Sewer Main Replacement (ID-12)

This project is located along 108th Avenue NE from NE 53rd Street to NE 68th Street and consists of the rehabilitation and/or replacement of approximately 4,000 linear feet of 8-inch diameter concrete pipe that has significant structural deficiencies that require higher maintenance. The existing pipe will be replaced with 8-inch to 12-inch PVC pipe for an estimated cost of \$3,784,000.

Emergency Sewer Construction Program (ID-13)

This program results in the installation of new sewer main extensions to accommodate side sewer connections for properties currently served by septic systems and meeting the program's criteria. City Ordinance No. 3638 directs the need for this biennial project. It is proposed that during the period of 2009 to 2014, \$4,200,000 will be spent on this program and from 2015 to 2029, \$11,200,000 will be spent.

Annual Inflow and Infiltration Reduction Program (ID-14)

This program will work towards eliminating sources of I & I throughout the City by employing various techniques such as replacing manhole lids with weather-tight lids and replacing aging side sewers and broken sections of pipe. \$600,000 is allocated towards this program from 2009 to 2014 and \$1,500,000 is allocated towards this program for 2015 to 2029.

Sewer System Telemetry System Upgrades (ID-15)

Currently the City's telemetry system operates over phone lines that have to be maintained by the phone company. When phone lines go down, staff is required to monitor the systems manually. New frame relay systems have proven to be much more reliable, providing better service. This project will install the final components of a City-wide conversion from a RUGID telemetry system to a frame relay SCADA system.

Lift Station Abandonment/Upgrades***Rose Point Lift Station Replacement (ID-16)***

This lift station has insufficient pumping capacity to convey peak flow rates during major storm events. During recent large rainstorms, the wet well has surcharged and overflows have occurred. The existing pumping capacity is approximately 250 gpm. Current peak flow rates are estimated at 620 gpm, with projected flows increasing to about 730 gpm during build-out conditions. Therefore, the existing lift station should be replaced with a new lift station with a pumping capacity of 800 to 900 gpm.

In order to avoid high velocities in the station's force main at these higher pumping rates, the existing 6-inch ductile iron (DI) force main should also be replaced with about 1,800 lineal feet of 8-inch DI or PVC C900 pipe. The projected cost for the station and force main replacements is \$1,324,000.

Trend Lift Station Abandonment (ID-17)

The existing lift station is in good working order. However, the station may be removed from service by constructing a gravity sewer along 132nd Avenue NE. Removing the lift station from service will reduce the City's operating and maintenance costs. Extending the gravity sewer and removing the lift station is estimated to cost \$945,000.

Project Costs and Schedule

The following **Table 7.1** provides a summary of the Capital Facilities Plan. Each project has been identified as a short-term (6-year) or long-term (6- to 20-year planning period).

**Table 7.1
Capital Facilities Plan**

SEWER MAIN EXTENSIONS/UPGRADES							Opinion of Probable Cost	
I.D. No.	Location	Existing Pipe Type	Existing Diam.	Proposed Pipe Type	Proposed Diam.	Length (Linear Feet)	Short-Term	Long-Term
1	West of Market Sewer Main Repl.	Concrete	6- to 12-inch	PVC	6- to 12-inch	45,000		\$20,265,000
2	124 th Avenue Sewer Main Repl.	PVC	8-inch	PVC	12-inch	1,030		\$975,000
3	1 st Street Sewer Main Repl.	Concrete	8-inch	PVC	8-inch	4,170		\$2,922,000
4	5 th Street Sewer Main Repl.	Concrete	8-inch	PVC	8-inch	1,430		\$1,002,000
5	6 th Street Sewer Main Repl.	Concrete	6-inch	PVC	8-inch	315		\$228,000
6	Kirkland Ave Sewer Main Repl.	Concrete	8-inch	PVC	12-inch	1,550		\$1,466,000
7	7 th Avenue S Sewer Main Repl.*	Concrete	6-inch	PVC	8-inch	850	\$1,319,600	
8	NE 80 th Street Sewer Main Repl. (Ph.2)*	Concrete	10-inch	PVC	10- to 12-inch	1,150	\$1,088,000	
9	NE 80 th Street Sewer Main Repl. (Ph.3)*	Concrete	10-inch	PVC	10- to 12-inch	1,000	\$1,859,400	
10	NE 108 th Street Sewer Main Repl.*	Concrete	12-inch	PVC	12- to 18-inch	3,000		\$4,523,300
11	6th Street South Sewer Main Repl.*	Concrete	10-inch	PVC	12- to 15-inch	950		\$900,000
12	108 th Ave NE Sewer Main Repl.*	Concrete	8-inch	PVC	8- to 12-inch	4,000		\$3,784,000
13	Emergency Sewer Construction	Varies	Varies	PVC	8- to 12-inch	TBD	\$4,200,000	\$11,200,000
14	Annual I/I Program						\$600,000	\$1,500,000
TOTALS FOR SEWER MAIN EXTENSIONS/UPGRADES							\$35,861,000	\$33,471,300

Table 7.1 (continued)						
Capital Facilities Plan						
LIFT STATION ABANDONMENT/UPGRADES					Opinion of Probable Cost	
I.D. No.	Location	Existing Pumping Capacity (gpm)	Proposed Pumping Capacity (gpm)	Length	Short-Term	Long-Term
15	Sewer Telemetry Upgrades				\$150,000	
16	Rose Point Lift Station Upgrade	250 gpm	800-900	1,800	\$1,342,000	
17	Trend Lift Station Abandonment *	120 gpm	0	N/A	\$945,000	
TOTALS FOR LIFT STATION ABANDONMENT/UPGRADES					\$2,437,000	\$0
TOTALS FOR CAPITAL FACILITIES PLAN					\$11,504,000	\$48,765,300

*Outstanding projects from 1993 Sewer Comprehensive Plan. Costs have been updated to 2008 dollars.

The purpose of this financial chapter is to provide a financial program that allows the sewer utility to remain financially viable during execution of the Capital Improvement Program (CIP) identified in this Plan. This viability analysis considers the historical financial condition of the utility, the financial impact of executing the CIP, the sufficiency of utility revenues to meet current and future financial and policy obligations, and the affordability of rates.

HISTORICAL FINANCIAL CONDITION

This section includes a six-year historical summary of financial performance as reported by the City on the Statement of Net Assets and the Statement of Revenues, Expenses, and Change in Net Assets. Financial statements are shown on a combined basis for the water and sewer utilities. These statements demonstrate the combined utilities have realized solid historical financial performance.

Table 8.1 provides a six-year summary of the combined Statement of Net Assets. Key performance indicators and trends are discussed below:

- Liquidity Ratio - The *Current Ratio* (unrestricted current assets divided by current liabilities) averaged slightly over a 1:1 ratio over the past six years climbing to an improved liquidity position of just under a 2:1 ratio in 2007. A ratio of 2:1 or higher is considered good in terms of healthy liquidity.
- Liquidity Ratio - *Working Capital* (unrestricted current assets minus current liabilities not devoted to debt service), converted to days of O&M, has fluctuated from year to year, with an average of about 28 days of O&M and reaching over 80 days of O&M in 2007. A working capital balance sufficient to cover 30 to 45 days of O&M is standard industry practice with the higher range appropriate for utilities with volume-based versus flat rate residential sewer rates (such as the City of Kirkland).
- Capital Structure Ratio – The *Debt to Equity Ratio* (total debt divided by the sum of retained earnings and contributed equity) averages about 13% debt and 87% equity, compared to the general industry target of no greater than 60% debt and 40% equity. As debt has been paid down over time, the 2007 debt to equity ratio has trended down to 9% debt / 91% equity. This bodes well for the City in terms of having capacity to acquire new debt to help fund the Capital Improvement Program without jeopardizing its debt to equity position.

Table 8.1 also shows the combined Statement of Revenues, Expenses and Changes in Net Assets are summarized in. Key performance indicators and trends are discussed below:

- The *O&M Coverage Ratio* (service revenues divided by operating expenses) averaged 1.26 over the past six years. A ratio of less than 1.0 is not considered a good financial result.
- The *Operating Ratio* (total operating expenses divided by total operating revenues) has average about 80%. Greater than 90% indicates there is little room for new debt service and capital replacement without additional rate increases.
- The *Debt Service Coverage Ratio* (revenues less O&M expenses divided by total annual debt service) averaged about 2.4 over the past six years, increasing to about 3.7 in 2007. This compares favorably with the industry target of 1.5 or greater.

Table 8.1
Water/Sewer Enterprise Fund Statement of Net Assets

	2002 Water/ Sewer	2003 Water/ Sewer	2004 Water/ Sewer	2005 Water/ Sewer	2006 Water/ Sewer	2007 Water/ Sewer
ASSETS						
Current Assets:						
Cash and Cash Equivalents	\$6,929,246	\$6,628,096	\$5,852,640	\$2,316,741	\$3,133,105	\$4,743,610
Investments (Note 3)	\$5,305,275	\$6,952,293	\$8,161,096	\$11,225,049	\$11,457,159	\$11,105,136
Receivables						
Interest	\$34,458	\$39,119	\$63,684	\$87,154	\$89,596	\$128,441
Contracts	\$0	\$504,375	\$1,259,101	\$1,003,578	\$1,804,542	\$1,530,666
Accounts	\$971,866	\$854,562	\$683,680	\$888,724	\$1,004,866	\$2,860,429
Loans	\$778,410	\$0	\$0	\$0	\$0	\$0
Assessments						
Deferred	\$3,266	\$2,316	\$4,066	\$3,550	\$6,075	\$6,275
Due From Other Governments	\$41,789	\$248,673	\$43,061	\$176	\$0	\$8,611
Inventories	\$165,496	\$182,006	\$231,363	\$250,464	\$289,706	\$324,215
Restricted Assets						
Deposits	\$0	\$0	\$0	\$0	\$0	\$16,659
Total Current Assets	\$14,229,806	\$15,411,440	\$16,298,691	\$15,775,436	\$17,785,049	\$20,724,042
Noncurrent Assets						
Restricted Assets						
Revenue Bond Reserves	\$845,962	\$845,962	\$824,758	\$827,907	\$822,275	\$822,275
Total Restricted Assets	\$845,962	\$845,962	\$824,758	\$827,907	\$822,275	\$822,275
Deferred Charges and Other Assets						
Deferred Charges	\$153,926	\$359,816	\$102,883	\$95,874	\$205,709	\$249,486
Non Current Receivables	\$0	\$0	\$0	\$0	\$0	\$0
Total Deferred Charges and Other Assets	\$153,926	\$359,816	\$102,883	\$95,874	\$205,709	\$249,486

Table 8.1 (continued)						
Water/Sewer Enterprise Fund Statement of Net Assets						
	2002	2003	2004	2005	2006	2007
	Water/ Sewer	Water/ Sewer	Water/ Sewer	Water/ Sewer	Water/ Sewer	Water/ Sewer
Capital Assets (Note 5)						
Land	\$47,784	\$47,784	\$47,784	\$47,784	\$47,784	\$47,784
Depreciable Capital Assets (Net)	\$58,834,037	\$59,305,905	\$61,477,179	\$64,832,441	\$70,750,270	\$77,966,992
Construction in Progress	\$2,236,627	\$5,788,053	\$8,063,856	\$8,828,237	\$5,380,194	\$1,119,169
Total Capital Assets	\$61,118,448	\$65,141,742	\$69,588,819	\$73,708,462	\$76,178,248	\$79,133,945
Total Noncurrent Assets	\$62,118,336	\$66,347,520	\$70,516,460	\$74,632,244	\$77,206,232	\$80,205,706
TOTAL ASSETS	\$76,348,142	\$81,758,960	\$86,815,151	\$90,407,680	\$94,991,281	\$100,929,748
LIABILITIES						
Current Liabilities						
Accounts Payable	\$95,972	\$738,711	\$159,288	\$817,341	\$186,368	\$169,332
Wages Payable	\$37,566	\$37,640	\$42,636	\$60,113	\$69,616	\$60,833
Compensated Absence Payable	\$44,462	\$59,632	\$67,690	\$42,443	\$41,632	\$41,036
Due to Other Governments	\$190,474	\$178,456	\$0	\$237,532	\$395,757	\$272,263
Accrued Interest Payable	\$21,592	\$23,615	\$23,600	\$23,120	\$19,184	\$16,575
Unearned Revenue	\$0	\$17,520	\$603	\$0	\$0	\$0
Deferred Revenue	\$795,947	\$504,716	\$1,259,442	\$1,003,578	\$1,804,542	\$1,530,666
Loans and Contracts Payable (current portion)	\$450,809	\$548,343	\$557,333	\$611,648	\$614,665	\$614,665
Sub-Total Current Liabilities	\$1,636,822	\$2,108,633	\$2,110,592	\$2,795,775	\$3,131,764	\$2,705,370
Current Liabilities Payable From Restricted Assets						
Deposits Payable	\$0	\$23,494	\$12,265	\$9,468	\$7,924	\$16,659
Accrued Interest Payable	\$31,506	\$29,481	\$21,140	\$19,653	\$17,912	\$15,906
Current Bond Principle Payable	\$480,000	\$495,000	\$580,000	\$595,000	\$615,000	\$640,000
SubTotal Current Liabilities Payable From Restricted Assets	\$511,506	\$547,975	\$613,405	\$624,121	\$640,836	\$672,565
Total Current Liabilities	\$2,148,328	\$2,656,608	\$2,723,997	\$3,419,896	\$3,772,600	\$3,377,935
Noncurrent Liabilities						
Compensated Absence Payable	\$0	\$0	\$0	\$10,610	\$10,408	\$10,259
Loans and Contracts Payable	\$3,867,555	\$5,131,687	\$4,880,460	\$4,811,962	\$4,523,187	\$3,908,522
Bonds Payable	\$6,580,000	\$6,085,000	\$5,635,000	\$5,040,000	\$4,425,000	\$3,785,000
Total Noncurrent Liabilities	\$10,447,555	\$11,216,687	\$10,515,460	\$9,862,572	\$8,958,595	\$7,703,781
TOTAL LIABILITIES	\$12,595,883	\$13,873,295	\$13,239,457	\$13,282,468	\$12,731,195	\$11,081,716
NET ASSETS						
Invested in capital assets net of related debt	\$31,575,250	\$52,828,616	\$57,891,286	\$62,607,080	\$65,963,301	\$70,153,276
Restricted for:						
Debt Service	\$334,455	\$291,481	\$211,353	\$203,786	\$181,440	\$165,616
Unrestricted	\$31,842,554	\$14,765,567	\$15,473,055	\$14,314,347	\$16,115,346	\$19,529,139
TOTAL NET ASSETS	\$63,752,259	\$67,885,664	\$73,575,694	\$77,125,213	\$82,260,087	\$89,848,031

CURRENT FINANCIAL STRUCTURE

This section summarizes the current financial structure of the utility, used as the baseline for the Capital Financing Strategy and Financial Forecast developed for this Plan.

The City operates a combined water/sewer utility enterprise fund that is responsible to fund all of its related costs. It is not dependent on general tax revenues or general fund resources. The primary source of funding for the utilities is derived from ongoing charges for service (user rates). Additional revenues are generated from capital facilities charges imposed on new development, miscellaneous fees and investment earnings. The City controls the level of user rates by ordinance, and, subject to statutory authority, can adjust rates as needed to meet financial obligations and objectives.

While the City operates a combined water/sewer utility enterprise fund, capital planning, financial planning and rate-setting is performed independently for each utility to provide for self-supporting water and sewer utilities. The City maintains a fund structure and implements financial policies that target management of a financially viable and fiscally responsible enterprise fund utility.

Funds

Separate accounting is maintained for restricted and unrestricted cash, and further segregated into operating and capital activities. While revenue and expense detail is identified separately for water and sewer, cash balances are reflected on a combined basis. For purposes of preparing the financial program for the sewer utility, cash balances were allocated between the two utilities on the basis of total revenues, total plant assets, and total debt payments, depending on the type of reserve. The City manages the following cash reserves:

Working Capital Reserve (WCR) – serves as an operating account where operating revenues are deposited and operating expenses are paid.

Operating Capital Reserve (OCR) – serves as an operating rate stabilization reserve, intended to help the utility avoid rate spikes in years of lower than planned revenue collections.

Capital Reserves – serves as a capital account where capital revenues are deposited (connection charges, grant proceeds, and debt proceeds) and capital expenditures are paid. Capital reserves also include annual transfers from the operating accounts when cash balances exceed target balance thresholds.

Restricted Bond Reserve - a restricted account set up to comply with revenue bond covenants, used to hold the final payment on outstanding revenue bond debt obligations.

Minimum balance thresholds for these reserves are discussed under the Financial Policies Section.

Financial Policies

A brief summary of the key financial policies employed by the City, as well as those recommended and incorporated in the financial program are discussed below:

Reserve Policies

Utility reserves serve multiple functions; they can be used to address variability and timing of expenditures and receipts; occasional disruptions in activities, costs or revenues; utility debt obligations; and many other functions. The collective use of individual reserves helps to limit the City's exposure to revenue shortfalls, meet long-term capital obligations, and reduce the potential for bond coverage defaults. Common reserves among municipal utilities are operating reserves, rate stabilization reserves, capital contingency reserves, and bond reserves. The City currently maintains a form of these reserves:

Operating Reserve – An operating reserve, or working capital reserve, provides a minimum unrestricted fund balance needed to accommodate the short-term cycles of revenues and expenses. These reserves are intended to address both anticipated and unanticipated changes in revenues and expenses. Anticipated changes may include billing and receipt cycles, payroll cycles, and other payables. Operating reserves can be used to meet short-term cash deficiencies due to the timing of annual revenues and expenditures. Generally, utilities target a certain number of days of working capital as a beginning cash balance to provide the liquidity needed to allow regular management of payable and payment cycles. Consistent with industry practice, the City maintains its working capital reserve at 45 days of operating and maintenance (O&M) expenses.

Rate Stabilization Reserves – A rate stabilization fund allows a utility to draw on the fund balance during revenue shortfalls that result from lower than expected customer consumption (or sewer flow). Conceptually, this reserve accounts for multi-year “ebbs and flows” by depositing money in good years so that funds are available to offset losses in bad years. Specifically, a rate stabilization reserve is a restricted fund balance intended to provide rate stability by mitigating unplanned variations in revenues and expenses. This type of reserve typically has defined uses and can be structured by policy to require Council approval before access to the funds; thus, the reserve does not serve the same day-day-operating purposes as the working capital reserve.

Although not explicitly called a rate stabilization reserve, the City has established an unrestricted reserve (operating capital reserve) to account for unanticipated fluctuations in revenues and expenses and provide for unforeseen contingencies. This reserve is funded at 12% of annual O&M expense.

Capital Contingency Reserve – A capital contingency reserve is an amount of cash set aside in case of an emergency should a piece of equipment or a portion of the utility’s infrastructure fail unexpectedly. Additionally, the reserve could be used for other unanticipated capital needs including capital project cost overruns. There are various approaches to identifying an appropriate level for this reserve, such as 1) identifying a percentage of a utility systems total costs of its fixed assets and, 2) determining the cost of replacing highly critical assets or facilities. The City’s policy is to maintain a balance equal to 10% of the six-year CIP.

Bond Reserve – Bond covenants often establish reserve requirements as a means of protecting an agency against the risk of nonpayment. This bond reserve can be funded with cash on hand, but is more often funded at the time of borrowing as part of the bond principal. This reserve requirement can also be met by using a surety bond. The City maintains a restricted bond reserve in compliance with its current bond covenants.

System Reinvestment Policies

The purpose of system reinvestment funding is to provide for the replacement of aging system facilities to ensure sustainability of the system for ongoing operation. Each year, the utility’s assets lose value, and as they lose value they are moving toward eventual replacement. That accumulating loss in value and future liability is typically measured for reporting purposes through annual depreciation expense, which is based on the original cost of the asset over its anticipated useful life. While this expense reflects the consumption of the existing asset and its original investment, the replacement of that asset will likely cost much more, factoring in inflation and construction conditions. Therefore, the added annual replacement liability is even greater than the annual depreciation expense.

The City’s policy for system reinvestment is based on a 50-year replacement cycle / cost analysis, which estimated the amount of annual cash necessary to be set aside from rates in order to replace the system with a targeted funding mix of 75% cash and 25% debt. The policy is implemented as a multiplier of annual depreciation expense.

Debt Policies

Bond covenants often establish a minimum debt coverage ratio as a means of protecting an agency against the risk of nonpayment. The City’s current bond covenants require a ratio of 1.25 times annual revenue bond debt service. The

City has established an internal policy for a generating a higher debt coverage ratio of 1.5x or greater. At a minimum, the City must maintain the debt coverage ratio stated in it bond covenants.

The City actively pursues low cost loans, where appropriate, and issues revenue bonds to finance capital costs in excess of available cash resources.

FUNDING AND FINANCING THE CIP

The capital funding plan defines a strategy for funding the CIP identified in this Plan, including an analysis of available resources from rate revenues, existing reserves, capital facilities charges, debt financing, and any special resources that might be readily available (e.g., grants, developer contributions, and so on). The capital funding plan impacts the financial plan through the use of debt financing (resulting in annual debt service) and the assumed level of rate revenues available for capital funding.

The CIP developed for this Plan identifies \$66.8 million (\$199.8 million inflated) in capital costs over the 20-year planning horizon. Costs are stated in 2009 dollars and escalated to the year of planned spending for financing projections. Current year 2008 projected capital spending is also included in the capital financing projections. Based on review of recent experience and current expectations, City staff provided capital cost escalation assumptions of 22% for 2009 through 2011, 8% for years 2012 through 2014, and 4% per year for remaining years.

Table 8.2 summarizes the annual costs associated with the 20-year CIP

Table 8.2 20-Year CIP		
Year	Current Day Dollars (2009)	Escalated Dollars
2008	\$1,506,000	\$1,506,000
2009	2,052,600	3,710,172
2010	-	-
2011	768,000	1,394,571
2012	1,500,000	2,941,674
2013	1,922,000	4,070,806
2014	1,676,000	3,833,759
2015-2029	57,385,000	182,299,012
Total	\$66,809,600	\$199,755,194

Available Funding Assistance and Financing Resources

Feasible long-term capital funding strategies should be defined to ensure adequate resources are available to fund the CIP identified in this Plan. In addition to the Utility's resources such as accumulated cash reserves, capital revenues, and rate revenues designated for capital purposes, capital needs can be met from outside sources such as grants, low-interest loans, and bond financing. The following is a summary of Utility Resources and Outside Resources.

Utility Resources

Utility resources appropriate for funding capital needs include accumulated cash in the CIP Funds, rate revenues designated for capital spending purposes, and capital revenues, such as capital facilities charges and other connection fees. The first two resources have been discussed in the Financial Policies section. Capital-related revenues are discussed below.

Capital Facilities Charges

A capital facilities charge (CFC), also called a "connection charge" as provided for by RCW 35.92.025, refers to a one-time charge imposed on new customers as a condition of connection to the utility system. The purpose of the CFC is two-fold: (1) to promote equity between new and existing customers; and (2) to provide a source of revenue to fund capital projects. Equity is served by providing a vehicle for new customers to share in the capital costs incurred to support their addition to the system. CFC revenues provide a source of cash flow used to support utility capital needs; revenue can only be used to fund utility capital projects or to pay debt service incurred to finance those projects. In the absence of a CFC, growth-related capital costs would be borne in large part by existing customers. In addition, the net investment in the utility already collected from existing customers, whether through rates, charges and/or assessments, would be diluted by the addition of new customers, effectively subsidizing new customers with prior customers' payments. To establish equity, a CFC should recover a proportionate share of the existing and future infrastructure costs from a new customer. From a financial perspective, a new customer should become financially equivalent to an existing customer by paying the CFC.

The City currently imposes a CFC of \$1,860 per customer equivalent. Based on current system investment and incorporating the eligible capital projects identified in this Plan, an updated charge of \$3,056 was derived.

Table 8.3 summarizes the CFC calculation per customer equivalent and **Table 8.4** provides the schedule of charges by meter size.

Table 8.3 CFC Calculation Summary	
	Dollars
EXISTING FACILITIES	
Plant-In-Service	
Sewer Utility Capital Assets	\$52,659,325
less: Contributed Capital	(23,755,218)
plus: Cumulative Interest on Non-Contributed Capital	10,326,138
less: Net Debt Principal Outstanding	-
Total Allocable Existing Facilities	\$39,230,245
FUTURE FACILITIES	
Capital Facilities Plan	
Total Future Projects	\$66,809,600
less: Identified Repair & Replacements	(43,167,678)
less: Contributed Capital	(13,708,667)
Total Allocable Future Facilities	\$9,933,256
CALCULATION	
TOTAL	
Total Allocable Costs	49,163,501
Total Customer Base (20 year planning period)	16,086
TOTAL CHARGE PER EQUIVALENT METER	\$3,056
<i>Current Charge</i>	\$1,860

Table 8.4 Schedule of CFCs by Meter Size			
Meter Size	Meter Capacity Factor	Charge	Fee Basis
5/8" Meter	1.0	\$3,056	per meter
3/4" Meter	1.0	\$3,056	per meter
1" Meter	2.5	\$7,641	per meter
1 1/2" Meter	5.0	\$15,282	per meter
2" Meter	8.0	\$24,451	per meter
3" Meter	16.0	\$48,902	per meter
4" Meter	25.0	\$76,409	per meter
6" Meter	50.0	\$152,819	per meter
8" Meter	80.0	\$244,510	per meter

Emergency Sewer Program

The City has an emergency sewer connection program where every other year it converts a group of septic system properties to sewer customers. The conversion costs are financed by the City with a 10-year customer repayment plan. The repayment stream is used as a supplemental capital resource.

Local Facilities Charges

While a CFC is the manner in which new customers pay their share of general facilities costs, local facilities funding is used to pay the costs of local facilities that connect each property to the system's infrastructure. Local facilities funding is often overlooked in a rate forecast since it is funded upfront by either connecting customers, developers, or through an assessment to properties - but never from rates. Although these funding mechanisms do not provide a capital revenue source toward funding CIP costs, the discussion of these charges is included in this chapter, as they are an impact to the new customer of the system.

There are a number of mechanisms that can be considered toward funding local facilities. One of the following scenarios typically occurs: (a) the utility charges a connection fee based on the cost of the local facilities (under the same authority as the CFC); (b) a developer funds extension of the system to their development and turns those facilities over to the utility (contributed capital); or (c) a local assessment is set up called a Utility Local Improvement District (ULID/LID) which collects tax revenue from benefited properties.

A Local Facilities Charge (LFC) is a variation of the connection charge authorized through RCW 35.92.025. It is a city-imposed charge to recover the cost related to service extension to local properties. Often called a front-footage charge and imposed on the basis of footage of main "fronting" a particular property, it is usually implemented as a reimbursement mechanism to a city for the cost of a local facility that directly serves a property. It is a form of connection charge and, as such, can accumulate up to 10 years of interest. It typically applies to instances where no developer-installed facilities are needed through developer extension due to the prior existence of available mains already serving the developing property. The City currently does not impose any form of local facilities charge in the sewer utility.

The Developer Extension is a requirement that a developer install onsite and sometimes offsite improvements as a condition of extending service. These are in addition to the CFC required and must be built to city standards. The City is authorized to enter into developer extension agreements under RCW 35.91.020. Part of the agreement between the City and the developer for the developer to extend service might include a late-comer agreement, resulting in a late-comer charge to new connections to the developer extension.

Latecomer Charges are a variation of developer extensions whereby a new customer connecting to a developer-installed improvement makes a payment to the City based on their share of the developers cost (RCW 35.91.020). The City passes this on to the developer who installed the facilities. This is part of the developer extension process, and defines the allocation of costs and records latecomer obligations on the title of affected properties. No interest is allowed, and the reimbursement agreement cannot exceed 15 years in duration.

LID/ULID is another mechanism for funding infrastructure that assesses benefited properties based on the special benefit received by the construction of specific facilities (RCW 35.43.042). Most often used for local facilities, some ULIDs also recover related general facilities costs. Substantial legal and procedural requirements can make this a relatively expensive process, and there are mechanisms by which a ULID can be rejected by a majority of property ownership within the assessment district boundary.

Outside Resources

Grants and Low Cost Loans

Historically, federal and state grant programs were available to local utilities for capital funding assistance. However, these assistance programs have been mostly eliminated, substantially reduced in scope and amount, or replaced by loan programs. Remaining miscellaneous grant programs are generally lightly funded and heavily subscribed. Nonetheless, the benefit of even the very low-interest loans makes the effort of applying worthwhile. Grants and low cost loans for Washington state utilities are available from the Department of Ecology and the Department of Community Trade and Economic Development. Each includes programs for which the City might be eligible. They are primarily targeted at sewer programs or low-income and/or rural communities.

Department of Ecology (from the FY 2008 Funding Guidelines)

The Department of Ecology Water Quality Program administers three major funding programs that provide low-interest loans, grants or loans and grant combinations for projects that protect, preserve and enhance water quality in Washington State.

Further detail is available in the FY 2008 Funding Guidelines document found at <http://www.ecy.wa.gov/pubs/0610062.pdf>.

Department of Community Trade and Economic Development (from the CTED website)

The Department of Community Trade and Economic Development has four grant and loan programs that the City might be eligible for:

- Community Development Block Grants General Purpose Grant
- Community Economic Revitalization Board Grant and Loan Program
- Public Works Trust Fund Loan Program

Community Development Block Grants General Purpose Grants – These grants are made available to Washington State small cities, towns and counties in carrying out significant community and economic development projects that principally benefit low and moderate income persons.

Eligible applicants are Washington State cities and towns with a population less than 50,000 and counties with a population less than 200,000 that are non-entitlement jurisdictions or are not participants in a HUD Urban County Entitlement Consortium.

Eligible projects include public facilities for water, wastewater, storm sewer and streets. Approximately \$12 million is expected to be available in 2008 with a maximum single grant amount of \$1 million.

The application period is September through November annually.

Community Economic Revitalization Board - CERB primarily offers low-cost loans; grants are made available only to the extent that a loan is not reasonably possible. The CERB targets public facility funding for economically disadvantaged communities, specifically targeting job creation and retention. Priority criteria include the unemployment rates, number of jobs created and/or retained, wage rates, projected private investment and estimated state and local revenues generated by the project. Traditional construction projects are offered at a maximum dollar limit per project of \$1 million. Local match of 25% is targeted.

Eligible applicants include cities, towns, port districts, special purpose districts, federally recognized Indian tribes, and municipal corporations.

The Board's policy is that all loans made by the CERB will be secured by a general obligation pledge of the taxing power of the borrowing entity. Terms do not exceed 20 years including available payment deferral of interest and principal for up to five years. Interest rates match the most current rate of Washington State bonds (not to exceed 10%).

Public Works Trust Fund – Cities, towns, counties and special purpose districts are eligible to receive loans. Water, sewer, storm, roads, bridges and

solid waste/recycling are eligible and funds may be used for repair, replacement, rehabilitation, reconstruction and improvements including reasonable growth (generally the 20-year growth projection in the comprehensive plan).

PWTF loans are available at interest rates of 0.5%, 1% and 2% with the lower interest rates given to applicants who pay a larger share of the total project costs. The loan applicant must provide a minimum local match of funds of 5% towards the project cost to qualify for a 2% loan, 10% for a 1% loan, and 15% for a 0.5% loan. The useful life of the project determines the loan term up to a maximum of 20 years.

Bond Financing

General Obligation Bonds – General obligation (G.O.) bonds are bonds secured by the full faith and credit of the issuing agency, committing all available tax and revenue resources to debt repayment. With this high level of commitment, G.O. bonds have relatively low interest rates and few financial restrictions. However, the authority to issue G.O. bonds is restricted in terms of the amount and use of the funds, as defined by Washington constitution and statute. Specifically, the amount of debt that can be issued is linked to assessed valuation.

RCW 39.36.020 states:

“(ii) Counties, cities, and towns are limited to an indebtedness amount not exceeding one and one-half percent of the value of the taxable property in such counties, cities, or towns without the assent of three-fifths of the voters therein voting at an election held for that purpose.

(b) In cases requiring such assent counties, cities, towns, and public hospital districts are limited to a total indebtedness of two and one-half percent of the value of the taxable property therein.”

While bonding capacity can limit availability of G.O. bonds for utility purposes, these can sometimes play a valuable role in project financing. A rate savings may be realized through two avenues: the lower interest rate and related bond costs; and the extension of repayment obligation to all tax-paying properties (not just developed properties) through the authorization of an ad valorem property tax levy.

Revenue Bonds – Revenue bonds are commonly used to fund utility capital improvements. The debt is secured by the revenues of the issuing utility and the debt obligation does not extend to the City’s other revenue sources. With this limited commitment, revenue bonds typically bear higher interest rates than G.O. bonds and also require security conditions related to the maintenance of dedicated reserves (a bond reserve) and financial performance

(added bond debt service coverage). The City agrees to satisfy these requirements by ordinance as a condition of bond sale.

Revenue bonds can be issued in Washington without a public vote. There is no bonding limit, except perhaps the practical limit of the utility's ability to generate sufficient revenue to repay the debt and provide coverage. In some cases, poor credit might make issuing bonds problematic.

Capital Financing Strategy

An ideal funding strategy would include the use of grants and low-cost loans when debt issuance is required. However, these resources are very limited and competitive in nature and do not provide a reliable source of funding for planning purposes. It is recommended that the City pursue these funding avenues but assume bond financing to meet needs above the utility's available cash resources. G.O bonds may be useful for special circumstances, but due to the bonding capacity limits are most often reserved for other City (non-utility) purposes. Revenue bonds are a more secure financing mechanism for utility needs. The Capital Financing Strategy developed to fund the CIP identified in this Plan assumes the following funding priority:

1. Accumulated capital cash reserves
2. Annual revenue collections from capital facilities charges (CFCs)
3. Annual transfers of rate-funded capital or excess cash (above minimum balance targets) from operating accounts
4. Interest earnings on CIP Fund balances and other miscellaneous capital resources
5. Revenue bond financing

The cash in the combined water/sewer CIP Funds was allocated between water and sewer in proportion to plant assets. The resulting sewer CIP fund begins 2008 with a cash balance of \$5.5 million. The City plans on system reinvestment funding from rates of \$817,991 and CFC revenue collections are budgeted at \$350,000 in 2008. Future CFC collections are projected at about \$180,000 annually based on the updated CFC and system plan growth projections of 0.4% annually.

The six-year CIP is projected to be 100% cash-funded. The 20-year CIP is forecasted to be funded 53% from cash with remaining needs funded from revenue bonds.

Table 8.5 presents the 20-year Capital Financing Strategy.

Table 8.5 20-year Capital Financing Strategy					
Year	Capital Expenditures 2009 Dollars	Capital Expenditures Escalated	Financing Resources		
			Cash Reserves	Revenue Bond Proceeds	Total Financing Resources
2008	\$1,506,000	\$1,506,000	\$1,506,000	-	\$1,506,000
2009	2,052,600	3,710,172	3,710,172	-	3,710,172
2010	-	-	-	-	-
2011	768,000	1,394,571	1,394,571	-	1,394,571
2012	1,500,000	2,941,674	2,941,674	-	2,941,674
2013	1,922,000	4,070,806	4,070,806	-	4,070,806
2014	1,676,000	3,833,759	3,833,759	-	3,833,759
2015-2029	57,385,000	182,299,012	88,437,063	93,861,949	182,299,012
Total	\$66,809,600	\$199,755,194	\$105,894,045	\$93,861,949	\$199,755,194

FINANCIAL FORECAST

The Financial Forecast, or revenue requirement analysis, forecasts the amount of annual revenue that needs to be generated by rates. The analysis incorporates operating revenues, operating and maintenance (O&M) expenses, debt service payments, rate funded capital needs, and any other identified revenues or expenses related to utility operations, and determines the sufficiency of the current level of rates. Revenue needs are also impacted by debt covenants (typically applicable to revenue bonds) and specific fiscal policies and financial goals of the utility.

The analysis determines the amount of revenue needed in a given year to meet that year’s expected financial obligations. For this analysis, two revenue sufficiency criteria have been developed to reflect the financial goals and constraints of the utility: (1) cash needs must be met; and (2) debt coverage requirements must be realized. In order to operate successfully with respect to these goals, both tests of revenue sufficiency must be met.

Cash Test

The cash flow test identifies all known cash requirements for the utility in each year of the planning period. Capital needs are identified and a capital funding strategy is established. This may include the use of debt, cash reserves, outside assistance, and rate funding. Cash requirements to be funded from rates are determined. Typically, these include O&M expenses, debt

service payments, system reinvestment funding or directly funded capital outlays, and any additions to specified reserve balances. The total annual cash needs of the utility are then compared to projected cash revenues using the current rate structure. Any projected revenue shortfalls are identified and the rate increases necessary to make up the shortfall are estimated.

Coverage Test

The coverage test is based on a commitment made by the City when issuing revenue bonds and some other forms of long-term debt. For purposes of this analysis, revenue bond debt is assumed for any needed debt issuance. As a security condition of issuance, the City is required per covenant to agree that the revenue bond debt would have a higher priority for payment (a senior lien) compared to most other utility expenditures; the only outlays with a higher lien are O&M expenses. Debt service coverage is expressed as a multiplier of the annual revenue bond debt service payment. For example, a 1.0 coverage factor would imply no additional cushion is required. A 1.25 coverage factor means revenues must be sufficient to pay O&M expenses, annual revenue bond debt service payments, plus an additional 25% of annual revenue bond debt service payments. The excess cash flow derived from the added coverage, if any, can be used for any utility purpose, including funding capital projects. The coverage requirement on the City's outstanding revenue bonds is 1.25 times bond debt, including CFC revenues. The City's internal policy is to meet the higher standard of 1.50 times bond debt, excluding CFC revenues.

In determining the annual revenue requirement, both the cash and coverage sufficiency tests must be met – the test with the greatest deficiency drives the level of needed rate increase in any given year.

Financial Forecast

The financial forecast is developed from the 2008 budget documents along with other key factors and assumptions to develop a complete portrayal of the sewer utility annual financial obligations. The following is a list of the key revenue and expense factors and assumptions used to develop the forecast:

- Annual customer growth is estimated at 1.35% in 2009, based on current City projections, and 0.40% per year thereafter, consistent with the population projections identified in this Plan.
- A combination of historical performance, estimated 2008 year-end performance, and the 2008 budget form the baseline for revenue and expense forecasts.
- Rate revenues include revenues generated from the City's local collection charges and from King Country Metro (Metro) treatment charges. City rate revenues (under existing rates) are forecasted

- incorporating customer growth. Metro charges are treated as a direct pass-through and incorporate customer growth and Metro's current rate forecast.
- Other operating revenue includes fines, penalties and fees, and other miscellaneous revenue and are forecasted to increase with growth and/or inflation depending upon the type of revenue.
- Interest earnings assume a rate of 3% applied to beginning of year cash balances.
- O&M expenses are escalated from the 2008 budget figures at 3% per year for general cost inflation and 6% for extraordinary cost inflation. State taxes are calculated based on prevailing tax rates.
- Existing debt service schedules were provided by the City and include two revenue bond issues, scheduled to be paid off in years 2012 and 2014, and several Public Works Trust Fund loans with varying pay off schedules (ranging from 2013 to 2024).
- Future debt service has been added as outlined in the capital funding plan. The forecast assumes a revenue bond interest rate of 5%, issuance cost of 2%, and a 20-year term. No bond issues are needed to fund the six-year CIP. Bond issue needs begin in 2015.
- Annual rate-funded capital (system reinvestment funding) is forecasted at policy levels (multiplier of annual depreciation expense).

Although the financial plan is completed for the 20-year time horizon of this Plan, the rate strategy focuses on the shorter term planning period of 2008 through 2014. It is imperative that the City revisit the proposed rates every two to three years to ensure that the rate projections developed remain adequate. Any significant changes should be incorporated into the financial plan and future rates adjusted as needed.

Table 8.6 summarizes the projected financial performance and rate requirements for 2008 through 2014 based on the above assumptions.

Table 8.6
Financial Forecast

Revenue Requirements Summary	2008	2009	2010	2011	2012	2013	2014
Revenues							
Rate Revenue - Local (w/ existing rates)	\$3,759,096	\$3,809,844	\$3,825,083	\$3,840,384	\$3,855,745	\$3,871,168	\$3,886,653
Rate Revenue - King County Treatment	4,967,712	5,746,310	5,769,295	6,558,120	7,079,906	7,282,293	7,603,879
Other Revenues	60,656	61,475	61,721	61,968	62,216	62,464	62,714
Interest Earnings	<u>90,541</u>	<u>80,951</u>	<u>81,425</u>	<u>83,243</u>	<u>83,243</u>	<u>77,854</u>	<u>77,854</u>
Total Revenues	\$8,878,005	\$9,698,579	\$9,737,524	\$10,543,715	\$11,081,109	\$11,293,779	\$11,631,100
Expenses							
Operating & Maintenance Expenses	\$1,689,214	\$1,781,376	\$1,858,520	\$1,950,155	\$2,046,946	\$2,149,194	\$2,257,217
King County Metro Treatment Expense	4,967,712	5,746,310	5,769,295	6,558,120	7,079,906	7,282,293	7,603,879
Existing Debt Service	755,528	752,556	748,688	750,311	436,952	578,430	288,572
New Debt Service	-	-	-	-	-	-	-
Rate-Funded System Reinvestment	<u>817,991</u>	<u>1,402,545</u>	<u>1,579,058</u>	<u>1,579,058</u>	<u>1,954,570</u>	<u>1,939,955</u>	<u>2,074,292</u>
Additions to Operating Reserves	-	-	-	-	-	-	<u>48,052</u>
Total Expenses	\$8,230,445	\$9,682,787	\$9,955,561	\$10,837,644	\$11,518,374	\$11,949,872	\$12,272,011
Annual Surplus/ Deficiency)	\$647,560	\$15,792	\$(218,038)	\$(293,930)	\$(437,264)	\$(656,093)	\$(640,912)
Annual Rate Adjustment	0.00%	8.04%	2.99%	7.87%	5.97%	3.48%	2.46%
Cumulative Rate Adjustment	0.00%	8.04%	11.28%	20.03%	27.20%	31.62%	34.86%
Ending Working Capital Fund Balance	\$1,091,299	\$1,107,092	\$1,167,700	\$1,167,700	\$1,167,700	\$1,167,700	\$1,233,557
Actual Days of O&M:	60	54	56	50	47	45	46
Minimum Target Balance [45 days]:	\$818,475	\$928,071	\$940,416	\$1,048,965	\$1,122,154	\$1,162,786	\$1,215,752

Forecasted rate increases for the sewer utility are summarized in three components: (1) The City’s local collection charges are forecast to increase by a total of 17.5% over the six-year period; (2) the pass-through Metro treatment charge is forecast to increase by 48% over the next six years; and, 3) on a combined, or weighted basis, the customer impact is forecasted to be about a 35% increase over six years.

CURRENT AND PROJECTED RATES

The City’s existing sewer rates are comprised of a fixed charge and a volume charge per hundred cubic feet (ccf) of average monthly winter water use. The City’s system winter average is 6 ccf per month. The City also passes through the King County Metro treatment charge.

Table 8.7 presents a comparison of current and projected rates. **Table 8.8** presents associated sample residential sewer bills.

Table 8.7 Current and Projected Rates							
Bi-Monthly Sewer Rates	2008 Rate	2009 Projected	2010 Projected	2011 Projected	2012 Projected	2013 Projected	2014 Projected
King County - Monthly Wholesale Charge	\$27.95	\$31.90	\$31.90	\$36.12	\$38.84	\$39.79	\$41.38
Bi-Monthly Equivalent	\$55.90	\$63.80	\$63.80	\$72.23	\$77.67	\$79.57	\$82.76
Consumption charge per unit of average winter water consumed	\$3.44	\$3.44	\$3.70	\$3.71	\$3.84	\$4.04	\$4.04
System Winter Average 6 ccf per month - 12 ccf for bi-monthly bill	12.00	12.00	12.00	12.00	12.00	12.00	12.00
Kirkland Wastewater Average Bi-monthly	\$41.28	\$41.28	\$44.38	\$44.53	\$46.10	\$48.48	\$48.48
Total Average Bi-monthly Sewer Bill	\$97.18	\$105.08	\$108.18	\$116.77	\$123.77	\$128.06	\$131.24
Total Average Monthly Sewer Bill	\$48.59	\$73.18	\$76.28	\$80.65	\$84.94	\$88.27	\$89.86

Table 8.8 Sample Residential Bill	
Rates in Year	Sample Bill
2008	\$48.59
2009	\$73.18
2010	\$76.28
2011	\$80.65
2012	\$84.94
2013	\$88.27
2014	\$89.86

Affordability

A common affordability benchmark for utility rates is to test the monthly medium income equivalent against the existing and projected monthly utility rates. If monthly bills are less than 1.5% of the median household income for the demographic area, they are generally considered affordable. The median household income for Kirkland in the 2000 census was \$60,332. Median income is forecasted to include 3% annual escalation. **Table 8.9** presents the City’s single family residential monthly sewer bills over the forecast period, tested against the 1.5% threshold. As shown in the table, the City’s sewer rates remain within the affordability range.

Table 8.8 Affordability				
Year	Annual Median Income	Income Escalator	1.50% Monthly	Projected Bill
2000	\$60,332	3%	\$75.42	
2001	\$62,142	3%	\$77.68	
2002	\$64,006	3%	\$80.01	
2003	\$65,926	3%	\$82.41	
2004	\$67,904	3%	\$84.88	
2005	\$69,941	3%	\$87.43	
2006	\$72,040	3%	\$90.05	
2007	\$74,201	3%	\$92.75	
2008	\$76,427	3%	\$95.53	\$48.59
2009	\$78,720	3%	\$98.40	\$73.18
2010	\$81,081	3%	\$101.35	\$76.28

Year	Annual Median Income	Income Escalator	1.50% Monthly	Projected Bill
2011	\$83,514	3%	\$104.39	\$80.65
2012	\$86,019	3%	\$107.52	\$84.94
2013	\$88,600	3%	\$110.75	\$88.27
2014	\$91,258	3%	\$114.07	\$89.86

CONCLUSION

The financial analysis indicates that the City will maintain reasonable sewer rate levels while financing the capital projects identified in this Plan. The City has in place fiscal policies, such as system reinvestment funding, that will allow the City to continue to maintain strong fiscal and financial health of the sewer utility.

These findings are dependent on the City increasing rates and charges as identified in this chapter and on the source data and assumptions used in the financial forecast. Should there be significant change to the assumptions such as changes to costs or timing of the CIP, financial forecast findings would change as well.

INTRODUCTION

This chapter provides an overview of Kirkland's sewer system responsibility and authority, system operation and control, management program, emergency response, and preventative measures. More information regarding certain programs is available from the City and has been referenced in this chapter.

MANAGEMENT AND OPERATIONS RESPONSIBILITY

The responsibilities for the day-to-day management of the City's sewer system including operation, maintenance and administration are listed below.

City Council

The City Council includes a Mayor, Deputy Mayor and five City Council members, each serving four-year terms. The City Council holds regular meetings at City Hall on the first and third Tuesday of each month. A record of all resolutions adopted by the Council is maintained at City Hall.

The current elected members are:

Mayor: James L. Lauinger

Deputy Mayor: Joan McBride

Council Member: Dave Asher

Council Member: Mary-Alyce Burleigh

Council Member: Jessica Greenway

Council Member: Tom Hodgson

Council Member: Bob Sternoff

PUBLIC WORKS DEPARTMENT

The Department of Public Works functions under the direction of a Director of Public Works, who is appointed by the City Manager. The current wastewater maintenance staff consists of maintenance and service personnel that function under the direction of the Storm and Sewer Division Manager, Bobbi Wallace. The sewer system tasks performed by the operations and maintenance staff include inspection, testing, installation and repair of system facilities, routine operation and preventive maintenance, recordkeeping, administrative tasks, general clerical work, and corrective or breakdown maintenance required in response to emergencies.

The City annually allocates funds for personnel training, certification and membership in professional organizations. The City believes the benefits of improved safety, skill and confidence greatly outweigh the time and costs of training, certification and affiliation with professional organizations.

Personnel Responsibilities

The key responsibilities of the wastewater operations and maintenance staff, as well as other staff that support the operation and maintenance activities of the City, are summarized as follows.

Public Works Director: Oversees, directs and controls the administration, operation, installation, maintenance and repair activities involving the City Public Works Department and coordinates with other City departments.

Sewer Division Manager: Plans, directs, organizes and administers all activities of the sewer division to provide efficient, effective and timely services. Performs a full range of managerial duties that are complex in both breadth and depth. Issues are often obscure, politically sensitive and have considerable public exposure. Responsible for personnel management, including performance evaluations and coordinating monthly team meetings, keeping production records, annual work planning, financial administration, long-range strategic planning, and development and implementation of complex operational changes. Manages and coordinates regional sewer utility activities with other cities, districts, state agencies and regional organizations, (such as decant discharge permits from King County), for the division and makes recommendations to the Public Works Director, City Manager and City Council.

Sewer Division Lead: Under the direction of the Sewer Division Manager. Oversees the scheduling of daily sewer maintenance staff. Plans, organizes and supervises the work of employees assigned to the maintenance staff. Trains staff as necessary.

Senior Maintenance Worker: Performs maintenance of the City sewer system and appurtenances. Coordinates field crew activities and operates heavy equipment. May inspect vendors for fats, oils and grease (FOG).

Utility Person: Performs general operational, maintenance, repair or construction tasks ensuring the effective operations of the City. Performs varied manual labor. May inspect vendors for fats, oils and grease (FOG).

Public Works Director, Daryl Grigsby – 3 years

Capital Projects Manager, Ray Steiger – 19 years

Development Engineering Manager, Rob Jammerman – 20 years

Transportation Engineering Manager, Dave Godfrey – 15 years

Street, Grounds and Fleet Manager, John Hopfauf – 20 years

Surface Water and Waste Water Manager, Bobbi Wallace – 2 years

Water Manager, Greg Neumann – 20 years

O&M Administration and Facilities Manager, Erin Leonhart – 10 years

Administration

Senior Public Works Accountant, Mike Reardon – 25 years, Accounting Support

Associate IV, Eileen Sanders – 4 years, Teri Woolley – 2 years

Engineering

Capital Projects Supervisor, Dave Snider – 17 years

Project Engineers, Don Anderson – 4 years, Gina Hortillosa – 4 years, Noel Hupprich – 5 years, Denise Pirolo – 5 years, Rod Steitzer – 5 years, Andrea Mast – 2 years

Operations and Maintenance Division

Surface Water and Waste Water Manager, Bobbi Wallace – 2 years

Surface Water and Waste Water Lead, Seppo Tervo – 18 years

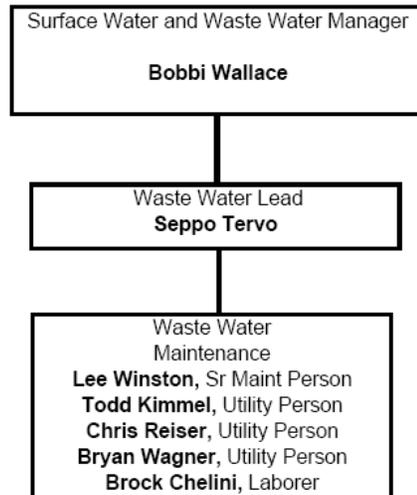
Wastewater Maintenance Workers:

Lee Winston – Senior Maintenance Person, 9 years

Todd Kimmel – Utility Person, 4 years

Chris Reiser – Utility Person, 7 months

Bryan Wagner – Utility Person, 3 months



PROFESSIONAL DEVELOPMENT

The City encourages professional growth among its staff members and has policies in place that support this position.

Employee Training

All maintenance personnel will be trained in the procedures and techniques necessary to efficiently perform their job descriptions. The City encourages employee participation in workshops, seminars, and other education program to improve job skills.

Maintenance Personnel

Maintenance will be performed by the sewer maintenance staff and will be supervised by the Field Lead Person.

Employee Certification

The City will pay fees and employee labor for the required certification testing, as well as required annual renewal fees.

ROUTINE OPERATION AND PREVENTATIVE MAINTENANCE

The key to routine operation is the ongoing maintenance and inspection of all sanitary sewer infrastructure and facilities.

City of Kirkland uses Hansen MMIS to track maintenance as well as associated costs.

GIS is used to map the Sanitary Sewer system. The field data collection for the map data upkeep is performed by the field crew. These changes are then forwarded to the GIS Dept. in order to update the data bases.

Daily Facility Maintenance

Receive and analyze telemetry readings – Lift Stations.

Weekly Facility Maintenance

Evaluate Pump Station Reports – Lift Stations. City crews perform all maintenance except rewiring meters.

Routine sewer main repairs are performed by maintenance staff. The City of Kirkland has a pipeline video truck and these repairs are based on and prioritized using this inspection data.

Monthly Facility Maintenance

Change filters – Lift Stations

Clean probes – Lift Stations

Clean priming tanks – Lift Stations

Run vibration tests – Lift Stations

Downtown Kirkland sewer lines have a grease problem and need monthly cleaning. These lines are shown on **Figure 5.1** in Chapter 5.

A list of mains that requires monthly inspection and rodding is included in **Appendix G**.

A list of mains that requires inspections and roddings six times per year (February, April, June, August, October, December) is included in **Appendix G**.

Quarterly Facility Maintenance

All sewer lift station wet wells are cleaned annually, except Plaza Lift Station, which is done every two weeks.

Annual Facility Maintenance

Flushing of sewer mains occurs twice a year. The areas with difficult access or mains that are too long for rodding receive focused attention.

Inspect every manhole at least once a year.

Entire sewer system is cleaned every 3 years.

Generator maintenance – Contracted out.

On-Going or Periodic Facility Maintenance

Maintain building and site – Lift Stations

EQUIPMENT, SUPPLIES AND CHEMICAL INVENTORY

The City has many types of equipment available for daily routine operation and maintenance of the sewer system. The equipment is stored at the City's maintenance facility. If additional equipment is required for specific projects, the City will rent or contract with a local contractor for the services needed. A list of major equipment used in the normal operation of the wastewater system is shown below in **Table 9.1**. The City has a central fleet operation, and other divisions and departments have equipment that can supplement that assigned to the sewer division, if needed.

An inventory of supplies in sufficient quantities for normal system operation and maintenance and short-term emergencies is stored at the department warehouse. The City also maintains a central warehouse of supplies that is adequate for routine (and most emergency) needs. There is a computerized inventory system that lists all “in-stock” supplies, including location and quantity.

Table 9.1 lists the vehicles and equipment that the City currently owns.

Table 9.1 Public Works - Sewer Vehicles				
Vehicle #	Model Year (Year Acquired)	Description	Replacement Date	Replacement Cost
D-03	2006	International Dump truck - 5 Yd.	6/1/2019	\$184,204
F-10	2002	Dodge Flatbed w/Crane	6/1/2010	\$45,751
F-17	2004	UD Cabover Dump Body	6/1/2014	\$94,117
F-19	2008	Ford Flat Bed F350 w/Crane	6/1/2016	\$48,099
K-01	2006	Ford F450 Video Camera Truck	6/1/2018	\$217,196
PU-47	1999	Ford F250 Ext. Cab. XL w/Crane	6/1/2009	\$27,186
PU-71	2008	Ford F250 (4x4)	6/1/2015	\$33,202
TL-11	1988	Wisconsin Trailer	6/1/2015	\$18,329
TR-07A*	2003	Case Backhoe 580SM (4X4)	6/1/2013	\$112,132
U-05	2000	Ford F450 Utility Truck	6/1/2009	\$54,670
V-03	2006	International Aquatech	6/1/2016	\$330,793
V-04	2006	International Aquatech	6/1/2016	\$330,793

EMERGENCY RESPONSE PROGRAM

The City is equipped with the necessary tools to deal with common and serious emergencies associated with sewer system failures. If a more serious emergency should develop, the City will hire a local contractor to make repairs to alleviate the emergency condition.

Key or "on-call" personnel can be reached by 911 or the City of Kirkland Police Department at 425-587-3400. The police dispatch operator calls or pages the Public Works "on-call" person. This person checks the emergency situation and calls the necessary crew to respond and resolve the situation.

The on-call person can respond to emergency calls within 30 minutes. A list of emergency telephone numbers is provided to each on-call employee. New employees are not placed on-call until they are familiar with the sewer system and maintenance procedures.

Some critical repair parts, tools and equipment are kept on-hand and maintained in a fully operational condition. As repair parts are used they are re-ordered. Inventory is kept current and is adequate for most common emergencies that can be reasonably anticipated. The City has access to an

inventory of repair parts, including parts required for repair of each type and size of pipe within the service area.

Emergency Call-Up List

Police 24/7, Public Works Telephone, M-F, 8:00 – 4:00, On-Call worker 3:00 pm to 6:30 am M-F and 24/7 on weekends, normal maintenance crew 6:30 – 3:00, After hour phone number – 425-587-3400 (Police Department Dispatch)

Sewage Spills

Department of Ecology (Northwest Region) – 425-649-7000

Seattle-King County Department of Public Health 206-296-4500

King County Right-of-Way Emergencies

King County Utility Inspections – 206-296-8122 (Ryan Harris)

Material Suppliers

Table 9.2 Material Suppliers			
Name	Address	Phone	Products
US Filter	Seattle, WA 98110	425-483-2724	Fittings, Hydrants, and Meters
HD Fowler	13440 Southeast 30th Street Bellevue, WA 98004	425-746-8400	Fittings, Hydrants, and Meters
Familian Northwest	1012 132nd Street Southwest Everett, WA 98204	425-483-8800	Fittings and Hydrants
Western Utilities/Hughes Supply	4106 134th Street Northeast Marysville, WA 98270	206-722-4800	Fittings, Hydrants, and Meters
Abrasives Northwest	1114 Andover Park West, Tukwila, WA 98188	206-575-0735	Sandblasting Media
Sanderson Safety	2600 Airport Way South, Seattle, WA 98134	800-547-0927	Safety Supplies, Sandblasting Safety Equipment
RH2 Engineering - Jim Swanson	12100 NE 195th St. Bothell, WA	425-951-5318	Telemetry Technical
Nelson Tool and Equipment, LLC	1411 Northeast 63rd Court, Redmond, WA 98052	425-702-9295	Hole Hog Repair
Stellar Industrial Supply	510 South Front Street, Seattle, WA 98108	800-410-2399	Marking Paint

**Table 9.2
Material Suppliers**

Name	Address	Phone	Products
AM Test, Inc.	14603 Northeast 87th Street, Redmond, WA 98052	425-885-1664	Water Testing
Ackley Tools Co.	5931 238th Street Southeast, Woodinville, WA 98072	425-481-6000	Metro Tech, Ditch Witch
Long Painting Company	21414 68th Avenue South, Kent, WA 98032	253-234-8050	Reservoir Painting
Interstate Coatings	754 South Chicago Street, Seattle, WA 98108	206-762-1320	Reservoir Interior Coating
Kelly Moore Preservative Paints	6220 Evergreen Way, Everett, WA 98203	425-353-7825	Hydrant and Valve Paint
Jones Painting, Inc.	1513 138th Street South, Tacoma, WA 98444	253-536-4160	Reservoir Painting
Baily & Associates	4919 52nd Avenue South, Seattle, WA	425-413-9043	Paint & Coatings Inspection
MetroCall	3015 112th Ave NE, Bellevue, WA	425-803-1530	Standby Pager
Arch Paging	Everett, WA 98201	425-252-9232	Telemetry Pager
Verizon		Dennis O'Brien 425-603-2758	Cell Phone Service
Verizon		Robin 800-483-6000 x8478	Telemetry Circuits
Hach Company	5600 Lindbergh Drive, Loveland, CO 80538	800-227-4224	Water Testing and Sampling Supplies
B&J Industrials			Hand Tools
Grainger Industrial Supply	2221 120th Blvd NE, Bellevue, WA 98004	425-462-0964	Hand Tools, Heaters, Safety Supplies
Crown Delta Environmental, Inc.	309 South Cloverdale Street, Seattle, WA 98108	206-763-5232	AC Pipe Removal
USA Leak Detection		206-725-1451	Leak Detection Services
Columbia Basin Water Works	1803 Basin Street Southwest, Ephrata, WA 98223	800-433-3611	Master Meter Testing
Custom Security Systems	Gary Nino, PO Box 3407 Lacey, WA 98509	800-227-0945	Rose Hill Building and South Reservoir Alarms

Emergency Management Plan

The City of Kirkland has developed a Comprehensive Emergency Management Plan. The Plan provides the order of proper procedures and chain of command in case of a sewer failure. The Public Works Director (or designee) will function as the Emergency Coordination Center Incident Commander during designated major emergencies or disasters that require significant essential department functions and management by Public Works. A copy of the City's Plan is on file at City Hall.

Appendix A

State Environmental Policy Act (SEPA) Determination

TO BE INSERTED LATER

Appendix B

Approvals

TO BE INSERTED LATER

Appendix C

Agency Comments/Responses

TO BE INSERTED LATER

Appendix D

Existing Service Agreements

RESOLUTION NO. R - 2687

A RESOLUTION OF THE KIRKLAND CITY COUNCIL AUTHORIZING THE CITY MANAGER TO SIGN ON BEHALF OF THE CITY OF KIRKLAND AN AGREEMENT WITH THE CITY OF BELLEVUE TO PROVIDE SANITARY SEWER SERVICE TO AN AREA WITHIN THE CITY OF KIRKLAND ADJACENT TO THE CITY OF BELLEVUE WITHIN THE VICINITY OF WATERSHED PARK.

WHEREAS, both the City of Kirkland and the City of Bellevue are authorized by State law to enter into interlocal governmental cooperative agreements; and

WHEREAS, the area described and designated within Exhibit "A" (attached hereto and by this reference incorporated herein) as subject area lies within the City of Kirkland and sewer service area of the City of Kirkland Sanitary Sewer System; and

WHEREAS; said area is not presently connected to the Kirkland Sanitary Sewer System, and because of the topography of the area may not readily be so connected; and

WHEREAS, the service area and corporate boundaries of the City of Bellevue and its sanitary sewer system lie adjacent to the subject area and the subject area can conveniently be connected into a Bellevue Sewer System facility existing or under construction; and

WHEREAS, both parties are desirous where possible and convenient to mutually assist one another,.

NOW, THEREFORE, be it resolved by the City Council of the City of Kirkland as follows:

Section 1. That certain agreement relating to sanitary sewer service, attached to the original of this Resolution as Exhibit "A" and by this reference incorporated herein, is hereby approved by the Kirkland City Council, and the City Manager for the City of Kirkland is hereby authorized and directed to sign said contract on behalf of the City of Kirkland.

PASSED by majority vote of the Kirkland City Council in regular meeting on the 17th day of December, 1979.

SIGNED IN AUTHENTICATION thereof on the 17th day of December, 1979.

s/ Robert L. Neir
MAYOR

ATTEST:

s/ Tom J. Anderson
Director of Administration & Finance
(ex officio City Clerk)

I hereby certify that the foregoing is a true and
correct copy of a Resolution of the City of Kirk-
land and that the same was published or posted ac-
cording to law, said Resolution being No. R-2687
entitled "A Resolution as above."

Donald Jensen - City Clerk

R-2687

AGREEMENT

This agreement made and entered into this day by and between the City of Kirkland, an optional code city, hereinafter referred to as "Kirkland" and the City of Bellevue, an optional code city, hereinafter referred to as "Bellevue",

W I T N E S S E T H :

WHEREAS, both Kirkland and Bellevue are authorized by State law to enter into cooperative agreements; and

WHEREAS, the area described and designated on Exhibit "A" (attached hereto and by this reference incorporated herein) as subject area of the City of Kirkland sanitary sewer system; and

WHEREAS, said area is not presently connected to the Kirkland sanitary sewer system, and because of the topography of the area, may not readily be so connected; and

WHEREAS, the service area and corporate boundaries of the City of Bellevue and its sanitary sewer system lie adjacent to the subject area and the subject area can conveniently be connected into a Bellevue sewer system facility existing or under construction; and

WHEREAS, both parties are desirous where possible and convenient to mutually assist one another.

NOW, THEREFORE, in consideration of the agreements herein contained, it is agreed as follows:

Section 1. All sanitary sewer facilities to be constructed within the subject area described and designated on Exhibit "A", as attached hereto and by this reference incorporated herein, shall upon construction and acceptance, become for all purposes, including customer service charges and maintenance,

part of the Kirkland sanitary sewer system, but may, nevertheless, be connected into the Bellevue sewer system sanitary facility line lying within 10 feet and at the point so designated as "connection point" on Exhibit "A".

Section 2. Bellevue agrees to accept all sewage entering into its system through said connection point and to convey same through its system to its connection with the municipality of Metropolitan Seattle System.

Section 3. No part of the cost of construction of the sanitary sewer facilities to be constructed within subject area, nor any of its future maintenance or repair, shall be borne by the City of Bellevue.

Section 4. City of Kirkland agrees to pay over to City of Bellevue as to each property within subject area, as it makes sewer connection, an amount equal to 1.6¢ per square foot of area of each property. In addition thereto, Kirkland will pay to Bellevue a monthly service trunkage charge in an amount equal to 12¢ per month per residential customer or residential equivalent, actually connected and served by the facilities of the Kirkland sewer system within the subject area.

Section 5. Neither party shall by virtue of this agreement acquire any proprietary or governmental interest in the sewage system or sewer line of the other party. Each party shall be solely responsible for the operation and maintenance of its own system of sewage collection and shall save the other party harmless from any claim for damage, real or imaginary, made by a third party, and alleging negligence or misfeasance in the operation or maintenance of the other party's system, or in the acts or omissions of its own officers or employees.

Section 6. This writing embodies the entire agreement of the parties. There are no promises, terms, conditions, or obligations other than those contained herein. This agreement may be amended only by written instrument signed by both parties.

Section 7. No waiver by either party of any term or condition of this agreement shall be deemed or construed as a waiver of any other term or condition, nor shall a waiver of any subsequent breach, whether of the same or of a different provision of this agreement.

Section 8. This agreement shall terminate upon 6 months written notice given by either party to the other party. In the event of termination under this paragraph, all costs of disconnection shall be borne by the party requesting the termination.

THIS AGREEMENT SIGNED the 20 day of December, 1979.

CITY OF KIRKLAND

By Allen B. Fike

CITY OF BELLEVUE

By _____

Execution of this agreement approved on behalf of the City of Bellevue by resolution of its City Council, adopted the _____ day of _____, 1979, and authorized by the City of Kirkland by Resolution No. R-2687 of the Kirkland City Council, adopted the 17th day of December, 1979.

RESOLUTION R 3118

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF KIRKLAND AUTHORIZING AND DIRECTING THE CITY MANAGER TO SIGN ON BEHALF OF THE CITY OF KIRKLAND, THAT CERTAIN INTERLOCAL GOVERNMENTAL AGREEMENT WITH THE CITY OF BELLEVUE, FOR THE PROVISION OF SANITARY SEWER SERVICE WITHIN THAT AREA OF KIRKLAND LYING WEST OF AND ADJACENT TO BRIDLE TRAILS STATE PARK.

Whereas, both Kirkland and Bellevue are authorized by state law to enter into cooperative agreements; and

Whereas; that area of the City of Kirkland within its sanitary sewer system service area, adjacent to Bridle Trails State Park as more specifically described in Exhibit A hereto, and by this reference incorporated herein, is not presently connected to the Kirkland sanitary sewer system, and because of the topography of the area may not readily be so connected; and

Whereas, the service area and corporate boundaries of the City of Bellevue and its sanitary sewer system lie adjacent to the subject area, and the subject area can conveniently be connected into a Bellevue sewer system facility existing or under construction; and

Whereas, both parties are desirous where possible and convenient to mutually assist one another, now, therefore,

Be it resolved by the City Council of the City of Kirkland as follows:

Section 1, The proposed interlocal governmental cooperative agreement between the City of Kirkland and the City of Bellevue, for the provision of sanitary sewer service to that area of Kirkland lying west of and adjacent to Bridle Trails State Park, as set forth in Exhibit A, attached to the original of this resolution and by this reference incorporated herein, is approved by the City Council. The City Manager for the City of Kirkland is authorized to sign said agreement on behalf of the City of Kirkland.

Passed by majority vote of the Kirkland City Council in regular, open meeting this 17th day of September, 1984.

ORIGINAL.

FILED NO. 9747
CITY OF BELLEVUE

DATE 10-2-84

CITY CLERK *O'Connell*

Res. 4428

AGREEMENT

This agreement made and entered into this day by and between the City of Kirkland, an optional code city, hereinafter referred to as "Kirkland" and the City of Bellevue, an optional code city, hereinafter referred to as "Bellevue",

WITNESSETH:

WHEREAS, both Kirkland and Bellevue are authorized by State law to enter into cooperative agreements; and

WHEREAS, the area described and designated on Exhibit "A" (attached hereto and by this reference incorporated herein) as subject are of the City of Kirkland sanitary sewer system; and

WHEREAS, said area is not presently connected to the Kirkland sanitary sewer system, and because of the topography of the area, may not readily be so connected; and

WHEREAS, the service area and corporate boundaries of the City of Bellevue and its sanitary sewer system lie adjacent to the subject area and the subject area can conveniently be connected into a Bellevue sewer system facility existing or under construction; and

WHEREAS, both parties are desirous where possible and convenient to mutually assist one another.

NOW, THEREFORE, in consideration of the agreements herein contained, it is agreed as follows:

Section 1. All sanitary sewer facilities to be constructed within the subject area described and designated on Exhibit "A", as attached hereto and by this reference incorporated herein, shall upon

2-28

construction and acceptance, become for all purposes, including customer service charges and maintenance, part of the Kirkland sanitary sewer system, but may, nevertheless, be connected into the Bellevue sewer system sanitary facility line lying within twenty feet and at the point so designated as "connection point" on Exhibit "A".

Section 2. Bellevue agrees to accept all sewage entering into its system through said connection point and to convey same through its system to its connection with the Municipality of Metropolitan Seattle System.

Section 3. No part of the cost of construction of the sanitary sewer facilities to be constructed within subject area, nor any of its future maintenance or repair, shall be borne by the City of Bellevue.

Section 4. City of Kirkland agrees to pay over to City of Bellevue as to each property within subject area, as it makes sewer connection, an amount equal to \$0.02 per square foot of area of each property. In addition thereto, Kirkland will pay to Bellevue a monthly service trunkage charge in an amount equal to 12¢ per month per residential customer or residential equivalent, actually connected and served by the facilities of the Kirkland sewer system within the subject area.

Section 5. Neither party shall by virtue of this agreement acquire any proprietary or governmental interest in the sewer system or sewer line of the other party. Each party shall be solely responsible for the operation and maintenance of its own system of sewage collection and shall save the other party harmless from any claim for damage, real or imaginary, made by a third party, and alleging negligence or misfeasance in the operation or maintenance of the other party's system, or in the acts or omissions of its own officers or employees.

Section 6. This writing embodies the entire agreement of the parties. There are no promises, terms, conditions, or obligations other than those contained herein. This agreement may be amended only by written instrument signed by both parties.

Section 7. No waiver by either party of any term or condition of this agreement shall be deemed or construed as a waiver of any other term or condition, nor shall a waiver of any subsequent breach, whether of the same or of a different provision of this agreement.

Section 8. This agreement shall terminate upon six (6) months written notice given by either party to the other party. In the event of termination under this paragraph, all costs of disconnection shall be borne by the party requesting the termination.

THIS AGREEMENT SIGNED this 19th day of September, 1984.

CITY OF KIRKLAND

By Tom J. Anderson
Tom J. Anderson, Acting City Manager

THIS AGREEMENT SIGNED this 1st day of October, 1984.

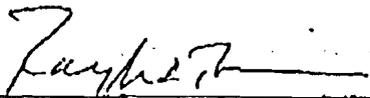
CITY OF BELLEVUE

By [Signature]

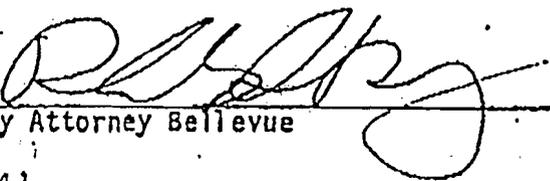
Execution of this agreement approved and authorized on behalf of:
the City of Bellevue by Resolution No. 4428, adopted this 1st
day of October, 1984; and

the City of Kirkland by Resolution No. R3118, of the Kirkland City
Council, adopted this 17th day of Sept., 1984.

Approved as to form:



City Attorney Kirkland

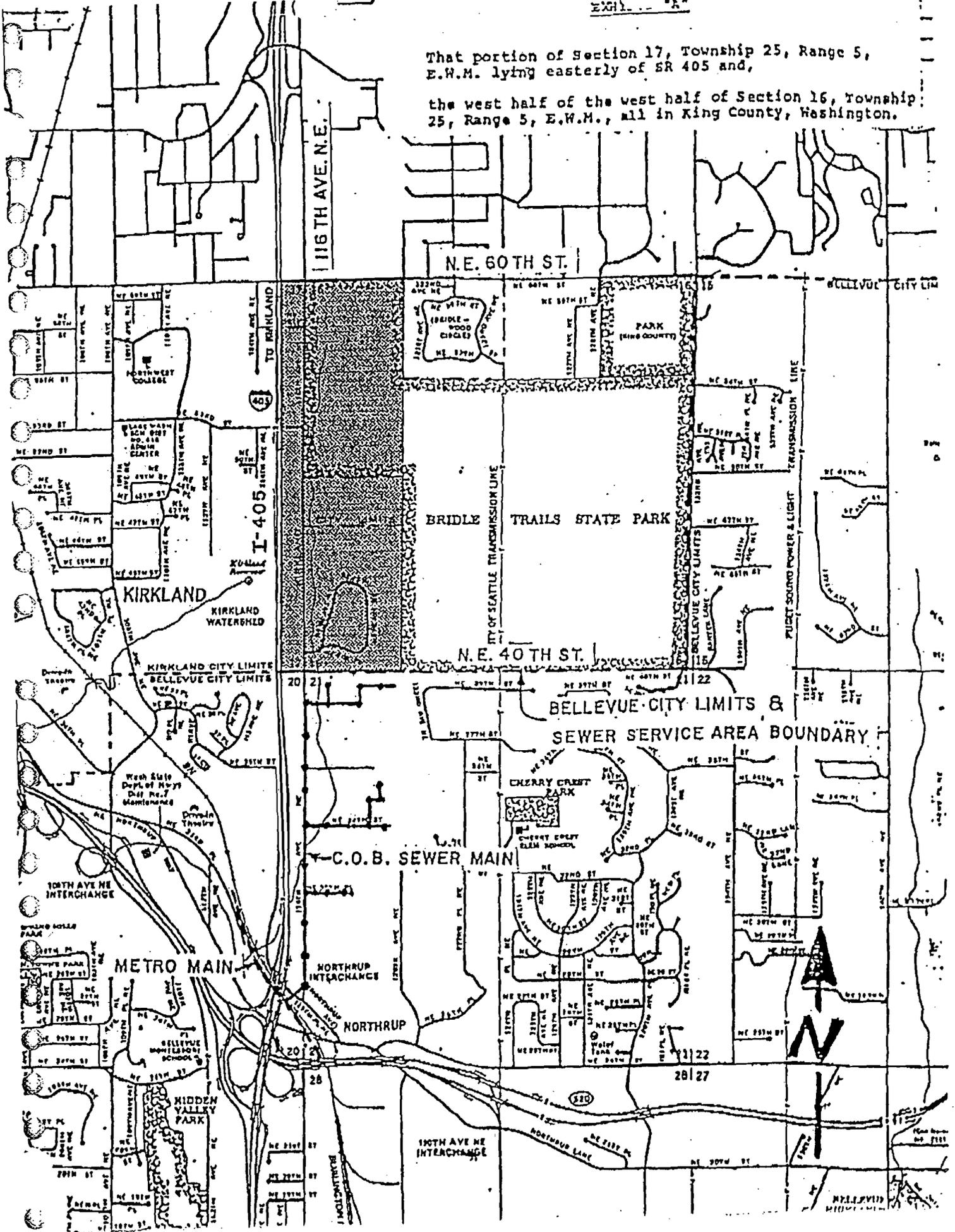


City Attorney Bellevue

4894J

That portion of Section 17, Township 25, Range 5, E.W.M. lying easterly of SR 405 and,

the west half of the west half of Section 16, Township 25, Range 5, E.W.M., all in King County, Washington.



RESOLUTION NO. R - 2492

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF KIRKLAND AUTHORIZING THE MAYOR TO SIGN ON BEHALF OF THE CITY A CERTAIN AGREEMENT BETWEEN THE CITY OF KIRKLAND AND NORTH-EAST LAKE WASHINGTON SEWER DISTRICT.

WHEREAS, that portion of the Northwest quarter of the Northwest quarter of the Northwest quarter of Section 32, Township 26, North Range 5, E.W.M., as described in the Agreement between the City of Kirkland and the Northeast Lake Washington Sewer District, copy of which is attached to the original of this resolution, and by this reference incorporated herein, lies within the City of Kirkland and the sewer service area of the City of Kirkland sanitary sewer system, and

WHEREAS, said area is not presently connected to the Kirkland sanitary sewer system and because of the topography of the area will not readily be so connected, and

WHEREAS, the service area and corporate boundaries of Northeast Lake Washington Sewer District lie adjacent to said area and said area can conveniently connect into the existing Northeast Lake Washington sewer system facilities, and

WHEREAS, both the City and the Sewer District are authorized by state law to enter into cooperative agreements,

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

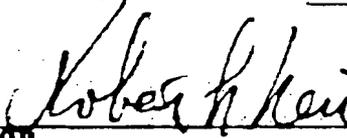
Section 1. The Mayor is hereby authorized and directed to sign on behalf of the City of Kirkland that certain agreement, copy of which is attached to the original of this resolution, and by this reference incorporated herein. Said agreement permits the City of Kirkland to connect a portion of the Kirkland sanitary sewer system to be constructed within the area described in said agreement into the existing Northeast Lake Washington Sewer System facility lying within Northeast 116th Street.

Section 2. Said agreement shall become effective upon its being properly signed by both the City of Kirkland,

as herein authorized and by the Northeast Lake Washington
Sewer District.

PASSED BY MAJORITY VOTE of the Kirkland City Council
in regular meeting on the 6th day of February,
1978.

SIGNED IN AUTHENTICATION thereof on the 6th day of
February, 1978.


MAYOR

ATTEST:


Director of Administration &
Finance
(ex officio City Clerk)

AGREEMENT

THIS AGREEMENT made and entered into this day by and between the CITY OF KIRKLAND, an optional code city hereinafter sometimes referred to as "City," and NORTHEAST LAKE WASHINGTON SEWER DISTRICT, a municipal corporation, hereinafter sometimes referred to as "Sewer District."

WITNESSETH:

WHEREAS, both City and Sewer District are authorized by state law to enter into cooperative agreements, and

WHEREAS, the area described and designated on Exhibit A (attached hereto and by this reference incorporated herein) as subject area lies within the City of Kirkland and the Sewer Service Area of the City of Kirkland sanitary sewer system, and

WHEREAS, said area is not presently connected to the Kirkland sanitary sewer system, and because of the topography of the area may not readily be so connected, and

WHEREAS, the service area and corporate boundaries of Northeast Lake Washington Sewer District lie adjacent to subject area, and subject area can conveniently connect into the existing Northeast Lake Washington Sewer System facilities, and

WHEREAS, both parties are desirous, where possible and convenient, to mutually assist one another,

NOW, THEREFORE, in consideration of the agreements

herein contained, it is agreed as follows:

Section 1. All sanitary sewer facilities to be constructed within the subject area, described and designated on Exhibit A as attached hereto and by this reference incorporated herein, shall upon construction and acceptance become for all purposes, including customer service charges and maintenance, part of the Kirkland sanitary sewer system but may, nevertheless, be connected into the Northeast Lake Washington Sewer District sanitary sewer line lying within Northeast 116th Street (at M-N 13-1) and at the point so designated as connection point on Exhibit A.

Section 2. Sewer District agrees to accept all sewage entering into its system through said connection point and to convey same through its system to its connection with the municipality of metropolitan Seattle system.

Section 3. No part of the cost of construction of the sanitary sewer facilities to be constructed within subject area, nor any of its future maintenance or repair, shall be borne by the Lake Washington Sewer District.

Section 4. City of Kirkland agrees to pay over to Sewer District as to each property within the subject area as it makes sewer connection, an amount equal to two cents (2¢) per square foot of area of each property. In addition thereto, the City will pay to Sewer District a monthly service trunkage charge in an amount equal to fourth cents (40¢) per month per residential customer or residential

equivalent actually connected and served by the facilities of the Kirkland Sewer System within the subject area.

Section 5. Neither party shall by virtue of this agreement acquire any proprietary or governmental interest in the sewage system or sewer line of the other party. Each party shall be solely responsible for the operation and maintenance of its own system of sewage collection and shall save the other party harmless from any claim for damage, real or personal, made by a third party, and alleging negligence or misfeasance in the operation or maintenance of the other party's system, or acts or omissions of its officers or employees.

Section 6. Each party shall seek and maintain with responsible insurers all such insurance as is customarily maintained with respect to sewage systems of like character and loss of or damage to the respective sewer facilities of each and against public and other liability to the extent that such insurance can be secured and maintained at a reasonable cost. Each party shall supply to the other party upon request a certificate showing such insurance to be in force.

Section 7. No waiver by either party of any term or condition of this agreement shall be deemed or construed as a waiver of any other term or condition nor shall a waiver of any subsequent breach, whether of the same or of a different provision of this agreement.

Section 8. This agreement shall terminate upon twelve (12) months' written notice given by either party to the other party. In the event of termination under this paragraph, all costs of disconnection shall be borne by the party requesting the termination.

THIS AGREEMENT SIGNED the _____ day of _____, 1978.

NORTHEAST LAKE WASHINGTON SEWER DISTRICT

By _____

CITY OF KIRKLAND

By Robert K. Hein

Execution of this Agreement approved on behalf of the Northeast Lake Washington Sewer District by resolution of its Board of Commissioners adopted the _____ day of _____, 1978, and authorized by the City of Kirkland by Resolution No. 2492 of the Kirkland City Council, adopted the 6th day of February, 1978.

CITY OF KIRKLAND
NORTHEAST LAKE WASHINGTON SEWER DISTRICT
MUNICIPALITY OF METROPOLITAN SEATTLE

JUANITA SYSTEM IMPROVEMENT AGREEMENT

THIS AGREEMENT, made as of the 3 day of November, 1982, between the City of Kirkland, a municipal corporation of the State of Washington (hereinafter referred to as "the City"), Northeast Lake Washington Sewer and Water District, a municipal corporation of the State of Washington (hereinafter referred to as "the District"), and the Municipality of Metropolitan Seattle, a metropolitan municipal corporation of the State of Washington (hereinafter referred to as "Metro");

W I T N E S S E T H:

WHEREAS, the City and the District have entered into long-term agreements with Metro for sewage disposal dated May 5, 1961 and May 16, 1963 (hereinafter referred to as the "Basic Agreements"); and

WHEREAS, Metro desires to modify and improve certain Metro facilities; and

WHEREAS, said modifications and improvements cannot be undertaken without modifications to certain City and District facilities; and

WHEREAS, it is in the interest of the parties that said modifications and improvements be undertaken;

NOW, THEREFORE, it is hereby agreed as follows:

Section 1. Definitions. The defined terms used in this Agreement shall have the meanings set forth in the Basic Agreements.

Section 2. Design and Construction of Certain Facilities.
It shall be the sole responsibility of Metro to design, construct, or otherwise undertake the following:

- a. A force main from the City's Kirkland Pumping Station to a point of connection with the District's 21-inch diameter gravity sewer at 98th Avenue N.E. approximately 500 feet south of N.E. Juanita Drive.

b. Modifications to the City's Kirkland Pumping Station necessary to insure operational compatibility with related new facilities.

c. A 12-inch diameter gravity sewer line between Metro's Juanita Heights Pumping Station and the City's Kirkland Pumping Station.

d. Connection of the City's sewer line currently tributary to Metro's Juanita Heights pumping station to the gravity sewer described in item c. of this Section 2.

Plans and specifications for the construction described in this Section 2 shall be in accordance with City specifications and shall be subject to review and approval by the City prior to commencement of construction.

Section 3. Work Involving City Facilities. The City authorizes Metro to construct all modifications to City facilities necessitated by the construction described in Section 2 subject to City review and approval of construction plans and specifications.

Section 4. Ownership and Maintenance of Completed Facilities. From and after the date of completion of the construction described in Section 2, the City shall own, operate, maintain, repair, replace, and be completely responsible for the following facilities as generally depicted on Exhibit A attached hereto:

a. The force main from the City's Kirkland Pumping Station to its point of connection to the District's 21 inch diameter gravity sewer.

b. The 12 inch diameter gravity sewer described in Section 2.c. from the site of Metro's abandoned Juanita Height's Pumping Station to the City's Kirkland Pumping Station.

Section 5. Acceptance of Contractor's Work. Prior to final acceptance of the contractor's work by Metro, the City shall be provided an opportunity to inspect the construction described

in Section 2 and make recommendations regarding deficiencies or incomplete work in accordance with the construction contract. It shall be the responsibility of Metro to pursue remedies enabled by the contractor's guaranty, and Metro agrees to pursue said remedies at the request of the City.

Section 6. Legal Relations. Metro shall take such reasonable actions as may be requested by the City to formalize the transfer of title to facilities conveyed to the City by the completion of construction as set forth in Section 2. From and after said completion, the City shall indemnify and hold harmless Metro from and against any and all claims, litigation, demands and suits for any personal injuries and property damage suffered or incurred by any person arising from the operation, maintenance, repair or replacement of said facilities.

Section 7. Connection to District Facilities. The district authorizes the connection of the force main described in Section 2.a. to its 21 inch diameter gravity sewer generally at the point of connection described in Section 2.a. The connection shall be made in accordance with design and construction standards of the District. The District does not transfer any title, right or interest in its facilities to the City, and the City shall not be permitted to connect its facilities to the District's facilities at any other point along the District's 21-inch diameter sewer line.

Section 8. Use of District Facilities. Following completion of the construction described in Section 2.a. and connection to District facilities as described in Section 7, the District will transport to Metro's Juanita Bay Pumping Station all sewage delivered by the City up to a maximum of 1,500 gpm to the District's 21 inch diameter gravity sewer via said connection for as long as the City may require. Capacity available to transport sewage delivered by the City shall not, in any event, be less than one-half the total capacity of said 21 inch diameter sewer line.

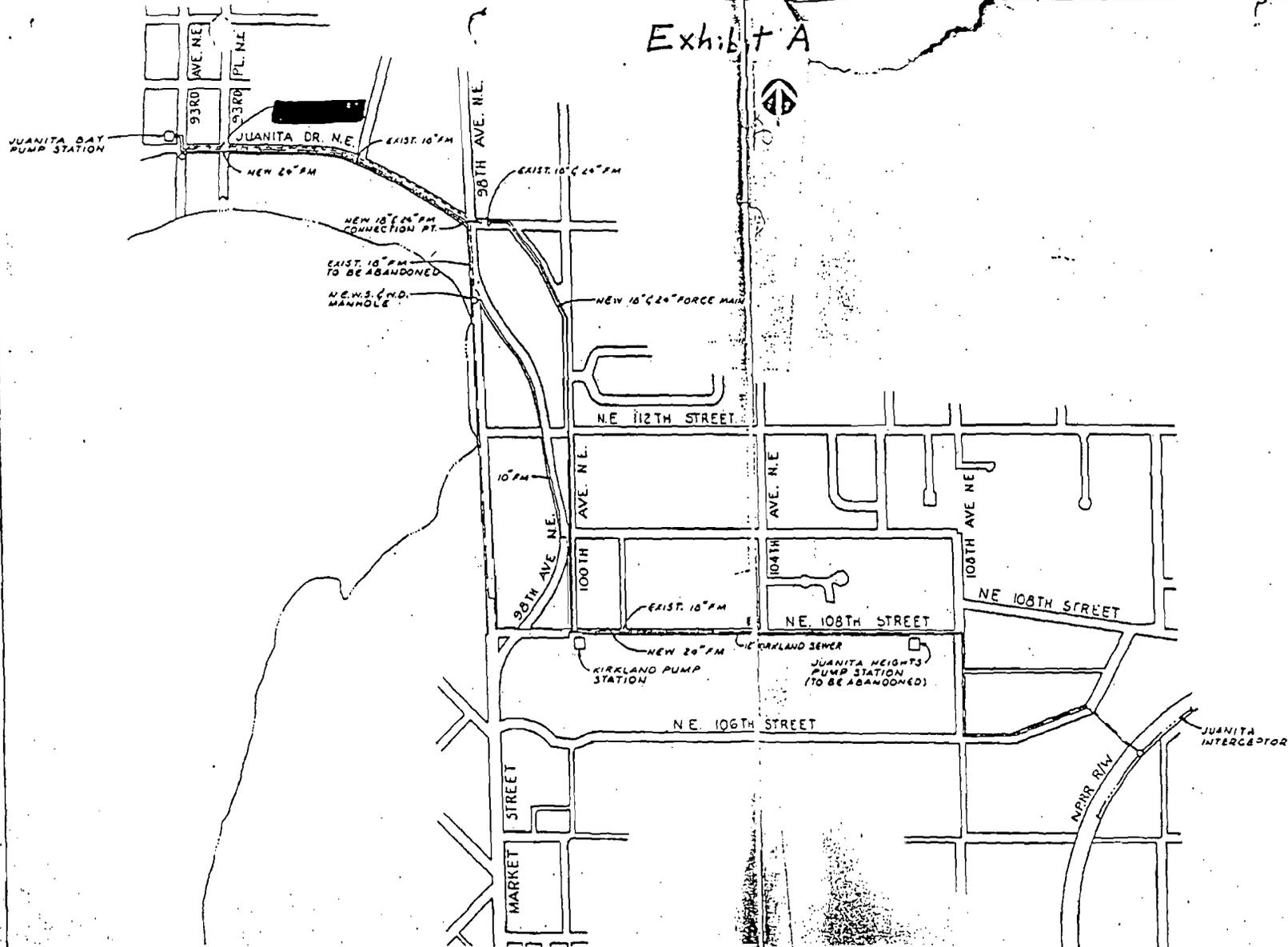
Section 9. Payment to the District by Metro. In consideration for the use of District facilities by the City as described in Section 8, Metro shall pay to the District \$75,000, which represents one-half the construction cost of the District's 21 inch diameter sewer line referred to in Section 8. Said payment is in consideration of the District's agreement to transport sewage delivered by the City to Metro's Juanita Bay pumping station and said payment is not payment for the transfer of any title, right or interest in the District's 21 inch diameter sewer line to the City.

Section 10. Payment to the District by the City. The City agrees to annually reimburse the District for one-half of future costs incurred by the District for maintenance, repair, and replacement of the District's 21 inch diameter sewer referred to in Section 8 between 98th Street Northeast and Metro's Juanita Bay Pumping Station. Said reimbursement to the District shall be made following submittal to the City of a properly documented invoice. The City's share of the foregoing costs shall not exceed \$750 for the first year following connection to the District's 21 inch diameter sewer line. Thereafter the City shall pay one-half of the costs incurred by the District for maintenance, repair and replacement of the District's 21-inch diameter sewer line.

Section 11. Payment to the City by Metro. In consideration for future reimbursement payments to be made by the City as described in Section 10, Metro shall pay to the City \$20,000 following commencement of operation of the facilities described in Section 2.

Section 12. Basic Agreement Unchanged. Except as otherwise provided in this Agreement, all provisions of the Basic Agreement shall remain in full force and effect.

Exhibit A




Kramer, Chin & Mayo, Inc.
 Consulting Engineers, Architects, Applied Scientists
 1017 First Avenue, Seattle, Washington 98101
 Phone 1291-447-5300

METRO Municipality of Metropolitan Seattle
 SANITARY CONNECTION SYSTEM - KIRKLAND 10" -
 DESIGN DEVELOPMENT
 VICINITY 1000
 May 24 1952

RESOLUTION NO. R 2655

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF KIRKLAND AUTHORIZING THE MAYOR TO SIGN ON BEHALF OF THE CITY OF KIRKLAND A CERTAIN AGREEMENT BETWEEN THE CITY OF KIRKLAND AND NORTHEAST LAKE WASHINGTON SEWER DISTRICT RELATING TO SANITARY SEWER FACILITIES WITHIN THE NORTH KIRKLAND IMPROVEMENT PROJECT AREA (L.I.D. NO. 115).

WHEREAS, a portion of the area lying within the North Kirkland Improvement Project (L.I.D. No. 115) as described in the agreement between the City of Kirkland and the Northeast Lake Washington Sewer District, a copy of which is attached to the original of this Resolution and by this reference incorporated herein, lies within the City of Kirkland and the sewer service area of the City of Kirkland's Sanitary Sewer System; and

WHEREAS, said area is not presently connected to the Kirkland Sanitary Sewer System, and because of the topography of the area, cannot readily be so connected; and

WHEREAS, the service area and corporate boundaries of the Northeast Lake Washington Sewer District lie adjacent to said area, said area can conveniently connect into the existing Northeast Lake Washington Sewer facilities; and

WHEREAS, both the City and sewer district are authorized by State law to enter into intergovernmental cooperative agreements;

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

Section 1. The Mayor is hereby authorized and directed to sign on behalf of the City of Kirkland that certain agreement, a copy of which is attached to the original of this Resolution and by this reference incorporated herein. Said agreement permits the City of Kirkland to connect a portion of the Kirkland Sanitary Sewer System, constructed within the area described in said agreement, and lying within the North Kirkland Improvement Project area (L.I.D. No. 115), into the existing Northeast Lake Washington Sewer System facility in the vicinity of 116th Avenue N.E. and N.E. 124th Street.

Section 2. Said agreement shall become effective upon its being properly signed by both the City of Kirkland, as herein authorized, and by the Northeast Lake Washington Sewer District.

AGREEMENT

THIS AGREEMENT made and entered into this day, by and between the City of Kirkland, an optional code city, hereafter referred to as "city"; and Northeast Lake Washington Sewer District of King County, Washington, a municipal corporation, hereinafter sometimes referred to as "sewer district".

W I T N E S S E T H

WHEREAS, both city and sewer district are authorized by state law to enter into cooperative agreements, and

WHEREAS, the area described and designated on Exhibit A, attached hereto and by this referenced incorporated in full herein, as subject area lies within the City of Kirkland and the sewer service area of the City of Kirkland Sanitary Sewer System, and

WHEREAS, the North Kirkland Improvement Project (L.I.D. 115) includes the installation of sanitary sewer service facilities within said subject area, and

WHEREAS, said area is not presently connected to the existing Kirkland Sanitary Sewer System, and because of the topography of the area may not readily be so connected, and

WHEREAS, the service area and corporate boundaries of Northeast Lake Washington Sewer District lie adjacent to subject area, and subject area can conveniently connect into the existing Northeast Lake Washington Sewer System facilities, and

WHEREAS, both parties are desirous where possible and convenient to mutually assist one another under terms and conditions as set forth herein, now, therefore,

IN CONSIDERATION of the agreements herein contained, it is agreed as follows:

Section 1. All sanitary sewer facilities to be constructed within the subject area as a part of or in connection with Local Improvement District No. 115, and the North Kirkland Improvement Project (which facilities are described and designated on Exhibit A, as attached hereto, and by this reference incorporated herein), shall upon construction and acceptance become for all purposes including customer service charges and maintenance, part of the Kirkland Sanitary Sewer System, but may nevertheless, be connected into the Northeast Lake Washington Sewer District sanitary sewer trunkage facilities at the point or points so designated as "connection point" on Exhibit A. Prior to making connection, city shall notify sewer district of the intended date of connection so that sewer district may cause its engineers to be physically present and to inspect and approve the connection to the sewer district's system. All costs of making said connection in complying with all federal, state and other applicable regulatory agency requirements shall be at the sole cost and expense of city.

Section 2. Sewer district agrees to accept sewage only from the area described in Exhibit A entering into its system

through said designated connection point and agrees to convey the same through its system to its connection with the municipality of Metropolitan Seattle System. The providing of this service by sewer district to city shall be subject to all requirements, rules and regulations of the municipality of Metropolitan Seattle (METRO), and agrees to pay all fees due METRO with respect to the sewage entering sewer district's system. Should it hereafter be claimed or asserted by sewer district or METRO that there are excessive flows due to infiltration or other reasons from the area described in Exhibit A resulting in increased METRO charges to sewer district, then city agrees to install a metering device to measure the flow entering district's system at the connection points.

Section 3. It is acknowledged that city has designed and constructed the sewer system within Exhibit A and that all costs of construction and of said connection to the system of sewer district shall be at the sole cost and expense of city and no part of the cost of construction of sanitary sewer facilities to be constructed within the area described in Exhibit A nor any of its maintenance, repair, replacement or restoration shall be borne or paid by sewer district.

Section 4. City agrees to pay to district the sum of \$ 35,633.89 as a connection charge for connecting the area described in Exhibit A to the system of the district which sum shall be paid as a condition precedent to the city making

the connection to the sewer district sewage system. Said payment has been based upon the sewer district existing requirement for connection charges of \$750 per gross acre.

In addition thereto, city will pay to sewer district a monthly sewer trunkage charge in an amount equal to forty cents (\$.40) per month for residential customer or residential equivalent (residential equivalent being computed per requirements of METRO) actually connected to and served by the facilities of City of Kirkland Sewer System within the area described in Exhibit A. City will maintain and provide records to sewer district of all customers, residential and commercial, and water flow for commercial customers so that the residential equivalent can be computed from time to time as requested by sewer district of city. Said monthly service trunkage charge shall be billed by sewer district to city from time to time but, in no event, less than annually. City agrees to report monthly to sewer district the number of residential customers or residential equivalents added to the system of city within the area described in Exhibit A for the preceding calendar month so that at all times district shall have an accurate count of residential customers or residential equivalents within the area described in Exhibit A.

Section 5. Sewer district reserves the right to provide sanitary sewer service within the sewer district boundary including those properties lying immediately west of and within the same drainage basin which could be served by way of connection into the City of Kirkland system described in Section 1 above. Said drainage basin is delineated on the map included as part

of Exhibit A. The City of Kirkland may likewise provide sewer services by way of connection into the sewer facilities described in Section 1 to those properties within the same drainage basin which are within the City of Kirkland provided that if services provided to property within the City of Kirkland by connection to a system that ultimately connects to the sewer district sewer system, then the property to be served must be real property included on Exhibit A and for which the connection charge has been computed and paid as provided for in Section 4. City may not provide sewer service to any real property, or residential equivalent customers whose sewage will flow into the sewer district's system unless said property is located on and a part of the real property described in Exhibit A, and connection fees have been paid as provided in Section 4 hereof. It is recognized that sewer district has a vested interest in limiting and defining the flow that will enter sewer district system in that district has to reserve capacity for other areas of sewer district that will not hereafter require sewer service by connecting to the sewer service of district that is providing services to city pursuant to this agreement.

Section 6. Neither party shall by virtue of this agreement acquire any proprietary or governmental interest in the sewage system or sewerline of the other party. Each party shall be solely responsible for the operation, maintenance, restoration and replacement of its own system of sewers.

Section 7. No waiver by either party of any term or condition of this agreement shall be deemed or construed as a waiver of any other term or condition.

Section 8. Each party agrees and covenants that this agreement is a valid exercise of the mutual assistance and interlocal governmental cooperation authority granted to the respective parties under the laws of the State of Washington, and to that end each of the parties agrees to defend and support this agreement as being for the benefit of the health, safety, and general welfare of the general public, and each party further agrees to cooperate with the other party with respect to any appearance which may be required by either party in any proceeding before any other governmental agency.

Section 9. This agreement may be terminated by either party giving twelve (12) months notice to the other party of intent to terminate this agreement whereupon the termination date shall be upon expiration of twelve (12) months from date of receipt of said notice. In the event of termination under this paragraph, all costs of disconnection and replacement and restoration shall be paid by city.

THIS AGREEMENT signed this _____ day of _____, 197__.

NORTHEAST LAKE WASHINGTON SEWER
DISTRICT OF KING COUNTY, WASHINGTON

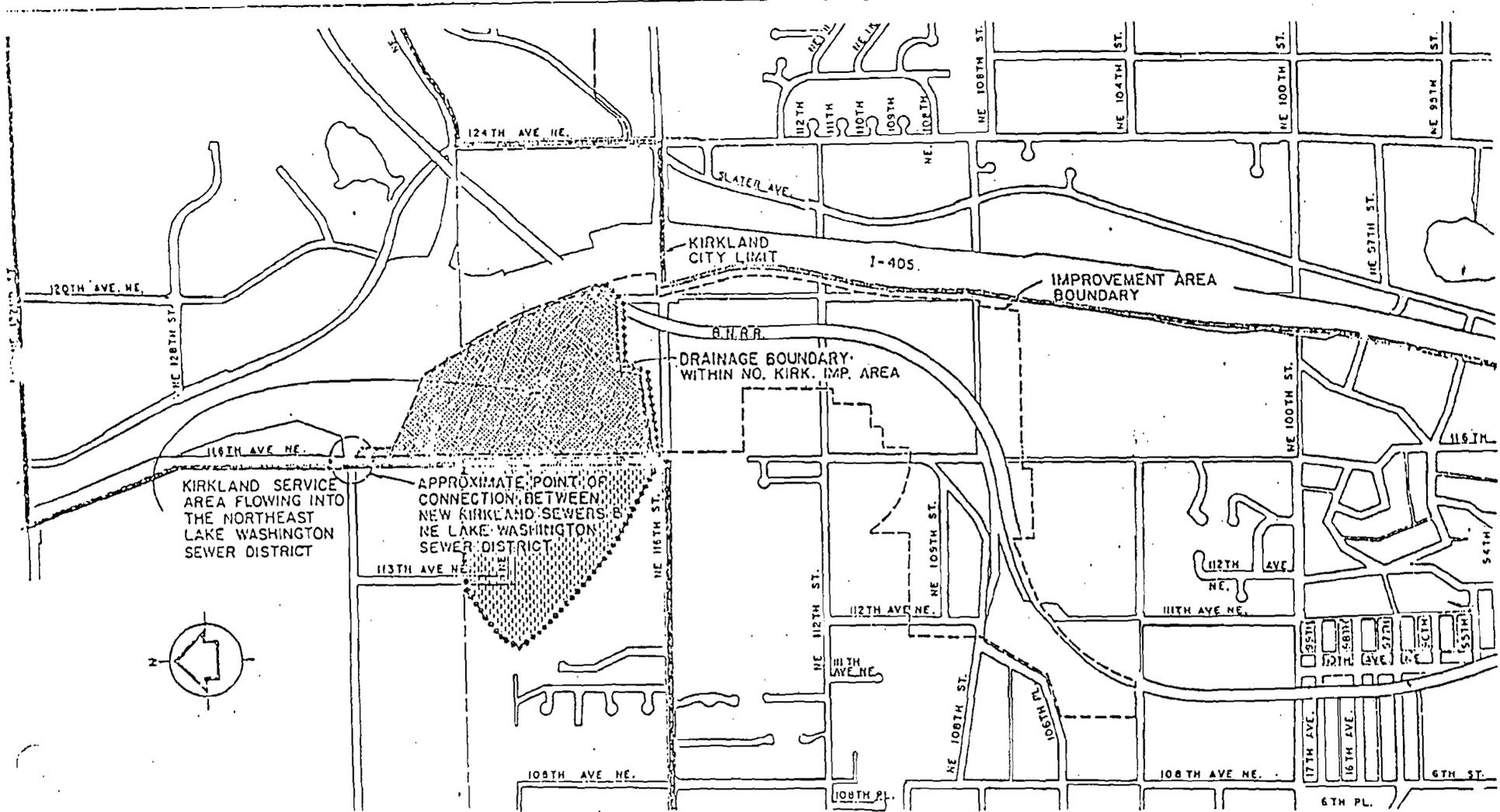
BY _____
President, Board of Commissioners

BY _____
Secretary, Board of Commissioners

CITY OF KIRKLAND

BY _____

The execution of this agreement approved on behalf of Northeast Lake Washington Sewer District by resolution of its Board of Commissioners, adopted the _____ day of _____, 197__, and authorized by the City of Kirkland by Resolution No. _____ of the Kirkland City Council adopted the _____ day of _____, 197__.



KIRKLAND SERVICE AREA FLOWING INTO THE NORTHEAST LAKE WASHINGTON SEWER DISTRICT

APPROXIMATE POINT OF CONNECTION BETWEEN NEW KIRKLAND SEWERS & NE LAKE WASHINGTON SEWER DISTRICT

DRAINAGE BOUNDARY WITHIN NO. KIRK. IMP. AREA

LEGEND:
 - - - - - KIRKLAND CITY LIMIT
 - - - - - NO. KIRKLAND IMPROVEMENT AREA BOUNDARY
 - - - - - NE LAKE WASHINGTON SEWER DISTRICT BOUNDARY
 - - - - - DRAINAGE BOUNDARY

Kramer, Chin & Mayo, Inc.
 Consulting Engineers, Architects, Applied Scientists
 1317 First Avenue, Seattle, Washington 98101
 Phone (206) 447-5311

Date
 7-79
 Scale
 1" = 800'

Designed By _____
 Drawn By _____
 Checked By _____
 Approved By _____

Revisions

EXHIBIT A
 KIRKLAND CITY LIMITS AND NE LAKE WASHINGTON DISTRICT,
 AND SURFACE DRAINAGE BOUNDARIES
 IN VICINITY OF STUDY AREA

Drawing Number _____
 Sheet Number 1 of 1

Date RECEIVED JUL 17 1961

File No.

Name To:

Seen:

JG	7/18 ✓
1316.07	

ORDINANCE NO. 835

AN ORDINANCE of the City of Kirkland, Washington, authorizing the execution of a contract for sewage disposal with the Municipality of Metropolitan Seattle containing provision for reimbursement to the city for the use of certain city sewerage facilities.

BE IT ORDAINED by the Mayor and City Council of the City of Kirkland as follows:

Section 1. The Mayor and Clerk are hereby authorized and directed on behalf of the City of Kirkland to enter into, execute and deliver a contract with the Municipality of Metropolitan Seattle which shall be substantially in the form set forth in Exhibit "A" attached hereto and by this reference made a part hereof.

Section 2. Said contract shall be executed in ten counterparts and shall bear the date of and be effective upon its execution by the Municipality of Metropolitan Seattle.

Section 3. This ordinance shall take effect upon its passage and publication in the manner provided by law.

ADOPTED by the Council of the City of Kirkland at a regular meeting thereof and approved by its Mayor this 15th day of May, 1961.



ATTEST:

George A. Compton
George A. Compton
City Clerk

[Signature]
Mayor

I hereby certify that the foregoing is a true and correct copy of an Ordinance of the City of Kirkland and that the same was published or posted according to law, said Ordinance being No. 835 and entitled "An Ordinance as above."

George A. Compton City Clerk

RESOLUTION NO. 89

A RESOLUTION of the Council of the Municipality of Metropolitan Seattle authorizing the execution of a contract for sewage disposal with the City of Kirkland.

WHEREAS, the Municipality of Metropolitan Seattle has heretofore adopted a comprehensive plan for the disposal of sewage for the Metropolitan Area; and

WHEREAS, it has determined that the acquisition, construction, operation and maintenance of the facilities

required to carry out such plan is feasible; and

WHEREAS, in order to carry out said plan it is necessary and desirable that contracts be entered into with those cities and sewer districts desiring to deliver their sewage to the Metropolitan Sewer System for disposal; and

WHEREAS, the Municipality has considered the terms and conditions incident to the acceptance of sewage for disposal, including the charges necessary therefor;

NOW, THEREFORE, BE IT RESOLVED by the Council of the Municipality of Metropolitan Seattle as follows:

Section 1. That the Municipality shall enter into an agreement with the City of Kirkland providing for the disposal of certain sewage collected by the City and that such agreement shall be substantially in the form of Exhibit "A" attached hereto and by this reference made a part hereof.

Section 2. That the Chairman and Clerk of the Council be and they are hereby authorized and directed to execute such

contract on behalf of the Municipality to bear the date of
and to be effective upon its execution by the City of
Kirkland.

ADOPTED by the Council of the Municipality of
Metropolitan Seattle at a regular meeting thereof held this
20th day of April, 1961.

/s/ C. Carey Donworth

C. Carey Donworth

Chairman of the Council

ATTEST:

/s/ Maralyn Sullivan

Maralyn Sullivan

Clerk of the Council

I, MARALYN SULLIVAN, duly selected, qualified
and Clerk of the Council of the Municipality of Metropolitan
Seattle, DO HEREBY CERTIFY that the foregoing resolution is
a true and correct copy of Resolution No. 87 of said
Council duly adopted at a regular meeting thereof held on
the 20th day of April, 1961, signed by the Chairman of such
Council in attendance at such meeting and attested by myself
in authentication of such adoption.

Maralyn Sullivan
Clerk

EXHIBIT A

AGREEMENT FOR SEWAGE DISPOSAL

THIS AGREEMENT made and executed this 5TH day of MAY, 1961, between the CITY OF KIRKLAND, a municipal corporation of the State of Washington, hereinafter referred to as the "City" and the MUNICIPALITY OF METROPOLITAN SEATTLE, a municipal corporation of the State of Washington, hereinafter referred to as "Metro,"

W I T N E S S E T H:

WHEREAS, the public health, welfare and safety of the residents of the City and the residents of the metropolitan area require the elimination of existing sources of water pollution and the preservation of the fresh and salt water resources of the area; and

WHEREAS, growth of population, topographic conditions and preservation of water resources require that certain major sewage disposal works be constructed and operated and that the cities and special districts within the metropolitan area dispose of their sewage in accordance with a comprehensive plan for the metropolitan area; and

WHEREAS, Metro was established by vote of the people in the metropolitan area pursuant to Chapter 35.58 RCW for the purpose of performing the function of metropolitan sewage disposal, has adopted a comprehensive plan for the disposal of sewage from the metropolitan area and intends to develop the facilities needed to carry out such plan and to issue revenue bonds to finance such development; and

WHEREAS, to carry out the purposes of Metro and perform its authorized function and to provide for the disposal of sewage from the City into the metropolitan sewage disposal system it is necessary that a contract be now entered into establishing certain rights and duties of the parties incident thereto;

NOW, THEREFORE, in consideration of the mutual covenants contained herein, IT IS HEREBY AGREED as follows:

Section 1. Definition of Terms. The following words and phrases used in this contract shall have the meanings hereinafter set forth in this section:

- (a) The words "Comprehensive Plan" shall mean the Comprehensive Sewage Disposal Plan for the metropolitan area adopted in Resolution No. 23 of the Municipality of Metropolitan Seattle and as same may be hereafter amended from time to time in the manner required by law.
- (b) The words "Metropolitan Sewerage System" shall mean all of the facilities to be constructed, acquired or used by Metro as a part of the Comprehensive Plan. The Metropolitan Sewerage System shall generally include sewage disposal facilities with capacity to receive sewage from natural drainage areas of approximately one thousand acres or more. The Metropolitan Sewerage System shall thus include trunk or interceptor sewer facilities extending to a point within each tributary, and natural drainage area, where not more than one thousand acres remain to be served beyond the upper terminus of such trunk or interceptor sewer.

- (c) The words "Local Sewerage Facilities" shall mean all facilities owned or operated by the Participant for the local collection of sewage to be delivered to the Metropolitan Sewerage System.
- (d) The words "Metropolitan Area" shall mean the area contained within the boundaries of the Municipality of Metropolitan Seattle as now or hereafter constituted.
- (e) The word "Participant" shall mean each city, town, county, sewer district, municipal corporation, person, firm or private corporation which shall dispose of any portion of its sanitary sewage into the Metropolitan Sewerage System and shall have entered into a contract with Metro providing for such disposal.
- (f) The words "Residential Customer" shall mean a single family residence billed by a Participant for sewerage charges.

Section 2. Delivery and Acceptance of Sewage. From and after July 1, 1962, the City shall deliver to the Metropolitan Sewerage System all of the sewage and industrial wastes collected by it and Metro shall accept the sewage and wastes delivered for treatment subject to such reasonable rules and regulations as may be adopted from time to time by the Metropolitan Council. Metro shall not directly accept sewage or wastes from any person, firm, corporation or governmental agency which is located within the boundaries of or is delivering its sewage into the Local Sewerage Facilities of any Participant without the written consent of such Participant.

Section 3. Construction of Facilities. Metro shall construct, acquire or otherwise secure the right to use all facilities required for the disposal of sewage delivered to Metro pursuant to this Agreement and shall perform all services required for the maintenance, operation, repair, replacement or improvement

of the Metropolitan Sewerage System, including any additions and betterments thereto.

Section 4. Connection of Local Sewerage Facilities to the Metropolitan Sewerage System. Local Sewerage Facilities of the City shall be connected to the Metropolitan Sewerage System at such time as any portion of the Metropolitan Sewerage System shall be available to receive sewage collected by such facilities. Metro shall, at its sole expense, connect those Local Sewerage Facilities of the City which are now in existence or which shall be constructed in accordance with the rules and regulations of Metro prior to the availability of the Metropolitan Sewerage System. Local Sewerage Facilities constructed after the Metropolitan Sewerage System shall have been made available to the area served by such Local Sewerage Facilities shall be connected to the Metropolitan Sewerage System at the expense of the Participant in accordance with the rules and regulations of Metro.

Section 5. Payment for Sewage Disposal. For the disposal of sewage collected by the City and delivered to Metro, the City shall pay to Metro on or before the last day of each month during the term of this agreement, commencing with the month of July, 1962, a sewage disposal charge determined as provided in this Section 5.

1. For the quarterly periods ending March 31, June 30, September 30 and December 31 of each year every Participant shall submit a written report to Metro setting forth (a) the number of Residential Customers billed by such Participant for local sewerage charges as of the last day of the quarter, (b) the total number of all customers billed by such Participant as of such day and (c) the total water consumption during such

quarter for all customers billed by such Participant other than Residential Customers. The quarterly water consumption report shall be taken from water meter records and may be adjusted to exclude water which does not enter the sanitary facilities of a customer. Where actual sewage flow from an individual customer is metered, the metered sewage flows shall be reported in lieu of adjusted water consumption. The total quarterly water consumption report in cubic feet shall be divided by 2,700 to determine the number of Residential Customer equivalents represented by each Participant's customers other than single family residences. The first report shall cover the quarterly period ending December 31, 1960 and shall be submitted on or before March 1, 1961. Succeeding reports shall be made for each quarterly period thereafter and shall be submitted within thirty (30) days following the end of the quarter. Metro shall maintain a permanent record of the quarterly customer reports from each Participant.

2. To form a basis for determining the monthly sewage disposal charge to be paid by each Participant during any particular quarterly period Metro shall ascertain the number of Residential Customers and Residential Customer equivalents of each Participant for each such quarterly period beginning with the July-September quarter of the year 1962. This determination shall be made by taking the sum of the actual number of Residential Customers reported as of the last day of the next to the last preceding quarter and the average number of Residential Customer equivalents per quarter reported for the four quarters ending with said next to the last preceding quarter, adjusted to eliminate any Residential Customers or Residential Customer equivalents whose sewage is delivered to a governmental

agency other than Metro or other than a Participant for disposal outside of the Metropolitan Area.

3. For the period from July 1, 1962 to December 31, 1963, the monthly rate for each Residential Customer and Residential Customer equivalent of the City shall be Two dollars (\$2.00) and the monthly sewage disposal charge to be paid by each Participant to Metro shall be obtained by multiplying the number of Residential Customers and Residential Customer equivalents of the Participant as determined in subparagraph 2 of this section by the monthly rate of Two dollars.

4. For each calendar year after the year 1963, the monthly sewage disposal charge payable to Metro shall be determined as follows:

a) Prior to July 1st of each year Metro shall determine its total monetary requirements for the disposal of sewage during the next succeeding calendar year. Such requirements shall include the cost of administration, operation, maintenance, repair and replacement of the Metropolitan Sewerage System, establishment and maintenance of necessary working capital and reserves, the requirements of any resolution providing for the issuance of revenue bonds of Metro to finance the acquisition, construction or use of sewerage facilities, plus not to exceed 1% of the foregoing requirements for general administrative overhead costs.

b) To determine the monthly rate per Residential Customer or Residential Customer equivalent to be used during said next succeeding calendar year, the total monetary requirements for disposal of sewage as determined in subparagraph 4(a) of this section shall be divided by twelve and the resulting quotient shall be divided by the

total number of Residential Customers and Residential Customer equivalents of all Participants ascertained in accordance with subparagraph 2 of this section for the October-December quarter preceding said July 1st; provided, however, that the monthly rate shall not be less than Two dollars (\$2.00) per month per Residential Customer or Residential Customer equivalent at any time during the period ending July 31, 1972.

c) The monthly sewage disposal charge paid by each Participant to Metro shall be obtained by multiplying the monthly rate by the number of Residential Customers and Residential Customer equivalents of the Participant determined as provided in Paragraph 2 of this section. An additional charge may be made for sewage or wastes of unusual quality or composition requiring special treatment, or Metro may require pretreatment of such sewage or wastes. An additional charge may be made for quantities of storm or ground waters entering those Local Sewerage Facilities which are constructed after January 1, 1961 in excess of the minimum standard established by the general rules and regulations of Metro.

5. A statement of the amount of the monthly sewage disposal charge shall be submitted by Metro to each Participant on or before the first day of each month during the term of this agreement commencing with the month of July 1962 and payment of such charge shall be due on the last day of such month. If any charge or portion thereof due to Metro shall remain unpaid for fifteen days following its due date, the Participant shall be charged with and pay to Metro interest on the amount unpaid from its due date until paid at the rate of 6% per annum, and Metro may, upon failure to pay such amount, enforce payment by any remedy available at law or equity.

6. The City irrevocably obligates and binds itself to pay its sewage disposal charge out of the gross revenues of the combined water and sewerage system of the City. The City further binds itself to establish, maintain and collect rates and charges for water and for sewage disposal service sufficient to pay all costs of maintenance and operation of the combined water and sewerage system of the City, including the sewage disposal charge payable to Metro hereunder, and sufficient to pay the principal of and interest on any revenue bonds of the City which shall constitute a charge upon such gross revenue. It is recognized by Metro and the City that the sewage disposal charge paid by the City to Metro shall constitute an expense of maintenance and operation of the combined water and sewerage system of the City prior in lien to any water and sewer revenue bonds of the City to be hereafter issued. It is further recognized that the City shall have the right to fix its own schedule of water and sewerage rates and charges, provided that same shall produce revenue to meet the covenants contained in this agreement.

Section 6. Responsibility of Participant. Each Participant shall be responsible for the delivery to the Metropolitan Sewerage System of sewage collected by such Participant, for the construction, maintenance and operation of Local Sewerage Facilities, and for the payment of all costs incident to the collection of such sewage and its delivery to the Metropolitan Sewerage System.

Section 7. Records. Permanent books and records shall be kept by Metro of the rates established, the volumes of sewage delivered and discharged into the Metropolitan Sewerage System wherever such volumes are measured and the number of Residential Customers and Residential Customer equivalents reported by each Participant, in addition to complete books of account showing all costs incurred in connection with the Metropolitan Sewerage

System. Such records shall be maintained beginning with the commencement of operation of any part of the Metropolitan Sewerage System.

Section 8. Development of Metropolitan Sewerage System.

It is contemplated that the Metropolitan Sewerage System will be developed in stages and the nature of facilities to be constructed, acquired or used and the time of such construction, acquisition or use shall be determined by Metro, it being contemplated that Metro shall ultimately provide sewage disposal service for the entire Metropolitan Area.

Section 9. Use of Facilities Owned or Operated by the

City. Effective July 1, 1962, or such earlier date as may be mutually agreed upon (hereinafter called "takeover date"), Metro shall have the exclusive right to use and the duty to maintain, operate, repair and replace the facilities owned by the City which are described in Exhibit "A" attached hereto and by this reference made a part hereof, subject to the continued availability of such facilities to receive, transport or treat sewage delivered by the City. From and after the takeover date Metro shall acquire, construct, maintain, operate, repair and replace all facilities now or hereafter required for the treatment and disposal of sewage delivered by the City and the City shall make payment for such treatment and disposal as provided in Section 5 of this Agreement.

For the privilege of using the facilities described in Exhibit "A" and for the easement rights hereby granted to Metro by the City of Kirkland as described in Exhibit "B" attached hereto and by this reference made a part hereof, Metro shall pay to the City of Kirkland a total amount of One Hundred Twenty One Thousand Nine Hundred Dollars (\$121,900.00) (hereinafter called "amount of reimbursement"). If the City shall construct improvements or additions to the

facilities described in Exhibit "A" with the approval of Metro after the date of this Agreement and prior to the takeover date, the City shall be reimbursed for the actual cost thereof in cash within thirty (30) days following the said takeover date in addition to the amount of reimbursement set forth above. The right of Metro to use facilities designated as "temporary" shall expire six months following the date of completion as determined by Metro of permanent metropolitan facilities adequate to replace such temporary facilities. The City shall continue to own the facilities described in this Section 9 and shall continue to pay the principal of and interest on any bonds issued to pay in whole or in part the cost of acquisition and construction of such facilities, provided that facilities which are designated as "permanent" shall be conveyed by the City to Metro by quit claim deed upon payment of all presently outstanding revenue bonds or general obligation bonds of the City secured by or issued to acquire or construct said facilities.

The City shall give written notice to Metro prior to June 1, 1961, setting forth the manner in which the amount of reimbursement shall be paid. The City may elect to receive all or any portion of said amount in cash within thirty (30) days following the date of delivery of revenue bonds issued by Metro for the purpose of providing funds therefor and, in any event, not later than July 1, 1962 (hereinafter called "cash payment date") and may elect to receive any portion which is not paid on said cash payment date together with interest thereon at the rate of 4% per annum from said date, in the form of a credit against the City's monthly sewage disposal charge in equal monthly amounts sufficient to amortize such unpaid amount of reimbursement and interest thereon prior

to July 1, 1977. The City may at any time after the cash payment date elect to receive any unpaid portion of the amount of reimbursement in cash with interest at the rate of 4% per annum to date of final payment by giving written notice to Metro at least one year prior to the date such final payment is to be made.

Section 10. Insurance and Liability for Damages.

Each Participant with a population of less than 100,000 shall secure and maintain with responsible insurers all such insurance as is customarily maintained with respect to sewerage systems of like character against loss of or damage to the respective sewerage facilities of each and against public and other liability to the extent that such insurance can be secured and maintained at reasonable cost. Any liability incurred by Metro as a result of the operation of the Metropolitan Sewerage System shall be the sole liability of Metro and any liability incurred by the City as a result of the operation of the Local Sewerage Facilities of the City shall be the sole liability of the City.

Section 11. Assignment.

Neither of the parties hereto shall have the right to assign this Agreement or any of its rights and obligations hereunder nor to terminate its obligations hereunder by dissolution or otherwise without first securing the written consent of the other party and this Agreement shall be binding upon and inure to the benefit of the respective successors and assigns of the parties hereto. In the event that the City should be dissolved, the local sewer facilities owned and operated by the City shall by such act of dissolution be assigned and transferred to Metro subject to any outstanding debts of the City incurred for the construction

or acquisition of such facilities and subject to the obligation of Metro to continue to provide sewer service to the residents served by such local facilities upon payment of the reasonable costs thereof.

Section 12. Effective Date and Term of Contract.

This Agreement shall be in full force and effect and binding upon the parties hereto upon the execution of the Agreement and shall continue in full force and effect for a period of fifty years unless prior to the takeover date Metro shall not have entered into a firm commitment for the sale of revenue bonds to finance any portion of the Comprehensive Plan, then in such event only, this Agreement shall be terminated as of said date. Metro shall make every reasonable effort to secure such a commitment prior to said date.

Section 13. Notice. Whenever in this Agreement notice is required to be given, the same shall be given by Registered Mail addressed to the respective parties at the following addresses:

Municipality of Metropolitan Seattle
152 Denny Way, Seattle 9, Washington

City of Kirkland
Kirkland, Washington

unless a different address shall be hereafter designated in

writing by either of the parties.

The date of giving such notice shall be deemed to be the date of mailing thereof. Billings for and payments of sewage disposal costs may be made by regular mail.

Section 14. Execution of Documents. This Agreement shall be executed in ten counterparts, any of which shall be regarded for all purposes as one original. Each party agrees that it will execute any and all deeds, instruments, documents and resolutions or ordinances necessary to give effect to the terms of this Agreement.

Section 15. Waiver. No waiver by either party of any term or condition of this Agreement shall be deemed or construed as a waiver of any other term or condition, nor shall a waiver of any breach be deemed to constitute a waiver of any subsequent breach whether of the same or a different provision of this Agreement.

Section 16. Remedies. In addition to the remedies provided by law, this Agreement shall be specifically enforceable by either party.

Section 17. Entirety. This Agreement merges and supersedes all prior negotiations, representations and agreements between the parties hereto relating to the subject matter hereof and constitutes the entire contract between the parties concerning the disposal of sewage by the City and acceptance of such sewage by Metro for disposal.

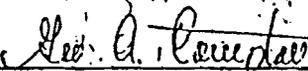
IN WITNESS WHEREOF, the parties hereto have executed

this Agreement as of the day and year first above written.

CITY OF KIRKLAND

By 
Byron Baggaley
Mayor

ATTEST:


George A. Compton
City Clerk

MUNICIPALITY OF METROPOLITAN SEATTLE

By _____
C. Carey Donworth
Chairman of the Council

ATTEST:

Maralyn Sullivan
Clerk of the Council

EXHIBIT "A"

TEMPORARY FACILITIES

FACILITY

Sewage treatment plant and associated improvements located on the following described property situated in King County, State of Washington, to wit:

Beginning at the meander corner between Sections 5 and 8, Township 25 North, Range 5 E.W.M., and running thence along section line north $89^{\circ} 39' 00''$ east 60.15 feet; thence north $22^{\circ} 21' 00''$ west 183.71 feet; thence north $70^{\circ} 04' 15''$ east, 496.71 feet to the true point of beginning; thence continuing north $70^{\circ} 04' 15''$ east, a distance of 319.13 feet; thence north $0^{\circ} 21' 00''$ east a distance of 198.76 feet, thence south $70^{\circ} 04' 15''$ west a distance of 319.13 feet; thence south $0^{\circ} 21' 00''$ west, a distance of 198.76 feet to the true point of beginning.

EXHIBIT "B"

Description of Permanent Sewage Pumping Station Easement

A perpetual easement for the purpose of installing, constructing, maintaining, operating, repairing and replacing an underground sewage pumping station with all connecting sewer lines, manholes, underground power, telephone, water or other utility lines or pipelines and appurtenances thereto, together with the right of ingress and egress to said station and the right to maintain an access stairway over, upon and under the westerly 10 feet of the easement property, said easement property being located in the City of Kirkland, King County, State of Washington, and more particularly described as follows:

Th prt of govt lot 5 sect 5 twp 25 N R 5 E W.M. daf
Beg at the meander cor betw sects 5 and 8 twp 25 N R
5 E W.M.; th N 89°39'00" E along the Sly In of sd govt
lot 5 a distance of 459.32 ft to the Sly production of
the Ely ln of 2nd St; th N 0°21'00" W 273.13 ft to the
SEly ln of 1st Ave as cyed to the City of Kirk and by
dd recdd under aud file No. 3883807 rec of sd co; th N
70°04'15" E along sd SEly ln 95.52 ft; th N 89°39'00"E
210.99 ft to the W ln 3rd St as cyed to the City of
Kirk in said deed; th N 0°21'00" W 60 ft along th W ln
of said 3rd St to the true point of beginning; th S
89°21'00"W 10 ft; th N 0°21'00" W 60 ft; th N 89°39'00"E
10 ft to the W ln of said 3rd St; th N 89°39'00"E 60 ft;
th S 0°21'00"E 60 ft; th S 89°31'00"W 60 ft to T.P.O.B.

reserving, however, to the city all right, title and interest which may be used and enjoyed without interfering with the easement rights herein conveyed and, in particular, to continue to use and maintain as a city street the surface of that portion of said property now used for a street following construction or repair of the pumping station thereunder and the restoration by Metro of any street improvements damaged by such construction or repair.

STATE OF WASHINGTON)
)
COUNTY OF KING) ss.

On this 5 day of May, 1961,
before me personally appeared BYRON BAGGALEY and GEORGE A.
COMPTON, to me known to be the Mayor and City Clerk,
respectively, of the City of Kirkland, a municipal corporation,
and acknowledged the within and foregoing instrument to be
the free and voluntary act and deed of said corporation, for
the uses and purposes therein mentioned, and on oath stated
that they were authorized to execute said instrument and that
the seal affixed is the corporate seal of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and
affixed my official seal the day and year first above written.



Ralph T. [Signature]
Notary Public in and for the State
of Washington, residing at Kirkland.

STATE OF WASHINGTON)
)
COUNTY OF KING) ss.

On this _____ day of _____, 19____,
before me personally appeared C. CAREY DONWORTH and MARALYN
SULLIVAN, to me known to be the Chairman of the Council and
Clerk of the Council, respectively, of the Municipality of
Metropolitan Seattle, a municipal corporation, and acknowledged
the within and foregoing instrument to be the free and
voluntary act and deed of said corporation, for the uses and
purposes therein mentioned, and on oath stated that they were
authorized to execute said instrument and that the seal affixed
is the corporate seal of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and
affixed my official seal the day and year first above written.

Notary Public in and for the State
of Washington, residing at Seattle



Northshore Utility District OFFICIAL FILE

ADDRESS

6830 NE 185th Street
Kenmore, WA 98028-2701

P.O. Box 82489
Kenmore, WA 98028-0489

TELEPHONES

Engineering: (425)398-4401
Administration: (425)398-4402
Operations: (425)398-4403
Information: (425)398-4400

FAX NUMBERS

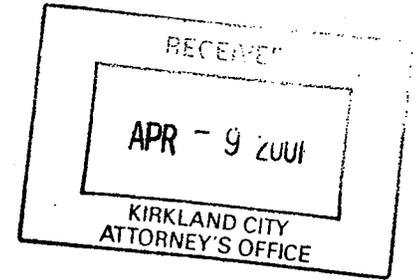
Engineering: (425)398-4435
Administration: (425)398-4430
Operations: (425)398-4432
Purchasing: (425)398-4434

Website: [Http://www.nud.net](http://www.nud.net)

April 5, 2001

City of Kirkland
City Hall
123 Fifth Avenue
Kirkland, WA 98033-6189

COPY



Attention: Bill Evans, Assistant City Attorney

Subject: Acceptance of Franchise

Dear Mr. Evans,

Please accept this letter as written acceptance of the Franchise Agreement between the City of Kirkland and Northshore Utility District. The City of Kirkland Ordinance number is 3767.

I have attached Resolution No. 2000-11-20 of Northshore Utility District approving the Franchise Agreement with the City of Kirkland. This resolution, passed on November 20th, 2000, approves the franchise (and the terms therein) and authorizes the General Manager to sign it and deliver it to the City of Kirkland for their approval. Given that there was no signature block for the District, we simply handled this last November by phone and email, noting our Board action approving the Franchise. This letter confirms those communications.

As requested, and in accordance with Section 15 of the Franchise, the Washington Government Entity Pool faxed written evidence of our insurance to you earlier this week. I have also provided a copy of that confirmation here.

Sincerely,

R. Daniel Olson, P.E.
General Manager

Attachments: NUD Resolution 2000-11-20

Written confirmation of insurance from WGEP



NORTHSHORE UTILITY DISTRICT KING COUNTY, WASHINGTON

Resolution No. 2000-11-20

A RESOLUTION of Northshore Utility District Approving Franchise Agreement with the City of Kirkland.

Background

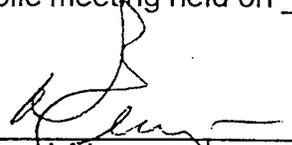
1. The District owns and operates certain facilities within the roads and rights-of-way located within the City of Kirkland.
2. The District previously operated these facilities under the authority of a franchise from King County. That franchise has expired and the roads and rights-of-way in which the facilities are located are now under the jurisdiction of the City of Kirkland.
3. The District staff has negotiated with the City of Kirkland for a Franchise Agreement for the District's continued operation of facilities within the City of Kirkland's roads and rights-of-way, a copy of which is attached hereto.
4. The District staff recommends the Board of Commissioners approve the Franchise Agreement and authorize the General Manager to sign it and deliver it to the City of Kirkland for their approval.

Now it is resolved that:

Action

5. The Board of Commissioners approves the Franchise Agreement and authorizes the General Manager to sign it and deliver it to the City of Kirkland for their approval.

ADOPTED by the Board of Commissioners of Northshore Utility District at an open public meeting held on NOV 20 2000.



Commissioner

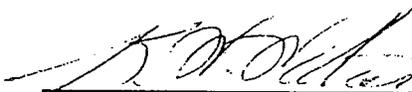


Commissioner

Commissioner



Commissioner



Commissioner

EVIDENCE OF COVERAGE
 WASHINGTON GOVERNMENTAL ENTITY POOL
 P.O. BOX 19330, Spokane, WA 99219
 Tel. 800-462-8418 or 509/838-0910
 Fax 509/747-3875

FILE

INSURED / PARTICIPANT

Northshore Utility District
 6830 NE 185th
 Kenmore, Washington 98028-2701

CERTIFICATE HOLDER

City of Kirkland
 123 Fifth Avenue
 Kirkland, Washington 98033-6189

Post-it® Fax Note	7671	Date	4-6-01	# of pages	1
To	FANNY VEE		From	KATHY	
Co./Dept.	NORTHSHORE		Co.	LOGEP	
Phone #	UTILITY		Phone #	800-462-8418	
Fax #	425-398-4430		Fax #	509-747-3875	

This is to certify that the policies of insurance and memorandum of coverage listed below have been issued to the insured named above for the policy period indicated, notwithstanding any requirement, term or condition of any contract or other document with respect to which this certificate may be issued or may pertain, the coverage afforded by the policies and memorandum of coverage described herein is subject to all terms, exclusions and conditions of such policies.

EFFECTIVE DATE: September 1, 2000

EXPIRATION DATE: August 31, 2001

COVERAGE

LIMIT

Comprehensive General Liability/Auto Liability

Washington Governmental Entity Pool
 Company: NPX Program

\$ 250,000 Self-Insured Retention
 \$ 20,000,000 Per Occurrence
 None Aggregate
 Member Deductible Applies

Employment Practice Liability

Washington Governmental Entity Pool
 Company: NPX Program

\$ 250,000 Self-Insured Retention
 \$ 20,000,000 Per Occurrence
 \$ 20,250,000 Aggregate
 Member Deductible Applies

Public Officials Liability

Washington Governmental Entity Pool
 Company: NPX Program

\$ 250,000 Self-Insured Retention
 \$ 20,000,000 Per Occurrence
 \$ 20,250,000 Aggregate
 Member Deductible Applies

Property / Mobile Equipment

Washington Governmental Entity Pool
 Company: NPX Program

Property on File with WGEP
 Member Deductible Applies

Automobile Physical Damage

Washington Governmental Entity Pool

Per Schedule on File with WGEP

Boiler and Machinery

Washington Governmental Entity Pool
 Company: NPX Program

Limits on File with WGEP
 Member Deductible Applies

Employee Dishonest Bond

Washington Governmental Entity Pool

Per Schedule on File with WGEP

Certificate holder is to be shown as additional insured in respects to the Franchise Agreement (Section 15) between the City of Kirkland and Northshore Utility District.

EOC-2001



Authorized Representative
 DATE: Wednesday, April 04, 2001

OFFICIAL FILE

COPY

ORDINANCE 3767

AN ORDINANCE OF THE CITY OF KIRKLAND GRANTING NORTHSHORE UTILITY DISTRICT, A WASHINGTON MUNICIPAL CORPORATION, THE RIGHT, PRIVILEGE, AUTHORITY AND FRANCHISE TO CONSTRUCT AND MAINTAIN, REPAIR, REPLACE, OPERATE UPON, OVER, UNDER, ALONG AND ACROSS THE FRANCHISE AREA FOR PURPOSES OF ITS WATER & SEWER UTILITY BUSINESS.

WHEREAS, pursuant to Resolution R-4223 the City Council authorized the City Manager to negotiate a franchise agreement with the Northshore Utility District ("NUD"); and

WHEREAS, NUD and the City have successfully negotiated such an agreement;

NOW THEREFORE, City Council of the City of Kirkland do ordain as follows:

Section 1. Definitions. Where used in this franchise (the "Franchise") these terms have the following meanings:

(a) "NUD" means Northshore Utility District, a Washington municipal corporation, and its respective successors and assigns.

(b) "City" means the City of Kirkland, a municipal corporation of the State of Washington, and its respective successors and assigns.

(c) "Franchise Area" means any, every and all of the roads, streets, avenues, alleys, highways, rights-of-way and unrestricted utility easements of the City as now laid out, platted, dedicated or improved; and any, every and all roads, streets, avenues, alleys, highways and rights-of-way that may hereafter be laid out, platted, dedicated or improved within the present limits of the City and as such limits may be hereafter extended.

(d) "Facilities" means tanks, meters, pipes, mains, services, valves, manholes, pressure reducing valves ("PRVs"), pump stations, meter stations, lines, and all necessary or convenient facilities and appurtenances thereto, whether the same be located over or under ground.

- (e) "Ordinance" means this Ordinance No. 3767, which sets forth the terms and conditions of this Franchise.
- (f) "Revenues" means the value proceeding or accruing from the performance of NUD's water and sewer business, including operations incidental thereto, but without any deduction on account of the cost of the commodity furnished or sold, the cost of materials used, labor costs, interest, delivery costs, taxes, or any other expense paid or accrued and without any deduction on account of losses; provided that it shall not include late fees, impact or mitigation fees, or connection charges.

Section 2. Franchise.

A. Facilities within Franchise Area. The City does hereby grant to NUD the right, privilege, authority and franchise to:

(a) Construct, support, attach, and connect Facilities between, maintain, repair, replace, enlarge, operate and use Facilities in, upon, over, under, along, through and across the Franchise Area for purposes of its water and sewer utility business as defined in RCW 82.04.065.

B. Permission Required to Enter Onto Other City Property. Nothing contained in this Ordinance is to be construed as granting permission to NUD to go upon any other public place other than those types of public places specifically designated as the Franchise Area in this Ordinance. Permission to go upon any other property owned or controlled by the City must be sought on a case-by-case basis from the City.

C. Compliance with Laws and Regulations. At all times during the term of this Franchise, NUD shall fully comply with all applicable federal, state, and local laws and regulations.

Section 3. Non-interference of Facilities.

NUD's Facilities shall be located, relocated and maintained within the Franchise Area so as not to unreasonably interfere with the free and safe passage of pedestrian and vehicular traffic and ingress or egress to or from the abutting property and in accordance with the laws of the State of Washington. Nothing herein shall preclude NUD from effecting temporary road closures as reasonably necessary during construction or maintenance of its Facilities

provided NUD receives prior City approval, which shall not be unreasonably withheld. Whenever it is necessary for NUD, in the exercise of its rights under this Franchise, to make any excavation in the Franchise Area, NUD shall, upon completion of such excavation, restore the surface of the Franchise Area to the specifications established within the City of Kirkland Public Works Policies and pre-approved plans and in accordance with standards of general applicability imposed by the City by ordinance, administrative order; provided, however, if the surface of the affected Franchise Area has an Overall Condition Index (OCI)* rating of 40 or less prior to NUD's excavation, then the area shall be restored with a permanent asphalt patch per City of Kirkland Pre-approved Plans in lieu of an asphalt street overlay.

If NUD should fail to leave any portion of any Franchise Area so excavated in a condition that meets the City's specifications per the Public Works Policies and Standards, then, subject to the foregoing sentence, the City may after notice of not less than five (5) days to NUD, which notice shall not be required in case of an emergency, order any and all work considered necessary to restore to a safe condition that portion of the Franchise Area so excavated, and NUD shall pay to the City the reasonable cost of such work; which shall include among other things the overhead expense of the City in obtaining completion of said work. The parties agree that this provision may be renegotiated upon the request of either party.

*The City of Kirkland's Overall Condition Index (OCI) rating is based upon standard pavement condition rating methodologies as recognized by the Washington State Department of Transportation (WSDOT) and the Northwest Pavement Managers Association (NWPMA).

B. Any surface or subsurface failure occurring during the term of this Agreement and caused by any excavation by NUD shall be repaired to the City's specifications, within fifteen (15) days or upon five (5) days written notice to NUD by the City; if NUD fails to so timely repair, then the City shall order all work necessary to restore the damaged area to a safe and acceptable condition and NUD shall pay the reasonable costs of such work to the City.

Section 4. Relocation of Facilities.

A. Whenever the City causes the grading or widening of the Franchise Area or undertakes construction of any water, sanitary sewer or storm drainage line, lighting, signalization, sidewalk improvement, pedestrian amenities, or other public street improvement (for purposes other than those described in section 4[B] below) and such project requires the relocation of NUD's then existing Facilities within the Franchise Area, the City shall:

(a) Provide NUD, at least ninety (90) days prior to the commencement of such project, written notice that a project is expected to require relocation; and

(b) Provide NUD with reasonable plans and specifications for such grading, widening, or construction and a proposed new location within the Franchise Area for NUD's Facilities.

After receipt of such notice and such plans and specifications, NUD shall relocate such Facilities within the Franchise Area so as to accommodate such street and utility improvement project; provided, however, NUD may, after receipt of written notice requesting a relocation of its Facilities, submit to the City written alternatives to such relocations. The City shall within a reasonable time evaluate such alternatives and advise NUD in writing whether one or more of the alternatives is suitable to accommodate work that would otherwise necessitate relocation of the Facilities. If so requested by the City, NUD shall submit such additional information as is reasonably necessary to assist the City in making such evaluation. The City shall give each alternative full and fair consideration. In the event the City ultimately reasonably determines that there is no other reasonable or feasible alternative, then NUD shall relocate its Facilities as otherwise provided in this Section 4. The City shall cooperate with NUD to designate a substitute location for its Facilities within the Franchise Area. City will establish a date by which Facilities will be relocated, which date will be not less than sixty (60) days after written notice to NUD as to the facility to be relocated. NUD must finish relocation of each such Facility by the date so established. The cost of relocating such Facilities existing within the present limits of the City shall be paid as follows:

(a) if the relocation occurs within six (6) years after NUD initially constructed such Facility, then the relocation shall be at the City's sole cost;

(b) if the relocation occurs more than six (6) years but within ten (10) years after NUD initially constructed such Facility, then the City shall pay fifty percent (50%) of the cost of such relocation and NUD shall pay the remaining fifty percent (50%); and

(c) if the relocation occurs more than ten (10) years after NUD initially constructed such Facility, then the relocation shall be at NUD's sole cost.

(d) For the purpose of planning, NUD and the City shall provide each other with a copy of their respective current adopted Capital Improvement Plan annually and upon request by the other party.

B. Whenever any person or entity, other than the City, requires the relocation of NUD's Facilities to accommodate the work of such person or

entity within the Franchise Area, or whenever the City requires the relocation of NUD's Facilities within the Franchise Area for the benefit of any person or entity other than the City, then NUD shall have the right as a condition of such relocation to require such person or entity to:

(a) make payment to NUD at a time and upon terms acceptable to NUD for any and all costs and expense incurred by NUD in the relocation of NUD's Facilities; and

(b) protect, defend, indemnify and save NUD harmless from any and all claims and demands made against it on account of injury or damage to the person or property of another arising out of or in conjunction with the relocation of NUD's Facilities, to the extent such injury or damage is caused by the negligence or willful misconduct of the person or entity requesting the relocation of NUD's Facilities or other negligence or willful misconduct of the agents, servants or employees of the person or entity requesting the relocation of NUD's Facilities.

C. Any condition or requirement imposed by the City upon any person or entity (including, without limitation, any condition or requirement imposed pursuant to any contract or in conjunction with approvals or permits for zoning, land use, construction or development) which necessitates the relocation of NUD's Facilities within the Franchise Area shall be subject to the provisions of subsection 4(B). However, in the event the City reasonably determines (and promptly notifies NUD in writing of such determination) that the primary purpose of imposing such condition or requirement upon such person or entity which necessitates such relocation is to cause the construction of an improvement on the City's behalf and in a manner consistent with City approved improvement plans (as described in 4[A] above) within a segment of the Franchise Area then:

NUD shall require only those costs and expenses incurred by NUD in integrating and connecting such relocated Facilities with NUD's other Facilities to be paid to NUD by such person or entity, and NUD shall otherwise relocate its Facilities within such segment of the Franchise Area in accordance with the provisions of subsection 4(A) above.

The provisions of this Section 4(C) shall in no manner preclude or restrict NUD from making any arrangements it may deem appropriate when responding to a request for relocation of its Facilities by any person or entity other than the City, where the facilities to be constructed by such person or entity are not or will not become City owned, operated or maintained facilities, provided that such arrangements do not unduly delay a City construction project.

D. This Section 4 shall govern all relocations of NUD's Facilities required in accordance with this Franchise. Any cost or expense in connection with the location or relocation of any Facilities existing under benefit of easement or other rights not arising under this Franchise, excluding rights arising under any prior King County franchise, shall be borne fifty percent (50%) by NUD and fifty percent (50%) by the City. Costs for location or relocation of any Facilities existing under any prior King County franchise shall be borne solely by NUD.

E. NUD recognizes the need for the City to maintain adequate width for installation and maintenance of City owned utilities such as, but not limited to, sanitary sewer, water, storm drainage and telecommunication facilities. Thus, the City reserves the right to maintain reasonable clear zones within the public right-of-way for installation and maintenance of said utilities. The clear zones for each right-of-way segment shall be noted and conditioned with the issuance of each right-of-way permit. If adequate clear zones are unable to be achieved on a particular right-of-way, NUD shall locate in an alternate right-of-way, obtain easements from private property owners, or propose alternate construction methods which maintain and/or enhance the existing clear zones.

Section 5. Indemnification. NUD shall indemnify, defend and hold the City, its agents, officers, employees, volunteers and assigns harmless from and against any and all claims, demands, liability, loss, cost, damage or expense of any nature whatsoever, including all costs and attorney's fees, made against them on account of injury, sickness, death or damage to persons or property which is caused by or arises out of, in whole or in part, the willful, tortious or negligent acts, failures and/or omissions of NUD or its agents, servants, employees, contractors, subcontractors or assigns in the construction, operation or maintenance of its Facilities or in exercising the rights granted NUD in this Franchise; provided, however, such indemnification shall not extend to injury or damage caused by the negligence or willful misconduct of the City, its agents, officers, employees, volunteers or assigns.

In the event any such claim or demand be presented to or filed with the City, the City shall promptly notify NUD thereof, and NUD shall have the right, at its election and at its sole cost and expense, to settle and compromise such claim or demand, provided further, that in the event any suit or action be begun against the City based upon any such claim or demand, the City shall likewise promptly notify NUD thereof, and NUD shall have the right, at its election and its sole cost and expense, to settle and compromise such suit or action, or defend the same at its sole cost and expense, by attorneys of its own election.

Section 6. Default. If NUD shall fail to comply with any of the provisions of this Franchise, unless otherwise provided for herein, the City may serve upon NUD a written order to so comply within thirty (30) days from the date such order is received by NUD. If NUD is not in compliance with this Franchise after expiration of said thirty (30) day period, the City may act to remedy the violation and may charge the costs and expenses of such action to NUD. The City may act without the thirty (30) day notice in case of an emergency. The City may in addition, by ordinance adopted no sooner than five (5) days after notice of the City Council hearing (at which NUD will have an opportunity to be heard) on the impending ordinance is given to NUD, declare an immediate forfeiture of this Franchise, provided, however, if any material failure to comply with this Franchise by NUD cannot be corrected with due diligence within said thirty (30) day period (NUD's obligation to comply and to proceed with due diligence being subject to unavoidable delays and events beyond its control, in which case the time within which NUD may so comply shall be extended for such time as may be reasonably necessary and so long as NUD commences promptly and diligently to effect such compliance), provided good faith dispute does not exist concerning such compliance.

In addition to other remedies provided herein, if NUD is not in compliance with requirements of the Franchise, and if a good faith dispute does not exist concerning such compliance, the City may place a moratorium on issuance of pending NUD right-of-way use permits until compliance is achieved.

Section 7. Non-exclusive Franchise. This Franchise is not and shall not be deemed to be an exclusive Franchise. This Franchise shall not in any manner prohibit the City from granting other and further franchises over, upon, and along the Franchise Area which do not interfere with NUD's rights under this Franchise. This Franchise shall not prohibit or prevent the City from using the Franchise Area or affect the jurisdiction of the City over the same or any part thereof.

Section 8. Franchise Term. Subject to the provisions of Section 9 below, this Franchise is and shall remain in full force and effect for a period of ten (10) years from and after January 1, 2001, provided that on January 1, 2006, and on January 1 every five (5) years thereafter, the term shall automatically be extended for an additional five (5) years, unless either NUD or the City gives the other party written notice of non-renewal prior to any such renewal date, in which case this Franchise shall terminate five (5) years after such renewal date; and provided further, however, NUD shall have no rights under this Franchise nor shall NUD be bound by the terms and conditions of this Franchise unless NUD shall, within thirty (30) days after the effective date of the Ordinance, file with the City its written acceptance of this Franchise, in a form acceptable to the City Attorney.

Section 9. Non-assumption. In consideration for the franchise fee and acceptance of the other terms and conditions of this Franchise, the City agrees that it will not exercise its statutory authority (RCW Chapter 35.13A as currently written) to assume jurisdiction over NUD or any NUD responsibilities, property, facilities or equipment within the City's corporate limits, including future annexed areas, for a minimum of ten (10) years from the date NUD files its written acceptance pursuant to Section 8 above or within (5) five years of annexation to the extent of the City's current planning area (which extends approximately to 145th Street), whichever is later.

Section 10. Franchise fee. In consideration for the rights granted NUD under this Agreement for existing sewer and water lines in the Franchise Area, NUD agrees to pay to the City a franchise fee equal to five percent (5%) of NUD's Revenues collected from NUD's customers with billing addresses that are within the corporate boundaries of the City. Fees for each calendar quarter shall be due thirty (30) days following the end of the calendar quarter. Should NUD be prevented by judicial or legislative action from collecting a franchise fee on all or a part of the Revenues, NUD shall be excused from the collection and distribution of that portion of the franchise fee. Should a court of competent jurisdiction declare, or a change in law make the franchise fee to be collected on behalf of the City invalid, in whole or in part, or should a court of competent jurisdiction hold that the collection of the franchise fee by NUD is in violation of a pre-existing contractual obligation of NUD, then NUD's obligation to collect and distribute a franchise fee to the City under this Section shall be terminated in accordance with and to the degree required to comply with such court action. NUD agrees that the franchise fee established by this Section is appropriate and that NUD will not be a party to or otherwise support legal or legislative action intended to result in judicial determinations or legislative action referred to above. City shall defend, indemnify and hold NUD harmless from and against any and all claims, suits, actions or liabilities (including costs and attorneys' fees) incurred or asserted against NUD directly or indirectly arising out of NUD's collection of the franchise fee as provided in this Franchise.

Section 11. Compliance with codes and regulations.

A. The rights, privileges and authority herein granted are subject to and governed by this ordinance and all other applicable ordinances and codes of the City of Kirkland, as they now exist or may hereafter be amended. Nothing in this ordinance limits the City's lawful power to exercise its police power to protect the safety and welfare of the general public. Any location, relocation, erection or excavation by NUD shall be performed by NUD in accordance with applicable federal, state and city rules and regulations, including the City Public Works Policies and Pre-approved Plans, and any

required permits, licenses or fees, and applicable safety standards then in effect or any Memorandum of Understanding with NUD.

B. Upon written inquiry, NUD shall provide a specific reference to either the federal, state or local law or the Washington Utilities and Transportation Commission ("WUTC") order or action establishing a basis for NUD's actions related to a specific franchise issue.

C. In the event that any territory served by NUD is annexed to the City after the effective date of this Franchise, such territory shall be governed by the terms and conditions contained herein upon the effective date of such annexation.

Section 12. Location of Facilities and Equipment. All Facilities and equipment to be installed within the Franchise Area shall be installed underground; provided, however, that such Facilities may be installed above ground if so authorized by the City, which authorization shall not be unreasonably withheld, conditioned or delayed, consistent with the provisions of the City's Land Use Code and applicable development pre-approved plans.

Section 13. Record of Installations and Service. With respect to excavations by NUD and the City within the Franchise Area, NUD and the City shall each comply with its respective obligations pursuant to Chapter 19.122, RCW and any other applicable state law.

Upon written request of the City, NUD shall provide the City with the most recent update available of any plan of potential improvements to its Facilities within the Franchise Area; provided, however, any such plan so submitted shall be for informational purposes within the Franchise Area, nor shall such plan be construed as a proposal to undertake any specific improvements within the Franchise Area.

As built drawings of the precise location of any Facilities placed by NUD in any street, alley, avenue, highway, easement, etc., shall be made available to the City within ten (10) working days of request.

Section 14. Shared Use of Excavations. NUD and the City shall exercise best efforts to coordinate construction work either may undertake within the Franchise Area so as to promote the orderly and expeditious performance and completion of such work as a whole. Such efforts shall include, at a minimum, reasonable and diligent efforts to keep the other party and other utilities within the Franchise Areas informed of its intent to undertake such construction work. NUD and the City shall further exercise best efforts to minimize any delay or hindrance to any construction work undertaken by themselves or other utilities within the Franchise Area.

If at any time, or from time to time, either NUD, the City, or another franchisee, shall cause excavations to be made within the Franchise Area, the party causing such excavation to be made shall afford the others, upon receipt of a written request to do so, an opportunity to use such excavation, provided that:

(a) Such joint use shall not unreasonably delay the work of the party causing the excavation to be made;

(b) Such joint use shall be arranged and accomplished on terms and conditions satisfactory to both parties. The parties shall each cooperate with other utilities in the Franchise Area to minimize hindrance or delay in construction.

The City reserves the right to not allow open trenching for five (5) years following a street overlay or improvement project. NUD shall be given written notice at least ninety (90) days prior to the commencement of the project. Required trenching due to an emergency will not be subject to five (5) year street trenching moratoriums.

The City reserves the right to require NUD to joint trench with other facilities if both parties are anticipating trenching within the same portion of the Franchise Area and provided that the terms of (a) and (b) above are met.

Section 15. Insurance. NUD shall maintain in full force and effect throughout the term of this Franchise, a minimum of One Million Dollars (\$1,000,000.00) liability insurance for property damage and bodily injury.

The City shall be named as an additional insured on any policy of liability insurance obtained by NUD for the purpose of complying with the requirements of this Section.

In satisfying the insurance requirement set forth in this section, NUD may self-insure against such risks in such amounts as are consistent with good utility practice. NUD shall provide the City with sufficient written evidence, the sufficiency of which shall be determined at the reasonable discretion of the City, upon request, that such insurance (or self-insurance) is being so maintained by NUD. Such written evidence shall include, to the extent available from NUD's insurance carrier, a written certificate of insurance with respect to any insurance maintained by NUD in compliance with this Section.

Section 16. Tariff Changes. If NUD shall file, pursuant to Chapter 80.28 RCW, with the WUTC (or its successor) any tariff affecting the City's

rights arising under this Franchise, NUD shall give the City Clerk written notice thereof within five (5) days of the date of such filing.

Section 17. Assignment. All of the provisions, conditions, and requirements herein contained shall be binding upon NUD, and no right, privilege, license or authorization granted to NUD hereunder may be assigned or otherwise transferred without the prior written authorization and approval of the City, which the City may not unreasonably withhold, condition or delay. Notwithstanding the foregoing, NUD may assign this agreement to an affiliate, parent or subsidiary or as part of any corporate financing, reorganization or refinancing which does not require assignment to any but an affiliate, parent or subsidiary without the consent of, but upon notice to, the City.

Section 18. Notice. Unless applicable law requires a different method of giving notice, any and all notices, demands or other communications required or desired to be given hereunder by any party (collectively, "notices") shall be in writing and shall be validly given or made to another party if delivered either personally or by Federal Express or other overnight delivery service of recognized standing, or if deposited in the United States Mail, certified, registered, or express mail with postage prepaid, or if sent by facsimile transmission with electronic confirmation. If such notice is personally delivered, it shall be conclusively deemed given at the time of such delivery. If such notice is delivered by Federal Express or other overnight delivery service of recognized standing, it shall be deemed given one (1) business day after the deposit thereof with such delivery service. If such notice is mailed as provided herein, such shall be deemed given three (3) business days after the deposit thereof in the United States Mail. If such notice is sent by facsimile transmission, it shall be deemed given at the time of the sender's receipt of electronic confirmation. Each such notice shall be deemed given only if properly addressed to the party to whom such notice is to be given as follows:

To City: City Clerk
 City of Kirkland
 123 Fifth Avenue
 Kirkland, WA 98033-6169
 Fax: (425) 576-2921

To NUD: General Manager
 Northshore Utility District
 6830 NE 185th St.
 Kenmore, WA 98028
 Fax:(425) 398-4435

With copy to: Andrew Maron
 Short Cressman & Burgess PLLC
 999 Third Avenue, Suite 3000
 Seattle, WA 98104-4088
 Fax: (206) 340-8856

Any party hereto may change its address for the purpose of receiving notices as herein provided by a written notice given in the manner aforesaid to the other party hereto.

Section 19. Miscellaneous. If any term, provision, condition or portion of this Franchise shall be held to be invalid, such invalidity shall not affect the validity of the remaining portions of this Franchise which shall continue in full force and effect. The headings of sections and paragraphs of this Franchise are for convenience of reference only and are not intended to restrict, affect, or be of any weight in the interpretation or construction of the provisions of such sections or paragraphs.

In addition to the franchise fee due under Section 10 above, NUD shall pay for the City's reasonable administrative costs in drafting and processing this franchise agreement and all work related thereto. NUD shall further be subject to all permit fees associated with activities undertaken through the authority granted in this franchise ordinance or under the laws of the City. Where the City incurs cost and expenses for review, inspection, or supervision of activities undertaken through the authority granted in this franchise or any ordinances relating to the subject for which a permit fee is not established, NUD shall pay such costs and expenses directly to the City. In addition to the above, NUD shall promptly reimburse the City for any and all costs it reasonably incurs in response to any emergency involving NUD's facilities.

City has the right, but not the obligation, to take over control and ownership of Franchise's facilities in the Franchise Area, specifically including the water and sewer plant network, without compensation, if: (1) such facilities are abandoned; or (2) in the event this Franchise is terminated and Franchisee does not remove such facilities at its own expense within a reasonable period of time. Furthermore, the City is specifically interested in retaining abandoned water and sewer lines for use as conduit for communication purposes and NUD shall notify the City at least 180 days prior to abandonment of any water or sewer line.

This Franchise may be amended only by written instrument, signed by both parties, which specifically states that it is an amendment to this Franchise, and is approved and executed in accordance with the laws of the State of Washington. Without limiting the generality of the foregoing, this Franchise (including, without limitation, Section 5 above) shall govern and supersede and shall not be changed, modified, deleted, added to, supplemented or otherwise amended by any permit, approval, license, agreement or other document required by or obtained from the City in conjunction with the exercise (or failure to exercise) by NUD of any and all rights, benefits, privileges, obligations, or duties in and under this Franchise, unless such permit, approval, license, agreement or document specifically:

(a) references this Franchise; and

(b) states that it supersedes this Franchise to the extent it contains terms and conditions which change, modify, delete, add to, supplement or otherwise amend the terms and conditions of this Franchise.

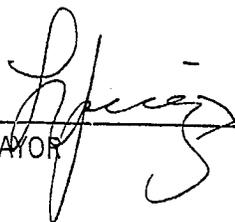
In the event of any conflict or inconsistency between the provisions of this Franchise and the provisions of any such permit, approval, license, agreement or other document, the provisions of this Franchise shall control.

This Franchise is subject to the provisions of any applicable tariff now or hereafter on file with the WUTC or its successor. In the event of any conflict or inconsistency between the provisions of this Franchise and such tariff, the provisions of such tariff shall control.

Section 20. Effective date. This Ordinance, being in compliance with RCW 35A.47.040, shall be in force and effect five (5) days from and after its passage by the Kirkland City Council and publication pursuant to Section 1.08.017 Kirkland Municipal Code in the summary form attached to the original of this ordinance and by this reference approved by the City Council.

Passed by majority vote of the Kirkland City Council in open meeting this 11th day of December, 2000.

Signed in authentication thereof this 11th day of December, 2000.



 MAYOR

Attest:



City Clerk

Approved as to Form:



City Attorney

Ord\NLD franchise agreement

PUBLICATION SUMMARY OF
ORDINANCE NO. 3767

AN ORDINANCE OF THE CITY OF KIRKLAND GRANTING NORTSHORE UTILITY DISTRICT, A WASHINGTON MUNICIPAL CORPORATION, THE RIGHT, PRIVILEGE, AUTHORITY AND FRANCHISE TO CONSTRUCT, AND MAINTAIN, REPAIR, REPLACE, REMOVE AND OPERATE UPON, OVER, UNDER, ALONG AND ACROSS THE FRANCHISE AREA FOR PURPOSES OF ITS WATER AND SEWER UTILITY BUSINESS.

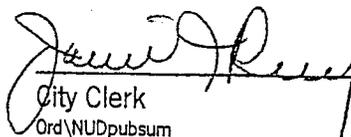
SECTIONS 1-15. Provide for: the grant to Northshore Utility District of a franchise for a water and sewer utility business for ten years on specified terms and conditions with the possibility of 5 year extensions thereafter, payment of franchise fees to the City and non-assumption of NUD facilities within Kirkland for 10 years after acceptance or 5 years after annexation, whichever is later.

SECTIONS 16-19. Set forth administrative provisions for the franchise and concerning its legal effect.

SECTION 20. Authorizes publication of the ordinance by summary, which summary is approved by the City Council pursuant to Section 1.08.017 Kirkland Municipal Code and establishes the effective date as five days after publication of summary.

The full text of this ordinance will be mailed without charge to any person upon request made to the City Clerk for the City of Kirkland. The ordinance was passed by the Kirkland City Council at its regular meeting on the 11th day of december, 2000.

I certify that the foregoing is a summary of Ordinance 3767 approved by the Kirkland City Council for summary publication.



City Clerk
Ord\NUPubsum

**PUBLIC WORKS
EMERGENCY RESPONSE
MUTUAL AID
AGREEMENT
FOR
SIGNATORY AGENCIES
IN THE
STATE OF WASHINGTON**

INTRODUCTION

The purpose of the Public Works Emergency Response Mutual Aid Agreement is to permit signatory agencies to make the most efficient use of their powers by enabling them to coordinate resources and to maximize funding reimbursement during disasters/emergencies.

This Agreement will allow signatory agencies to support each other during disasters/emergencies to protect life and property, when the event is beyond the capabilities of the affected entity. This Agreement provides the mechanism for an immediate response to the Requesting Agency provided the Responding Agency has the resources and expertise necessary and available.

When faced with a disaster or emergency, public works agencies have a responsibility to maintain service and recover in the most expedient way. This can best be accomplished by preparation, coordination and cooperation with other public works agencies. Agencies are charged with the responsibility of coordinating efforts and compiling damage and recovery information on disasters and then reporting to the appropriate authority. Then the State requests aid and assistance from the federal government.

The following definitions for disaster and emergency are from the State Comprehensive Disaster Plan and were used in this Public Works Emergency Response Mutual Aid Agreement:

Disaster - An event expected or unexpected, in which a community's available, pertinent resources are expended; or the need for resources exceeds availability; and in which a community undergoes severe danger; incurring losses so that the social or economic structure of the community is disrupted; and the fulfillment of some or all of the community's essential functions are prevented.

Emergency - An event, expected or unexpected, involving shortages of time and resources; that places life, property or the environment, in danger; that requires response beyond routine incident response resources.

The reference guide is designed to be useful to individual agencies during a proclaimed emergency -- whether it be to borrow a piece of equipment for a specific job or request crews to assist in repair of a major failure. The reference guide will be updated and revised periodically, please insert the revisions immediately.

AGREEMENT

**PUBLIC WORKS
EMERGENCY RESPONSE
MUTUAL AID AGREEMENT**

WHEREAS, the purpose of this pre-disaster agreement between the agencies is to provide for immediate assistance to protect life and property;

WHEREAS, this Agreement is authorized under State of Washington, RCW's 35 (City), 36 (County), 38.52 (Emergency Management), 39.34 (Interlocal Agreement) and 47 (Public Highway Transportation (DOT)); which is activated only in the event of a proclamation of an emergency by the local and/or state government approving authority;

WHEREAS, the agency asking for assistance from any signatory agency will herein be referred to as the Requesting Agency;

WHEREAS, the signatory agency agreeing to assist another signatory agency asking for assistance will herein be referred to as the Responding Agency;

WHEREAS, it is necessary and desirable that this Agreement be executed for the exchange of mutual aid; with the intent to supplement not supplant agency personnel.

NOW, THEREFORE, it is hereby agreed by each and all of the parties signatory to the Agreement as follows:

1. Each agency signatory to this Agreement agrees to furnish, upon its sole discretion, those resources and services it deems to be available to each other signatory agency hereto as necessary to assist in the prevention, response, recovery and mitigation of proclaimed emergencies/disasters.
2. It is hereby understood that this Agreement shall not supplant pre-existing mutual aid agreements nor deny the right of any agency hereto to negotiate other mutual aid agreements.
3. The Responding Agency shall assist in only those situations for which it has determined it has qualified personnel, appropriate equipment and necessary materials. Resources of the Responding Agency that are made available to the Requesting Agency shall, whenever possible,

remain under the control and direction of the Responding Agency. The Requesting Agency shall coordinate the activities and resources of all Responding Agencies.

4. It is hereby understood that the Responding Agency will be reimbursed (e.g., labor, equipment, materials and other related expenses as applicable, including loss or damage to equipment) at its adopted usual and customary rates. The Responding Agency shall submit an itemized voucher of costs to the Executive Head of the Requesting Agency within sixty (60) days after completion of work (RCW 38.52.080). Unless otherwise agreed, the Responding Agency shall receive reimbursement within ninety (90) days after the voucher submittal date.
5. The Responding Agency shall have no responsibilities or incur any liabilities because it does not provide resources and/or services to any other party to this Agreement. The Responding Agency shall retain the right to withdraw some or all of its resources at any time. Notice of intention to withdraw shall be communicated to the Requesting Agency's designated official, or the official's designee, as soon as practicable.
6. All privileges, immunities, rights, duties and benefits of officers and employees of the Responding Agency shall apply while those officers and employees are performing functions and duties on behalf of the Requesting Agency, unless otherwise provided by law. Employees of the Responding Agency remain employees of the Responding Agency while performing functions and duties on behalf of the Requesting Agency (RCW 38.52.080).
7. To the extent permitted by law, the Requesting Agency shall protect, defend, hold harmless and indemnify all other Responding signatory Agencies, and their officers and employees from any and all claims, suits, costs, damages of any nature, or causes of action, including the cost of defense and attorneys fees, by reason of the acts or omissions, whether negligent, willful, or reckless, of its own officers, employees, agency or any other person arising out of or in connection with any acts or activities authorized by this agreement, and will pay all judgments, if any, rendered. This obligation shall not include such claims, costs, damages or other expenses which may be caused by the sole negligence of the Responding Agencies or their authorized agents or employees.
8. Authorization and approval of this Agreement shall be in a manner consistent with the Agency's current procedures. This Agreement shall be effective upon approval by two or more agencies and shall remain in effect as long as two or more agencies are parties to this Agreement. Upon execution of this Agreement, the agency shall send an original or a certified copy of the agreement to the Washington State Department of Transportation, Highways & Local Programs Service Center. Highways & Local Programs shall maintain a list of all signatory agencies and send an updated list to all agencies whenever an agency is added or removed from the list.
9. Any agency signatory to this Agreement may cancel its participation in this Agreement by giving written notice to the Washington State Department of Transportation, Highways & Local Programs Service Center.
10. This Agreement is for the benefit of the signatory agencies only and no other person or entity shall have any rights whatsoever under this Agreement as a third party beneficiary.

Appendix E

Sanitary Sewer Pre-Approved Notes, Design Criteria and Plans

INDEX

SANITARY SEWER POLICIES

- S-1 Requirements for Construction near Lakefront Sewer Line
- S-2 Closed Circuit Camera Requirements for Sewer Mains

SANITARY SEWER PRE-APPROVED NOTES, DESIGN CRITERIA, & PLANS

Sanitary Sewer - Plan Notes	1 - 2
Sanitary Sewer - Design Criteria	3 - 9
Sanitary Sewer Trench Detail	S.01
Water and Sewer Spacing and Clearance	S.02
Pipe Bedding	S.03
Soil/Cement Pipe Anchor	S.04
Casing Installation	S.05
Sampling Tee	S.06
Check Valve Assembly for Joint Use Side Sewer (4 to 8-inch Diameter)	S.07
Sewer Main Bypass Plug	S.08
Standard 48" Sanitary Sewer Manhole	S.09
Shallow Manhole Assembly	S.10
Extra Shallow Manhole Assembly	S.11
Sanitary Sewer Internal Drop Connection	S.12
Sewer Manhole Main Channel and Shelf	S.13
Ladder and Manhole Steps	S.14
24" Manhole Ring and Cover	S.15
24" Manhole Frame With Locking Cover	S.16
Cleanout	S.17
Side Sewer Marker Post	S.18
Side Sewer Stubs	S.19
Residential Side Sewer Installation	S.20
Single-Family Sewer Lift Station - Simplex System	S.21

Sanitary Sewer – Index (continued)

Commercial and Multifamily Sewer Lift Station - Duplex System	S.22
100-Gallon Baffle Type Oil/Water Separator	S.23
450-Gallon Baffle Type Oil/Water Separator	S.24
800- & 1,000-Gallon Baffle Type Oil/Water Separator	S.25
Manhole Frame and Grate Adjustment	S.26
Paved Vehicle Service Area Drainage Detail	S.27
Single Family Simplex Sewer Lift Station Gravity / Force Main Connection	S.28
Grease Interceptor	S.29

SANITARY SEWER - PLAN NOTES

1. A pre-construction conference shall be held prior to the start of construction. The Contractor shall be responsible for securing all necessary permits prior to construction.
2. All construction and materials shall conform to City of Kirkland Department of Public Works and current WSDOT/APWA standards and specifications for road, bridge, and municipal construction.
3. Approximate locations of existing utilities have been obtained from available records and are shown for convenience. The Contractor shall be responsible for verification of the locations shown and for discovery of possible additional utilities not shown so as to avoid damage or disturbance. The underground utility location service shall be contacted for field location prior to any construction. The owner or his representative shall be contacted if a utility conflict exists. For utility location in King County, call 1-800-424-5555. The Contractor is responsible to ensure that utility locates are maintained throughout the life of the project.
4. It shall be the Contractor's responsibility to coordinate his activities with local utility companies to ensure that all utilities are installed according to these plans and the requirements of the individual utility companies.
5. All manholes shall conform to WSDOT/APWA standards, eccentric cones with manufacturer-approved gaskets and 1/2" polypropylene-encapsulated safety steps and ladders. All manholes shall have cast iron rings and ductile iron covers. Lids shall have 2" raised letters marked "SEWER." All cleanouts shall have cast iron rings and covers marked "CO" that are in paved areas.
6. All side sewers shall be tested for acceptance at the same time the main sewer is tested. Side sewer locations shall be verified in the field prior to construction and backfilling. All side sewers shall be capped with a watertight plug, have a cleanout and test tee installed, and shall be marked for location with a 2" x 4" stake painted white, marked sewer, with 3' exposed, and the depth of the cap written on the stake. See Standard Detail S.18. The stake shall be secured to the end of the plug with wire a minimum of 16 gauge. Initial side sewer installation shall run to the property line. The remaining side sewer shall not be installed until testing and acceptance of the sewer trunk line by the City of Kirkland is completed. Number and location of side sewers shown are approximate only and may be changed as required during construction. Contractor shall notify Engineer when exact locations are determined and provide the Engineer and the City of Kirkland Department of Public Works with an as-built. If approved by the Public Works Department, all double-sided sewer wyes must be at the property line.
7. All main-line trenches shall be compacted prior to testing sewer lines for acceptance.
8. Pressure testing of gravity sewer mains shall conform to the following standards: (1) air testing will require a minimum of 4 psi for 15 minutes with no pressure drop; (2) water testing will require a minimum of 10' of head in a standpipe at the test location for 15 minutes with no drop in the water level in the standpipe. Either test is acceptable.
9. Pressure testing of force mains and laterals will require an air test of 25 psi minimum for 15 minutes with no pressure drop.
10. New connections to existing manholes or sewer lines shall be sealed off until upstream construction is finished, tested, cleaned, and accepted. All construction debris and water shall be removed prior to opening the seal.

Sanitary Sewer - Plan Notes (continued)

11. All PVC sewer pipe and fittings shall meet the requirements of ASTM Specifications D-3034 for 4" to 15" diameter and ASTM F679 for 18" to 27" diameter. Pipe shall be SDR-35 and shall conform to standard specifications. Bedding and backfill shall meet WSDOT and APWA specifications.
12. Minimum slope for side sewers shall be two percent (2%).
13. An approved copy of the sewer plan must be on site whenever construction is in progress.
14. Prior to construction of sewer lines, the necessary lot corners must be set, and the Contractor shall be responsible for the verification of the location of pipes, manholes, and invert elevations.
15. Pipe anchors, if used, shall be installed: not over 36' center to center on grades from 20 percent to 35 percent; not over 24' center to center on grades from 35 percent to 50 percent; and not over 16' center to center on grades 50 percent and greater.
16. All manholes shall have a minimum of 0.10' to a maximum of 1.00' drop between invert in and invert out.
17. PVC sewer pipe shall be tested for deflection according to WSDOT/APWA specifications.
18. All trench backfill shall be compacted to 95 percent density in roadways, roadway shoulders, roadway prism and driveways, and 85 percent density in unpaved areas. All pipe zone compaction shall be 95 percent.
19. It shall be the responsibility of the Contractor to adjust all manhole lids and cleanout lids to match final asphalt elevations in roadways or ground elevations in landscaped areas.
20. When tying into existing manholes that are below minimum standards, the existing manhole must be upgraded to meet current standards.
21. All new sewer main extensions shall be videoed prior to final acceptance.

SANITARY SEWER - DESIGN CRITERIA

I. MATERIALS

A. Pipe

1. PVC pipe shall conform to the provisions of ASTM D-3034 for SDR-35 wall thickness. Pipe joints shall be rubber gasket type. Solvent cement joints shall not be used.
2. Pipe fittings shall be furnished with bells and spigots which are integral with the pipe wall.
3. PVC pipe for force mains and laterals shall be Schedule 40 with glue joints. Run tracer wire along length of force main/lateral pipe.
4. Ductile iron pipe, Class 50, shall be used when minimum cover or minimum separation from water main cannot be obtained.

B. Manhole

1. Concrete manhole adapters shall be Kor-n-seal boot or an approved equal.
2. Manholes shall be pre-cast and shall conform to Standard Plan No. S.09, S.10, and S.11. All holes for inlet and outlet pipe shall be blocked out when manhole sections are cast.
3. Ladder rungs and steps shall be 1/2" polypropylene-coated, safety-type step, 12" minimum width. Ladder side bars shall be 9/16" round bar, polypropylene coated (see Standard Plan No. S.14).
4. Manhole frames shall be cast iron and covers shall be ductile iron with a combined weight of not less than 360 pounds, and shall have a minimum clear opening of 23-3/4". Frames and covers shall be equal to Olympic Foundry MH 30D/T. Cover to be marked "SEWER" in 2" raised letters. In unimproved areas and easements, manhole shall extend a minimum of 6" and a maximum of 18" above grade. Manhole ring cover shall have three recessed 5/8" x 1-1/4" stainless steel socket head cap screws for locking.
5. Reducing cones shall provide an eccentric reduction from 48" to 24" and shall not be less than 17" in height.
6. Manhole sections shall be jointed with flexible joint using rubber gaskets conforming to ASTM C443. Joints shall be watertight.

II. JOINTING

- A. Care shall be taken in making all joints in order to secure complete watertightness.
- B. Deflection in the pipe shall not be allowed either vertically or horizontally unless instructed by the Engineer. If a deflection is necessary, as determined by the Engineer, the allowable deflection shall not exceed that recommended by the pipe manufacturer.

III. CONNECTION TO EXISTING LINES

- A. The method of making connections to existing lines shall be approved by the Engineer prior to construction. No existing lines shall be abandoned and no new lines shall be put in operation until the new lines have been tested and accepted by the Engineer.
- B. It is the Contractor's sole responsibility to maintain the existing sewer lines in service before the new lines are put in operation.
- C. PVC pipe connections into new concrete manholes shall be made using Kor-n-seal boot or approved equal. Connections to existing concrete manholes shall be made by using a PVC manhole adaptor (sand collar).
- D. Grouting shall be non-shrink type.

IV. MANHOLES

- A. Drop manhole assembly shall be constructed using PVC fitting with gasket-fitted joints. Glue jointing is not acceptable. Drop assembly shall conform to Standard Plan No. S.12. No outside drops are allowed. Dry manholes shall be allowed only when no other feasible alternative exists.
- B. Flow line inverts shall be channeled using concrete and shall be finished with smooth flow line and surface finished. When connecting into an existing manhole, the new flow channel shall interface with the existing channel. Channeling shall conform to Standard Plan No. S.13.
- C. All joints in the manhole shall be sealed against leaks.
- D. The manhole cover shall be adjusted to final grade with approved methods.
- E. Ladders and steps shall be secured and grouted in the new manholes before the manhole is put into service.
- F. Manholes shall be constructed at all horizontal and vertical bends and at changes in pipe material.

V. TESTING

- A. Lamping of lines to check deflection in the pipe will be conducted prior to any pressure tests.
- B. Mandreling and/or video taping the sewer main may be required by the Public Works Department.
- C. A 15-minute, 4 psi air test with no pressure drop will be required to ensure joint seals.
- D. Force laterals require a 15 minute, 25 psi air test with no pressure drop.

VI. LATERALS

- A. Joint-Use Laterals
 - 1. Minimum pipe size shall be 6".

Sanitary Sewer - Design Criteria (continued)

2. Maximum of two houses can be served on a single 6" line, unless otherwise approved by the Public Works Department.
3. One cleanout must be installed for every 100' of length and at each elbow greater than 22 1/2 degrees. Place locator tape on cap when outside of paved surface.
4. Any lateral under a structure such as a rockery and with less than 3' of cover below the structure base shall be ductile iron for 5' on each side of the structure.
5. Backflow valve/check valve will be required by the Engineer per Title 15 of the Kirkland Municipal Code.
6. Testing of laterals shall conform to Title 15 of the Kirkland Municipal Code.

B. Single-Family Laterals

1. Minimum pipe size off the main channel to the property/right-of-way line shall be 6".
2. Minimum cover of 6' is required at the property/right-of-way line.
3. One service lateral for each family unit, unless otherwise approved by the Public Works Department.
4. Location of lateral shall be at lowest property corner or as conditions dictate.
5. Any lateral under a structure such as a rockery and with less than 3' of cover below the structure base shall be ductile iron for 5' on each side of the structure.
6. Backflow valve/check valve may be required by the Engineer.

C. Multifamily Laterals

Backflow valve/check valve will be required by the Engineer per Title 15 of the Kirkland Municipal Code.

D. Laterals for commercial and multifamily applications shall be tied into a manhole whenever possible. When this is not feasible, laterals shall be connected to the sewer main by one of the following approved methods:

1. Cut in a wye connection
2. PVC saddle
3. Romac sewer saddle
4. Inserta Tee
5. Thermal Fusion for HDPE Mains.

VII. SEWER LIFT STATIONS - PRIVATE

A. General Requirements

Sanitary Sewer - Design Criteria (continued)

1. All pumps within lift stations must be submersible grinder pumps, manufactured by Hydromatic or equal.
 2. All equipment and accessories shall be standard manufactured items and those coming in direct contact with sewage shall be specifically manufactured for such use.
 3. The pressure piping downstream of the lift station must tie into a 6-inch side sewer which flows by gravity into the sewer main. No direct connections of force laterals and sewer mains will be allowed.
 4. Lift station chamber must be either concrete or fiberglass.
 5. The lift station must be cycled on/off ten times to ensure all floats and alarms function properly before being signed off by the City. This test must be witnessed by the Public Works Inspector.
- B. Single-Family Lift Stations - Specific Requirements
1. Lift station to be a minimum of a simplex system (one pump).
 2. There shall be a minimum of three mercury level control floats; one for turning the pump ON, the second for turning the pump OFF, and the third for a high-water alarm.
 3. Grinder pump shall be two HP minimum, which is adequate for a single residence with up to 70 feet of head.
 4. Audio and visual alarm panel to be located inside the single-family residence.
 5. Pre-designed lift station packages are acceptable.
- C. Commercial and Multi-Family Lift Stations - Specific Requirements
1. Lift station to be a duplex system (dual pumps) and must be designed by a licensed professional engineer.
 2. Audio and visual alarms are required. Alarms are to be located within the building structure near the maintenance office or property manager's office.
 3. For multi-family projects, the Public Works Department shall determine if the development is to be served by individual lift stations for each unit/building or if the entire development may be served by one lift station. When the entire development is to be served by one lift station, a three-party maintenance agreement between the City of Kirkland, the development, and a lift station maintenance company shall be recorded with the property.

VIII. CONSTRUCTION

- A. Through Sewer Main Line
1. Minimum pipe size shall be 8" (size as required by flow calculations).
 2. Maximum distance between manholes shall not exceed 400'.

Sanitary Sewer - Design Criteria (continued)

3. Normal depth of pipe shall be 7' to 12'. All other depths to be approved by the Public Works Department.

B. Dead End Sewer Main Line

Dead end sewer main shall terminate with a manhole unless otherwise approved by the Public Works Department.

C. Required Separation Between Water Lines and Sanitary Sewers (Reference Standard Detail No. S.02).

1. *Horizontal Separation (Parallel)* - A minimum horizontal separation of ten (10) feet between gravity sanitary sewers and any potable water lines shall be maintained, whenever possible. The distance shall be measured from edge to edge.
2. *Unusual Conditions (Parallel)* - When local conditions prevent a horizontal separation as described above, a gravity sewer line may be laid closer than ten (10) feet to a water line provided:
 - a) It is laid in a separate trench; or it is laid in the same trench with the water line that is located at one side on a bench of undisturbed earth; and
 - b) In either case, the elevation of the crown of the gravity sewer must be at least 18 inches below the invert of the water line. When this vertical separation cannot be obtained, the gravity sewer shall be constructed of materials and joints that are equivalent to water main standards of construction and shall be pressure tested to assure water tightness prior to backfilling.
3. *Vertical Separation (Perpendicular)* - Sewer lines crossing water lines shall be laid below the water lines to provide a separation of at least 18 inches between the invert of the water line and the crown of the sewer line, whenever possible.
4. *Unusual Conditions (Perpendicular)* - When local conditions prevent a vertical separation as described above, the following construction shall be used:
 - a) Gravity sewers passing over or under water lines shall be:
 - i. Constructed of material described in Standard Detail No. S.02. The one segment of the maximum standard length of pipe (but no less than 18 feet long) shall be used with the pipes centered to maximize joint separation; or
 - ii. Constructed of standard gravity sewer material encased in concrete or in a 1/4" thick continuous steel casing with all voids pressure-grouted with sand-cement grout.
 - iii. The length of the sewer pipe, in both i. and ii. above, shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the water line. The sewer pipe shall be the longest standard length available from the manufacturer.
 - b) Water lines passing under gravity sewers, in addition, shall be protected by providing:
 - i. A vertical separation of at least 18 inches between the invert of the sewer and the crown of the water line;
 - ii. Adequate structural support for the sewers to prevent excessive deflection of joints and settling on and breaking of the water lines; and

Sanitary Sewer - Design Criteria (continued)

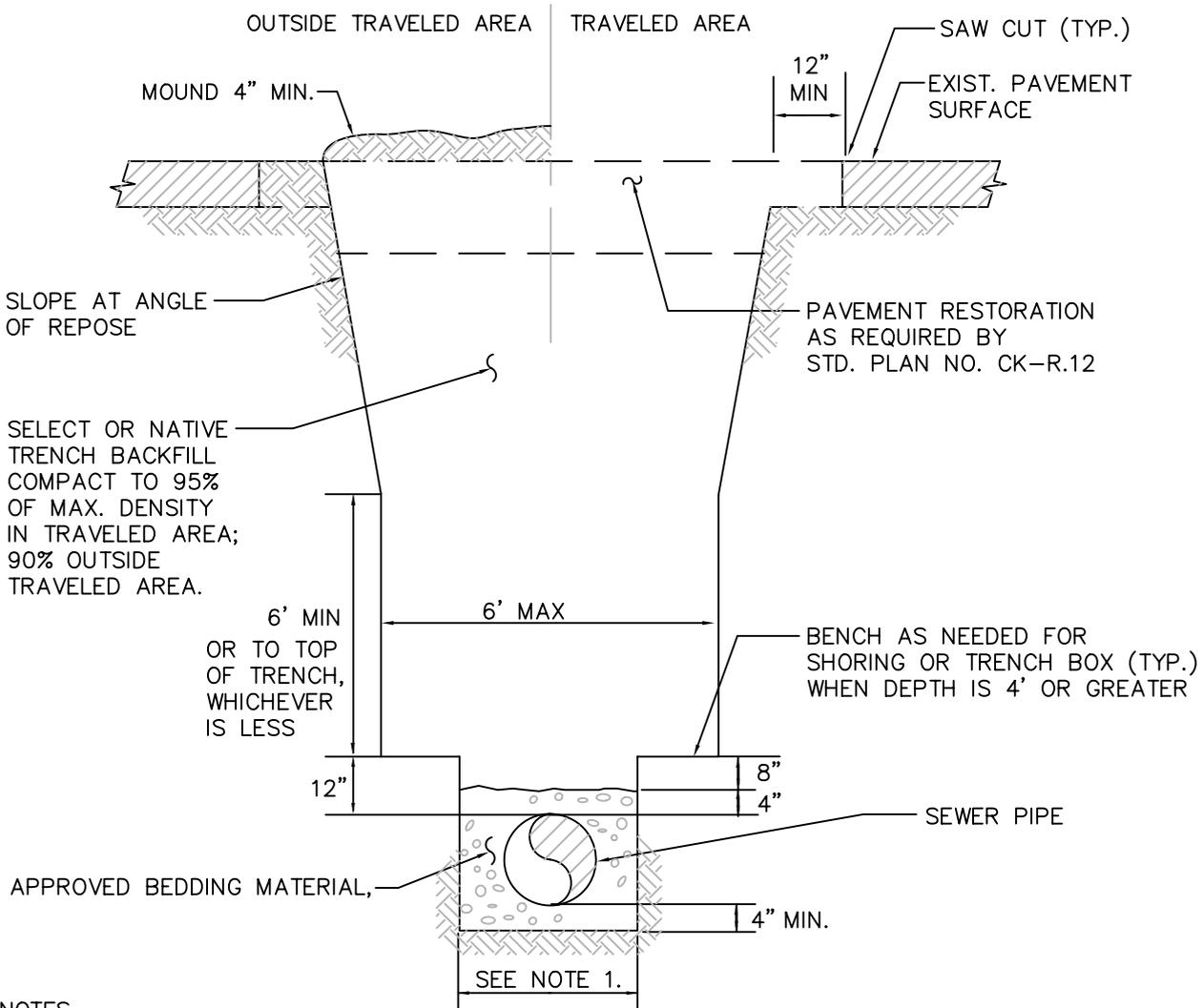
- iii. The length of the sewer pipe shall be centered at the point of crossing so that the joints will be equidistant and as far as possible from the water line. The sewer pipe shall be the longest standard length available from the manufacturer.
 - c) Pressure sewers shall only be constructed under water lines with ductile iron pipe or standard sewer pipe in a steel casing for a distance of at least ten (10) feet on each side of the crossing.
- D. Trench and Bedding Detail
1. Trench section shall conform to Standard Plan No. S.01.
 2. The trench width to 6" above the top of pipe shall not be greater than 1 1/2 times the outside diameter of pipe plus 18", except that the trench width shall be such as to provide adequate space for workmen to place and joint the pipe properly and safely. Trench walls shall be kept vertical, except the walls of the trenches above an elevation 6" above the top of pipe may be sloped back to prevent the banks from sloughing into the ditch.
 3. When soft or unstable material is encountered at the subgrade which, in the opinion of the City Engineer, will not uniformly support the pipe, such material shall be excavated to an additional depth as required by the City Engineer and backfilled with foundation rock material placed in 12" lifts and compacted to 95 percent of the maximum dry density to the pipe foundation grade.

Where unusually bad foundation conditions are encountered at the bottom of the trench, the City Engineer may order special foundation material to be placed.
 4. Wherever necessary to prevent caving, excavations in sand, gravel, sandy soil, or other unstable material shall be adequately sheeted and braced. Where sheeting and bracing are used, the trench width may be increased accordingly. Trench sheeting shall remain in place until the pipe has been laid, tested for defects, and repaired if necessary, and the earth around it compacted to a depth of 2' over the top of the pipe.
 5. Excavation for manholes and other appurtenances shall be sufficient to leave 12" minimum and 24" maximum clearance on all sides.
 6. Joints shall not be left uncovered except in the immediate area of pipe laying. Under no circumstances shall water be permitted to rise in the trench until after the pipe has been placed, tested, and backfilled.
 7. Regardless of the method of densification used, materials shall be brought up at substantially the same rate on both sides of the pipe, and care shall be taken so that the pipe is not floated or displaced. Fill material shall not be dropped directly on the pipe.
 8. Pipe zone material shall consist of excavated or imported material free from roots or other organic material, mud, muck, and frozen material.
 9. Pipe zone material shall be densified by compaction using mechanical tamping to a density of 95 percent of maximum dry soil density using a modified proctor. Equipment with suitably-shaped tamping feet shall be used to compact the material and ensure that the specified soil density is obtained beneath the haunches of the pipe.

Sanitary Sewer - Design Criteria (continued)

At the time of placement, the materials shall have the optimum moisture content required for compaction and the moisture content shall be uniform throughout each layer. Materials shall be placed in layers not more than 6" thick after each compaction.

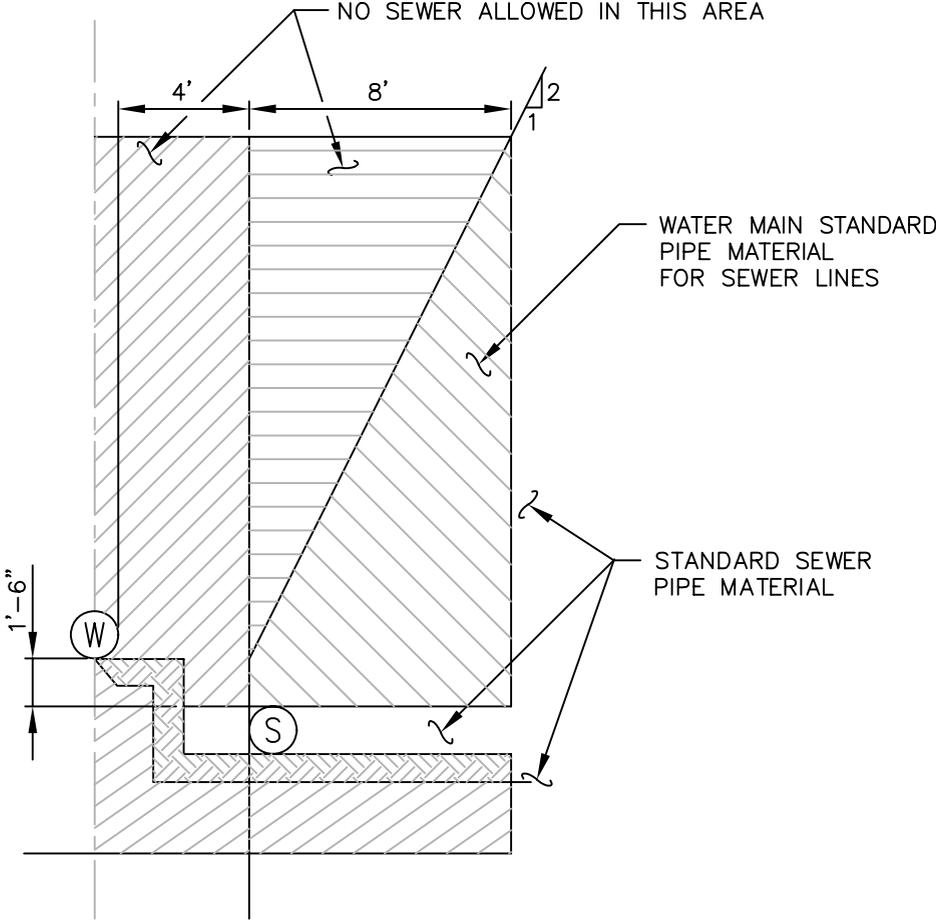
10. Trench backfill above the pipe zone to the surface of the finish grade or native ground shall be placed so that the resulting density will be 95 percent of maximum dry soil density, modified proctor, within travelled ways and 85 percent of maximum dry soil density for areas outside travelled ways. Backfill material shall be placed in continuous horizontal layers not exceeding 12" in thickness. This will be strictly adhered to for all pipes placed in the right-of-way.
11. Native backfill shall be mounded to a height of 4" over the top of the trench for ordinary backfill outside travelled ways.
12. Material for backfilling around manholes and other appurtenances shall be gravel barrow. Materials shall be deposited in a manner to ensure that the manhole or other appurtenance is not disturbed from the proper alignment, and backfill shall be compacted to the ground surface.
13. All interior bracing placed inside the pipe by the manufacturer shall be removed only after the backfill is complete.



NOTES

1. TRENCH BACKFILL BELOW TOP 4 FEET MAY BE NATIVE MATERIALS OR AS REQUIRED BY THE SPECIFICATIONS, OR AS DIRECTED BY THE PUBLIC WORKS INSPECTOR
2. MAXIMUM WIDTH OF TRENCH AT TOP OF PIPE
 - * 30 INCHES FOR PIPE UP TO AND INCLUDING 12" NOMINAL DIAMETER.
 - * O.D. PLUS 16 INCHES FOR PIPE LARGER THAN 12" NOMINAL DIAMETER.
3. IN PAVED AREAS USE CRUSHED ROCK BACKFILL
 - * FULL DEPTH OF TRENCH WHERE SEWER MAIN CROSSES PERPENDICULAR TO THE TRAVELED LANE OR DRIVEWAY.
 - * TOP FOUR FEET WHERE SEWER MAIN RUNS PARALLEL TO THE TRAVELED LANE, UNLESS EXISTING MATERIAL IS DETERMINED BY THE ENGINEER TO BE SUITABLE FOR BACKFILL.

CITY OF KIRKLAND	
PLAN NO. CK-S.01	
	SANITARY SEWER TRENCH DETAIL



PARALLEL CONSTRUCTION

TABLE 1
WATER MAIN STANDARD PIPE MATERIAL

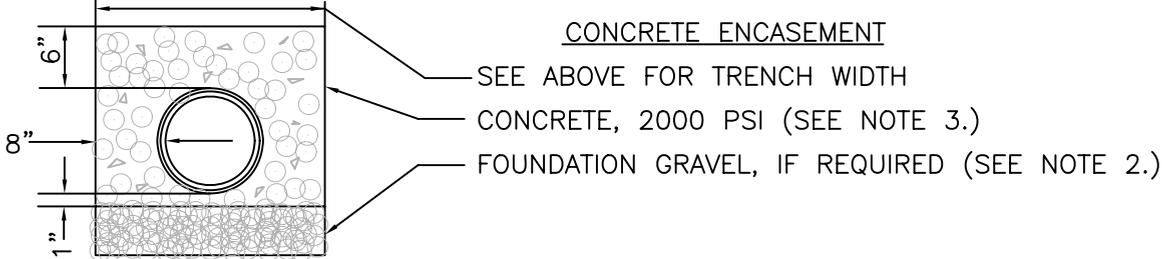
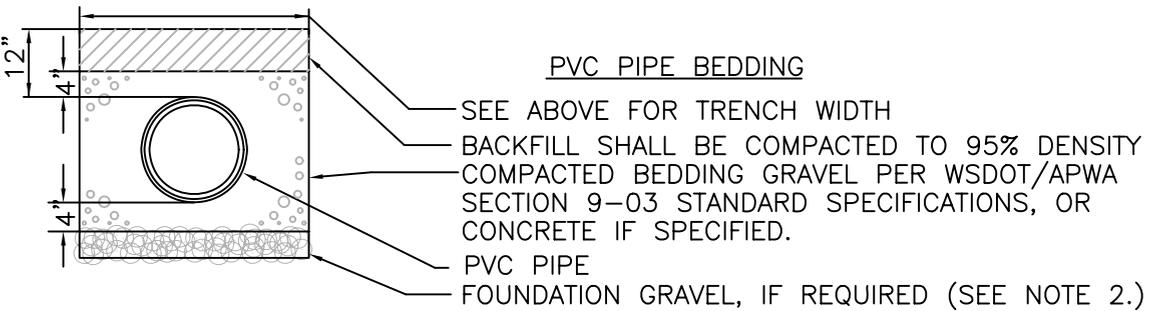
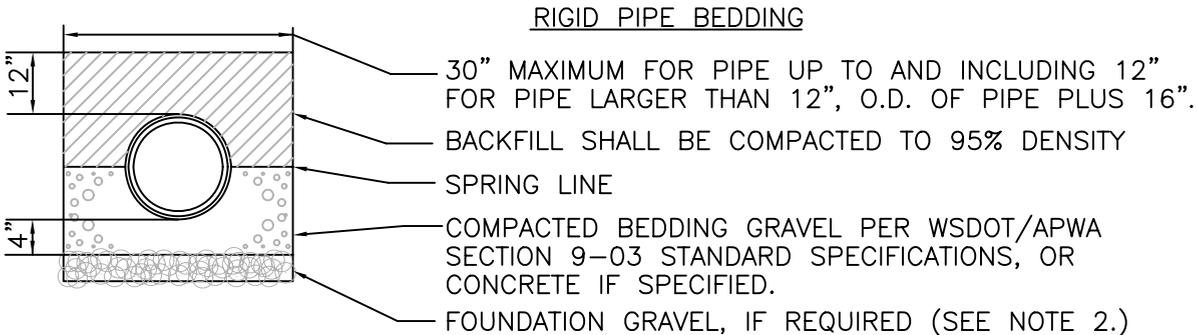
AWWA STANDARD			
TYPE OF PIPE	PIPE	JOINT	FITTINGS
DUCTILE IRON	C 1.52	C 111	C 110
CONCRETE CYLINDER	C 303		

NOTE:

1. TO BE USED WHEN 10' MINIMUM SEPARATION CANNOT BE OBTAINED.

CITY OF KIRKLAND	
PLAN NO. CK-S.02	
	WATER AND SEWER SPACING AND CLEARANCE

PIPE BEDDING CLASSES



NOTES:

1. COMPACTED CRUSHED SURFACING TOP COURSE PER WSDOT/APWA SECTION 9-03.9(3) STANDARD SPECIFICATIONS CAN ALSO BE USED AS BEDDING GRAVEL.
2. EXCAVATE UNSTABLE MATERIAL DOWN TO FIRM SOIL AND REPLACE WITH FOUNDATION GRAVEL PER SECTION 9-03.9(1) OF THE STANDARD SPECIFICATIONS
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANCHORING PIPE TO PREVENT FLOTATION DURING CONCRETE PLACEMENT.

CITY OF KIRKLAND	
PLAN NO. CK-S.03	
	PIPE BEDDING

NATIVE BACKFILL COMPACTED TO DENSITY OF ADJACENT SOIL, SEE SPECS

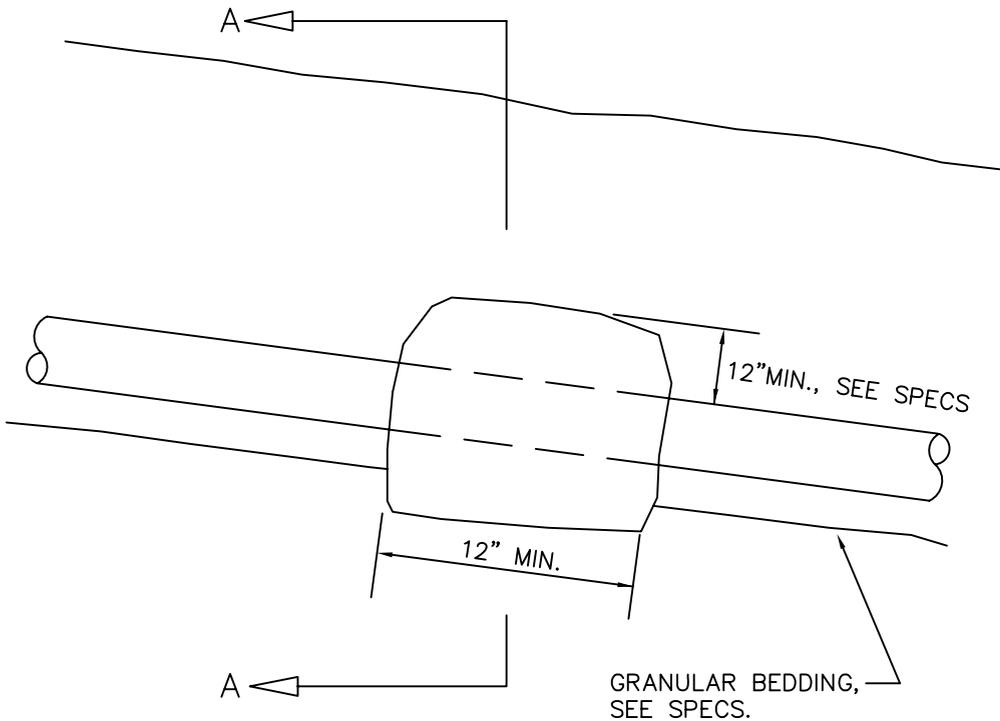
SOIL-CEMENT MIX PLACED AS DIRECTED BY ENGINEER

GRAVITY OR PRESSURE PIPE

12" MIN.

12" MIN.

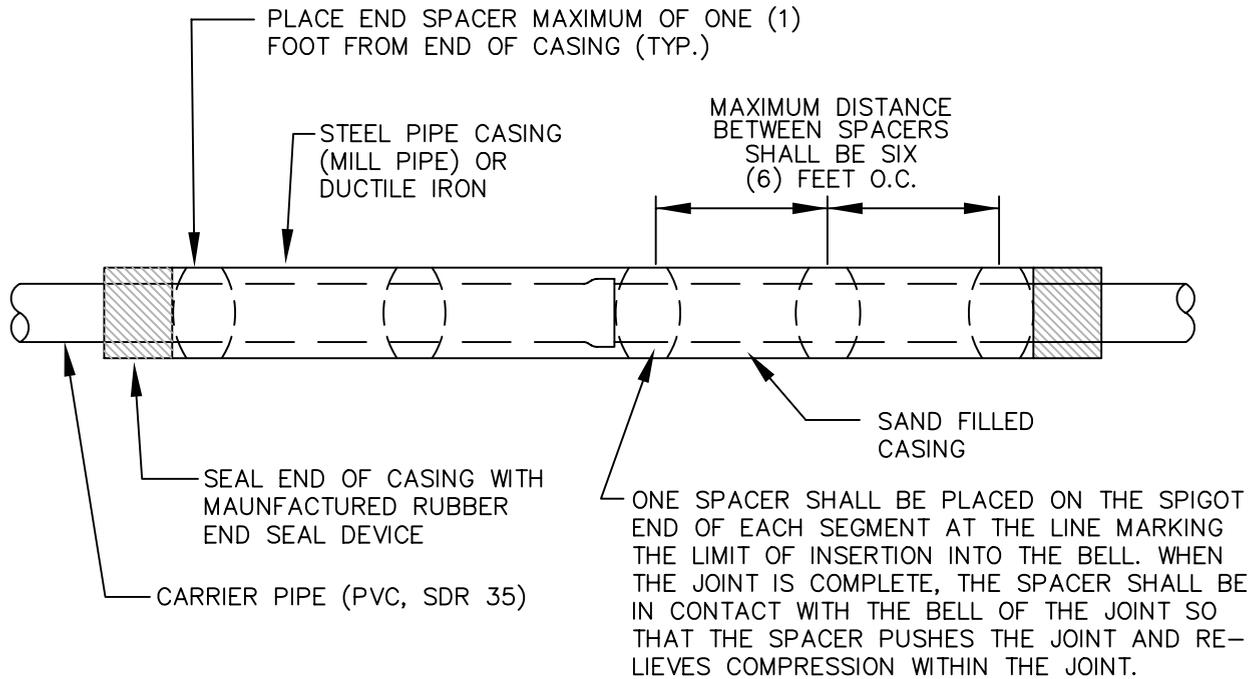
SECTION A-A



NOTE:

1. SOIL CEMENT BLOCKS PLACED OVER AND AROUND PIPE. TAMPED INTO PLACE BEFORE PLACING BACKFILL. USE 10% CEMENT WITH 90% NATIVE SOIL AND WATER TO SUIT TO FORM A DRY MIX THAT WILL HOLD ITS SHAPE WHEN MOLDED INTO A BALL. SOIL CEMENT BLOCKS REQUIRED ON SLOPES 20% OR GREATER.

CITY OF KIRKLAND	
PLAN NO. CK-S.04	
	<p>SOIL/CEMENT PIPE ANCHOR</p>



CASING SPACERS (SEE APPROVED MATERIALS LIST)

CARRIER PIPE DIAMETER	8"	10"	12"
CASING DIAMETER	14"	16"	20"
STEEL CASING THICKNESS	0.25"	0.25"	0.25"
SPACER BAND WIDTH	12"	12"	12"

ANTICORROSIVE COATING THICKNESS:
CASING - 8 MILLS DFT

NOTES:

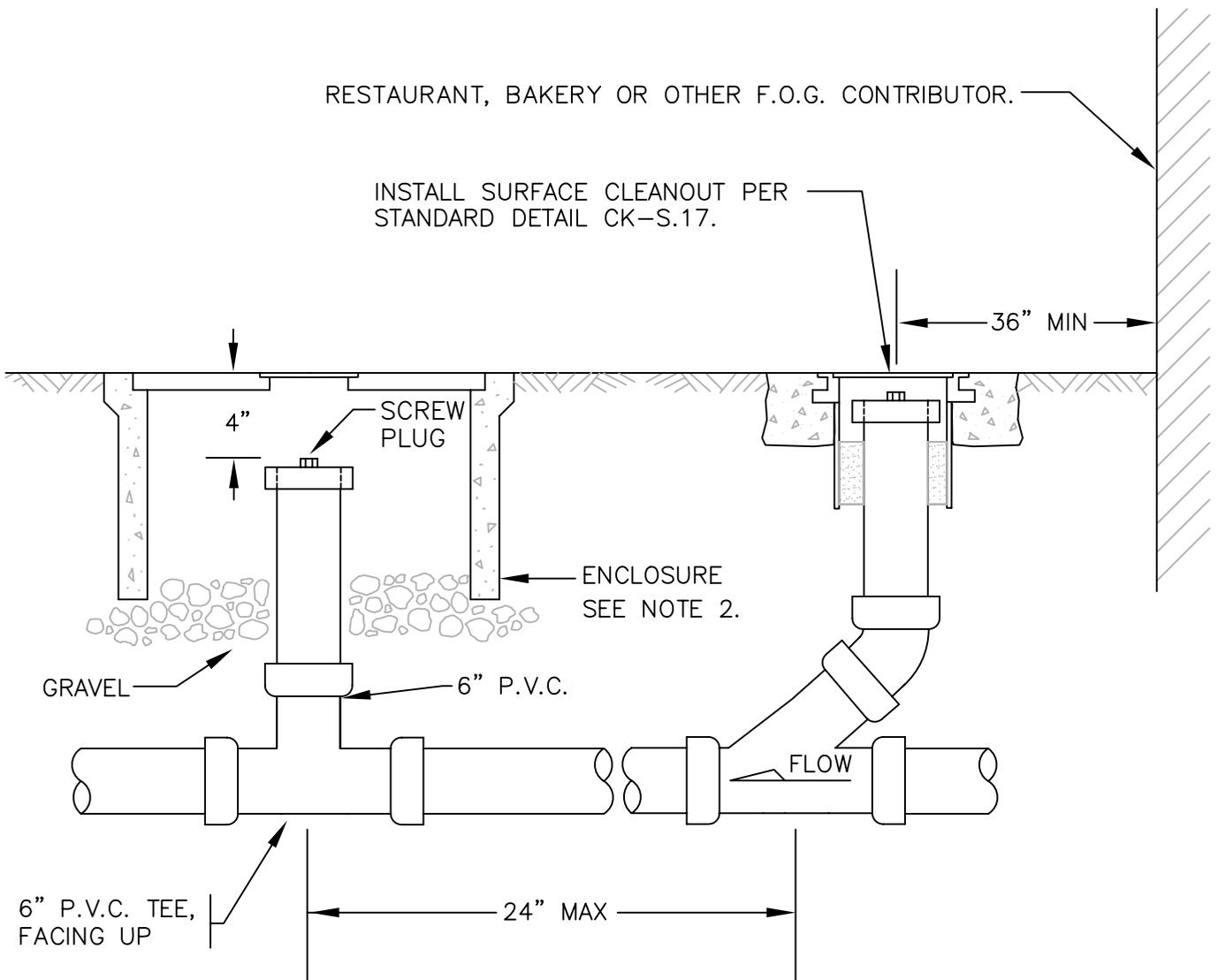
1. CASING SPACERS SHALL BE "CENTER POSITIONING" TYPE.
2. MINIMUM RUNNER WIDTH SHALL BE 2 INCHES.
3. RUNNER HEIGHT SHALL BE SIZED TO PROVIDE:
 - A. MINIMUM 0.75" BETWEEN CARRIER PIPE BELL AND CASING PIPE WALL AT ALL TIMES.
 - B. MINIMUM 1" CLEARANCE BETWEEN RUNNERS AND TOP OF CASING WALL TO PREVENT JAMMING DURING INSTALLATION.
4. STEEL CASING DIAMETERS ARE "OUTSIDE DIAMETER" FOR 16" AND LARGER.

CITY OF KIRKLAND

PLAN NO. CK-S.05



CASING
INSTALLATION



NOTES:

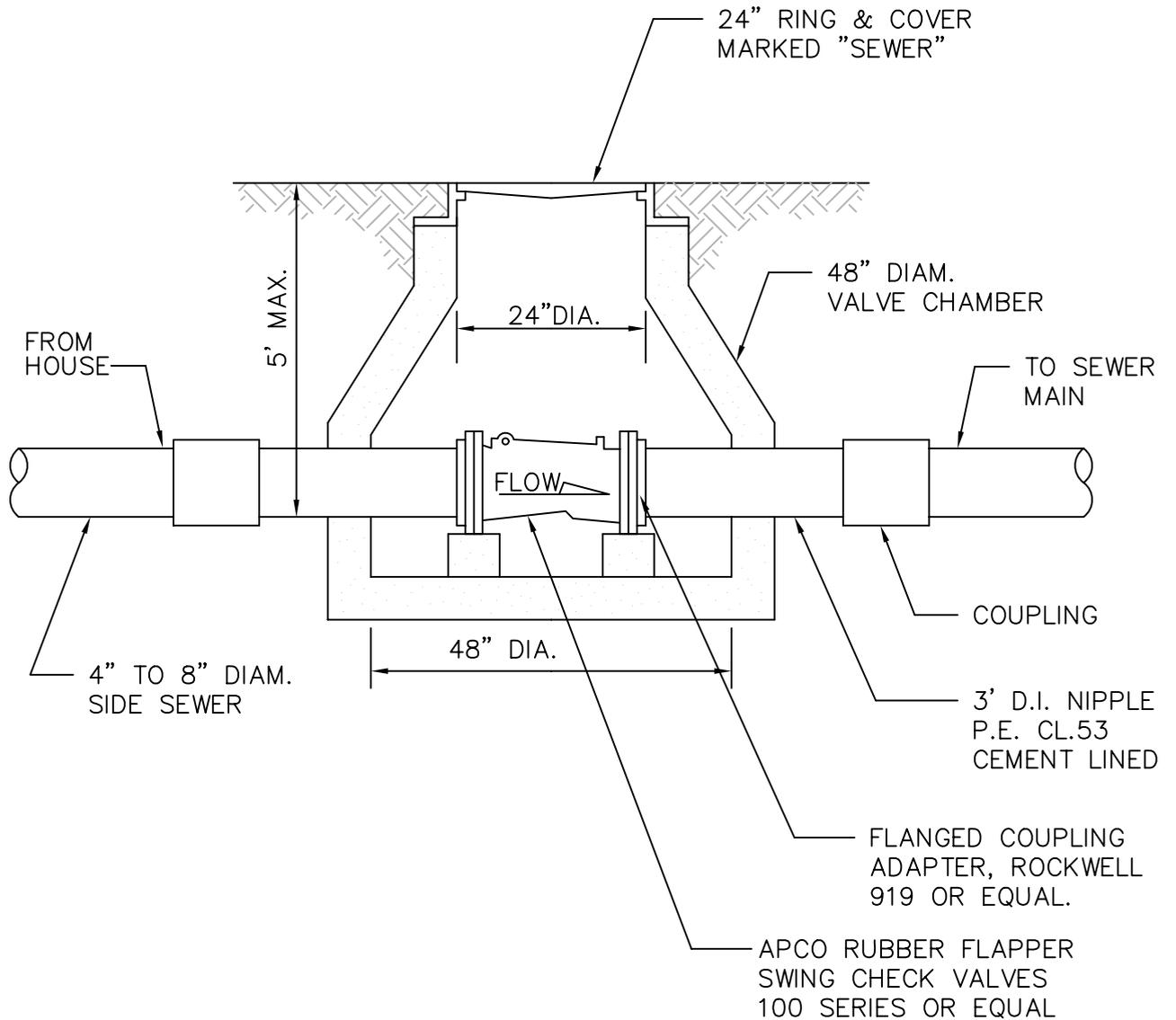
1. INSTALL SAMPLING TEE ON EXISTING OR NEW SIDE SEWER.
2. CONCRETE METER BOX, FOGTITE OR EQUAL.
FOGTITE 1-D IN NONTRAVELED AREAS.
FOGTITE B-10T IN SIDEWALK.
FOGTITE J-20S IN AREAS WITH VEHICULAR TRAFFIC (DIAMOND PLATE FRAME).

CITY OF KIRKLAND

PLAN NO. CK-S.06



SAMPLING TEE

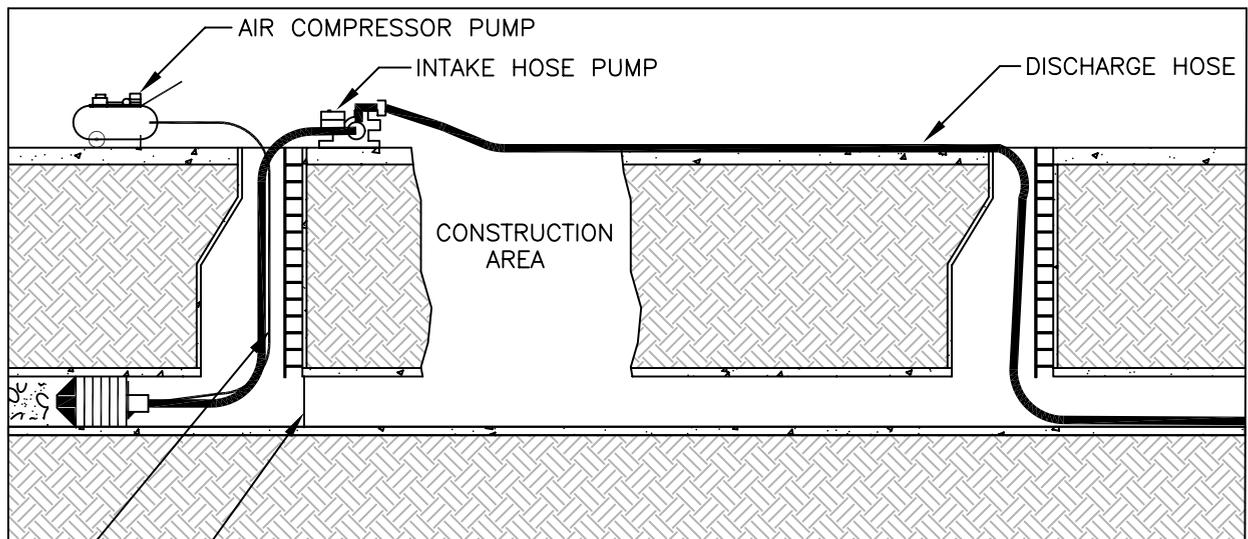
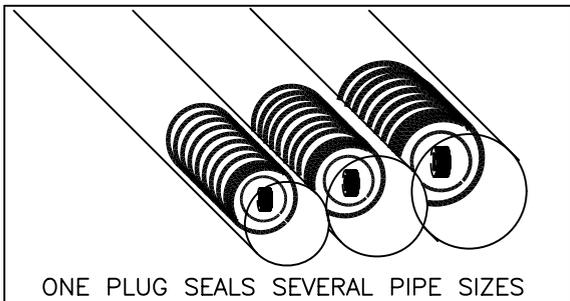
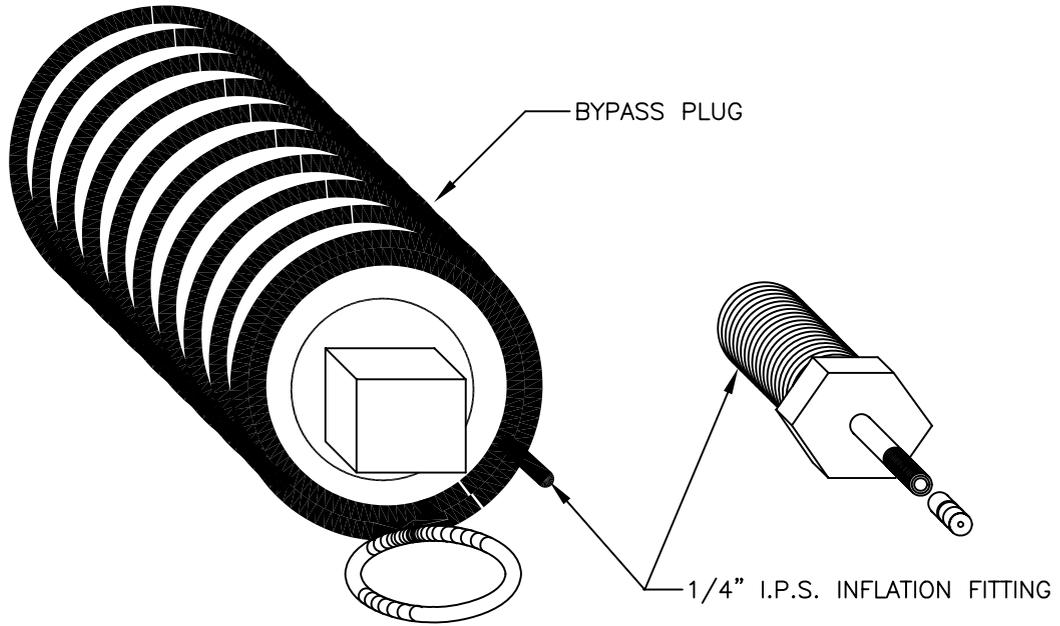


CITY OF KIRKLAND

PLAN NO. CK-S.07



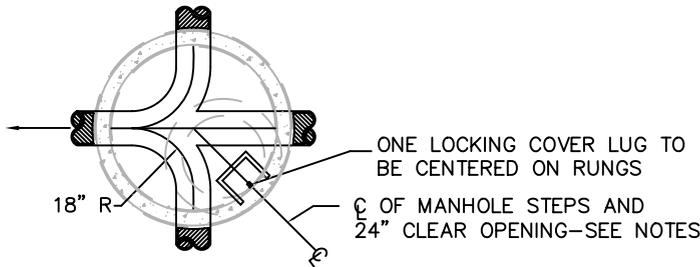
CHECK VALVE
ASSEMBLY FOR JOINT
USE SIDE SEWER
(4" TO 8" DIAMETER)



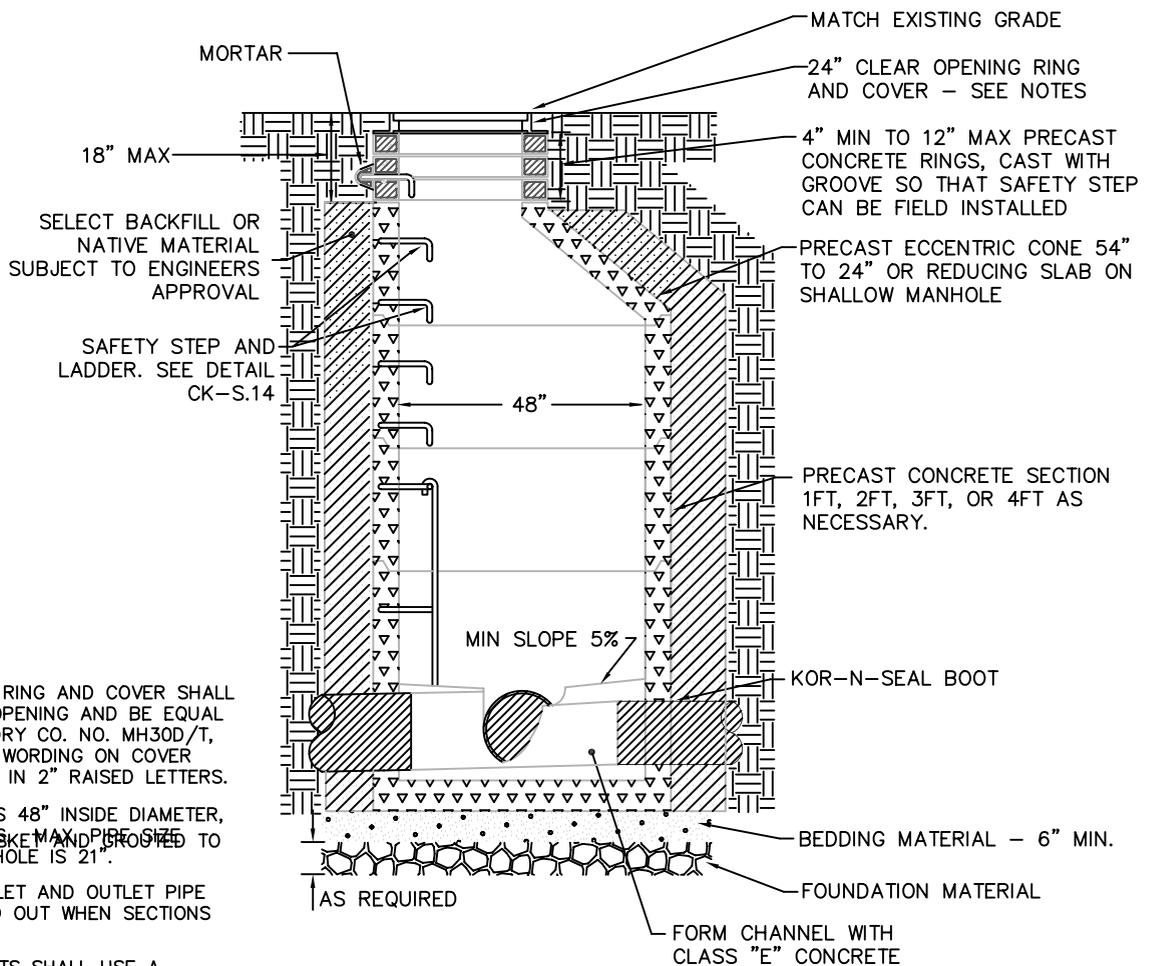
SCREEN MUST BE INSTALLED, TO PREVENT DEBRIS FROM ENTERING MAIN, BEFORE MANHOLE CAN BE SERVICED

INFLATION HOSE

CITY OF KIRKLAND	
PLAN NO. CK-S.08	
	SEWER MAIN BYPASS PLUG



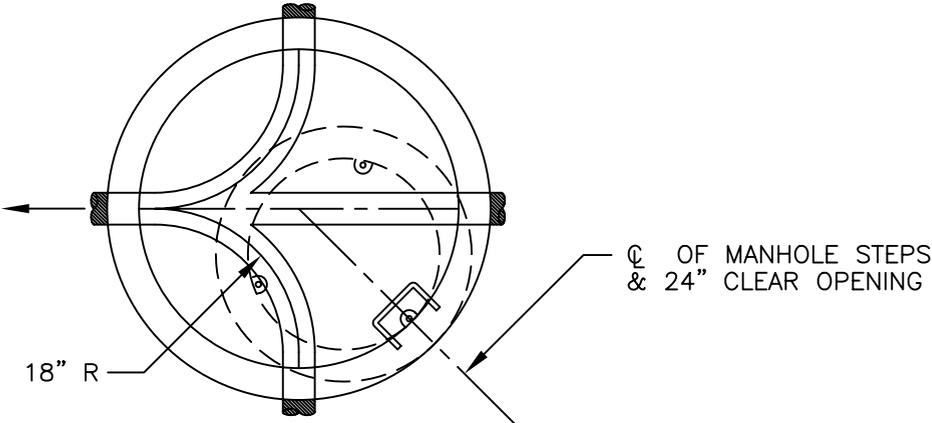
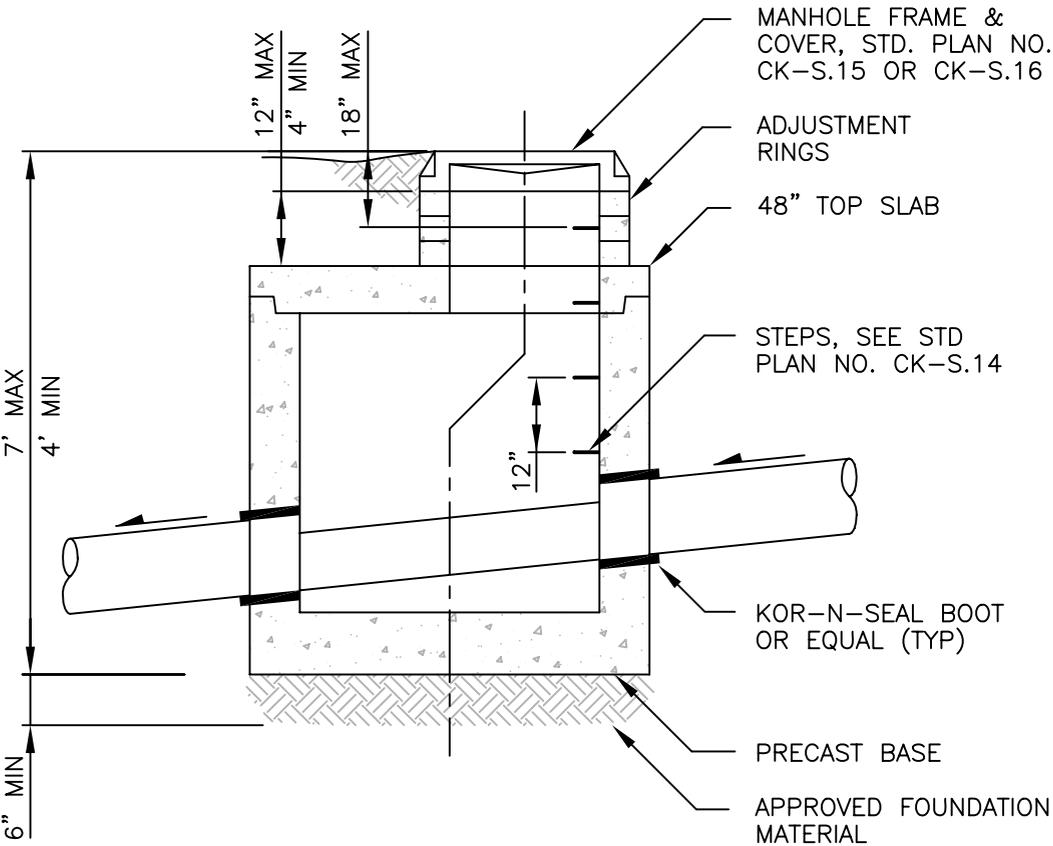
PLAN VIEW



NOTES:

1. LOCKING MANHOLE RING AND COVER SHALL HAVE 24" CLEAR OPENING AND BE EQUAL TO OLYMPIC FOUNDRY CO. NO. MH30D/T, WITH PICK-HOLE. WORDING ON COVER SHALL BE "SEWER" IN 2" RAISED LETTERS.
2. MANHOLE SHOWN IS 48" INSIDE DIAMETER, CONFIRM RUBBERNESS MAX AND PROPOSED FOR THE 48" MANHOLE IS 21".
3. ALL HOLES FOR INLET AND OUTLET PIPE SHALL BE BLOCKED OUT WHEN SECTIONS ARE CAST.
4. ALL MANHOLE JOINTS SHALL USE A AND ENCAPSULATED EQUAL TO MA INDUSTRIES. MEET ASTM C-443 SPECIFICATIONS
5. ALL PIPE THROUGH MANHOLE WALL SHALL HAVE A "KOR-N-SEAL" BOOT OR EQUAL.
6. MANHOLE STEPS SHALL BE 1/2" DIA. DEFORMED REINFORCING BARS
7. BEDDING AND FOUNDATION MATERIAL REQUIRED AS SHOWN ON DETAL AND AS NOTED IN THE SPECIFICATIONS. NATIVE MATERIAL MAY BE USED IF APPROVED BY ENGINEER.
8. LOCATION OF MANHOLE STEPS SHALL NOT BE OVER FLOW LINES AND SHALL BE APPROVED BY THE ENGINEER
9. 54" MANHOLE 27" MAX. PIPE
 72" MANHOLE 36" MAX. PIPE
 96" MANHOLE 48" MAX. PIPE

CITY OF KIRKLAND	
PLAN NO. CK-S.09	
	STANDARD 48" SANITARY SEWER MANHOLE

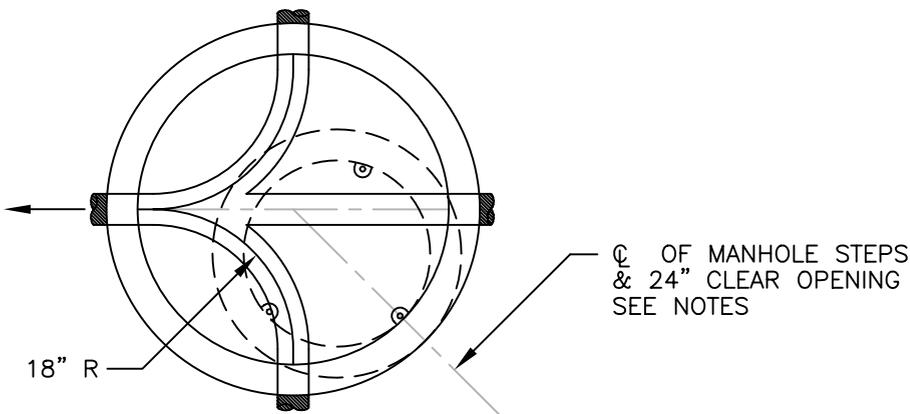
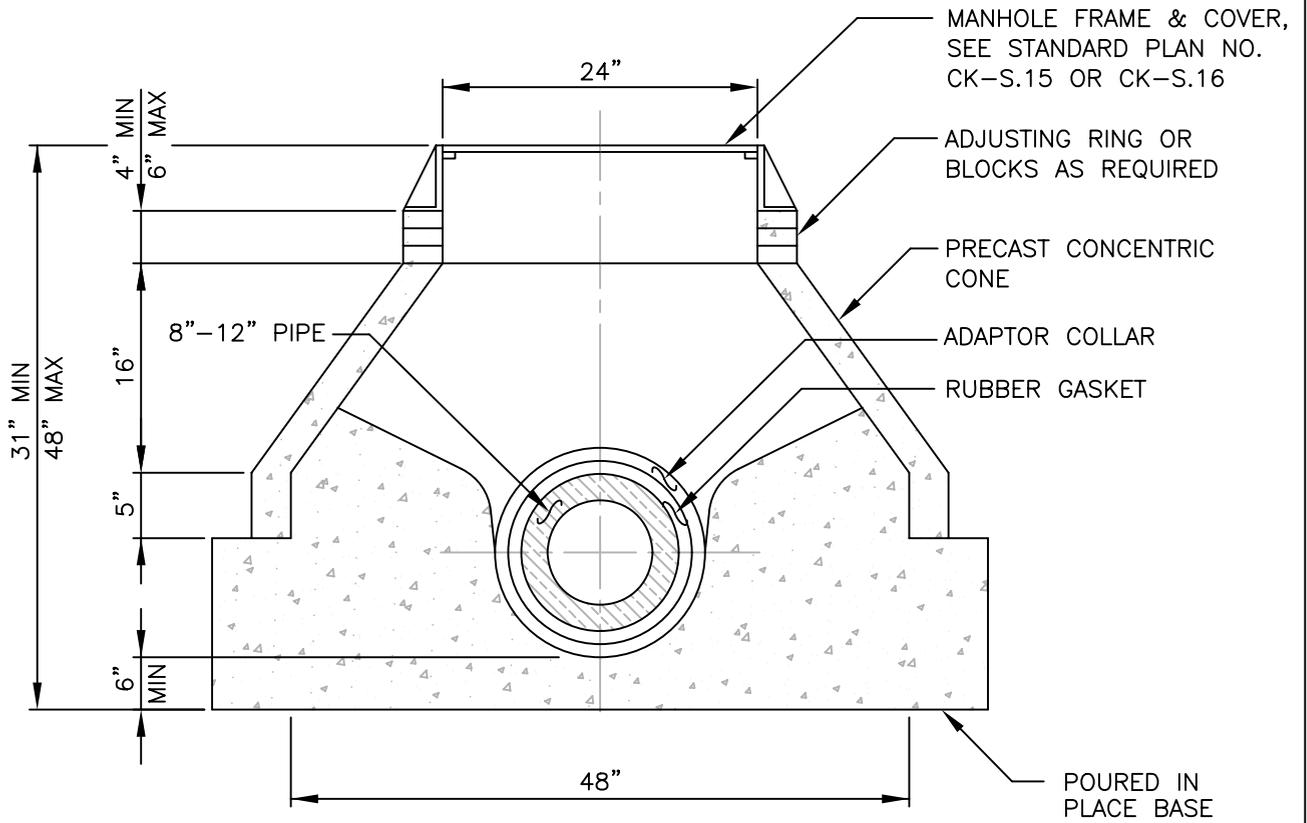


PLAN

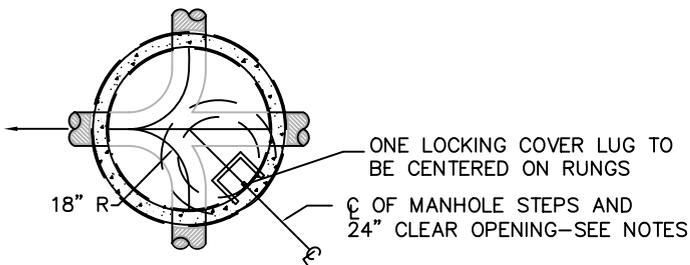
CITY OF KIRKLAND
PLAN NO. CK-S.10



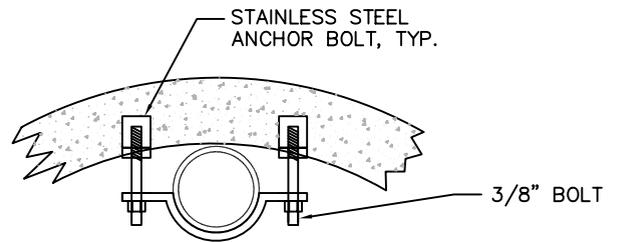
SHALLOW
MANHOLE
ASSEMBLY



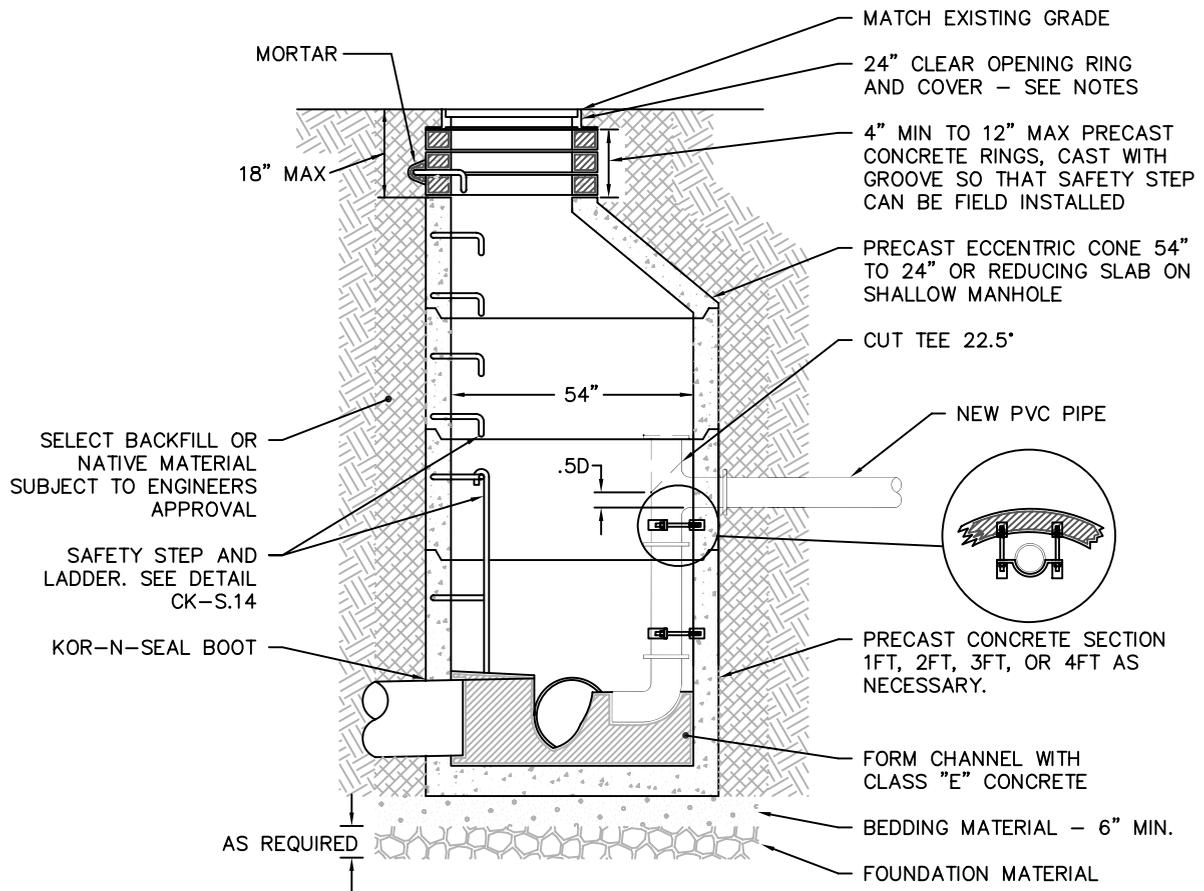
CITY OF KIRKLAND	
PLAN NO. CK-S.11	
	EXTRA SHALLOW MANHOLE ASSEMBLY



PLAN VIEW



STAINLESS STEEL PIPE STRAPPING
PLAN VIEW



NOTES:

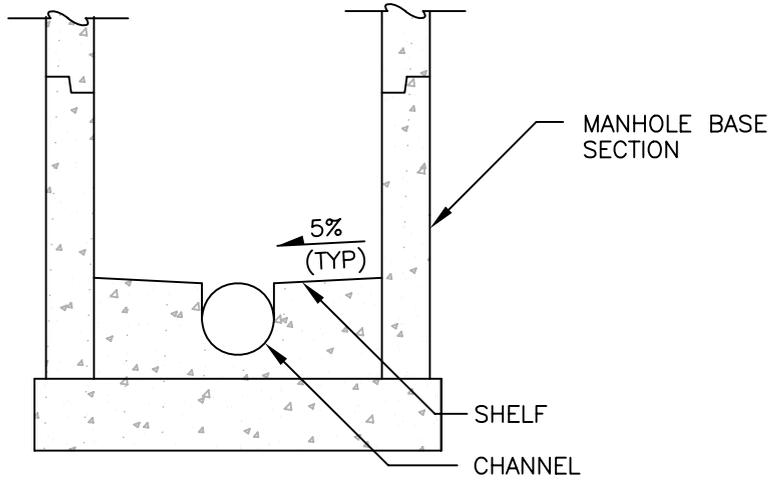
1. USE ONLY WHEN APPROVED BY PUBLIC WORKS.
2. NO EXTERNAL DROPS ALLOWED.

CITY OF KIRKLAND

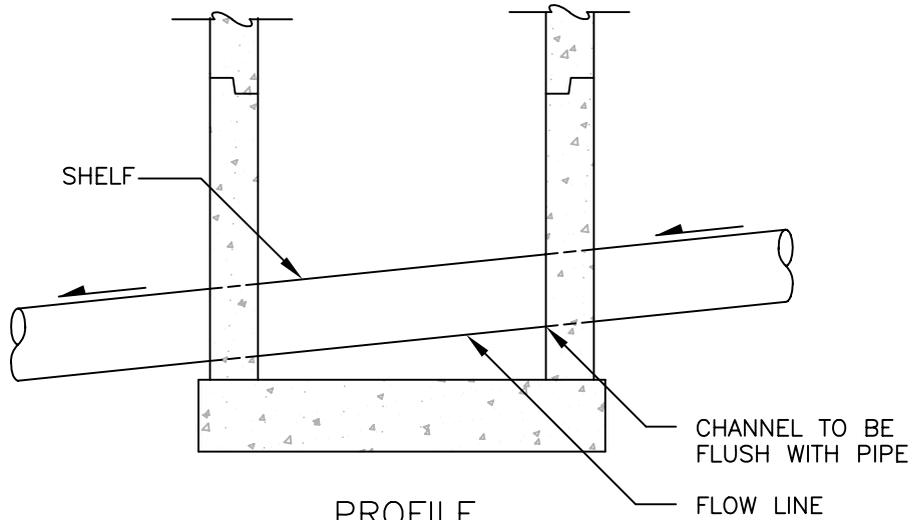
PLAN NO. CK-S.12



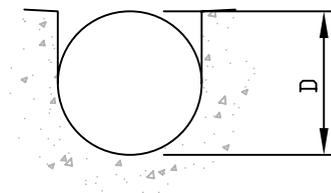
SANITARY SEWER
INTERNAL DROP
CONNECTOR



CROSS SECTION



PROFILE



CHANNEL SECTION

NOTES

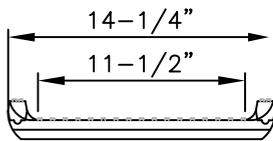
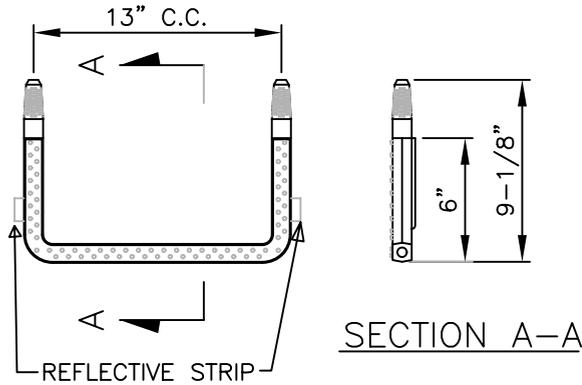
1. DEPTH OF CHANNEL MUST BE SAME AS PIPE DIAMETER.
2. MINIMUM 0.1' DROP ACROSS CHANNEL; MAXIMUM 1.0' DROP ACROSS CHANNEL.

CITY OF KIRKLAND

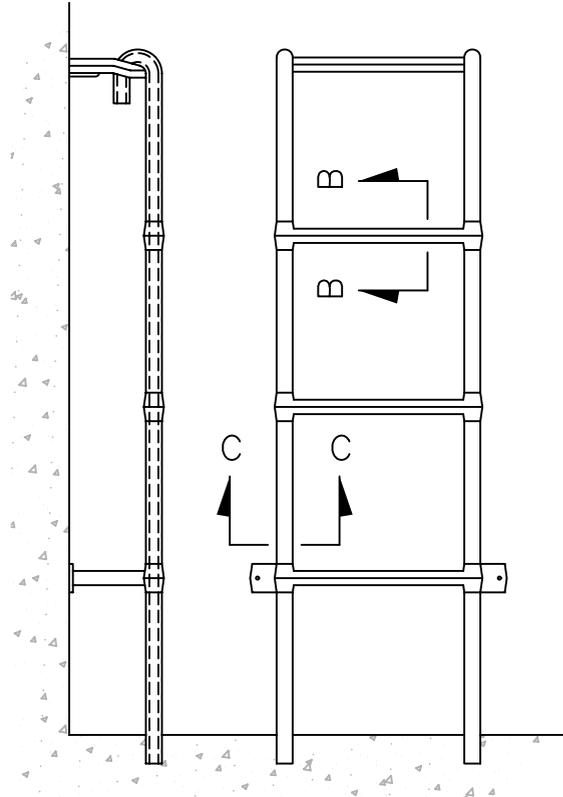
PLAN NO. CK-S.13



SEWER MANHOLE
MAIN CHANNEL
AND SHELF

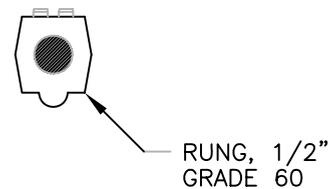


P-13938
POLYPROPYLENE STEP



SPECIFICATIONS

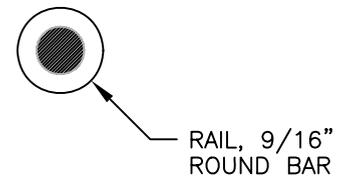
1. ALL STEPS SHALL MEET THE REQUIREMENTS OF ASTM C-478, AASHTO M-199, WISHA AND ALL ASHA SPECIFICATION.
2. THE POLYPROPYLENE SHALL CONFORM TO ASTM D-4101.
3. THE 1/2" GRADE 60 DEFORMED REINFORCING BAR SHALL MEET ASTM A-615.
4. STEP REFLECTORS OR BRIGHT COLORED STEPS REQUIRED.



SECTION B-B

INSTALLATION

1. THE STEP CAN BE CAST IN PLACE.
2. DRIVEN INTO PREFORMED HOLES WITH CONCRETE CURED TO 3,000 PSI MINIMUM.
3. DRIVEN INTO 2 PARALLEL 1" DIAMETER HOLES DRILLED 13" OR 10" ON CENTER, 3-1/2" DEEP.
4. DRILL 2 1-1/8" OR 1-1/4" HOLES, 3-1/2" DEEP, APPLY EPOXY IN THE HOLE AND AROUND THE BARBS OF THE STEP. PUSH THE STEP INTO THE HOLES ALLOWING THE EPOXY TO FLOW OUT TO THE SQUARE SHOULDER OF THE STEP.

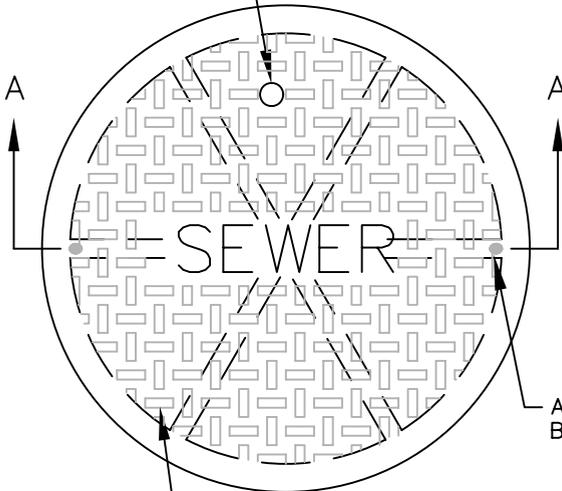


SECTION C-C

ANY OF THE ABOVE METHODS WILL RESIST A PULLOUT FORCE OF OVER 1,500 LBS.

CITY OF KIRKLAND	
PLAN NO. CK-S.14	
	LADDER AND MANHOLE STEPS

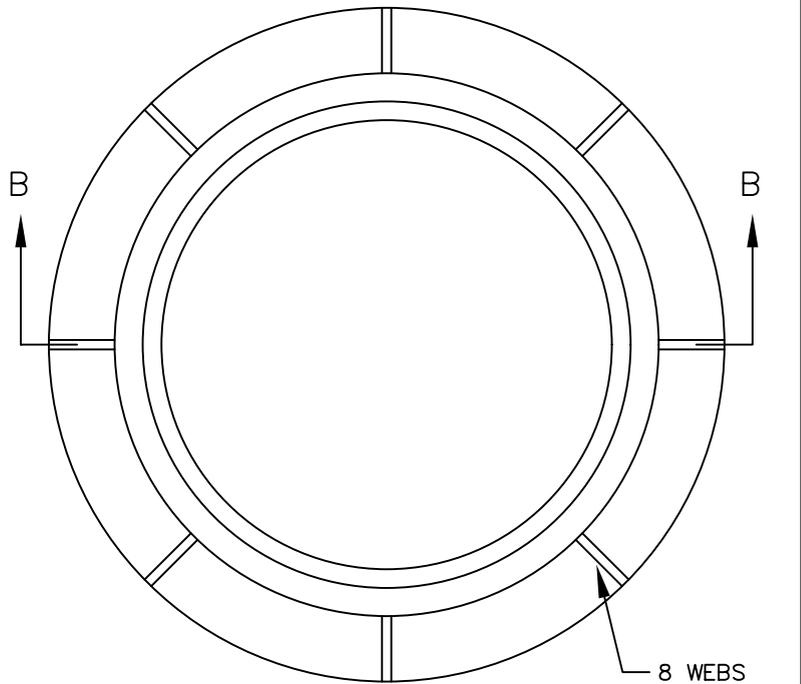
1" DIA. LIFT HOLE
8 1/2" FROM CENTER
OF COVER (SEE NOTE 2)



COVER PLAN

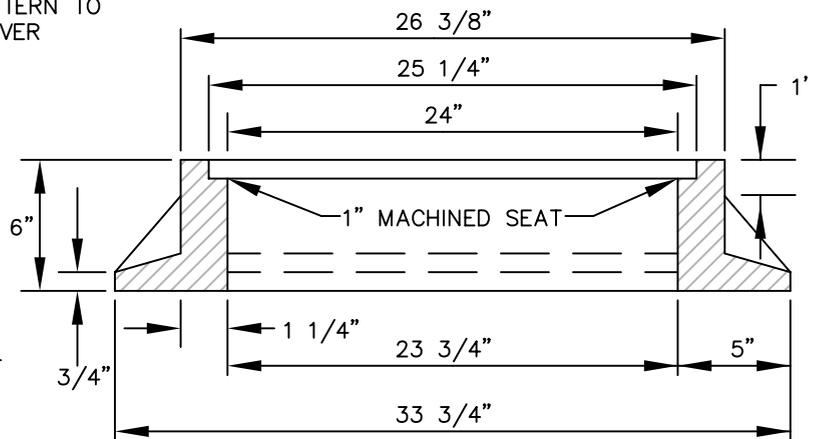
NON-SKID INTEGRAL PATTERN TO
BE CAST ON TOP OF COVER

ALL LIDS SHALL
BE LOCKING



RING PLAN

8 WEBS
1/2" THICK

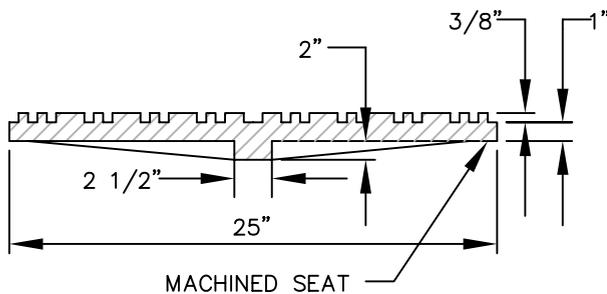


SECTION B-B

CAST IRON RING
MINIMUM WEIGHT 210 LBS.

NOTE:

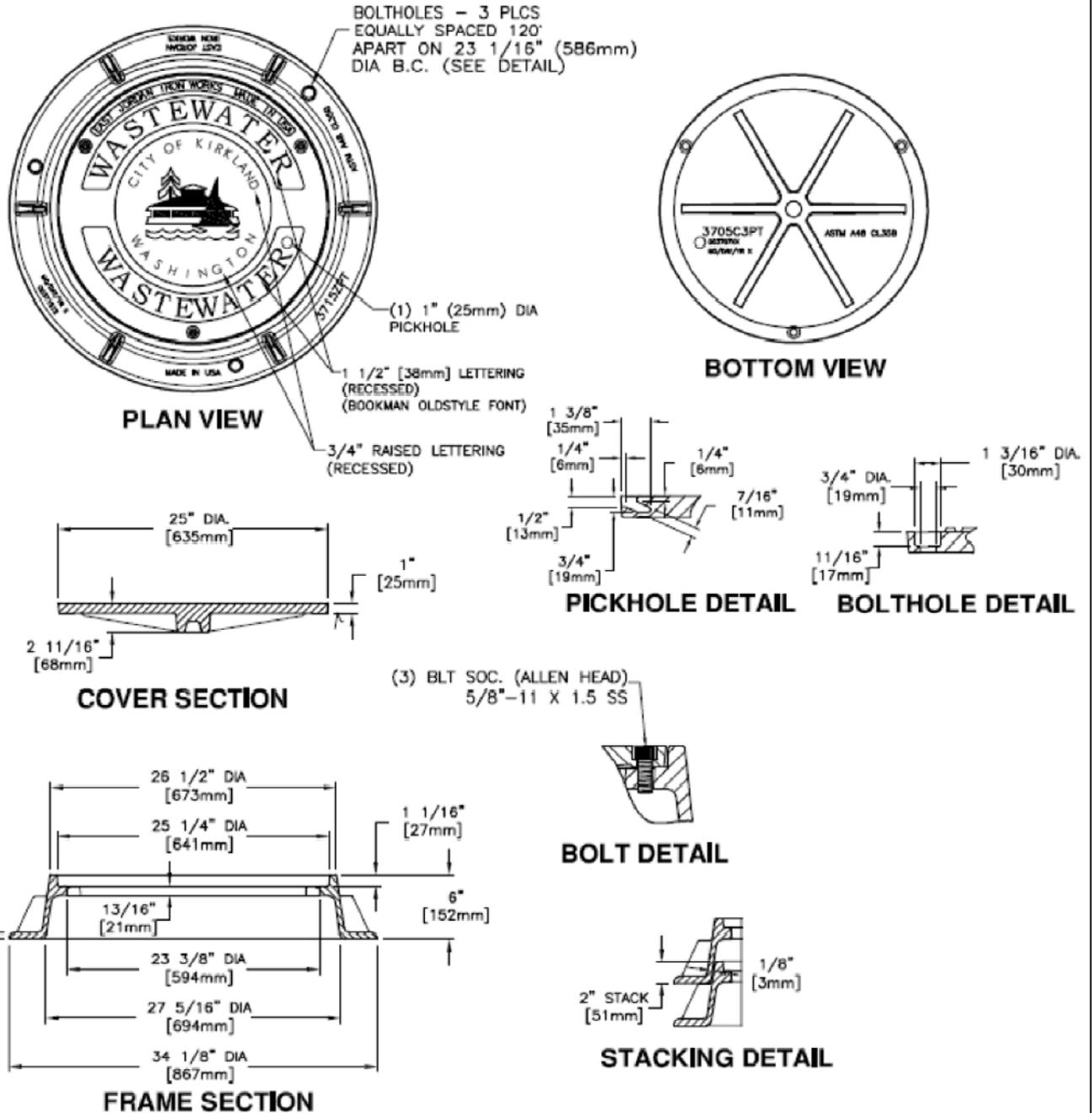
1. COVERS SHALL HAVE THE WORD "SEWER" IN 2" RAISED LETTERS.
2. MANHOLES LOCATED IN SIDEWALKS AND STREET CROSSWALKS SHALL HAVE LOW PROFILE WAFFLE PATTERN AS PROVIDED BY UTILITY VAULT COMPANY OR EQUAL.



SECTION A-A

DUCTILE IRON OR CAST IRON COVER
MINIMUM WEIGHT 150 LBS.

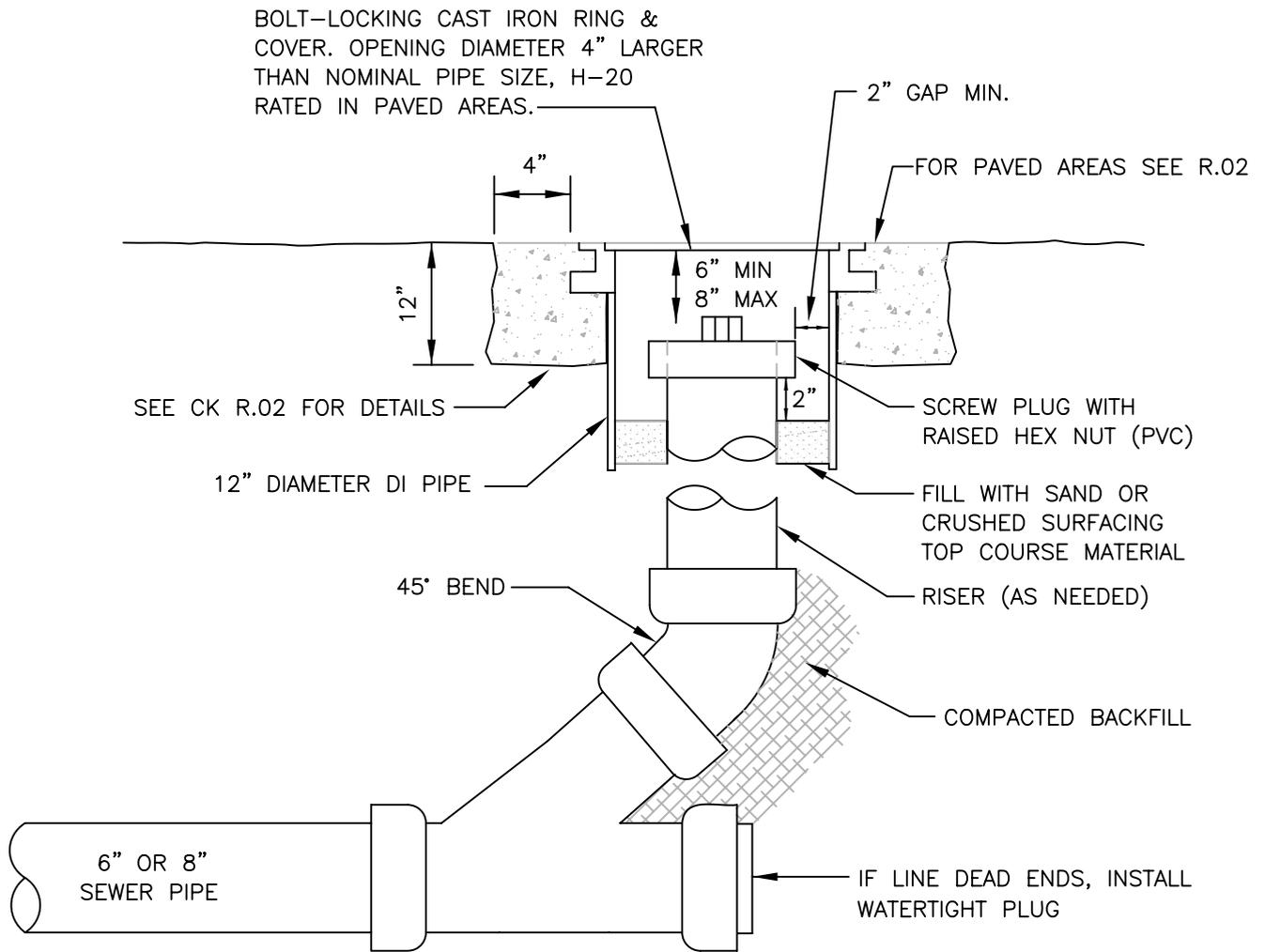
CITY OF KIRKLAND	
PLAN NO. CK-S.15	
	24" MANHOLE RING AND COVER



NOTES

1. USE WITH THREE LOCKING BOLTS 5/8"-11 BOLT SOCKET (ALLEN HEAD), 2" LONG DRILL HOLES SPACED 120° APART ON 23-1/16" DIA B.C.
2. COVER MATERIAL IS GRAY IRON ASTM A48 CL35B, WITH A MINIMUM WEIGHT OF 141 LBS.
3. FRAME MATERIAL IS GREY IRON ASTM A48 CL35B, WITH A MINIMUM WEIGHT OF 134 LBS.
4. DRILL AND TAP THREE 5/8"-11 NC HOLES THROUGH RING AT 120° AND 23-1/16" DIA B.C.
5. PRODUCT SUPPLIED BY EAST JORDAN IRON WORKS, OLYMPIC FOUNDRY, OR APPROVED EQUAL.

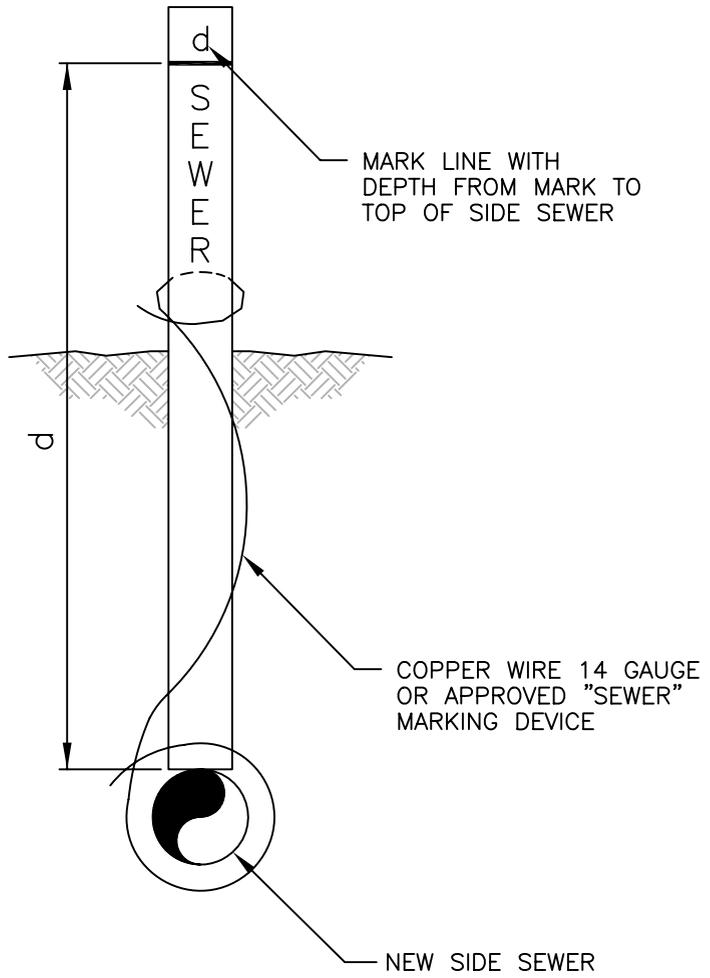
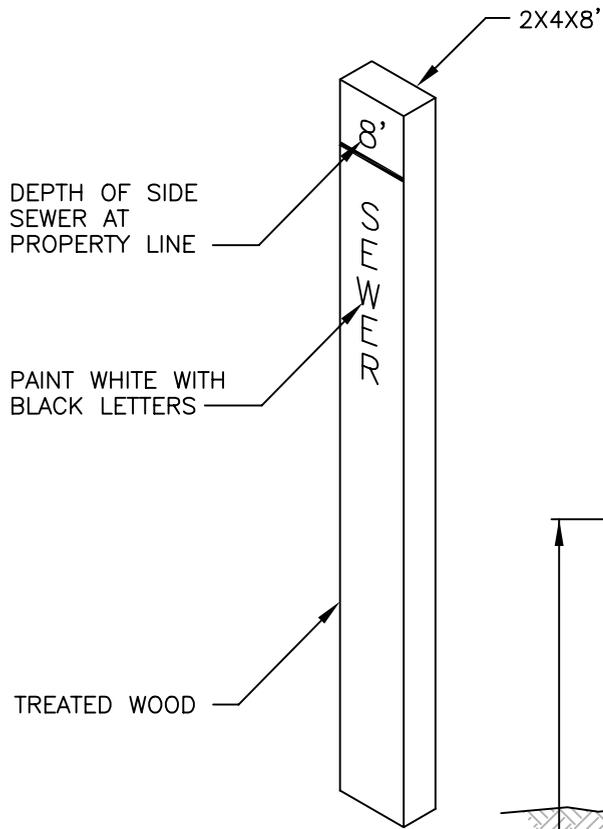
CITY OF KIRKLAND	
PLAN NO. CK-S.16	
 CITY OF KIRKLAND WASHINGTON	24" MANHOLE FRAME W/LOCKING COVER



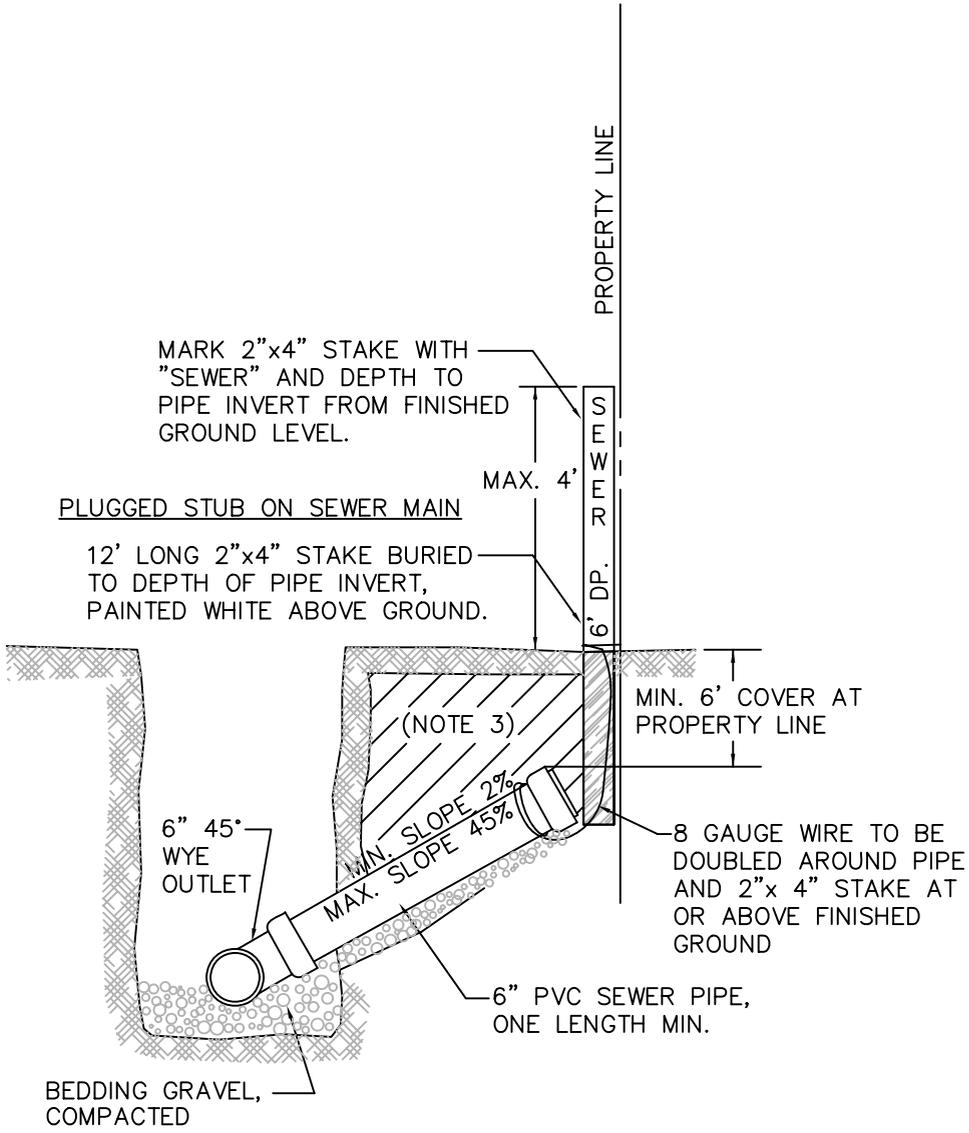
NOTES

1. CAST IRON COVER SHALL READ "SEWER".
2. LOCKING BOLTS FOR COVER SHALL BE 5/8" -11 NC STAINLESS STEEL TYPE 304 SOCKET (ALLEN) HEAD BOLTS, 2 INCHES LONG.

CITY OF KIRKLAND	
PLAN NO. CK-S.17	
	CLEANOUT



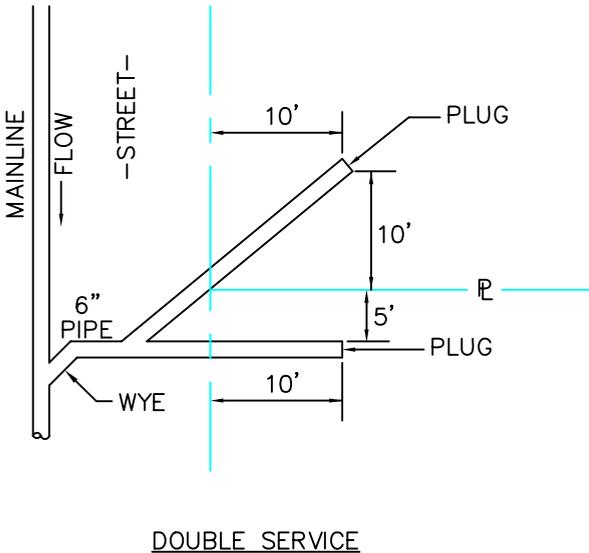
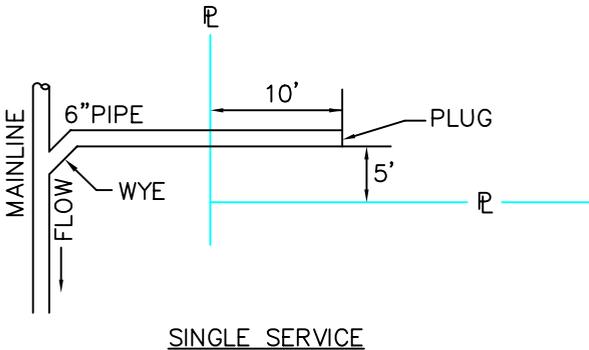
CITY OF KIRKLAND	
PLAN NO. CK-S.18	
	SIDE SEWER MARKER POST



NOTES:

1. WHERE SIDE SEWER CONNECTS TO MANHOLE: INVERT OF SIDE SEWER SHALL BE EQUAL TO OR ABOVE MAIN SEWER CROWN, BUT NOT TO EXCEED 18" ABOVE INVERT OF MAIN SEWER. (FOR COMMERCIAL AND MULTIFAMILY APPLICATIONS ONLY)
2. UNLESS OTHERWISE INDICATED ON PLAN, SIDE SEWER SHALL BE MIN. OF 6' DEEP AT PROPERTY LINE, OR 5' LOWER THAN THE LOWEST ELEVATION, WHICHEVER IS LOWER.
3. TRENCH BACKFILL SHALL BE PER CITY OF KIRKLAND STD. PLAN NO. CK-S.01.

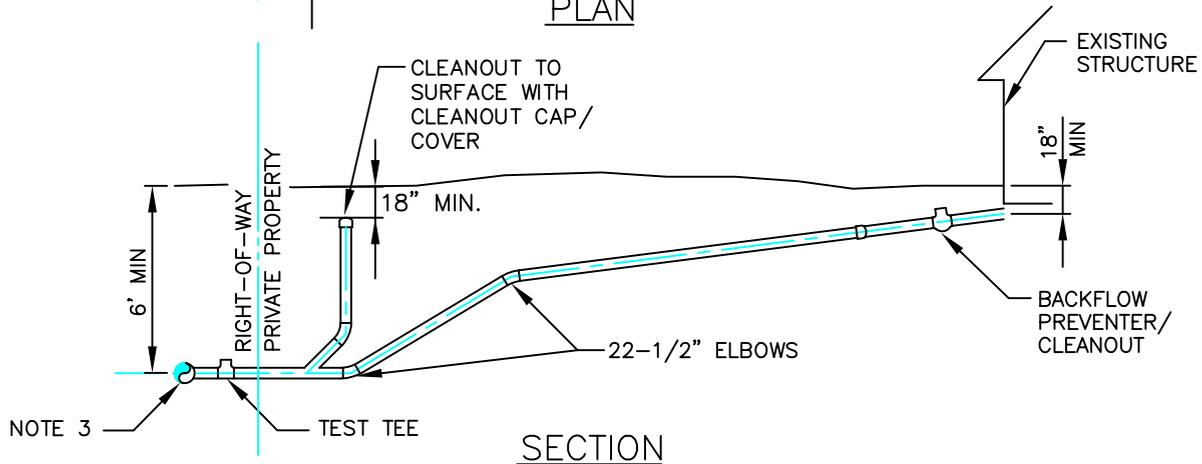
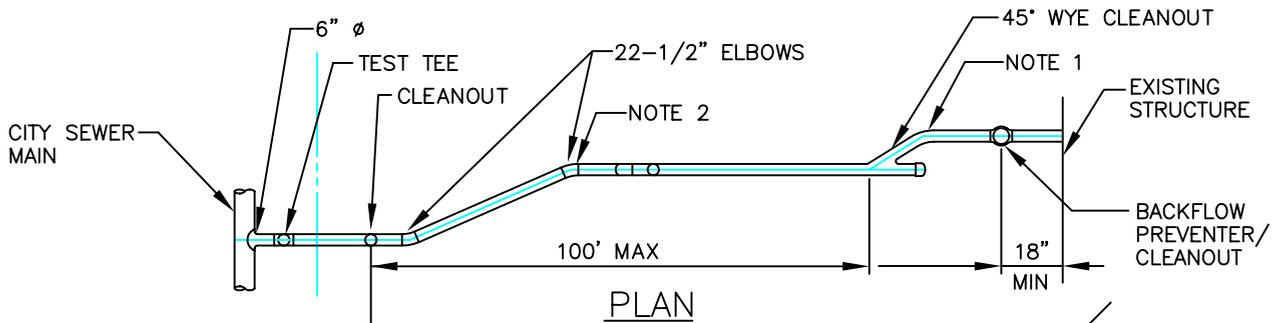
CITY OF KIRKLAND	
PLAN NO. CK-S.19	
	SIDE SEWER STUB "PROFILE VIEW"



NOTES:

1. WHERE SIDE SEWER CONNECTS TO MANHOLE:
INVERT OF SIDE SEWER SHALL BE EQUAL TO OR ABOVE MAIN SEWER CROWN, BUT NOT TO EXCEED 18" ABOVE INVERT OF MAIN SEWER.
(FOR COMMERCIAL AND MULTIFAMILY APPLICATIONS ONLY)
2. UNLESS OTHERWISE INDICATED ON PLAN,
SIDE SEWER SHALL BE MIN. OF 6' DEEP AT PROPERTY LINE, OR 5' LOWER THAN THE LOWEST ELEVATION, WHICHEVER IS LOWER.
3. TRENCH BACKFILL SHALL BE PER CITY OF KIRKLAND STD. PLAN NO. CK-S.01.

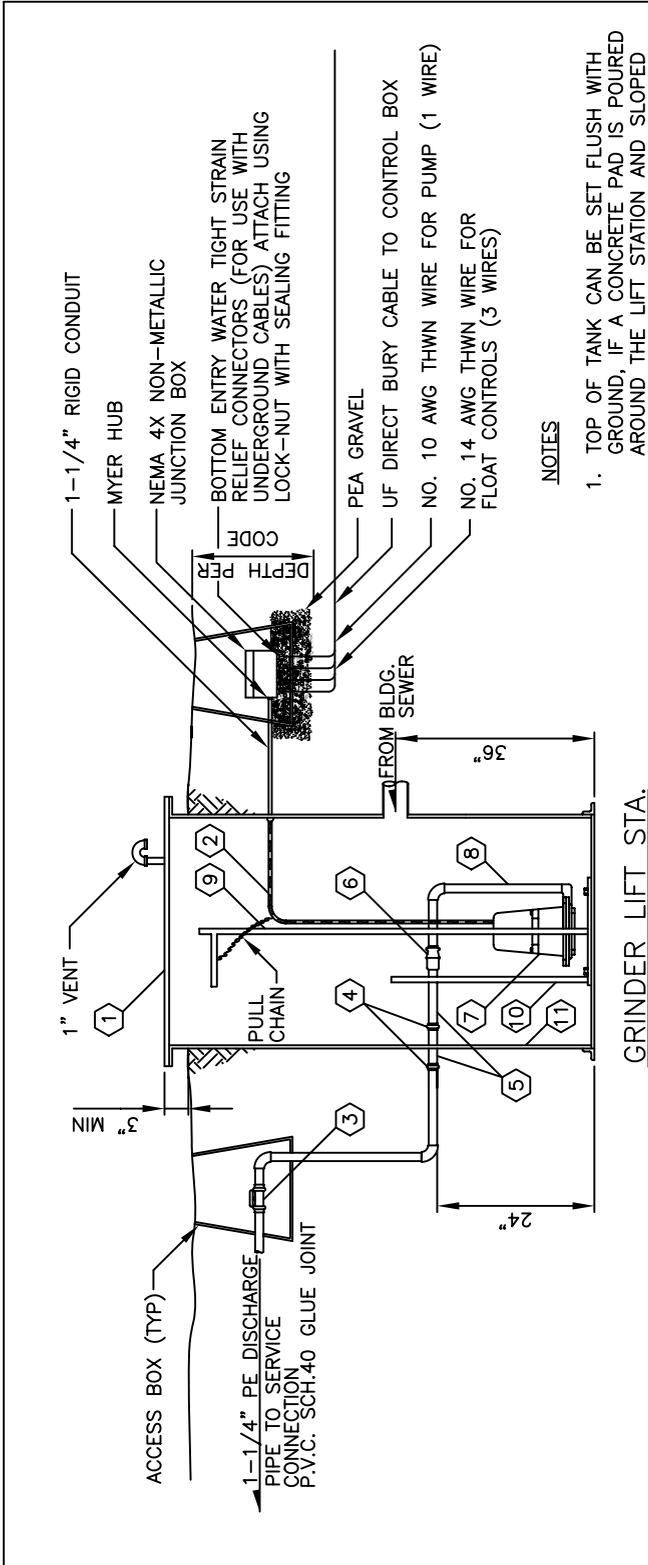
CITY OF KIRKLAND	
PLAN NO. CK-S.19A	
	SIDE SEWER STUB "PLAN VIEW"



NOTES

1. ELBOWS SHALL NOT BE GREATER THAN 45 DEGREES.
2. CLEAN OUT IS REQUIRED FOR EACH PIPE LENGTH GREATER THAN 100' AND FOR EACH 90 DEGREES ACCUMULATED ELBOW PER 100'.
3. RIGHT-OF-WAY RESTORATION SHALL MATCH OR EXCEED THE ORIGINAL CONDITION AND BE IN ACCORDANCE WITH THE CITY STANDARD.
4. BACKFILL FOR PAVED AREA SHALL BE 3/4" MINUS CRUSHED SURFACING TOP COURSE, COMPACTED IN 12" LIFTS.
5. ALL HOUSE PLUMBING OUTLETS MUST BE CONNECTED TO THE SEWER. NO DOWNSPOUTS OR STORM DRAINAGE MAY BE CONNECTED TO THE SEWER SYSTEM.
6. 18" MINIMUM COVERAGE OF PIPE.
7. 6' MINIMUM COVERAGE AT PROPERTY LINE.
8. LAY PIPE IN STRAIGHT LINE BETWEEN BENDS. MAKE ALL CHANGES IN GRADE OR LINE WITH A 1/8 BEND OR WYE. 90 DEGREE CHANGE WITH 1/8 BEND AND WYE.
9. 6" SEWER PIPE MINIMUM SIZE IN STREET, AND ELSEWHERE AS DIRECTED BY ENGINEER. 2% MINIMUM GRADE (UNLESS DIRECTED BY ENGINEER) 50% MAXIMUM.
10. 4" SEWER PIPE MINIMUM SIZE ON PROPERTY. 2% MINIMUM GRADE, 100% (45 DEGREE) MAXIMUM.
11. TEST "T" WITH PLUG AT WYE.
12. CONSTRUCTION IN STREET MUST BE DONE BY A REGISTERED/LICENSED CONTRACTOR.
13. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH CURRENT SIDE SEWER ORDINANCES.
14. ALL CONSTRUCTION REQUIRES A PERMIT AND PAYMENT OF FEE, COMPLETE LEGAL DESCRIPTION OF PROPERTY AND DIMENSIONS.
15. BACKFLOW PREVENTER (CHECK VALVE) IS REQUIRED:
 - A. IF CONNECTED TO A COMBINED SIDE SEWER.
 - B. IF CONNECTION AT HOUSE IS LOWER THAN BOTH UPSTREAM AND DOWNSTREAM MANHOLE LID.
16. AS-BUILT DRAWING SHOWING LOCATION OF SIDE SEWER IN RELATION TO THE HOUSE IS REQUIRED AFTER INSTALLATION.
17. BEDDING TO BE CLASS C (GRAVEL BORROW) FOR RIGID PIPE AND CLASS F (PEA GRAVEL) FOR FLEXIBLE PIPE (APWA), SECTION 61.
18. ASTM D-3034 OR SDR-35.

CITY OF KIRKLAND	
PLAN NO. CK-S.20	
	RESIDENTIAL SIDE SEWER INSTALLATION



GRINDER LIFT STA. DETAIL

MATERIALS LIST

- ① 24" DIA GALVANIZED COVER
- ② POWER CONDUIT
- ③ 1-1/4" PVC TRUE UNION BALL VALVE (SS) HAYWARD OR EQUAL
- ④ 1-1/4" GALVANIZED UNION
- ⑤ 1-1/4" GALVANIZED NIPPLES
- ⑥ CHECK VALVE AND PUMP DISCONNECT HYDROMATIC, GOULD OR EQUAL.
- ⑦ 2 HP GRINDER PUMP - SEE NOTES
- ⑧ 1-1/4" GALVANIZED PIPING, APPROXIMATELY 1.2' LONG
- ⑨ HOT DIPPED GALVANIZED STEEL RAIL GUIDE SYSTEM
- ⑩ HOT DIPPED GALVANIZED PUMP TECH SHORT RAIL
- ⑪ 24" X 60" FIBERGLASS TANK



CITY OF KIRKLAND

PLAN NO. CK-S.21

SINGLE FAMILY
SIMPLEX SEWER
LIFE STATION

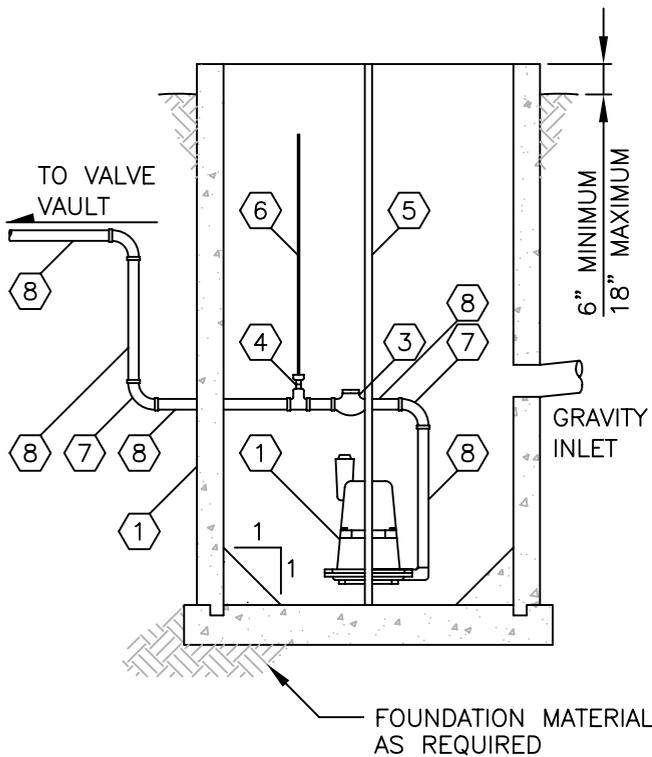
NOTES

1. TOP OF TANK CAN BE SET FLUSH WITH GROUND, IF A CONCRETE PAD IS POURED AROUND THE LIFT STATION AND SLOPED AWAY FROM THE STATION. KEEP ROCKS AND DEBRIS OUT OF STATION.
2. ACCESS BOX:
TRAFFIC AREAS - EQUAL TO CARSON MODEL 1419-14B WITH 1419-2B COVER
TRAFFIC AREAS- H-20 RATED CONCRETE BOX EQUAL TO FOGITTE B9-1/2 METER BOX
LIDS SHALL BE MARKED ELECTRICAL OR SEWER RESPECTIVELY OR HAVE NO MARKINGS AT ALL.
3. CONTROL FLOATS NOT SHOWN FOR CLARITY.

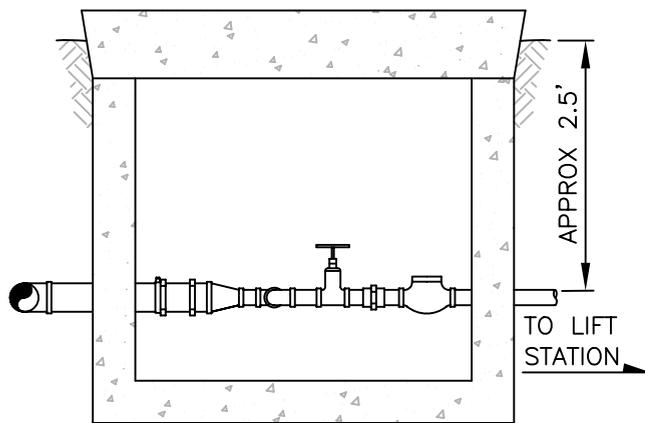
EQUIPMENT SCHEDULE

ITEMS 1 THRU 6 BASED ON HYDR-O-RAIL, HYDR-O GRND DUPLEX PACKAGE LIFT STATION AS MANUFACTURED BY HYDROMATIC PUMP COMPANY.

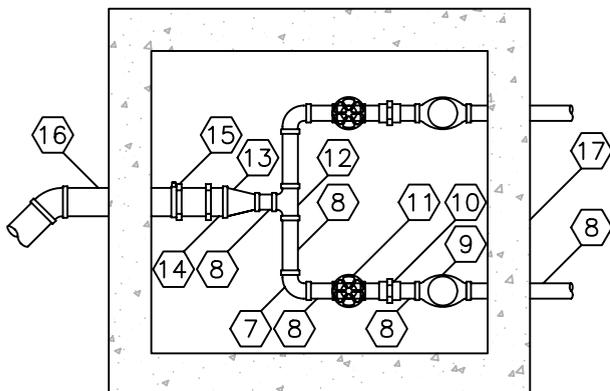
- ① 2 EXPLOSION-PROOF SUBMERSIBLE SEWAGE GRINDER PUMPS EQUAL TO HYDROMATIC O2FX500 5HP, 1750 RPM MOTOR. DESIGN POINT: GPM AT 54' TDH.
- ② 60" LD CONCRETE MANHOLE WITH GROUTED HOPPER BOTTOM AS SHOWN.
- ③ 2" BALL CHECK AGAINST HYDRAULICALLY SEALED DISCHARGE FLANGE EQUAL TO HYDROMATIC.
- ④ 2" GATE VALVE
- ⑤ 1-1/2" GALVANIZED GUIDE RAILS (2 EACH PER PUMP)
- ⑥ GATE VALVE EXTENSION (1 EACH PER VALVE)
- ⑦ 2" C.I. 90° BEND (S X S)
- ⑧ 2" C.I. PIPE (S X S)
- ⑨ 2" BALL CHECK (S X S)
- ⑩ 2" UNION
- ⑪ 2" GATE VALVE (S X S)
- ⑫ 2" C. I. TEE
- ⑬ 2" X 2-1/2" C.I. REDUCER (S X S)
- ⑭ 2-1/2" C.I. PIPE (S X S)
- ⑮ 2-1/2" COUPLING - C.I. TO PVC
- ⑯ 2-1/2" PVC PIPE & FITTINGS - ASTM D 2241 SDR 26. SEE SITE PLAN FOR CONTINUATION.
- ⑰ CONCRETE VAULT - 3.5' H X 3.5' L X 3.5' W EQUAL TO UTILITY VAULT MODEL 444-LA WITH 44-332P COVER. DRAIN TO NEAREST STORM DRAIN FACILITY.



LIFT STATION ELEVATION



VALVE VAULT ELEVATION



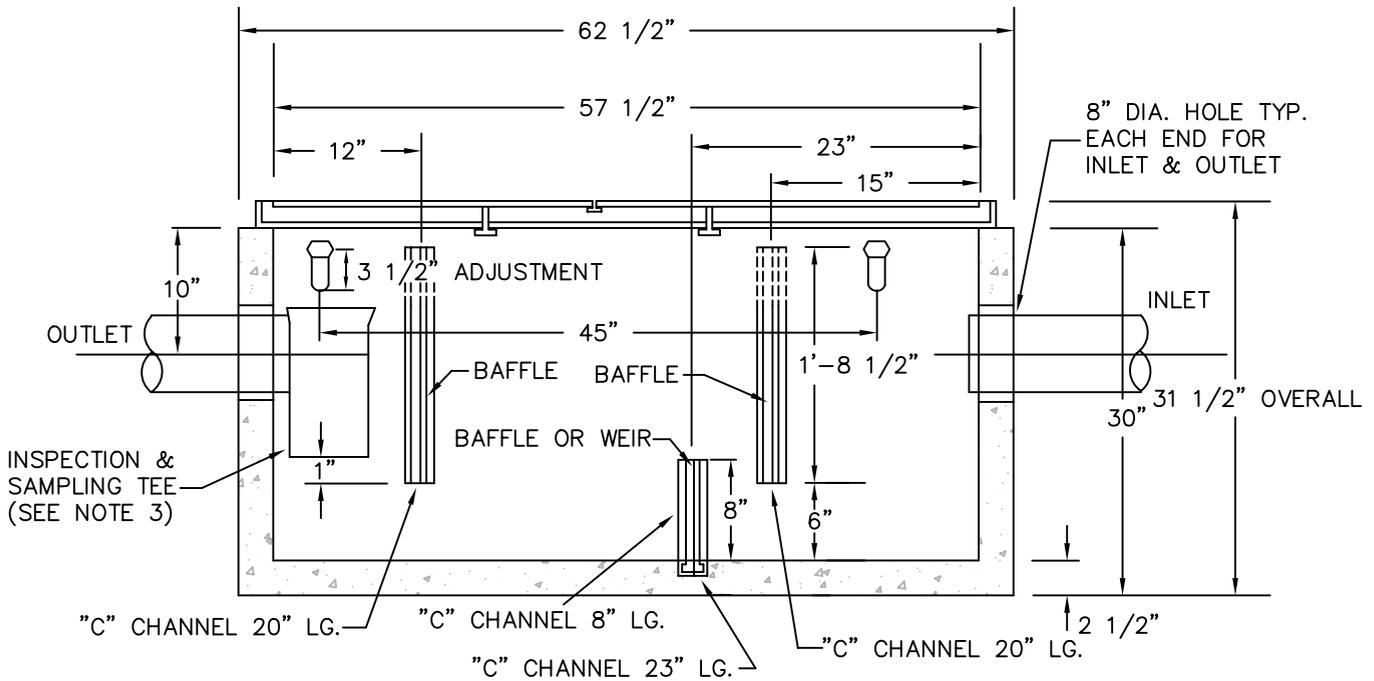
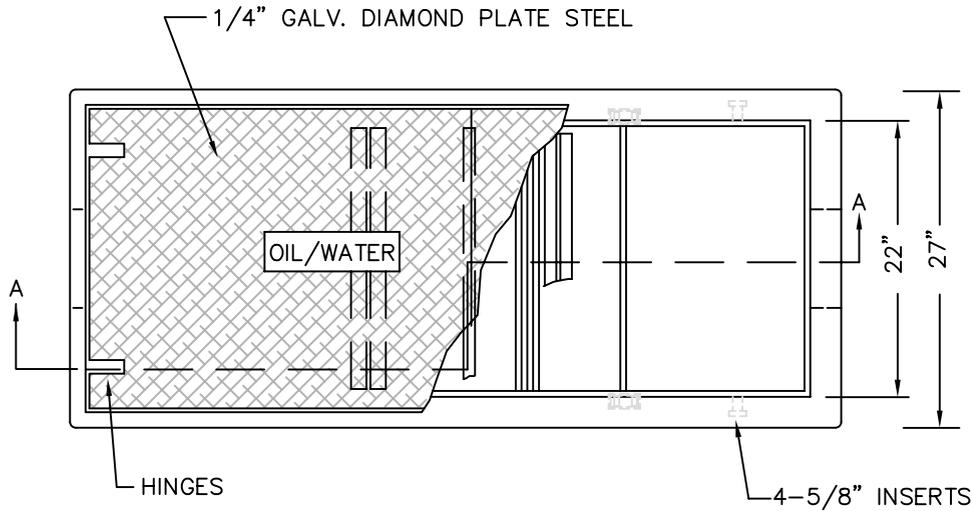
VALVE VAULT PLAN

CITY OF KIRKLAND

PLAN NO. CK-S.22



COMMERCIAL AND
MULTI-FAMILY
DUPLEX SEWER
LIFT STATION



SECTION A-A

NOTES:

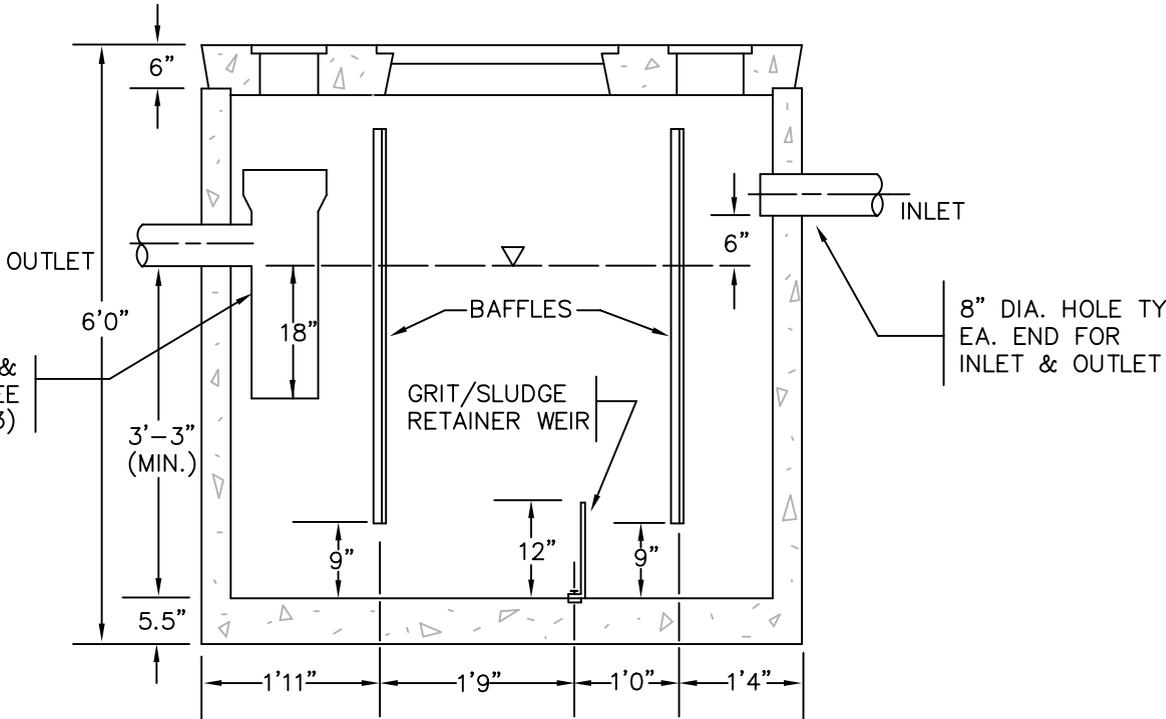
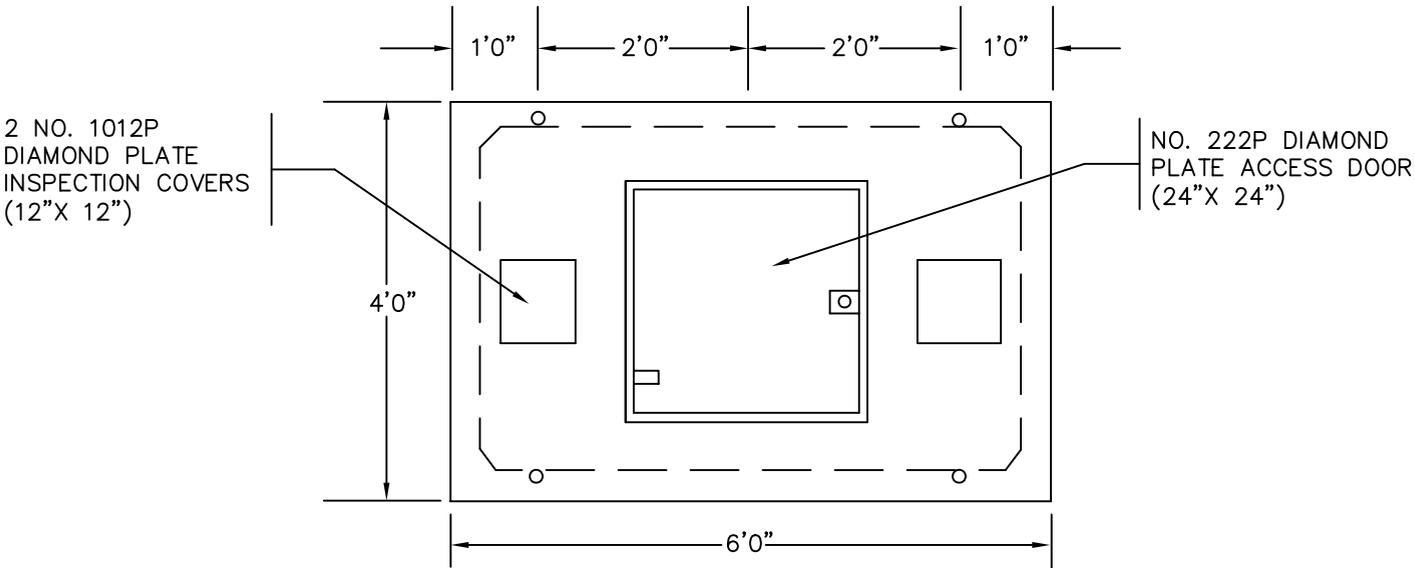
1. UTILITY VAULT COMPANY, INC., #25-SA, OR EQUAL. PRESET VAULT SHALL HAVE KNOCKOUTS AT ALL PIPE OPENINGS. IF KNOCKOUTS ARE NOT PRESENT THEN PIPE OPENINGS SHALL BE CORE-DRILLED. PIPE OPENINGS SHALL BE 2" LARGER THAN PIPE DIAMETER.
2. LOCATE WITHIN 20 FEET OF DRIVE FOR ACCESS BY MAINTENANCE VEHICLE.
3. INSPECTION AND SAMPLING TEE TO BE INSTALLED BY CONTRACTOR. LINE-SIZED PVC TEE SHALL BE USED WHERE LINE IS 6" DIA. OR GREATER. SIX INCH PVC TEE SHALL BE USED WHERE LINE-SIZE IS LESS THAN 6" DIA.
4. FILL WITH CLEAN WATER PRIOR TO STARTUP OF SYSTEM.
5. GRAY AND BLACK WATER SHALL BE CARRIED BY SEPARATE SIDE SEWER.
6. CONNECTIONS TO CONCRETE WALLS WITH P.V.C. PIPE REQUIRE KOR-N-SEAL CONNECTOR. SEAL ALL PIPE CONNECTIONS WITH NON-SHRINK GROUT.

CITY OF KIRKLAND

PLAN NO. CK-S.23



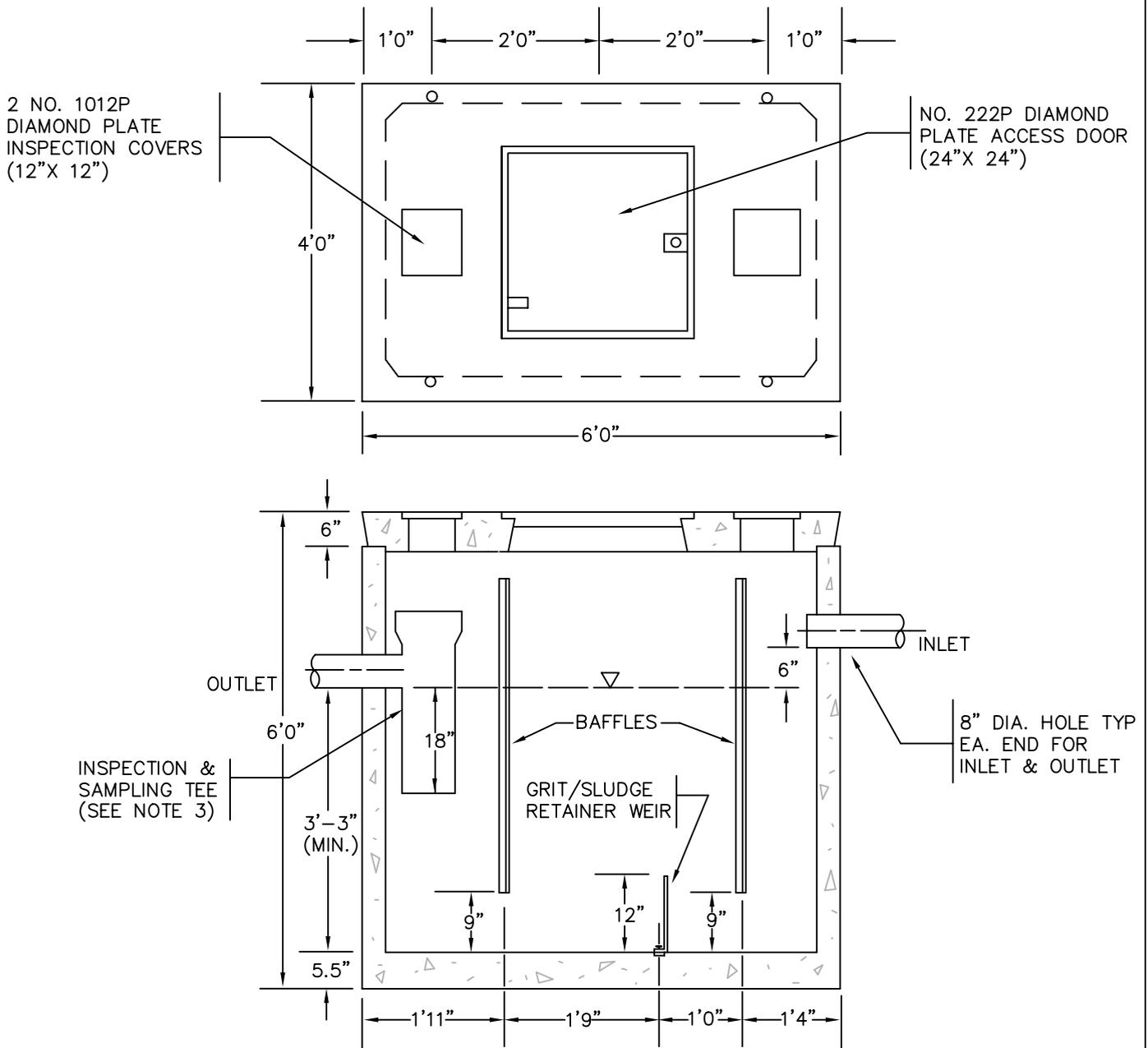
100 GALLON BAFFLE
TYPE OIL/WATER
SEPARATOR



NOTES:

1. UTILITY VAULT COMPANY, INC., #660-SA, OR EQUAL. PRESET VAULT SHALL HAVE KNOCKOUTS AT ALL PIPE OPENINGS. IF KNOCKOUTS ARE NOT PRESENT THEN PIPE OPENINGS SHALL BE CORE-DRILLED. PIPE OPENINGS SHALL BE 2" LARGER THAN PIPE DIAMETER.
2. LOCATE WITHIN 20 FEET OF DRIVE FOR ACCESS BY MAINTENANCE VEHICLE.
3. INSPECTION AND SAMPLING TEE TO BE INSTALLED BY CONTRACTOR. LINE-SIZED PVC TEE SHALL BE USED WHERE LINE IS 6" DIA. OR GREATER. SIX INCH PVC TEE SHALL BE USED WHERE LINE-SIZE IS LESS THAN 6" DIA.
4. FILL WITH CLEAN WATER PRIOR TO STARTUP OF SYSTEM.
5. GRAY AND BLACK WATER SHALL BE CARRIED BY SEPARATE SIDE SEWER.
6. CONNECTIONS TO CONCRETE WALLS WITH P.V.C. PIPE REQUIRE KOR-N-SEAL CONNECTOR. SEAL ALL PIPE CONNECTIONS WITH NON-SHRINK GROUT.

CITY OF KIRKLAND	
PLAN NO. CK-S.24	
	<p style="font-size: 1.2em; margin: 0;">450 GALLON BAFFLE TYPE OIL/WATER SEPARATOR</p>



NOTES:

1. UTILITY VAULT COMPANY, INC., #577-SA, OR EQUAL. PRESET VAULT SHALL HAVE KNOCKOUTS AT ALL PIPE OPENINGS. IF KNOCKOUTS ARE NOT PRESENT THEN PIPE OPENINGS SHALL BE CORE-DRILLED. PIPE OPENINGS SHALL BE 2" LARGER THAN PIPE DIAMETER.
2. LOCATE WITHIN 20 FEET OF DRIVE FOR ACCESS BY MAINTENANCE VEHICLE.
3. INSPECTION AND SAMPLING TEE TO BE INSTALLED BY CONTRACTOR. LINE-SIZED PVC TEE SHALL BE USED WHERE LINE IS 6" DIA. OR GREATER. SIX INCH PVC TEE SHALL BE USED WHERE LINE-SIZE IS LESS THAN 6" DIA.
4. FILL WITH CLEAN WATER PRIOR TO STARTUP OF SYSTEM.
5. GRAY AND BLACK WATER SHALL BE CARRIED BY SEPARATE SIDE SEWER.
6. CONNECTIONS TO CONCRETE WALLS WITH P.V.C. PIPE REQUIRE KOR-N-SEAL CONNECTOR. SEAL ALL PIPE CONNECTIONS WITH NON-SHRINK GROUT.

WATER DEPTH	GALLONS	FLOW RATE AT 45 MINUTE RETENTION
4'-0"	800	17.8 G.P.M.
5'-0"	1000	22.2 G.P.M.

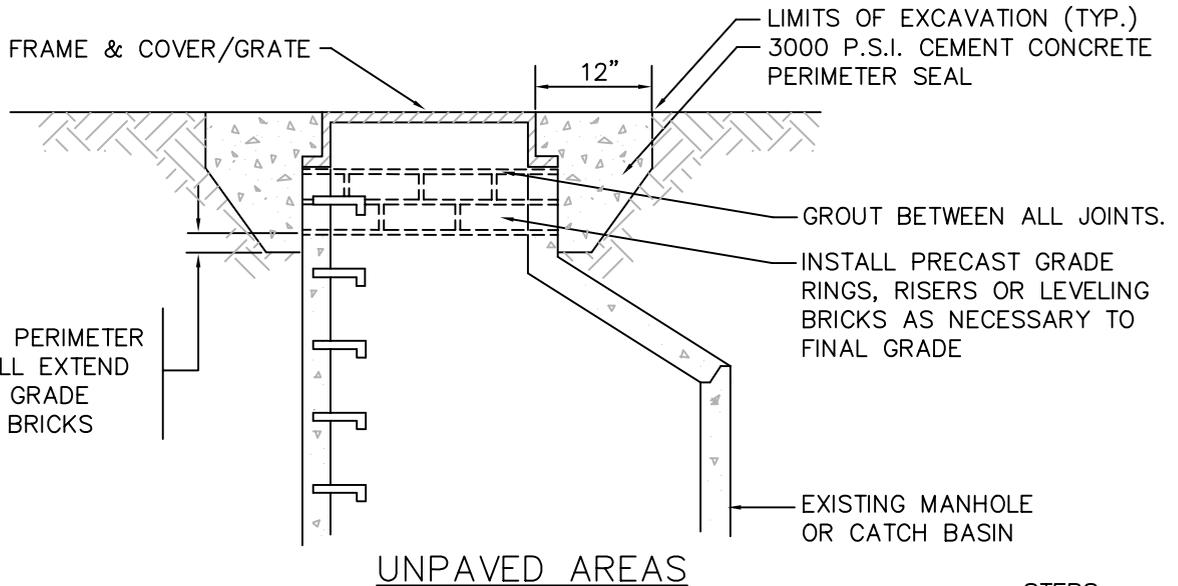
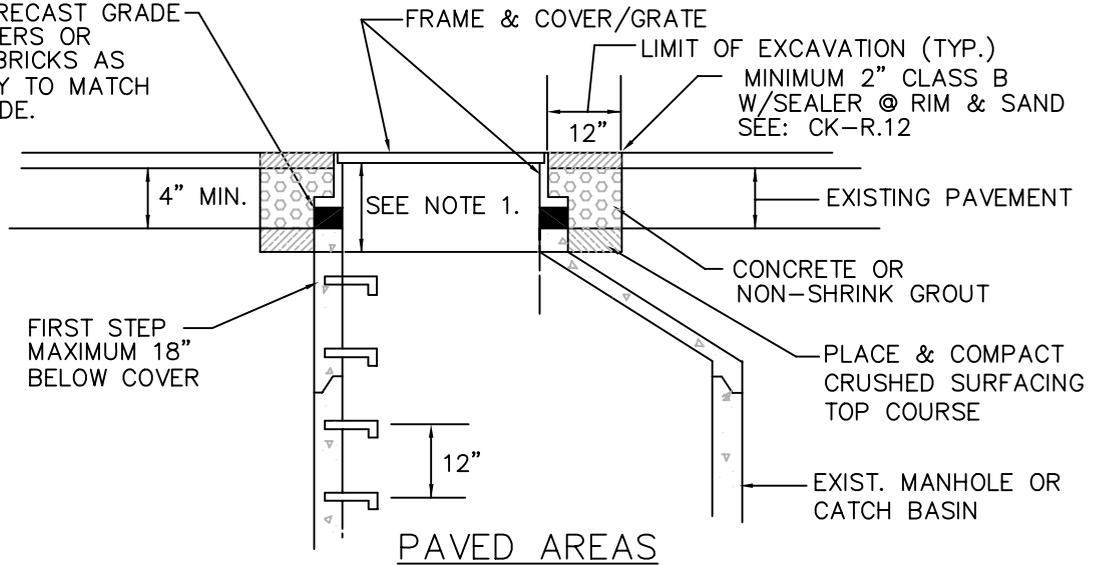
CITY OF KIRKLAND

PLAN NO. CK-S.25



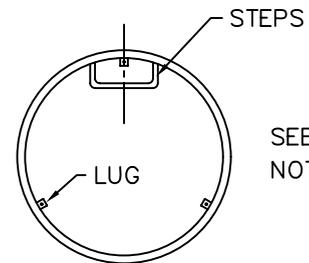
800 & 1000 GALLON
BAFFLE TYPE OIL/
WATER SEPARATOR

INSTALL PRECAST GRADE RINGS, RISERS OR LEVELING BRICKS AS NECESSARY TO MATCH FINAL GRADE.



NOTES:

1. WHERE DEPTH OF NECK EXCEEDS 18 INCHES, ADJUST MANHOLE/CATCH BASIN TO GRADE BY INSERTING NEW BARREL SECTION BETWEEN THE CONE/SLAB AND EXISTING BARREL.
2. GRADE RINGS, RISERS, BRICK AND FRAME SHALL BE SET IN 3/4" NON-SHRINK GROUT, GROUT BETWEEN ALL JOINTS. ALL SURFACES MUST BE CLEAN OF DEBRIS AND DIRT, AND WETTED PRIOR TO GROUTING. GROUT SMOOTH INSIDE AND OUTSIDE SURFACES.
3. STEPS OR HAND HOLDS SHALL BE ADDED AS NEEDED.
4. PRECAST GRADE RINGS AND RISERS MUST BE CAST WITH GROOVE TO ALLOW FIELD INSTALLATION OF SAFETY STEP.
5. REPLACE EXISTING FRAME AND COVER/GRATE IF NON-STANDARD.
6. IF REQUIRED: LOCKING MH FRAMES SHALL BE POSITIONED WITH ONE LUG CENTERED OVER STEPS.



SEE NOTE 6

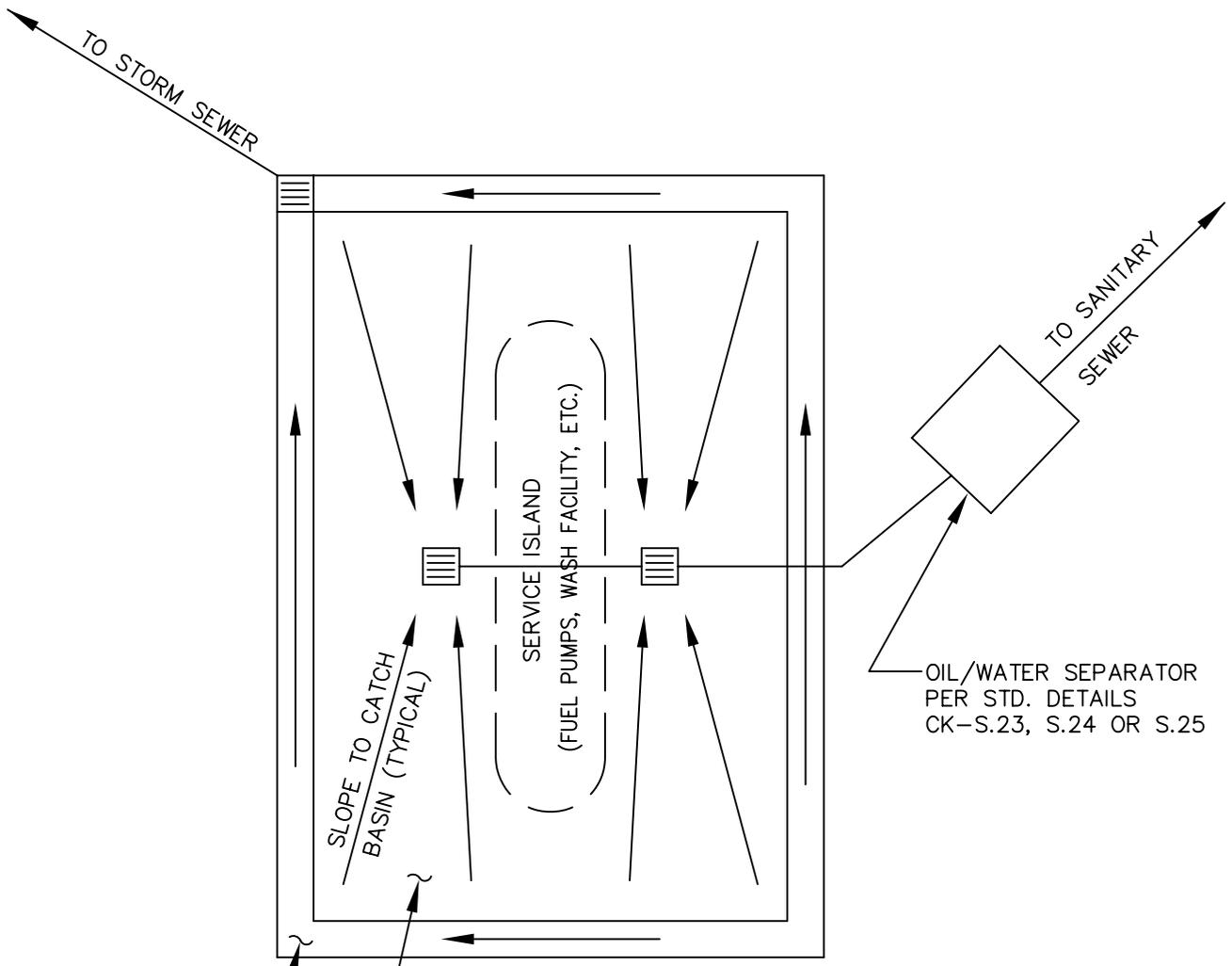
LOCKING MH FRAME
PLAN VIEW

CITY OF KIRKLAND

PLAN NO. CK-S.26



MANHOLE
FRAME AND GRATE
ADJUSTMENT



SLOPE TO CATCH
BASIN (TYPICAL)

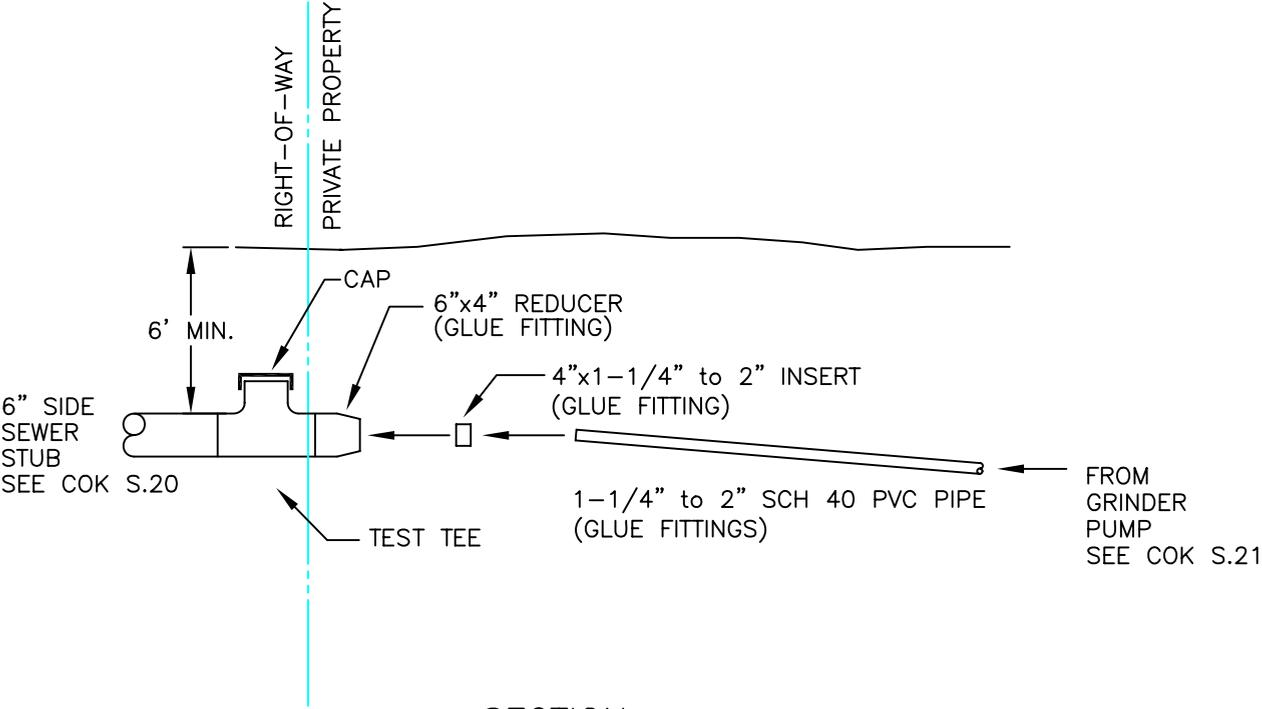
SERVICE ISLAND
(FUEL PUMPS, WASH FACILITY, ETC.)

OIL/WATER SEPARATOR
PER STD. DETAILS
CK-S.23, S.24 OR S.25

UNCOVERED PAVED VEHICLE SERVICE AREA.
NOTE: UNCOVERED AREA GRADED TO DRAIN
TO SANITARY SEWER SHALL NOT EXCEED
200 SQ. FT. AREAS OVER 200 SQ. FT.
REQUIRE ROOF, WITH ROOF DRAINING TO
STORM SYSTEM.

PAVED GUTTER. SLOPE TO STORM SEWER INLET.
NOTE: GUTTER NOT REQUIRED WHERE SURROUNDING
GRADE DRAINS AWAY FROM SERVICE AREA.

CITY OF KIRKLAND	
PLAN NO. CK-S.27	
	PAVED VEHICLE SERVICE AREA DRAINAGE DETAIL



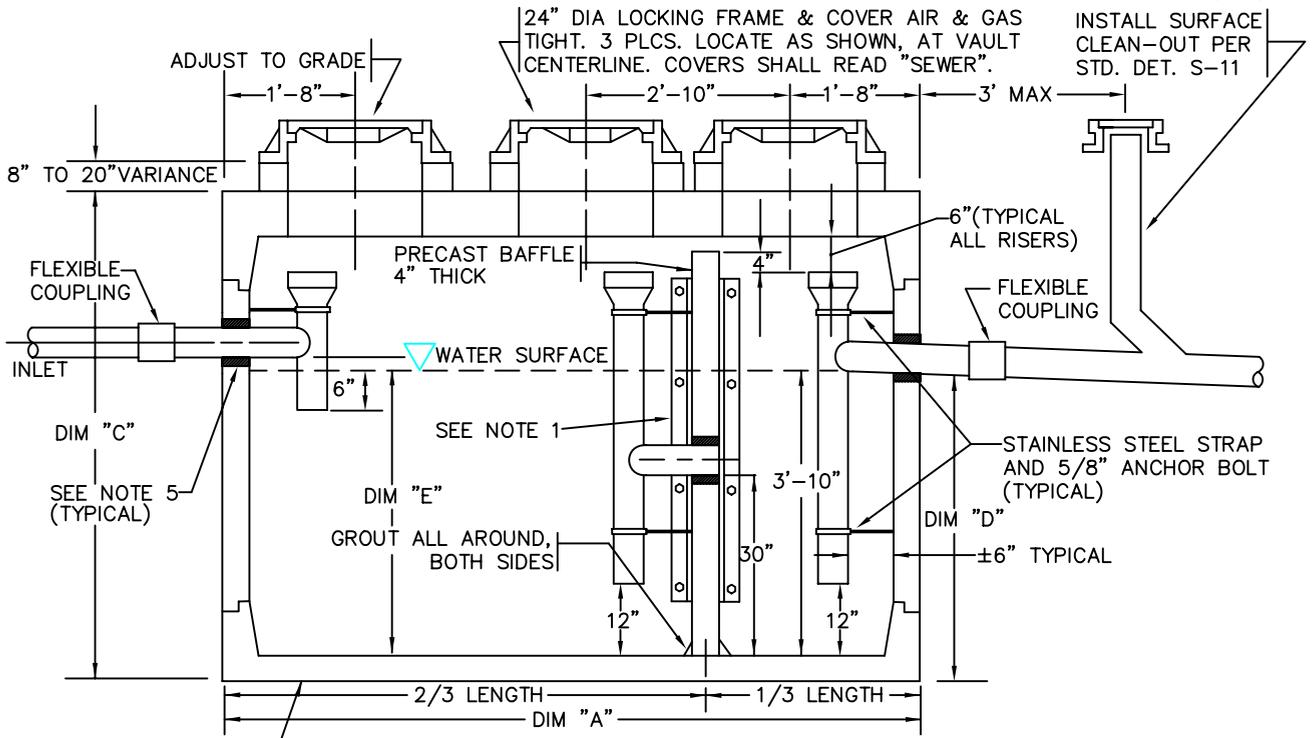
SECTION

NOTES

- 1. GRINDER PUMP DISCHARGE LINE MUST FLOW INTO A 6 INCH P.V.C. GRAVITY LINE. SIDE SEWER STUB.
- 2. 6 FOOT MINIMUM COVERAGE AT PROPERTY LINE AND IN RIGHT-OF-WAY.
- 3. 18 INCH MINIMUM COVERAGE OF PIPE ON PRIVATE PROPERTY.
- 4. RIGHT OF WAY RESTORATION SHALL MATCH OR EXCEED THE ORIGINAL CONDITION AND BE IN ACCORDANCE WITH THE CITY STANDARD.
- 5. BEDDING TO BE CLASS F PEA GRAVEL FOR GRINDER PUMP FORCE MAIN.
- 6. GRINDER PUMP FORCE MAIN SHALL BE LAID STRAIGHT WITH MINIMUM DEFLECTION.
- 7. PROTECTIVE STEEL CASING IS REQUIRED IF:
 - A. LESS THAN 3 FEET OF COVERAGE IS ATTAINABLE UNDER A DRIVING SURFACE.
 - B. UTILITY SEPARATION IS LESS THAN ADEQUATE.

CITY OF KIRKLAND	
PLAN NO. CK-S.28	
	SINGLE FAMILY SIMPLEX SEWER LIFT STATION GRAVITY/FORCE-MAIN CONNECTION

LAST REVISED: 11/30/99



PRECAST CONCRETE VAULT, UTILITY VAULT CO., INC., OR EQUAL (SEE NOTE 2). SEE CHART BELOW FOR DIMENSIONS REQUIRED FOR EACH GALLON CAPACITY, VAULT OUTSIDE WIDTH IS DIMENSION "B".

NOTES:

1. IF VAULT IS NOT SLOTTED TO ACCEPT PRECAST CONC. BAFFLE THEN PRECAST CONC. BAFFLE SHALL BE HELD IN PLACE BY (2) 3"x3"x3/8" ANGLE (4FT. LONG) ATTACHED TO VAULT WALL WITH (4 EA.) 1/2" BOLTS AND NUTS (WITH WASHERS) SPACED 14" O.C. ANGLE AND FASTENERS SHALL BE STAINLESS STEEL OR GALVANIZED AND ASPHALT COATED.
2. PRECAST VAULT AND BAFFLE SHALL HAVE KNOCKOUTS AT ALL PIPE OPENINGS. IF KNOCKOUTS ARE NOT PRESENT THEN PIPE OPENINGS SHALL BE CORE-DRILLED. PIPE OPENINGS SHALL BE 2" LARGER THAN PIPE DIAMETER.
3. POSITION RISERS BELOW ACCESS OPENINGS TO ALLOW CLEAR ACCESS TO RISER AND VAULT CHAMBER.
4. LOCATE INTERCEPTOR WITHIN 20' OF DRIVE FOR ACCESS BY MAINT. VEHICLE.
5. CONNECTIONS TO CONCRETE WALLS WITH P.V.C. PIPE REQUIRE KOR-N-SEAL CONNECTOR. SEAL ALL PIPE CONNECTIONS WITH NONSHRINK GROUT.
6. LINE-SIZED P.V.C. PIPE SHALL BE USED THROUGHOUT WHERE LINE IS 6" DIA. OR GREATER. SIX INCH P.V.C. SHALL BE USED THROUGHOUT WHERE LINE IS LESS THAN 6" DIA.
7. GRAY-WATER ONLY. BLACK-WATER SHALL BE CARRIED BY SEPARATE SIDE SEWER.
8. CLEAN-OUT REQUIRED 3' MAX. DOWNSTREAM OF INTERCEPTOR.
9. FILL WITH CLEAN WATER PRIOR TO START UP OF SYSTEM.
10. FOR CAPACITIES LESS THAN 1500 GALLONS, SUBSTITUTE 12" DIA. CAST IRON COVER AND FRAME FOR "CENTER" MANHOLE. LOCATE DIRECTLY ABOVE TEE. OLYMPIC FOUNDRY 5931 OR EQUAL.

GALLON CAPACITY		600	750	1000	1500	2000	2500	3000	4000	5000	6000
UV CO. MODEL No.		577-GA	577-GA	4484-GA	5106-GA	612-GA	612-GA	814-GA	814-GA	818-GA	818-GA
LENGTH	DIM "A"	7'-0"	7'-0"	9'-0"	11'-2"	12'-8"	12'-8"	15'-7"	15'-7"	19'-11"	19'-11"
WIDTH	DIM "B"	4'-8"	4'-8"	5'-0"	5'-8"	6'-8"	6'-8"	9'-7"	9'-7"	9'-11"	9'-11"
HEIGHT	DIM "C"	7'-0"	7'-0"	7'-2"	7'-2"	8'-0"	8'-0"	8'-6 1/2"	8'-6 1/2"	8'-11"	10'-5"
	DIM "D"	3'-6"	4'-3"	4'-2"	4'-4"	4'-7"	5'-6"	5'-0"	6'-3"	6'-2"	7'-2"
WATER DEPTH	DIM "E"	3'-2"	3'-11"	3'-10"	4'-0"	3'-10"	4'-9"	3'-9"	5'-0"	4'-9"	5'-9"

CITY OF KIRKLAND

PLAN NO. CK-S.29



GREASE INTERCEPTOR

Appendix F

TAZ Planning Data Workbook

TAZ	Neighborhood	Office			Commercial			Industrial			Institutions	TOTAL Employees	Multi-family		Single family		TOTAL RESIDENCE			
		Capacity	2,022	Estimated Employees	Capacity	2,022	Estimated Employees	Capacity	2,022	Estimated Employees			Capacity	2,022	Residence	Capacity		2,022	Residence	
236	Lakeview	487,479	486,071	1,944	0	0	0	0	0	0	0	1,944	342	344	485	17	17	39	525	
237	Lakeview	700,677	622,776	2,491	16,208	16,208	32	0	0	0	0	2,524	0	0	0	1	1	2	2	
238	Lakeview	0	0	0	0	0	0	0	0	0	0	0	69	63	88	132	130	309	397	
239	Lakeview	948,450	930,166	3,721	43,404	14,401	29	0	0	0	1,520	3,749	45	45	64	0	0	0	64	
240	Lakeview	0	0	0	0	0	0	0	0	0	0	0	196	197	278	2	2	5	283	
241	Lakeview	5,675	1,318	5	42,931	24,295	49	0	0	0	0	54	587	578	814	46	46	109	923	
242	Lakeview	0	0	0	0	0	0	0	0	0	0	0	80	80	112	176	174	413	526	
243	Central Houghton	0	0	0	0	0	0	0	0	0	6,528	0	3	3	4	298	272	645	650	
244	Central Houghton	0	0	0	0	0	0	0	0	0	0	0	57	57	81	227	215	512	592	
245	Central Houghton	8,271	8,271	33	127,675	72,786	146	0	0	0	0	179	106	93	131	368	351	834	966	
246	Central Houghton	60,723	60,723	243	5,932	2,460	5	0	0	0	9,071	248	246	245	345	373	368	876	1,221	
247	Bridle Trails	0	0	0	72,295	72,295	145	0	0	0	4,800	145	2	2	3	205	197	469	471	
248	Bridle Trails	35,586	35,586	142	0	0	0	0	0	0	0	142	2	2	3	299	291	692	695	
249	Bridle Trails	5,000	5,000	20	149,100	148,623	297	0	0	0	3,557	317	131	132	186	395	371	882	1,067	
250	Moss Bay	0	0	0	0	0	0	0	0	0	0	0	221	213	300	66	64	153	453	
251	Moss Bay	0	0	0	0	0	0	0	0	0	0	0	92	85	119	5	5	12	131	
252	Moss Bay	101,752	24,783	99	21,421	15,366	31	0	0	17,708	130	271	297	419	26	26	62	481		
253	Moss Bay	251,540	60,357	241	67,096	39,985	80	144,807	150,005	255	36,812	576	584	582	820	117	116	276	1,096	
254	Moss Bay	93,932	33,626	135	104,228	71,136	142	0	0	10,121	277	230	202	284	7	7	17	301		
255	Moss Bay	240,837	159,941	640	284,579	232,970	466	0	0	0	1,106	250	200	281	0	0	0	281		
256	Moss Bay	213,530	87,493	350	235,350	202,093	404	0	0	0	754	342	301	424	0	0	0	424		
257	Moss Bay	723,579	322,538	1,290	540,559	369,893	740	0	0	0	2,030	640	530	747	0	0	0	747		
258	Moss Bay	36,000	36,000	144	0	0	0	28,532	28,532	49	0	193	88	81	114	19	19	45	159	
259	Moss Bay	277,768	266,311	1,065	0	0	0	0	0	0	1,065	378	373	525	5	5	12	537		
260	Everest	305,122	117,735	471	78,092	51,624	103	273,121	111,501	190	0	764	73	73	103	0	0	0	103	
261	Everest	215,263	119,409	478	15,543	8,274	17	152,218	117,797	200	0	694	383	367	518	125	120	286	804	
261.5	Everest	190,916	190,916	764	0	0	0	85,142	85,142	145	0	908	64	64	91	127	127	302	393	
262	South Rose Hill	1,191	277	1	0	0	0	947	214	0	0	1	99	78	110	272	248	588	698	
263	South Rose Hill	0	0	0	44,573	23,417	47	0	0	0	50,625	47	14	13	18	1,042	979	2,326	2,344	
264	South Rose Hill	163,139	58,299	233	270,060	97,271	195	12,270	12,270	21	7,416	449	248	172	243	91	86	205	448	
265	North Rose Hill	40,633	23,302	93	263,392	207,345	415	15,647	15,647	27	1,484	534	164	156	220	7	6	15	235	
266	North Rose Hill	0	0	0	168,360	65,237	130	0	0	0	0	130	24	14	19	3	3	7	26	
267	North Rose Hill	229,420	92,368	369	199,393	130,736	261	55,184	46,123	78	0	709	82	50	70	7	7	17	87	
268	Market	308,876	206,305	825	79,203	60,012	120	0	0	0	0	945	204	205	289	780	769	1,828	2,117	
269	Norkirk	0	0	0	5,184	5,184	10	0	0	0	16,560	10	111	104	146	111	108	256	402	
270	Norkirk	1,536	1,536	6	0	0	0	0	0	0	0	6	215	203	286	75	74	176	462	
271	Norkirk	0	0	0	0	0	0	0	0	0	6,904	0	15	15	21	543	530	1,260	1,281	
272	Norkirk	132,618	56,753	227	3,168	3,168	6	427,557	369,624	628	0	862	5	5	6	111	109	258	265	
273	Norkirk	0	0	0	0	0	0	0	0	0	0	0	7	7	10	511	498	1,184	1,194	
274	Highlands	0	0	0	0	0	0	0	0	0	0	0	163	148	208	980	951	2,260	2,468	
275	North Rose Hill	89,332	20,746	83	0	0	0	0	0	0	16,582	83	252	236	332	111	103	246	578	
276	North Rose Hill	4,271	4,271	17	0	0	0	0	0	0	42,443	17	0	0	0	718	655	1,556	1,556	
277	North Rose Hill	159,277	113,117	452	64,267	25,499	51	0	0	0	0	503	366	282	398	267	236	560	958	
278	North Rose Hill	49,092	11,401	46	0	0	0	0	0	0	5,613	46	2	2	3	1,121	1,077	2,559	2,562	
279	North Rose Hill	11,497	6,171	25	25,060	25,060	50	48,740	48,740	83	0	158	495	493	695	2	2	5	700	
280	Totem Lake	0	0	0	37,958	8,351	17	38,575	38,575	66	0	82	791	709	999	1	1	2	1,001	
281	Norkirk	0	0	0	0	0	0	0	0	0	0	0	551	531	748	76	65	154	902	
282	Market	0	0	0	0	0	0	0	0	0	8,541	0	12	9	12	630	601	1,427	1,440	
283	South Juanita	0	0	0	0	0	0	816	816	1	0	1	268	268	378	791	760	1,806	2,185	
284	South Juanita	0	0	0	0	0	0	0	0	0	14,825	0	775	775	1,092	1	1	2	1,094	
285	South Juanita	132,396	132,396	530	284,681	153,208	306	2,257	2,257	4	0	840	1,131	940	1,325	5	5	12	1,337	
286	South Juanita	0	0	0	0	0	0	0	0	0	0	0	286	285	402	167	162	384	787	
287	North Juanita	2,436	566	2	3,703	3,703	7	0	0	0	0	10	388	387	546	463	456	1,083	1,629	
288	North Juanita	26,802	6,224	25	0	0	0	0	0	0	6,680	25	373	372	524	298	297	705	1,229	
289	North Juanita	57,379	13,326	53	0	0	0	0	0	0	5,171	53	173	174	245	211	202	481	726	
290	Highlands	42,820	24,133	97	0	0	0	564,121	564,121	959	0	1,056	177	107	151	37	35	84	235	
291	Totem Lake	19,955	4,634	19	36,200	36,200	72	449,991	449,991	765	0	856	44	26	37	0	0	0	37	
292	Totem Lake	814,784	814,784	3,259	51,130	20,230	40	0	0	0	2,720	3,300	202	203	287	3	3	7	294	
293	Totem Lake	63,703	23,949	96	384,465	269,385	539	364,619	364,619	620	0	1,254	105	64	90	0	0	0	90	
294	Totem Lake	0	0	0	121,763	121,763	244	0	0	0	0	244	0	0	0	0	0	0	0	
295	Totem Lake	1,350	1,350	5	339,901	303,515	607	182,869	182,869	311	0	923	53	32	45	1	1	2	48	
296	Totem Lake	0	0	0	0	0	0	0	0	0	0	0	574	578	814	0	0	0	814	
297	Totem Lake	19,681	19,681	79	204,869	174,096	348	77,195	77,195	131	0	558	15	9	13	0	0	0	13	
298	Totem Lake	145,000	145,000	580	516,319	473,304	947	0	0	0	0	1,527	196	204	287	0	0	0	287	
299	Totem Lake	0	0	0	545,129	183,439	367	535,923	535,923	911	0	1,278	32	20	28	0	0	0	28	
300	Totem Lake	840,341	453,822	1,815	0	0	0	0	0	0	0	1,815	1,257	843	1,187	0	0	0	1,187	
301	Totem Lake	83,622	81,507	326	0	0	0	0	0	0	28,780	326	341	287	404	0	0	0	404	
302	Totem Lake	86,508	20,090	80	0	0	0	0	0	0	0	80	658	659	928	0	0	0	928	
	Total	8,429,758	5,905,028	23,620	5,453,191	3,732,534	7,465	3,460,530	3,201,961	5,443	304,461	36,529	16,278	14,872	20,960	12,473	11,954	28,410	49,370	
	Employees	33,719	23,620		10,906	7,465		5,883	5,443											
	Employees Sub-Total	50,508	36,529		36,529															
	Special Gen & Institution	4,350	4,250																	
	Lynn Trust & Mall Employees		1,123																	
	2022 Total Employees	54,858	41,902																	
	Official Target		41,184																	
	Difference		718																	

The Capacity column does not include the private amendments but includes redevelopment of Totem Lake TL1 & TL2 & Mall
The 2022 column includes both the private amendment and the Totem Lake Plan

Appendix G

Rodding Schedules

Monthly Rodding List

Date	Crew	Location	Map #	MH ID From	MH ID To	Linear Feet	Belly	Sand	Clean	Add'l Comments	work order
		112 Lake WA Blvd-Hectors	E-4	93	1175	57'	Y N	Y N	Y		
		112 Lake WA Blvd-Hectors	E-4	1175	1215	151'	Y N	Y N	Y		
		201 Kirkland Ave	E-4	1215	1221	122'	Y N	Y N	Y		
		132 Kirkland Ave	E-4	1221	1243	59'	Y N	Y N	Y		
		202 Kirkland Ave	E-4	1323	1243	233'	Y N	Y N	Y		
		111 Park Lane	F-4	82	1160	66'	Y N	Y N	Y		
		111 Park Lane	F-4	1160	1169	54'	Y N	Y N	Y		
		200 Main St	F-4	1169	1231	207'	Y N	Y N	Y		
		200 Main St	F-4	1231	1248	35'	Y N	Y N	Y		
		200 Main St	F-4	1243	1248	120'	Y N	Y N	Y		
		205 Main St	F-4	83	1207	256'	Y N	Y N	Y		
		205 Main St	F-4	1207	1253	86'	Y N	Y N	Y		
		147 Park Lane	F-4	1253	1252	108'	Y N	Y N	Y		
		147 Park Lane	F-4	1248	1252	158'	Y N	Y N	Y		
		208 Park Lane	F-4	1252	1296	117'	Y N	Y N	Y		
		248 Park Lane	F-4	1296	1351	182'	Y N	Y N	Y		
		248 Park Lane	F-4	1351	1364	71'	Y N	Y N	Y		
		248 Park Lane	F-4	1364	1362	23'	Y N	Y N	Y		
		733 6th Ave	F-3	1950	1929	116'	Y N	Y N	Y		
		733 6th Ave	F-3	1929	1917	158'	Y N	Y N	Y		
		733 6th Ave	F-3	1917	1883	197'	Y N	Y N	Y		
		218 Kirkland Ave	F-4	1324	1323	39'	Y N	Y N	Y		
		218 Kirkland Ave	F-4	153	1324	128'	Y N	Y N	Y		
		312 Central Way	F-4	1422			Y N	Y N	Y		
		312 Central Way	F-4	1366			Y N	Y N	Y		

Quarterly Rodding List (Jan, Apr, Jul, Oct)

Date	Crew & Equipment	Location	Map #	MH ID From	MH ID To	Linear Feet	Belly	Sand	Clean/Add'l	Comments
		12673 NE 85th St	F-1	3103	3077	179'	Y N	Y N	Y	
		12673 NE 85th St	F-1	3123	3103	133'	Y N	Y N	Y	
		12673 NE 85th St	F-1	717	3123	105'	Y N	Y N	Y	
		12673 NE 85th St	F-1	3050	3077	122'	Y N	Y N	Y	
		8005 128th Ave NE	F-1	702	3076	385'	Y N	Y N	Y	
		12654 NE 80th St	F-1	3018	3008	126'	Y N	Y N	Y	
		12654 NE 80th St	F-1	3076	3018	207'	Y N	Y N	Y	
		12614 NE 80th St	F-1	2958	2954	19'	Y N	Y N	Y	
		12614 NE 80th St	F-1	3008	2958	327'	Y N	Y N	Y	
		11906 NE 80th St	F-2	2582	2577	54'	Y N	Y N	Y	
		11906 NE 80th St	F-2	2594	2582	127'	Y N	Y N	Y	
		11906 NE 80th St	F-2	2648	2594	328'	Y N	Y N	Y	
		6211 108th Ave NE	D-3	1827	1829	119'	Y N	Y N	Y	
		6211 108th Ave NE	D-3	1825	1827	119'	Y N	Y N	Y	
		6211 108th Ave NE	D-3	1824	1825	91'	Y N	Y N	Y	
		6211 108th Ave NE	D-3	1820	1824	325'	Y N	Y N	Y	
		201 3rd Ave S	E-4	176	1307	347'	Y N	Y N	Y	
		202 2nd Ave S	E-4	135 c/o	1308	151'	Y N	Y N	Y	
		202 2nd Ave S	E-4	1307	1308	282'	Y N	Y N	Y	
		500 16th Ave W	G-5	961	939	130'	Y N	Y N	Y	
		500 16th Ave W	G-5	42	961	154'	Y N	Y N	Y	
		1623 6th St W	H-5	31 c/o	923	87'	Y N	Y N	Y	
		1623 6th St W	H-5	942	941	2'	Y N	Y N	Y	
		1623 6th St W	H-5	941	923	272'	Y N	Y N	Y	
		1301 5th St	G-4	255 c/o	1685	196'	Y N	Y N	Y	
		1949 4th St	H-4	1549	1452	362'	Y N	Y N	Y	
		1949 4th St	H-4	1452	1393	223'	Y N	Y N	Y	
		1949 4th St	H-4	1393	1304	296'	Y N	Y N	Y	
		525 9th Ave	F-4	1705 c/o	1743	157'	Y N	Y N	Y	
		525 9th Ave	F-4	297 c/o	1743	160'	Y N	Y N	Y	
		525 9th Ave	F-4	1742	1743	159'	Y N	Y N	Y	
		532 8th Ave	F-4	1743	1740	156'	Y N	Y N	Y	
		11004 NE 112th St	I-3	1957	1956	245'	Y N	Y N	Y	
		11226 110th Ave NE	I-3	1958	1957	285'	Y N	Y N	Y	
		11253 110th Ave NE	I-3	366	1997	45'	Y N	Y N	Y	
		11253 110th Ave NE	I-3	1997	1958	175'	Y N	Y N	Y	

6 TIMES PER YEAR RODDING LIST (FEB, APR, JUN, AUG, OCT, DEC)

DATE	CREW	LOCATION	MAP #	DETAILS	LINEAR FEET	REMARKS
		4010 LK WA BLVD	A-4	1430, 1466, 1488, 1493	56' / 318' / 62'	
		5240 - 111 AVE NE	C-3	2037, 2043, 2034	203' / 237'	
		4500 LK WA BLVD CARILLON POINT	C-4	1072, 1094, 1101, 1120, 1159	253' / 129' / 141' / 363'	
		4726 - 108TH AVE NE	B-3	1794, 1850, 1849	198' / 132'	
		6702 - 123RD AVE NE	D-2	2783, 2781, 598	152' / 150'	
		6401 - 105TH AVE NE	D-4	1525, 1538, 214, 1587	45' / 186' / 190'	
		6920 - 116TH AVE NE	E-2	2376, 2395, 2469	86' / 410'	
		8629 - 120TH AVE NE COSTCO	F-2	2605, 2607, 2604, 2569	232' / 243' / 320'	
		8613 - 122ND AVE NE	F-2	2668, 2673, 2669, 2674	239' / 298' / 270'	
		109 SLATER AVE S	E-3	2320, 2306, 2268	303' / 313'	
		111 SLATER AVE S	F-3	2320, 2334, 483	372' / 287'	
		89 KIRKLAND AVE ANTHONY'S HOMEPORT	E-4	1065, 1108, 1093, 1082, 1070	217' / 54' / 61' / 40'	

TWICE YEARLY RODDING LIST (MARCH, SEPTEMBER)

Date	Crew/Equipment	Location	Map #	MH ID From	MH ID To	Linear Feet	Belly	Sand	Clean	Add'l comments/WO#
		719- 4th St W	G-5	20	857	505'	Y N	Y N	Y	
		618- 11th Ave W	G-5	816	808	88'	Y N	Y N	Y	
		618- 11th Ave W	G-5	818	816	346'	Y N	Y N	Y	
		10028 116th Ave NE	H-2	488	2364	302'	Y N	Y N	Y	
		605- 18th Ave W	H-5	942	938	83'	Y N	Y N	Y	
		605- 18th Ave W	H-5	959	942	65'	Y N	Y N	Y	
		815- 14th Ave W	H-5	782	781	172'	Y N	Y N	Y	
		815 - 14th Ave W	H-5	783	782	34'	Y N	Y N	Y	
		815 - 14th Ave W	H-5	787	783	177'	Y N	Y N	Y	
		10858 117th Pl NE	I-2	2562	2476	478'	Y N	Y N	Y	
		11837 NE 112th St	I-2	2540	2538	369'	Y N	Y N	Y	
		11837 NE 112th St	I-2	2542	2540	309'	Y N	Y N	Y	
		11837 NE 112th St	I-2	2544	2542	246'	Y N	Y N	Y	
		10407 NE 113th Pl	I-4	1479	1482	322'	Y N	Y N	Y	
		10612 110th Ave NE	J-3	1991	1989	381'	Y N	Y N	Y	
		10612 110th Ave NE	J-3	1994	1991	229'	Y N	Y N	Y	
		10612 110th Ave NE	J-3	1999	1994	229'	Y N	Y N	Y	
		12716 NE 97th Pl	G-1	661	2994	145'	Y N	Y N	Y	
		12716 NE 97th Pl	G-1	2994	3004	200'	Y N	Y N	Y	
		12741 NE 97th Pl	G-1	3004	3035	224'	Y N	Y N	Y	
		12741 NE 97th Pl	G-1	3035	3036	126'	Y N	Y N	Y	
		12741 NE 97th Pl	G-1	3036	3042	302'	Y N	Y N	Y	
					total rodded	5,332				

Twice Yearly Rodding List (Jan, June)

Date	Crew/Equipment	Location	Map #	MH ID From	MH ID To	Linear Feet	Belly	Sand	Clean	Act'dl Comments	Work Order
		RxR Line-10407 NE 52nd St	B-4	1439	1424	131'	Y N Y N	Y N	Y	*add extra hose prior to cleaning	
		RxR Line-10407 NE 52nd St	B-4	1464	1439	147'	Y N Y N	Y N	Y		
		RxR Line-10420 NE 47th Pl	B-4	1486	1464	291'	Y N Y N	Y N	Y		
		RxR Line-10420 NE 47th Pl	B-4	1501	1486	303'	Y N Y N	Y N	Y		
		RxR Line-10420 NE 47th Pl	B-4	1513	1501	175'	Y N Y N	Y N	Y		
		8605 - 120th Ave NE	D-2	2016	1621	150'	Y N Y N	Y N	Y		
		8605 - 120th Ave NE	D-2	2016	2019	242'	Y N Y N	Y N	Y		
		8605 - 120th Ave NE	D-2	2053	2016	221'	Y N Y N	Y N	Y		
		4548 Lk WA BLVD	B-4	1261	1283	313'	Y N Y N	Y N	Y		
		4548 Lk WA BLVD	B-4	1283	1288	42'	Y N Y N	Y N	Y		
		4548 Lk WA BLVD	B-4	1288	1284	239'	Y N Y N	Y N	Y		
		4548 Lk WA BLVD	B-4	1294	1289	87'	Y N Y N	Y N	Y		
		4548 Lk WA BLVD	B-4	1297	1294 c/o	8'	Y N Y N	Y N	Y		
		6636 - 110th Ave NE	C-3	1948	1878	395'	Y N Y N	Y N	Y		
		6636 - 110th Ave NE	C-3	348	1948	144'	Y N Y N	Y N	Y		
		6636 - 110th Ave NE	C-3	c/o *	348	250'	Y N Y N	Y N	Y		
		11349 NE 53rd St	C-3	2255	2218	203'	Y N Y N	Y N	Y		
		6514 - 113th Ave NE	D-3	2209	2208	137'	Y N Y N	Y N	Y		
		6514 - 113th Ave NE	D-3	2208	2206	206'	Y N Y N	Y N	Y		
		6514 - 113th Ave NE	D-3	2206	2203	224'	Y N Y N	Y N	Y		
		800- 9th Ave S	D-3	1962	1964	242'	Y N Y N	Y N	Y		
		800- 9th Ave S	D-3	1960	1962	193'	Y N Y N	Y N	Y		
		800- 9th Ave S	D-3	351	1960	206'	Y N Y N	Y N	Y		
		6500 - 103rd Ave NE	D-2	182	1440	387'	Y N Y N	Y N	Y		
		442 - 7th St S	D-4	1614	1562	188'	Y N Y N	Y N	Y		
		442 - 7th St S	D-4	254	1614	219'	Y N Y N	Y N	Y		
		211 - 6th St	E-4	1577	1645	137'	Y N Y N	Y N	Y		
		211 - 6th St	E-4	1608	1577	134'	Y N Y N	Y N	Y		
		211 - 6th St	E-4	1621	1609	140'	Y N Y N	Y N	Y		
		211 - 6th St	E-4	1630	1621	47'	Y N Y N	Y N	Y		
		211 - 6th St	F-4	1610	1625	36'	Y N Y N	Y N	Y		
		211 - 6th St	F-4	1620	1619	78'	Y N Y N	Y N	Y		
		211 - 6th St	F-4	1616	1620	245'	Y N Y N	Y N	Y		
		211 - 6th St	F-4	234 c/o	1616	121'	Y N Y N	Y N	Y		
		637 - 3rd St	F-4	1289	1344	181'	Y N Y N	Y N	Y		
		321 - 3rd St	F-4	1255	1345	274'	Y N Y N	Y N	Y		

YEARLY RODDING LIST

NOTIFY RESIDENT OF 324 - 11 Ave West - The SMITH's (827-7744) Day before cleaning line, notify the Smiths the day cleaning takes place
Also contact 1201 market street building before cleaning

DATE	CREW	LOCATION	MAP #	DETAILS	LINEAR FEET	REMARKS
		10903 NE 53RD ST - BEST HIGH SCHOOL	C-3	1836, 1882, 1930	249' / 296'	
		11133 NE 65TH ST- ELEMENTARY SCHOOL	D-3	2193, 2197, 2195	254' / 289'	
		507 -8TH ST S	E-3	1969, 1966	233'	
		1522 - 1st ST	G-5	1000, 1050, 986	249' / 178'	
		312 - 11TH AVE	G-5	931, 35	212'	NOTIFY RESIDENT OF 324 - 11 Ave West - The SMITH's (827-7744) Day before cleaning line, & notify the Smiths the day cleaning takes place. Don't clean unless prior notice has been given!. Also contact 1201 market street before cleaning!!!
		10210 - 117TH AVE NE	H-2	2463, 2464, 2470, 2468	79' / 136' / 272'	
		1843 - 3RD ST	H-4	1312, 1214, 1132	236' / 232'	

CRITICAL MANHOLE INSPECTION CHECK LIST

CREW _____

DATE _____

FEB. APR. JUNE AUG. OCT. DEC.

CONDITION ?

B-3	M - 1794	NE 48 & 108 NE	DROP	
B-4	M-1501	NE 46 & RR TRACKS		
B-4	M-1486	NE 47PL & RR TRACKS		
A-4	M-1709	NE 38 & R.R. TRACKS		
A-4	M-1321	YARROW BAY L.S. COLLECTOR M-H		
B-4	M-1407	NE 52 & RR TRACKS		
D-3	M-2203	NE 65 & 113 AVE		
E-3	M-2376	NE 70 & 116 AVE NE	DROP	
D-2	M-2802	NE 60 & 124 AVE BY POWER LINE ROAD		
D-2	M-2580	NE 65 & 120 BY DUMP		
D-2	M-2587	NE 66 & 120 BY DUMP		
D-2	M-2593	NE 67 & 120 BY DUMP		
E-2	M-2484	NE 80 & 11644	DROP	
F-1	M-3077	NE 84 & 128 LOS MARG	DROP	
F-1	M-3050	NE 85 & 128 PARK. LOT WALDO'S		
F-1	M-3058	NE 88 & 128 AVE	DROP	
G-1	M-3033	NE 95 & 128 AVE BIG MH		
I-1	M-3060	NE 112 & 128 AVE	DROP	
J-1	M-2828	NE 116 & 124 AVE	DROP	
I-3	M-1814	NE 108 & 108 AVE	DROP	
I-4	M-1467	NE 108 & 106 AVE	DROP	
G-5	M-931	11 AE W. BTW 4 W. & MKT		

ATTACHMENT F
Only for 10' & Greater Depths
Wastewater and Storm Water Division Form

City of Kirkland Fall Protection Work Plan

A copy of this work plan must be completed by City of Kirkland employees prior to entry of any work site or job location where they may be exposed to fall hazards of ten (10) or more feet. A copy of the work plan must remain on the job site for the duration of the inspection activity. If this policy cannot be followed due to the nature of the task, or if an employee is not satisfied that the job can be completed safely, the employee shall contact his or her supervisor. In these cases, work inspection activities shall not begin until both the employee and the supervisor agree that the job can be completed safely. The use of personal protective equipment for fall restraint or fall arrest may be used only by trained employees who have completed the training required by the City of Kirkland. If employees are observed to be exposed to fall hazards without fall protection, the employee's supervisor should be notified immediately.

SECTION I:

Employer Name: City of Kirkland Date Prepared: ____/____/____
 Job Location/Address: _____ City: City of Kirkland
 Type of Operation/Work Activities: _____
 Duration of Inspection Activities: _____ Inspector's Name/ID: _____

Method of Overhead Protection:

Hard Hats: ____ 3 1/2" Toe Boards: ____ Warning Signs: ____ Debris Nets: ____ Other: _____
Describe

Protection of surrounding areas:

_____ Coning

SECTION II:

NOTE: This section is to be used by City of Kirkland employees that are specifically approved and required to use personal fall arrest/restraint equipment.

Method of Fall Protection:

Fall Restraint: Yes ____ No ____	Fall Arrest: Yes ____ No ____
Anchorage Type: _____ Installation: _____	Equipment Inspection Date: ____/____/____
Type of Harness: Body - Miller	Type of Lanyards: _____
Serial Number: P950 - Green Harness	Serial Number: _____
Serial Number: d70183 or F82423 - Yellow Harness	Serial Number: _____
Inspection Date: ____/____/____	Inspection Date: ____/____/____
Life Lines: ____ Inspection Date: ____/____/____	
Type: _____	

Storage Location of Fall Protection Devices: _____

SECTION III:

Emergency Action Plan

1. Evaluate the injured employee's condition.
2. If injury warrants, administer first aid
3. If injury is serious or on a tower/tank, call **911**.

The competent person's signature verifies that the hazard analysis has been done and all City of Kirkland employees involved in the job have received training in the fall protection systems being used.

Competent Person's Signature: _____ Date: ____/____/____

**ATTACHMENT E
Wastewater & Surface Water Supplemental**

CONFINED SPACE ENTRY PERMIT

Date & Time Issued _____ Date and Time Expires _____
 Job Site/Space Identification _____ Entrant(s) _____
 Work to be Performed _____ Attendant _____
 Equipment to be Worked On _____ Entry Supervisor _____

Have you reviewed the Hazard Recognition Checklist before Entry? YES NO

Initial Atmospheric Check

(>19.5, <23.5%) Oxygen _____ Instrument Make Industrial Scientific
 (<10%) Explosive _____
 (<10 ppm H2S) Toxic/Flammable _____ Instrument Model TMX 412
 (<35 ppm CO) Toxic/Flammable _____
 (< _____ ppm) Toxic _____ Last Calibration Date _____
 (< _____ ppm) Toxic _____

Tester's Signature _____ Bump Test completed YES NO

List All Entrants	Time In/Out
_____	_____
_____	_____
_____	_____

Atmosphere	1	2	3	4	5	6	7	8	TWA
Time Tested									
Oxygen 19.5 -23.5%									
LFL/LEL 10%									
CO ppm									
H2S ppm									
Toxic (identify) ppm									
Toxic (identify) ppm									

Check Appropriate Box

1. Source Isolation Pumps

Line Blinded N/A YES NO
 Disconnected or Blocked N/A YES NO

2. Ventilation Modification

Mechanical N/A YES NO
 Natural Ventilation Chimney Effect N/A YES NO

3. Emergency Phone Contact #s 911

4. Rescue Procedures Use City of Kirkland radio to contact Public Works Dispatch or Fire Rescue

5. Entry, Standby, Fire Watch and Back-up Persons

Successfully completed training. Is it current (<2 years)? _____

6. Equipment

Gas Monitor N/A YES NO SCBAs for entrant & rescuer N/A
 Full Body harness with lifelines N/A YES NO PPE N/A YES NO
 Hoisting equipment for people N/A YES NO GFCI end/or assured grounding in place N/A YES NO
 Hoisting equipment for tools N/A YES NO Alarm system checked; alarms reviewed N/A YES NO
 Intrinsically safe equipment tools N/A YES NO

7. HOT WORK PERMIT ATTACHED N/A YES NO

8. Warning: If conditions become unacceptable, remove personnel IMMEDIATELY. Remove individuals as soon as conditions are suspected of change.

9. We have reviewed the Space and the Work authorized by this Permit and the information contained therein.

Permit prepared by: _____ Date: _____
 Approved by: _____ Date: _____
 Reviewed by: _____ Date: _____

This Permit shall be kept at the jobsite
 Return this copy to the Entry Supervisor following job completion.

This Permit not valid unless all appropriate items are completed.



Equipment:
Date:
Crew:

SEWER PUMP STATION MAINTENANCE LOG

PLAZA L.S. GIS ID #1038

- Weekly
-
1. Wash wet well
 2. Record hour readings/compare
 3. Check sump pump
 4. Check telemetry
 5. Operate pumps
 6. Check emergency generator batteries, fluids, fuel level

Wet well clean
Hrs _____

- Monthly
8. Clean/deodorize
 9. Clean check valves
 10. Flush sump

Time In: _____ Time Out: _____ Total: _____

Emergency Call

Problem: _____

Corrective Action Taken: _____

YARROW BAY L.S. GIS ID #1113

- Weekly
-
1. Wash wet well
 2. Record hour readings/compare
 3. Check dry well
 4. Operate pumps
 5. Check sump pump
 6. Check telemetry
 7. Flush wet well
 - Level sensor tube
 8. Facility maintenance

- Monthly
1. Clean/deodorize
 2. Clean check valves
 3. Flush sump
 4. Check emergency generator batteries, fluids, fuel level

Time In: _____ Time Out: _____ Total: _____

Emergency Call

Problem: _____

Corrective Action Taken: _____

SOUTH BAY L.S. GIS ID #884

- Weekly
-
1. Wash wet well
 2. Record hour readings/compare
 3. Check dry pump
 4. Operate pumps
 5. Operate valves
 6. Check heater
 7. Check sump pump
 8. Check telemetry

- Monthly
1. Facility maintenance
 2. Weedeating
 3. Clean/sanitize
 4. Flush sump

Time In: _____ Time Out: _____ Total: _____

Emergency Call

Problem: _____

Corrective Action Taken: _____

TREND GIS ID #3226 NE 112TH & 132ND Ave. NE L.S.

- Weekly
-
1. Operate pumps
 2. Record hour readings/compare
 3. Change filter elements
 4. Check sump pump
 5. Operate valves
 6. Check bubbler
 7. Facility maintenance
 8. Weedeating

- Monthly
1. Clean/deodorize
 2. Drain compressor
 3. Flush sump

Time In: _____ Time Out: _____ Total: _____

Emergency Call

Problem: _____

Corrective Action Taken: _____

WAVERLY L.S. GIS ID #776

- Weekly
-
1. Wash wet well
 2. Record hour readings/compare
 3. Check dry well
 4. Operate pumps
 5. Operate valves
 6. Check heater
 7. Check sump pump
 8. Check telemetry

- Monthly
1. Facility maintenance
 2. Weedeating
 3. Clean/sanitize
 4. Flush sump

Time In: _____ Time Out: _____ Total: _____

Emergency Call

Problem: _____

Corrective Action Taken: _____

ROSE POINT L.S. GIS ID #785

- Weekly
-
1. Wash wet well
 2. Record hour readings/compare
 3. Change filter elements
 4. Operate pumps
 5. Operate valves
 6. Check heater
 7. Check sump pump
 8. Check telemetry
 9. Check annunciator
 10. Facility maintenance
 11. Weedeating

- Monthly
1. Clean/deodorize
 2. Drain compressor
 3. Flush sump

Time In: _____ Time Out: _____ Total: _____

Emergency Call

Problem: _____

Corrective Action Taken: _____



MINIMUM SLOPE FLUSHING LIST



NE 80th St and NE 116th St

ORIGIN OF FLUSH MAP# & M-H#	LOCATION	HYD#	M-H TO BE CHECKED PRIOR, DURING, AFTER	GALLONS USED 1-UNIT=748 GAL.	FOOTAGE	EMPLOYEES	COMMENTS	DATE
E-1-3210	7401 131ST PL NE	Address	3209, 3165		2607'			
E-1			3097, 3073					
F-1			3076					
E-2-2398	7406 - 116th AVE NE	Address	2399, 2400		3306'			
E-2			2412, 2421					
E-2			2445, 2458					
E-3			2393, 2320					
E-3			2117					
NE 116TH ST SEWER BASIN								
I-1-3164	13002 NE 111TH PL	259	3194, 3199		5404'			
I-1			3137, 3086					
I-1			3091, 3060					
I-1			2986, 2895					
I-1			2823					

Slater Ave NE, NE 70th St

ORIGIN OF FLUSH MAP# & M-H#	LOCATION	HYD#	M-H TO BE CHECKED PRIOR, DURING, AFTER	GALLONS USED 1 UNIT=748 GAL.	FOOTAGE	EMPLOYEES	COMMENTS	DATE
H-1-3088	12818 NE 103rd PL	8	3029, 3027, 3020, 3035, 3033		2468'			
H-1-662	12626 NE 100TH	ADDRESS	2913, 2853		2112'			
H-2			2797, 2794					
H-2			2650					
F-1-694	12713 NE 83RD CT	ADDRESS	2993, 2992		1001'			
F-1			3048, 3050					
F-1			3077					
MINIMUM SLOPE SEWER FLUSHING MAIN PROGRAM (SEWER BASIN NE 70TH ST)								
C-3-2257	5506 114TH AVE NE	259	2272, 2151		5910'			
D-3			1820, 1824					
D-4			1825, 1827					
D-4			1834, 1660					
D-1-2929	NE 60TH ST WEST OF 126TH AVE NE	Address	2802, 2810		4950'			
D-2			2580, 2618					
D-2			2619					
C-1-2868	5626 125TH LN NE	257	2854, 2845		1200'			
C-1-2868			2801, 2802					
D-1-3218	NE 66TH ST & 132ND AVE NE	31	3219, 3162		4710'			
D-1			3163, 3151					
D-2			3150, 2619					

SHORING EQUIPMENT DATA
8-2007

~~Lee Als Review~~
~~TX-BW~~

The following information should help staff track what is available in the way of shoring for the Surface and Wastewater Division.

AMOUNT	SIZE	SHORT/TALL	COMMENT/NOTES
4	22" to 36"	SHORTS (18")	
2	34" to 55"	TALL (60")	
1	34" to 55"	SHORT (18")	
2	53" to 72"	TALL (60")	
12	4' X 8'		SHORING SHEETS
2			YELLOW GRAB HOOKS
			*MIX SHORING FLUID BOTTLES W/5 GAL WATER

TYPE	AMOUNT & SIZE	NOTE
MANHOLE BOX	(1) 9' X 9'	
TRENCH BOX	(1) 4'4" W X 8' L X 6'6" T	(1) 4' T EXTENSION
STEEL END WEDGES	(2) 6' X 3'4"	