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INTRODUCED BY ROB MCKENNA  
PROPOSED NO. 97-193

ORDINANCE NO. **12731**

AN ORDINANCE approving the King County Water District #17  
Comprehensive Water Plan.

PREAMBLE:

K.C.C. 13.24 requires approval of comprehensive plans and plan updates for water purveyors serving unincorporated King County as a prerequisite to the granting of right-of-way franchises and approval of right-of-way construction permits.

Although Water District #17 is wholly within the incorporated area of the Town of Hunts Point and would not normally require King County review and approval of its plan, Water District #17 requested King County involvement.

The King County Utilities Technical Review Committee met to consider the plan and recommended approval on July 24, 1996.

The Town of Hunts Point approved the plan on August 5, 1996.

BE IT ORDAINED BY THE COUNCIL OF KING COUNTY:

21 SECTION 1. The King County Water District #17 Comprehensive Water Plan,

22 Attachment A, is hereby approved without conditions.

23 INTRODUCED AND READ for the first time this 7<sup>th</sup> day of  
24 April, 1997.

25 PASSED by a vote of 12 to 0 this 5<sup>th</sup> day of  
26 May, 1997.

27  
28 KING COUNTY COUNCIL  
29 KING COUNTY, WASHINGTON  
30

31  
32  
33 Jane Hague  
34 Chair

35  
36 ATTEST:

37  
38 Jane Masano  
39  
40 **ACTING** Clerk of the Council

41 APPROVED this 16 day of May, 1997.

42  
43 [Signature]  
44  
45 King County Executive  
46

47  
48 Attachments:

49 A. The King County Water District #17 Comprehensive Water Plan.

12731

COMPREHENSIVE WATER PLAN  
KING COUNTY WATER DISTRICT NO. 17  
HUNTS POINT, WASHINGTON

PREPARED BY  
H. ALLAN NEWBILL, P.E.  
13835 N.E. 69th Street  
#683  
Redmond, Washington 98052

MARCH 1996

REVISED FEBRUARY 1997



EXPIRES 12-7-97

**12731**

This Comprehensive Water Plan for King County Water District No. 17 was revised in February 1997 as requested by the King County Utilities Technical Review Committee and the State of Washington Department of Health to provide more detailed information on the following items:

1. Projected population and service connections for the next 20 years.
2. The District's Conservation Program and recommendations for compliance with the State statutes on conservation.
2. The District's Operation and Maintenance Program, including the water quality monitoring program, and recommendations for improvements.

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**COMPREHENSIVE WATER PLAN  
KING COUNTY WATER DISTRICT NO. 17**

**AUTHORIZATION**

Chapter 57.16 of the Revised Code of Washington(RCW) states that before the commissioners of a water district can order any improvements or submit to vote any proposition for incurring any indebtedness they shall adopt a comprehensive plan of water supply for the district. As will be seen herein, the Commissioners of Water District No. 17 have found that there is a need to upgrade their facilities. Accordingly, they have authorized the preparation of this Comprehensive Water Plan (Plan) update.

**REQUIRED APPROVALS**

Following adoption by resolution of the Water District No. 17 Commissioners, the Comprehensive Plan, in accordance with WAC 248-54-580, must be submitted to and approved in writing by the Washington State Department of Health. This required approval is given by the State District Engineer for King County, Washington. In addition, the Plan must be submitted to and approved by resolution of the Town Council of the Town of Hunts Point.

Inasmuch as the District is located entirely within the incorporated boundaries of the Town of Hunts Point no approval is required from either King County or the director of public health for King County.

**RECOMMENDATION**

Based upon the information contained hereafter, it is recommended that the existing facilities of King County Water District No. 17 be replaced with the proposed improvements shown on the Comprehensive Water Plan map attached to this document. These proposed facilities shall consist of approximately 1900 feet of 12-inch, 2360 of 8-inch and 150 feet of 4-inch Ductile Iron Pipe, along with the appropriate valves, fire hydrants and fittings. Fire hydrant spacing should not exceed 400 feet between fire hydrants, with the most northerly hydrant being located 250 feet from the south property line of the last lot on the Point.

The connection to the Bellevue facilities should be relocated to the area immediately adjacent of the District's south boundary, as shown on the attached map.

It is also recommended that an agreement be pursued with the City of Bellevue providing for the takeover of all District

facilities and the assumption of all then outstanding Water District obligations by the City at a future time considered appropriate by the parties.

## LEGAL DESCRIPTION OF WATER DISTRICT

The area served by the Water District is legally described as follows:

All of the Assessor's Plat of Hunts Point as per map recorded in Volume 19 of Plats, page 97, together with all shorelands lying in front of above described real estate in King County, Washington.

## HISTORICAL BACKGROUND/EXISTING CONDITIONS

King County Water District No. 17 was incorporated in 1925. As can be seen on the Comprehensive Water Plan map attached to and made a part of this Plan, the boundaries of the Water District encompass that area of land known as the Assessor's Plat of Hunts Point, located entirely within the Town of Hunts Point, Washington. Accordingly, service is provided to all parcels located on both sides of Hunts Point Road starting at the 3200 block and proceeding north to the end of the Point. Inasmuch as the District is bounded on the north, east and west sides by Lake Washington and on the south by the City of Bellevue service area, future expansion is not possible.

The original system consisted of 3600 feet of wood-stave water main. Water was pumped from Lake Washington through a 1,880 foot suction line. In 1939 the District replaced the wood-stave line with the present asbestos-cement line. Lastly, the District abandoned the Lake Washington supply line in 1949 when they began purchasing their water from King County Water District No. 68, which was later taken over by the City of Bellevue. Bellevue buys their water from the Seattle Water Department through the Tolt River Pipeline system.

As seen on the attached map the current District facilities start at Bellevue's master meter located on the east side of Hunts Point Road immediately north of the SR 520 on-ramp. A 6-inch asbestos-cement supply line is located along the east side of Hunts Point Road from the meter vault northward to the District's boundary. At this point the main becomes a service line, increasing in size from 6-inch to 8-inch just north of the south boundary. The entire service line consists of approximately 1,894 feet of 8-inch, 1,800 feet of 6-inch and 760 feet of 4-inch asbestos-cement water line.

Other than the master meter connection to the Bellevue sys-

tem, the District has no other emergency interties nor any other service agreements.

Existing static pressures within the system range from approximately 85 pounds per square inch(psi) at the south boundary of the District to 95 psi at the north end of the line.

As stated above, the Water District is located entirely within the boundaries of the Town of Hunts Point. The population of the Town has remained relatively constant for many years due to the fact that it is totally developed except for a few vacant lots. The Hunts Point population for the last seven years was as follows:

<u>YEAR</u>	<u>POPULATION</u>
1990	514
1991	506
1992	515
1993	502
1994	504
1995	504
1996	514

The District currently has 98 single-family residential service accounts, serving about one-half of the Town, or a population of between 250 and 260. There are no services other than residential services. All services are metered. The average water usage per service ranges from 1000 cubic feet per month during the winter months to 3500 cubic feet in the summer.

While the existing facilities appear to be adequate to handle the domestic needs of the District, fire flow tests have indicated that the system has a capability of providing only 340 gallons per minute(gpm) with a 20 psi pressure residual at the north end of the line. As will be seen under the Land Use Regulations section, the 340 gpm flow is far below that required by the Uniform Fire Code which has been adopted by the State of Washington, the City of Bellevue and the Town of Hunts Point. Calculated fire flows at the south boundary of the District indicate a capacity of approximately 1100 gpm with a 20 psi residual pressure. This lack of adequate fire flow has been a serious problem for the Bellevue Fire Department in their efforts to control several major house fires on the Point in the last few years. You will see under the LAND USE REGULATIONS section that the size of the houses being built within the District boundaries is increasing.

Associated with the increased size of the houses is the fact that many houses are now being built on multiple lots. Thus the new houses are replacing two or more original houses, which in turn has caused a decrease in the number of service



accounts in the District. Presently there are two vacant lots within the District's boundaries which are legal building sites upon which new houses could be built. These lots have been developed as garden areas for the owners living on the adjacent lots. Furthermore, there are no parcels of land within the District which can be legally subdivided into additional lots. Therefore, the maximum number of new services that could possibly be realized in the next 20 years is two.

From the above data it can be seen that the future demands for domestic use will in all likelihood remain somewhat constant or possibly decrease, depending upon the effectiveness of the recommended conservation program to be found hereafter. Fire flow requirements will always exceed the domestic needs.

Another consideration that must be given to the existing facilities is the age of the present asbestos-cement line. As stated above the line was installed in 1939, thus making it approximately 57 years old. The normal life expectancy of asbestos-cement pipe ranges between 50 and 60 years.

Because of the size of the District they are unable to employ a full-time maintenance staff. Repairs and other work required by the District must, therefore, be completed by contracting with private construction companies. The District has a part time superintendant who coordinates such work, as well as handle other administrative and billing responsibilities.

As a result of the conditions stated above, consideration has been given by the Commissioners to the possibility of the City of Bellevue taking over the District's facilities for operation and maintenance, or preferably to a transfer of ownership of those facilities to the City which in turn would assume and agree to pay the District's outstanding utility obligations. Through informal inquiries to the Bellevue City Council, the District has been told that Bellevue would not consider taking over the District's service area, or operating or acquiring its facilities, unless the existing facilities were upgraded to Bellevue's present standards.

#### LAND USE REGULATIONS

All property within the District's boundaries falls under the R-40 Use Zone of the Hunts Point Zoning Code. All lots in the R-40 zone must have a minimum area of 40,000 square feet unless they have been otherwise approved by the Town as legal non-conforming building sites. It is very unlikely that the R-40 Use Zone will ever be changed to provide lots smaller than the current 40,000 square foot lots. The only

primary uses currently permitted in Hunts Point are single family dwelling units.

For many years the Hunts Point Code permitted a maximum gross floor area ratio within the R-40 zone of 0.20. Gross floor area ratio is defined as the sum of all floor areas in all buildings on the lot, exclusive of over-water covered moorage area, divided by the lot area. Because of a more recent trend of two or more contiguous lots being purchased by one owner and utilized as a single building site, the Hunts Point Town Council in 1992 adopted Ordinance No. 253 which established the maximum gross floor area ratio for the R-40 use zone as follows:

<u>Lot Area</u>	<u>Gross Floor Area Ratio</u>
0 - 20,000 square feet(sf)	0.25
20,000 - 40,000 sf	5,000 sf plus 0.15 of lot area over 20,000 sf
40,000 - 100,000 sf	8,000 sf plus 0.10 of lot area over 40,000 sf
Over 100,000 sf	14,000 sf plus 0.05 of lot area over 100,000 sf

Subject, however, to the following conditions:

(a) The primary structure may not exceed the larger of 12,000 sf or 0.75 of the allowable gross floor area.

(b) The gross floor area of any structure located within 25 feet of the primary structure shall be included in the gross floor area of the primary structure.

Within the District there is currently under construction one primary residence of 12,000 square feet, along with a number of other structures in the 4,000 to 10,000 square foot range.

#### FIRE FLOW - UNIFORM FIRE CODE

The Uniform Fire Code states that for one family dwellings the minimum fire flow shall be 1,000 gallons per minute for structures that do not exceed 3,600 square feet in fire area. Fire area is defined as the total floor area of all floor levels within the exterior walls, and under the horizontal projections of the roof of the building. For residential structures greater than 3,600 square feet the fire flow must be as follows:

<u>Fire Area</u> <u>(sq.ft.)</u>	<u>Required Fire Flow</u> <u>(gallons per minute)</u>	<u>Flow Duration</u> <u>(hours)</u>
3,600	1,500	2
4,800	1,750	2
6,200	2,000	2
7,700	2,250	2
9,400	2,500	2
11,300	2,750	2
13,400	3,000	3
15,600	3,250	3
18,000	3,500	3
20,600	3,750	3

A reduction in required fire flow of 50 percent may be approved by the Fire Marshall when an approved automatic sprinkler system is installed in the house.

The maximum residential structure that could be constructed based upon the above fire flow requirements will be discussed under the HYDRAULIC ANALYSIS section.

## DESIGN CRITERIA

Because of the potential of the City of Bellevue taking over the District's facilities for operation and maintenance, the design standards used in determining the recommended improvements shown herein were those of the City of Bellevue. These standards entitled Water and Sewer Planning/Design Standards (Standards) are contained in the appendix section of this document.

As can be seen in the Standards the required spacing for fire hydrants in residential areas is 500 feet. However, the Uniform Fire Code requires that spacing on long dead-end lines be reduced by 100 feet. The recommended system is a single line in excess of 4000 feet. In addition, the Hunts Point Zoning Code requires all lots within the District to have a setback area of 25 percent of the lot depth on the street side. Lot depths range between 100 and 550 feet approximately, with many driveways in excess of 125 feet. Fire hydrant spacing, therefore, must not exceed 400 feet. This recommended spacing was discussed with the City of Bellevue Fire Marshall.

## STORAGE

The District has no storage facilities and must, therefore, rely entirely upon the storage capabilities of the City of Bellevue. Bellevue presently has 5,500,000 gallons of storage located in the Town of Clyde Hill and a total 9,500,000

gallons within the pressure zone which serves the District's system. These facilities can easily meet the peak demands of both the City of Bellevue and the District for domestic and fire flow needs.

## HYDRAULIC ANALYSIS

Several alternatives were considered for the proposed improvements. In selecting the appropriate pipe sizing the two major items of concern were:

1. Obtain the maximum fire flow possible.
2. Provide a domestic supply that is palatable.

Low domestic flows in an oversized line can cause water quality concerns due to the fact that over a period of time the chlorine will diminish and thus allow the possible growth of bacteria. This condition requires a flushing of the system to keep the water palatable. Since the proposed system is a dead-end line in excess of 4,000 feet, the frequency of flushing was a concern.

The recommended system is felt to be a reasonable compromise in pipe sizing. The Bellevue Utilities Department has estimated that the proposed line will have to be flushed twice each year. They normally flush dead-end lines annually. The fire flow capability of the system is shown in the table below. Bellevue's existing looped system which serves the proposed District line contains a great deal of 6-inch pipe. The 6-inch pipe will eventually be replaced with 8-inch pipe which will increase the fire flow capabilities within the District boundaries. The following table, therefore, shows the estimated fire flow before and after the upgrading of the Bellevue lines. The possible structure size with and without a sprinkler system is also shown.

<u>Condition</u>	<u>Fire Flow</u> <u>(gal. per min.)</u>	<u>Structure Size(sf)</u>	
		<u>Without</u> <u>Sprinklers</u>	<u>With</u> <u>Sprinklers</u>
Existing Bellevue System	1300	3599	11,299
Upgraded Bellevue System	1650	4799	17,799

## CONSERVATION PROGRAM

While it is known that a number of the property owners within the District have water rights which allows them to ex-

tract water from Lake Washington for irrigation purposes, the extent to which these rights are actively used is not known. The District currently has no other organized program for encouraging conservation. It's current rate structure is as follows:

Bimonthly Meter Charge	\$20.00
Consumption Charge per 100 Cubic Feet	
November through April	\$1.76
May through October	\$1.91

While the increased rate for the summer months may be an encouragement to some to conserve during that time period, the overall affect on consumption is probably negligible.

The City of Bellevue, which serves the balance of the Town of Hunts Point, has a current rate structure as follows:

	<u>1997</u>	<u>1998</u>
Bimonthly Meter Charge		
5/8" or 3/4" meter	\$11.50	\$12.43
1" meter	\$20.36	\$22.00
1-1/2" meter	\$34.44	\$37.20
Consumption Charge per 100 Cubic Feet		
0 to 2,000	\$1.13	\$1.23
2,001 to 3,000	\$1.56	\$1.71
3,001 to 10,000	\$2.01	\$2.19
Over 10,000	\$3.26	\$3.26

It is obvious that a rate structure similar to that of the City of Bellevue would provide a greater incentive for conservation.

It has also been found that an educational program can be of value in helping the consumer to understand why there is a need for conservation in this area where our annual rainfall is so high. To help water purveyors develop an educational program the Washington State Departments of Health and Ecology have jointly prepared a series of water saving guideline brochures, copies of which are contained in the Appendix. Copies of these brochures may be obtained from the Department of Health.

In order for the District to comply with the State requirements relating to the conservation of domestic water use, it is recommended that the District adopt a new rate structure, similar in format to that of the City of Bellevue. It is further recommended that an educational program be developed by obtaining copies of the above discussed conservation brochures which should be mailed to each customer.

## FINANCIAL

### Introduction

In order to finance the water main replacement project, the District will form a special benefit assessment district, either a local improvement district (LID) or utility local improvement district (ULID), including all of the property benefited by the project. The cost of the project will be assessed against the benefited property. An LID may be converted to a ULID at any time before the confirmation of the assessments. Both interim construction financing and permanent long-term financing will be required because the District does not have other funds available to pay any significant part of the project cost.

### Interim Financing

When the special benefit assessment district has been formed by resolution, after notice to the affected property owners and a public hearing, the District will be able to obtain interim financing for the full project cost from the bank of its choice. A note or notes will be issued and either paid for upon delivery to the lender or delivered to the lender to evidence a line of credit upon which the District would be entitled to draw periodically to pay the costs of design and other services, administration and construction.

### Assessments

Upon the completion of construction, when all associated costs are known, a final assessment roll will be prepared. After notice to property owners and a hearing, the District will levy and confirm the final assessments against the benefited properties. The assessments may be paid in whole or in part during a 30-day period without interest. Thereafter any remaining balance may be paid in annual installments over a term of years with interest as determined by the District.

### Permanent Financing

The final outstanding assessments will be pledged to the payment of bonds issued either by the District or the City of Bellevue. The bonds could be LID bonds or revenue bonds in either case. While the District is capable of accomplishing issue itself, if the City of Bellevue were to take over the District's facilities after construction and completion of the assessment process it might be more convenient and economical for the City to issue its revenue bonds to which ULID assessments could be pledged pursuant to an agreement between the City and the District. The City would then collect the assessments as they become due and apply the assessment proceeds to payment of City utility revenue

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bonds. Alternatively, if bonds were issued initially by the District, an agreement could provide for the City to assume and duly pay such obligations from the sources originally pledged following takeover of the District's facilities by the City.

## Local Improvement District Cost Estimate

### Construction Costs

1. 12" Ductile Iron Pipe	1900 LF	@ \$45.00	\$85,500.00
2. 8" Ductile Iron Pipe	2360 LF	@ \$35.00	82,600.00
3. 4" Ductile Iron Pipe	150 LF	@ \$28.00	4,200.00
4. 12" Gate Valve	4 Ea	@ \$850.00	3,400.00
5. 8" Gate Valve	7 Ea	@ \$525.00	3,675.00
6. Ductile Iron Fittings	2300 lbs	@ \$2.25	5,175.00
7. Connection to Existing main	1 Ea	@ \$1700.00	1,700.00
8. New Service-Long Side	50 Ea	@ \$500.00	25,000.00
9. New Service-Short Side	50 Ea	@ \$400.00	20,000.00
10. New Meter Box	100 Ea	@ \$60.00	6,000.00
11. New 5 1/4" MVO Fire Hydrant Assembly, including hydrant run	11 Ea	@ \$1900.00	20,900.00
12. Remove Existing Fire Hydrant	8 Ea	@ \$350.00	2,800.00
13. Crushed Surfacing	220 Ton	@ \$15.00	3,300.00
14. Backfill Gravel	3700 Ton	@ \$10.00	37,000.00
15. Remove Existing Concrete	70 SY	@ \$10.00	700.00
16. Remove Existing Asphalt	210 SY	@ \$5.00	1,050.00
17. Asphalt Concrete Patching	60 Ton	@ \$100.00	6,000.00
18. Concrete Patching	55 SY	@ \$40.00	2,200.00
19. Asphalt Cold Mix	20 Ton	@ \$50.00	1,000.00
20. Double Blue Traffic Button	11 Ea	@ \$15.00	165.00
21. Top Soil and Seeding	100 CY	@ \$30.00	3,000.00

Sub-total	\$315,365.00
Contingency (10%)	31,600.00
Sub-total	\$346,965.00
Sales Tax (8.2%)	28,451.13
<b>TOTAL CONSTRUCTION COSTS</b>	<b>\$375,416.13</b>

### Engineering and Surveying Costs

Preparation of Plans and Specifications	\$4,900.00
Contract Administration and Construction Inspection	8,000.00
Surveying - Design and Construction	3,000.00

<b>TOTAL ENGINEERING AND SURVEYING COSTS</b>	<b>\$15,900.00</b>
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Legal Costs

Estimated legal expenses associated with various aspects of the improvement project, its authorization, execution, financing, transfer to Bellevue and dissolution of the District are as follows.

Negotiation and preparation of agreement for takeover of facilities and assumption of District obligations by the City of Bellevue	\$5,000.00
Attention to Boundary Review Board matters	\$1,000.00
Attention to legal aspects of SEPA compliance	\$2,500.00
Participation in preparation and approval of Comprehensive Plan	\$2,500.00
Formation of LID or ULID	\$2,500.00
Preparation of proceedings for and furnishing an approving legal opinion on interim financing	\$2,000.00
Attention to legal issues associated with design, bidding, contracting, construction and payment for the project	\$2,000.00
Confirmation of assessments	\$1,500.00
Preparation of proceedings for and furnishing an approving legal opinion on permanent financing by bonds or loan	\$3,000.00
Preparation of proceedings for judicial approval of takeover, assumption and dissolution, and obtaining court order	\$3,500.00
Attention to details of transfer, assumption and dissolution	\$2,000.00
Drafting legislation providing necessary authorization for contemplated transactions and attention to legislative process	\$4,500.00
TOTAL LEGAL COSTS	<u>\$32,000.00</u>

The foregoing figures represent estimates on the basis of circumstances currently known or anticipated and assume no contested litigation or administrative proceedings. The actual cost of legal services often reflects the conduct of other parties or participants and the effects of newly discovered facts or events. Participation in contested litiga-



tion or administrative proceedings, and attendance at most meetings or hearings will be billed at the hourly rates of participating lawyers in addition to the above estimates.

Financial

INTERIM FINANCING

Loan fee, placement fee or discount	\$2,500.00
Interest for 6 months (assuming 4% per annum on \$400,000)	\$8,000.00
Note printing, if applicable	<u>\$1,500.00</u>
Sub-total	\$12,000.00

PERMANENT BOND OR LOAN FINANCING

Loan fee, placement fee or discount	\$4,000.00
Bond printing, if applicable	<u>\$1,500.00</u>
Sub-total	\$5,500.00

TOTAL FINANCIAL COSTS **\$17,500.00**

Interest is not shown on the permanent financing element since it is not an out-of-pocket cost but would be paid annually together with the principal installments of property owner assessments. It is not possible to estimate reliably now the principal amount of permanent financing that will be required since that figure will be reduced by any prepayments of assessments made by property owners during the 30-day period permitted by law before permanent financing is accomplished.

Appraisal Services

The following costs are associated with determining the feasibility of the project and the distribution of the LID assessments.

Preliminary assessment roll	\$17,500.00
Final assessment roll	<u>\$17,500.00</u>
TOTAL APPRAISAL SERVICES	<b>\$35,000.00</b>

Accounting and Clerical Costs

The following costs are related to the preparation and administration of the assessment roll and the annual assessment notices over the period of the LID.

Accounting and Clerical \$5,000.00

Summary of LID Costs

Construction Costs	\$375,416.13
Engineering and Surveying Costs	15,900.00
Legal Costs	32,000.00
Financial Costs	17,500.00
Appraisal Services	35,000.00
Accounting and Clerical	<u>5,000.00</u>

**Total Estimated LID costs \$480,816.13**

OPERATION AND MAINTENANCE PROGRAM

The District's Operation and Maintenance Program is contained in the Appendix.

While the District has no cross connections with any other supply source, there may be cross connections within customer systems. Irrigation systems are an example. They may be connected to the domestic facilities through a separate irrigation meter or within the customer system itself. All cross connections are potential sources for contamination of the domestic supply, and must be regulated to prevent back-flow into the domestic system.

At the present time the District has no record showing the location of any cross connections. It is recommended that the District conduct a study to determine where cross connections exist, and verify that such connections meet State regulations. This information will be needed during the preparation of any plans and specifications for future improvements. It is also recommended that the District adopt a resolution outlining the requirements for cross connections and the enforcement of those requirements.

It is further recommended that the District add to the Operation and Maintenance Program contained in the Appendix as follows:

1. Preparation of a written outline related to system repair procedures describing shut down procedures, a list of contractors that may be called if needed to assist in the work, parts or material suppliers, and procedures for restoration of service, including any flushing or purity samples that must be taken.

2. Preparation of a written outline for flushing of the system or for any other corrections that must be made as a result of a positive test from the water purity monitoring performed by the Seattle Water Department. This should also include instructions on the procedures for taking the repeat

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samples.

A review of the Seattle Water Departments reports relating to Total Trihalomethane Monitoring, as contained in the Water District's files, shows that the running average for the quarterly tests taken within the Districts system during 1996 was 92.0. The average for Seattle's entire Tolt whole-sale service area is 77.4. Inasmuch as the District's readings are approaching the maximum allowable of 100.0, it is recommended that the District flush the system twice yearly, as compared to the present once a year.

Lastly, in 1992 Seattle Water began their regional lead and copper monitoring program to comply with the United States Environmental Protection Agency Lead and Copper Rule (LCR). The results of those tests indicated the presents of lead and copper in Seattle's system. No samples were taken within the District's boundaries.

Seattle has once again began monitoring for lead and copper and they do not expect this years tests to differ from the 1992 tests. Seattle has informed the District that they do not intend to take any samples within the District's bound-

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APPENDIX

CITY OF BELLEVUE  
WATER PLANNING/DESIGN STANDARDS

<u>Section</u>	<u>Title</u>	<u>Page Number</u>
1.	Planning Criteria	PW-1
2.	General Design Standards	PW-2
3.	Valving	PW-3
4.	Fire Hydrants	PW-3
5.	Pipe Class/Protection/Cover	PW-4
6.	Clearances/Other Utilities	PW-5
7.	Slopes	PW-6
8.	Connections to Existing System	PW-6
9.	Easements	PW-6
10.	Services	PW-6
11.	Backflow Prevention	PW-7

## WATER PLANNING?DESIGN STANDARDS

1. PLANNING CRITERIA

A. ENSURE ADJACENT PROPERTIES CAN BE PROVIDED WATER SERVICE (EXTEND TO EXTREME OF PROPERTY WITH ADEQUATE CAPACITY AND PRESSURE)

## B. DEMAND PROJECTIONS

○ UNIT DEMAND

- SINGLE FAMILY - 100 GALLONS PER CAPITA PER DAY (GPCD)
- MULTI-FAMILY - 80 GPCD
- COMMERCIAL - 20 GPCD/EMPLOYEE

○ PEAKING FACTORS

- MAXIMUM DAY DEMAND (MDD) = AVERAGE DAY DEMAND (ADD) x 2.25

## C. SYSTEM PARAMETERS

○ WATER VELOCITY IN MAINS - VELOCITIES SHALL NOT EXCEED 10 FEET PER SECOND DURING HIGHEST DEMAND AND FIREFLOW

○ DISTRIBUTION SYSTEM PRESSURES (MEASURED AT BUILDING ELEVATIONS)

DESIRABLE - MINIMUM 50 PSI  
MAXIMUM 80 PSI

ALLOWABLE - MINIMUM 43 PSI  
MAXIMUM 125 PSI

\* INDIVIDUAL PRESSURE REDUCING VALVES ARE REQUIRED ON ALL SERVICES WHEN WATER PRESSURE EXCEEDS 80 PSI IN BELLEVUE OR 100 PSI IN THE COUNTY

○ RESERVOIR REPLENISHMENT - FACILITIES (I.E. TRANSMISSION MAINS, PUMP STATIONS) SHALL BE SIZED TO ENABLE STORAGE FACILITIES TO BE REFILLED WITHIN 3 DAYS AFTER AN EMERGENCY OR MAJOR FIRE.

D. FIREFLOW REQUIREMENTS SHALL BE AS DETERMINED BY EITHER CITY OF BELLEVUE OR KING COUNTY FIRE MARSHAL

○ DETERMINATION OF AVAILABLE FIREFLOW SHALL BE COMPUTED USING A COMPUTER SIMULATED MODEL ACCEPTABLE TO THE UTILITY.

○ MINIMUM SYSTEM PRESSURE DURING FIREFLOW ANALYSIS SHALL BE 20 PSI AT THE FIRE LOCATION AND 10 PSI THROUGH OUT THE REST OF THE SYSTEM.

## 2. GENERAL DESIGN STANDARDS

- A. FINAL DRAWINGS SHALL BE PROVIDED TO THE UTILITY ON MYLAR AND ON A DISKETTE WITH AUTOCLAD COMPATIBILITY FOR AS-BUILDING AND PERMANENT RECORDS.
- B. EACH FITTING/VALVE SHALL HAVE ATTACHMENT TYPE LISTED (E.G. FL, MJ, FL x MJ, ETC.)
- C. INDICATE TYPE OF PAVEMENT RESTORATION REQUIRED (IF WORKING IN EXISTING STREETS).
- D. DIMENSION EXISTING AND NEW MAIN LOCATIONS FROM RIGHT-OF-WAY LINE AND/OR PROPERTY LINE.
- E. BLOCKING - REFERENCE STANDARD DETAILS
  - AT VERTICAL BENDS, PIPE SHALL BE RESTRAINED A MINIMUM OF 36 FEET (@ JOINTS) FROM EACH SIDE OF BEND. REDUCED SIZE CONCRETE BLOCKS SHALL BE INSTALLED AT BENDS PER STANDARD DETAIL 5C-1. SEE APPENDIX B - APPROVED MATERIALS LIST FOR JOINT RESTRAINT METHODS.
  - CHECK IF SPECIAL BLOCKING DESIGNS ARE NECESSARY (E.G. POOR SOIL, CONFLICTING UTILITY, ETC.).
  - SHOW ALL BLOCKING ON PROFILES.
- F. BASE MAP SHALL CONFORM TO ALL REQUIREMENTS LISTED ON THE WATER AND SEWER UTILITIES PLAN FORMAT.
- G. CHECK WITH UTILITY DEVELOPMENT DIVISION TO DETERMINE HOW SURROUNDING DEVELOPMENT WILL AFFECT DESIGN:
  - SERVE TO EXTREME OF PROPERTY IF ADJACENT PROPERTY HAS POTENTIAL FOR FUTURE DEVELOPMENT.
  - SYSTEM MAY REQUIRE ADDITIONAL LOOPING (I.E. ELIMINATE DEAD END LINES).
- H. TO ASSURE COMPATIBILITY WITH EXISTING SYSTEM, CHECK WITH UTILITY DEVELOPMENT DIVISION TO DETERMINE HYDRAULIC GRADIENTS.
- I. DRAWINGS SHALL REFERENCE DISTANCE TO NEAREST EXISTING VALVE/HYDRANT FROM NEW POINT OF CONNECTION TO EXISTING WATERMAIN.
- J. GENERAL CONSTRUCTION NOTES MUST BE INCLUDED ON FIRST PLAN SHEET (SEE ATTACHED PLAN SAMPLES, APPENDIX A). REMOVE NOTES THAT DON'T APPLY AND ADD ADDITIONAL NOTES TO THE LIST IF NECESSARY.
- K. CHECK WITH LOCAL JURISDICTION FOR NECESSARY PERMITTING REQUIREMENTS.

- L. PROVIDE TEMPORARY 2" BLOW OFF ASSEMBLIES FOR TESTING AND DISINFECTION OF NEW WATERMAINS (WHERE HYDRANTS ARE NOT AVAILABLE). PLACE BLOW OFF AT HIGH END OF LINE, WHERE POSSIBLE.
- M. CAP END OF EXISTING WATER LINES TO BE ABANDONED AS FOLLOWS:
- ASBESTOS CEMENT LINES: USE END CAP COUPLING.
  - CAST OR DUCTILE IRON LINES: USE M.J. CAP OR PLUG.
- N. MINIMUM WATERMAIN SIZE
- 8" MINIMUM WHEN SERVING FIRE HYDRANTS.
  - 6" MINIMUM MAY BE USED IN LOCALIZED CONDITIONS WHERE FIRE HYDRANTS ARE SERVED BY LOOPED LINES, SUBJECT TO UTILITY APPROVAL.
  - 4" MINIMUM SHALL BE USED TO SERVE WATER TO END OF CUL-DE-SAC WHEN NO FUTURE EXTENSION IS REQUIRED.

### 3. VALVING

- A. 600' MAXIMUM DISTANCE BETWEEN VALVES ON DISTRIBUTION MAINS.
- B. PROVIDE VALVES AT BOTH ENDS OF AN EASEMENT.
- C. VALVES SHALL BE PLACED ON 3 OF THE 4 LEGS ON EACH CROSS AND 2 OF THE 3 LEGS ON EACH TEE, UNLESS TAPPING AN EXISTING MAIN.
- D. ADDITIONAL VALVING MAY BE REQUIRED FOR AREA ISOLATION.
- E. AIR/VACUUM VALVES SHALL BE INSTALLED AT LOCAL HIGH POINTS IN WATERMAIN.
- F. BLOW-OFF ASSEMBLIES SHALL BE INSTALLED AT LOCAL LOW POINTS IN THE WATERMAIN TO ALLOW FOR REMOVAL OF SEDIMENTS.

### 4. FIRE HYDRANTS

THE FOLLOWING INFORMATION IS PROVIDED AS GUIDELINES TO BE USED DURING DESIGN. FINAL NUMBER OF HYDRANTS AND THEIR LOCATION SHALL BE APPROVED BY THE CITY OF BELLEVUE OR KING COUNTY FIRE MARSHAL.

- A. GUARD POTS ARE TO BE USED ONLY IN PARKING LOTS WHEN NO CURBS ARE PRESENT OR IN EXPOSED AREAS IN PARKING LOTS.
- B. FIRELINE/HYDRANT RUN OVER 50' IN LENGTH MUST BE 8" (TERMINATE WITH TEE, PLUG AND HYDRANT ASSEMBLY).
- C. FIRE HYDRANT LOCATIONS:

SINGLE-FAMILY RESIDENTIAL: SPACING = 500' APART  
 COVERAGE = 250' FROM FRONT PROPERTY



LINE OF THE MAIN BODY OF A LOT.

MULTI-FAMILY/COMMERCIAL: AS DETERMINED BY THE FIRE MARSHAL.  
HYDRANT SHALL BE LOCATED MINIMUM 50'  
FROM ANY BUILDING

EXCEPTION: ON ARTERIAL STREETS WITHOUT RESIDENTIAL ACCESS  
(THROUGH TRAFFIC ONLY), REQUIRE 1000' HYDRANT SPACING.

- D. 3' MINIMUM CLEARANCE SHALL BE PROVIDED AROUND HYDRANT FOR OPERATION.
- E. PIPING BETWEEN FIRE SPRINKLER VAULTS AND PROTECTED BUILDING SHALL NOT BE SHOWN ON WATER DESIGN.

5. PIPE CLASS/PROTECTION/COVER

- A. PIPE SHALL BE DUCTILE IRON, CLASS 52.
- B. DUCTILE IRON PIPE SHALL BE ENCASED IN A STEEL OR DUCTILE IRON CASING WHEN CROSSING UNDER IMPROVEMENTS WHERE THE ABILITY TO REMOVE AND REPLACE PIPE WITHOUT DISTURBANCE TO THE IMPROVEMENT IS NEEDED. CASINGS ARE REQUIRED WHEN:
  - o CROSSING UNDER ROCKERIES OVER 5' HIGH.
  - o CROSSING UNDER RETAINING WALL FOOTINGS OVER 5' WIDE.
  - o CROSSING UNDER REINFORCED EARTH RETAINING WALLS (BOTH WALL AND REINFORCING MATERIAL).

CASINGS SHALL EXTEND A MINIMUM OF 5' PAST EACH END OF THE IMPROVEMENT, OR A DISTANCE EQUAL TO THE DEPTH OF PIPE WHICHEVER IS GREATER. THE CARRIER PIPE SHALL BE SUPPORTED BY CASING SPACERS WHERE CASING LENGTH EXCEEDS 20'.

MINIMUM CLEARANCE BETWEEN BOTTOM OF ROCKERY AND TOP OF PIPE OR CASING SHALL BE 2'. THE TRENCH SHALL BE BACKFILLED WITH CRUSHED ROCK WHEN CLEARANCE IS LESS THAN 3'.

C. WATERMAIN DEPTH OF COVER:

3' MINIMUM FROM FINAL GRADE (SEE EXCEPTION IN 5.D BELOW)

6' MAXIMUM FROM FINAL GRADE.

D. BUILDING SETBACK REQUIREMENTS:

5' MINIMUM FROM COVERED PARKING TO WATERMAIN

10' MINIMUM FROM BUILDING (AND RETAINING WALLS) TO WATERMAIN.

20' MINIMUM EASEMENT SHALL BE PROVIDED BETWEEN BUILDINGS.

WHEN PASSING BETWEEN BUILDINGS WHICH ARE 25' APART OR LESS, DUCTILE IRON PIPE SHALL BE INSTALLED WITH 2' OF PIPE COVER (5' BEYOND THE LIMITS OF EACH BUILDING).

E. ALL DUCTILE IRON PIPE AND ADJACENT FITTINGS SHALL BE ENCASED IN 8-MIL POLYETHYLENE PER AWWA C105.

6. CLEARANCES/OTHER UTILITIES

A. WATER SERVICE AND SEWER STUBS SHALL HAVE AT LEAST 5' HORIZONTAL SEPARATION.

B. CHECK FOR CROSSING OR PARALLEL UTILITIES. MAINTAIN MINIMUM VERTICAL AND HORIZONTAL CLEARANCES. AVOID CROSSING AT HIGH ACUTE ANGLES (SMALLEST ANGLE MEASURE BETWEEN UTILITIES SHOULD BE BETWEEN 45 AND 90 DEGREES).

C. AT POINTS WHERE THRUST BLOCKING IS REQUIRED, MINIMUM CLEARANCE BETWEEN THE CONCRETE BLOCKING AND OTHER BURIED UTILITIES OR STRUCTURES SHALL BE 5'.

D. HORIZONTAL CLEARANCES FROM WATERMAIN:

CABLE TV	5'
GAS	5'
POWER	5'
STORM	5'
SANITARY	10'
TELEPHONE	5'

E. VERTICAL CLEARANCE FROM WATERMAIN:

CABLE TV	1'
GAS	1'
POWER	1'
STORM	1'
SANITARY	2'
TELEPHONE	1'

F. WHERE WATERMAIN CROSSES ABOVE OR BELOW SANITARY SEWER, ON FULL LENGTH OF WATER PIPE SHALL BE USED WITH THE PIPES CENTERED FOR MAXIMUM JOINT SEPARATION.

G. SEND LETTER AND PRELIMINARY PLAN TO EXISTING UTILITIES TO INFORM THEM OF NEW CONSTRUCTION. REQUEST AS-BUILT INFORMATION AND INCORPORATE INTO PLANS. AT MINIMUM THE FOLLOWING UTILITIES SHOULD BE CONTACTED:

CABLE TELEVISION  
 NATURAL GAS  
 POWER  
 SANITARY SEWER  
 STORM DRAINAGE  
 TELEPHONE

**7. SLOPES**

- A. VERTICAL BENDS SHALL BE USED WHEN JOINT DEFLECTION WOULD EXCEED ONE-HALF OF MANUFACTURE'S RECOMMENDED MAXIMUM DEFLECTION.
- B. PIPE JOINTS SHALL BE RESTRAINED WHERE SLOPES ARE 20% OR GREATER. JOINT RESTRAINT ON SLOPES SHALL BE MEGALUG RESTRAINER FOR MECHANICAL JOINT FITTINGS AND TIE ROD/RESTRAINER CLAMP ASSEMBLIES FOR DUCTILE IRON PUSH ON JOINTS, OR OTHER METHODS FROM APPROVED MATERIALS LIST. ANCHOR BLOCKS SHALL BE USED IN CONJUNCTION WITH JOINT RESTRAINT WHERE SLOPES ARE 25% OR GREATER.

**8. CONNECTIONS TO EXISTING SYSTEM**

- A. WHEN TAPPING WATER MAINS USE STAINLESS STEEL OR FULL-BODIED CAST IRON MUELLER TYPE TAPPING TEE.
- B. CONNECTIONS TO EXISTING MAINS 8" AND LARGER SHALL BE VIA A WET TAP UNLESS OTHERWISE APPROVED BY THE UTILITY. THE WET TAP SHALL BE A MINIMUM OF ONE PIPE SIZE SMALLER THAN THE EXISTING MAIN.
- C. CONNECTIONS TO EXISTING MAINS SMALLER THAN 8" SHALL BE BY CUTTING IN A TEE, UNLESS OTHERWISE APPROVED BY THE UTILITY.
- D. SIZE ON SIZE TAPPING TEES ARE NOT ALLOWED.

**9. EASEMENTS**

- A. SHOW EASEMENTS OFF ROADWAYS AND IDENTIFY WIDTH.
- B. SHOW EASEMENTS ON ALL PRIVATE PROPERTY. IF EASEMENT IS DEFINED AS A CONSTANT WIDTH ON EACH SIDE OF THE WATERMAIN, THEN SHOW A SEGMENT OF THE EASEMENT AND LABEL AS TYPICAL (TYP).
- C. ALL EASEMENTS SHALL BE A MINIMUM OF 15' IN WIDTH, UNLESS OTHERWISE APPROVED OR REQUIRED BY THE UTILITY.
- D. ALSO SEE SECTION 5.D "BUILDING SETBACK REQUIREMENTS".

**10. SERVICES**

- A. LOCATE WATER SERVICES AND INDICATE SIZE. SIZES SHALL BE DETERMINED BY THE DEVELOPER'S ENGINEER PER THE UNIFORM PLUMBING CODE.
- B. ON OFFICES, MULTI-FAMILY DEVELOPMENTS AND PLATS WITH PLANTER AREAS PROVIDE IRRIGATION SERVICES.
- C. IRRIGATION SHALL BE BY SEPARATE WATER MAIN CONNECTION AND SERVICE. NO DEDUCT METERS.
- D. STATIC SERVICE PRESSURES AT GROUND FLOOR ELEVATION SHALL BE DETERMINED AT ALL LOTS/BUILDINGS TO ENSURE COMPLIANCE WITH SYSTEM PRESSURE STANDARDS.

- E. PLAN SHALL IDENTIFY LOTS/BUILDINGS WHERE BUILDER/OWNER SHOULD INSTALL INDIVIDUAL PRESSURE REDUCING VALVES. REQUIRED ON CUSTOMER SIDE OF SERVICE LINES (AFTER WATER METER BOX) WHEN SERVICE PRESSURES EXCEED 80 PSI.
- F. MINIMUM ALLOWABLE SERVICE SIZE SHALL BE 1 x 3/4". CHECK THAT MINIMUM PRESSURE CAN BE MAINTAINED WHEN SERVICE IS FLOWING AT ANTICIPATED MAXIMUM LEVELS. IF FRICTION LOSSES WILL CAUSE PRESSURE AT BUILDING TO DROP BELOW MINIMUM, INCREASE SERVICE LINE SIZE AS NECESSARY TO RAISE PRESSURE.

## 11. BACKFLOW PREVENTION

IRRIGATION SYSTEMS, FIRE SPRINKLER SYSTEMS, AND OTHER WATER USES WHICH MAY OR WILL CAUSE THE CONTAMINATION OF THE POTABLE WATER SUPPLY BY BACKFLOW, SHALL BE REQUIRED TO INSTALL APPROVED BACKFLOW PREVENTION ASSEMBLIES, AND/OR OTHERWISE MEET THE REQUIREMENTS OF THE WAC 246-290-490 "CROSS CONNECTION CONTROL REGULATION IN WASHINGTON STATE", AND THE RECOMMENDATIONS OF THE PNWS-AWWA CROSS CONNECTION CONTROL MANUAL, LATEST EDITION. REQUIREMENTS MAY INCLUDE PREMISE, FACILITY, OR FIXTURE ISOLATION, OR A COMBINATION OF SUCH, DEPENDING UPON THE DEGREE OF HAZARD. ALL BACKFLOW PREVENTION ASSEMBLIES INSTALLED SHALL BE ON THE WASHINGTON STATE DOH LIST OF APPROVED BACKFLOW PREVENTION ASSEMBLIES, MOST RECENT EDITION AT THE TIME OF INSTALLATION, AND SHALL BE INSTALLED PER THE STANDARD DETAILS.

FIRE SPRINKLER SYSTEM CONNECTION TO THE UTILITIES WATER SYSTEM SHALL BE OWNED AND MAINTAINED BY THE PROPERTY OWNER, BEGINNING IMMEDIATELY DOWNSTREAM OF THE GATE VALVE WHERE THE SYSTEM CONNECTS TO THE UTILITY'S WATER MAIN.

THE BACKFLOW PREVENTION ASSEMBLY ON FIRE SPRINKLER SYSTEM CONNECTIONS SHALL BE LOCATED AS CLOSE TO THE SERVING WATER MAIN AS POSSIBLE, EITHER ON THE OWNER'S PROPERTY OR AN EASEMENT DEDICATED TO THE OWNER'S PROPERTY.

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22. Water the lawn in the evening when evaporation is less likely to occur. Avoid watering during the heat of the day or when windy.

23. Use native plants when landscaping your lawn. Generally, native plants require less care and water than ornamental varieties.

24. Place a layer of mulch around plants and trees to avoid excessive evaporation.

*Water is a precious and limited resource. Let's Use It Wisely!*

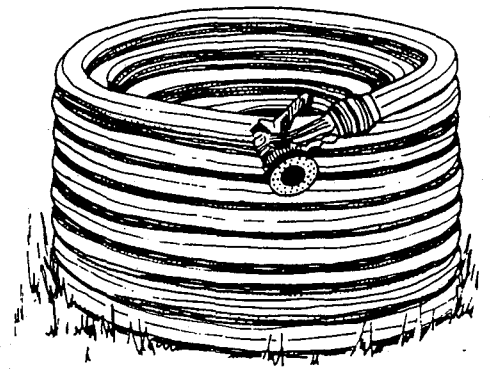
### Other

25. Prevent water runoff from your sprinkler system. Watering the sidewalk, gutter, or street wastes water.

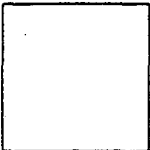
26. Use a broom, not a hose, when cleaning driveways and walkways.

27. Use a hose with a shut-off nozzle to wash the car.

28. Locate the master water supply valve and label it. The master supply valve can be easily turned off in case of a major leak or broken pipe.



*Can you think of other ways to save? Contact your local water utility with suggestions and any questions.*



Washington State  
DEPARTMENT OF  
SOCIAL & HEALTH  
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OFFICE OF ENVIRONMENTAL  
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## WATER SAVING

# Guideline 1

28 Ways To Reduce Water Waste

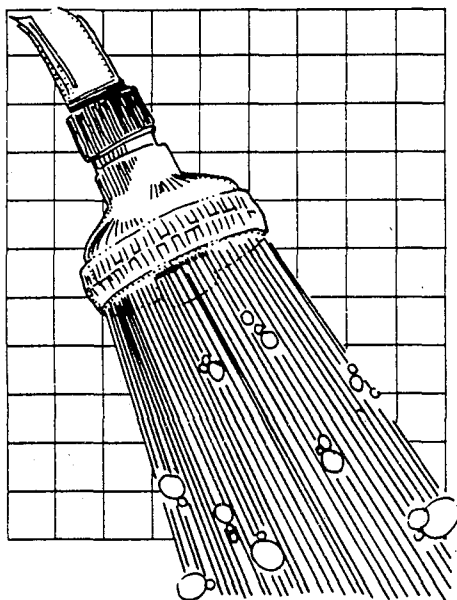
# 28 Tips

If we had to carry buckets of water from the river or well, we'd think twice about how to best use our supply. An average family of four uses 255 gallons of water indoors per day. Outdoor water use can double or triple this amount. That adds up to many trips to the well.

Count the ways to save.

## Bathroom

*Bathroom use accounts for seventy-three percent of all water used in the home. Small changes can equal big savings.*



1. Check toilets for leaks. Drop food coloring or a leak-detection tablet in the toilet tank. If color appears in the bowl, there is a leak that requires immediate attention.
2. Flush only when necessary. Every time you flush you use about six gallons of water. Don't use the toilet as a wastebasket.
3. Reduce the water level per flush by installing a water displacement device in the toilet tank. A plastic bottle, weighted with water or sand, works well. Never use a brick.
4. Take shorter showers. Turn off the water flow when lathering up, and then turn it back on to rinse.

5. Install water-saving shower heads or flow restrictors, which are available at local hardware stores and other retail outlets.

6. Take baths. Only the shortest shower saves more water than a partially-filled tub. Also, consider bathing small children together.

7. Turn off the water after wetting your toothbrush. Use a glass of water to rinse. Avoid letting the faucet run.

8. Rinse your razor in a sink of water. Letting the water run uses about three gallons per minute.

9. Check faucets and pipes for leaks. A small drip from a worn washer can waste 20 or more gallons a day. Larger leaks waste even more.

## Kitchen & Laundry

10. Turn the dishwasher on only when full.
11. Use both sides of the sink when washing dishes by hand; one to wash, one to rinse. Avoid washing dishes under running water.
12. Wash your dishes only once a day.
13. Clean vegetables in a pan of water, not under a running faucet. The water collected can be used for your household plants.

14. Keep a bottle of drinking water in the refrigerator. Now there is no need to run the tap to get a glass of cool water.

15. Pre-rinse clothes only when absolutely necessary.

16. Use the proper water level or load size selection on the washing machine.

## Lawn & Garden

*The amount of water used outdoors can vary greatly. Water consumption can be as much as 500 to 1,000 gallons per day during the summer months. Be water wise.*

17. Water only when needed. Frequency depends on the type of plants and soil conditions.
18. Water only as rapidly as the soil can absorb the water.
19. Water root areas of your plants to establish hardiness. Shallow roots are less likely to withstand drought condition.
20. Install a trickle or drip irrigation system for a slow, steady supply of water to the plant roots. This method can save up to 60% over other watering techniques.
21. Consider water requirements when purchasing new plants.



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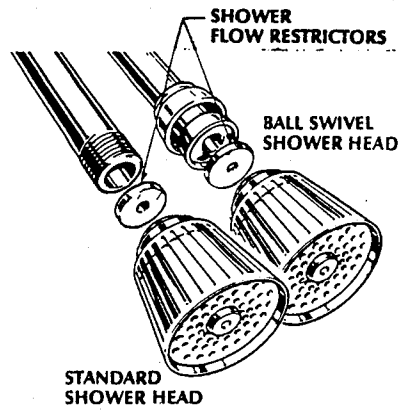
## HOW TO USE YOUR WATER METER TO CHECK FOR LEAKS

*Water meters can detect a leak in your water system:*

- Locate your meter. It is usually found in a meter box in a small concrete vault near the street.
- Turn off all faucets in and around the home.
- Check the meter reading.
- Wait 15 minutes.
- Read your meter again. If the reading has changed, you have a leak that needs immediate attention.

*Clean, safe water is a precious and limited resource. Reducing water waste can ensure an adequate, affordable supply.*

**LET'S USE WATER WISELY.**

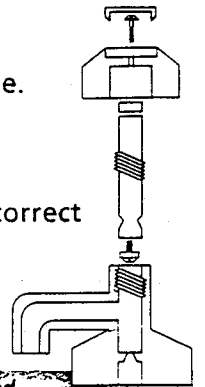


## Bathroom Fixtures

Bathroom use accounts for 73% of all water used in the home. Small changes add up to big water savings. Install a shower flow restrictor and save two to three gallons of water per minute. Faucet restrictors save water too.

## How To Fix A Leak

1. Turn off water supply to faucet.
2. Remove decorative cover and handle.
3. Remove collar or locknut.
4. Take out stem.
5. Replace washer. Be sure to use the correct size and type of washer.
6. Reverse the process to reassemble.
7. Turn water supply back on.



*Remember, all faucets are not alike. You may need the assistance of an expert.*

DSHS 22-644 X (5/88)



Washington State  
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## WATER SAVING

# Guideline 2

Find Out How To Save

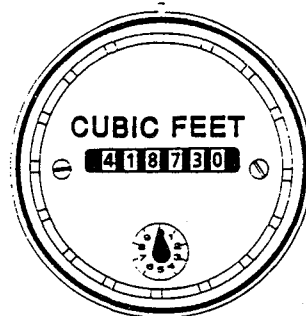
## Household Water Use Tips

# 418730

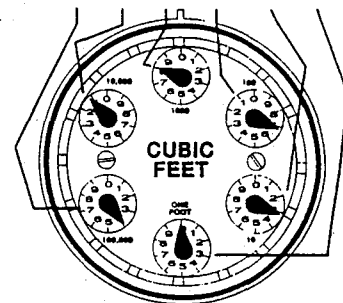
### LEARN TO READ YOUR WATER METER

KNOWING HOW CAN HELP YOU:

- Detect a leak
- Measure the amount of water your family uses
- Understand your water bill



Some meters read straight across like the odometer on a car. Remember your meter is never reset.



Other meters are circular with five or six dials. Read each dial clockwise, starting at the 100,000 dial. If a pointer is between two figures, read the lower number.

### HOW MANY GALLONS OF WATER DOES YOUR FAMILY USE PER DAY?

1. Read your meter before using any water.
2. Keep track of all indoor water-using activities for one day. (See example)
3. Calculate the number of gallons used for each activity. Use the "Water Activity Chart" below.
4. Divide total gallons of water used by the number of family members to get a per-person consumption rate.
5. Read your meter the next morning to verify your calculations.

An overall 10% reduction in water consumption is expected after installing flow restrictors and toilet displacement bags. Remeasure your water consumption after installing these conservation devices.

TOTALS	
BEGINNING METER READING	_____
<b>BATHROOM</b>	
Toilet	18 flushes x 5 gal/flush = 90 GAL.
SINK	6 minutes x 3 gal/minute = 18 GAL.
SHOWER	25 minutes x 5 gal/minute = 125 GAL.
<b>KITCHEN</b>	
SINK	6 minutes x 3 gal/minute = 18 GAL.
Dishwasher	1 wash cycle x 15 gal/use = 15 GAL.
<b>OTHER</b>	
Laundry	1 wash cycle x 37 gal/use = 37 GAL.
	<b>303 GAL. per day</b>
	$303 \div 4$ (# in family) = <b>76 gal. per person</b>
FINAL METER READING	_____

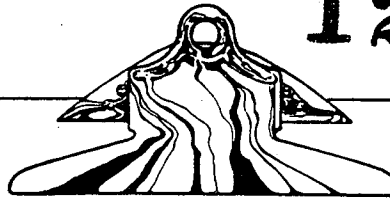
A typical family of four uses 255 gallons of water per day.

### Water Activity Chart

	Gallons Used per use	Water Savings Over Conventional Methods (percentage %)	Gallons Used per minute	Water Savings Over Conventional Methods (percentage %)
<b>TOILET</b>				
• Conventional	5	—		
• Common low-flush	3.5	32		
<b>WASHING MACHINE</b>				
• Wash recycle	26	29		
• Front load	21	43		
<b>FAUCETS</b>				
• Conventional			3	—
• Common low-flow			2.5	17
• Flow-limiting			1.5	50
<b>SHOWERHEADS</b>				
• Conventional			5	—
• Common low-flow			3	42
• Flow-limiting			2	63



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**LAWN WATERING GUIDE**

Here's a simple way to determine your lawn watering needs:

- 1. Place five or more flat bottom cans or coffee mugs randomly around your lawn.
- 2. Turn on your sprinkler(s) for 15 minutes.

3. Measure the depth of the water in each can with a ruler to determine the average water depth in the cans.

4. Refer to the following chart and read the number of minutes you should water every third day. Record the times for future reference.

AVERAGE DEPTH IN TEST CANS	1/8"	1/4"	3/8"	1/2"	5/8"	3/4"	1"	1-1/8"
MINUTES TO WATER EVERY THIRD DAY IN SPRING	30	15	10	7-1/2	6	5	4	3-1/3
MINUTES TO WATER EVERY THIRD DAY IN SUMMER	60	30	20	15	12	10	8	6-2/3
MINUTES TO WATER EVERY THIRD DAY IN FALL	24	12	8	6	4-3/4	4	3-1/3	2-1/2

Reminders: Use this chart as a guide only, and alter your water practices according to climatic conditions. Decrease watering times and frequencies during cool and/or humid weather. Skip at least one scheduled watering after any substantial rainfall.

THIS GUIDE WAS PREPARED IN COOPERATION WITH THE WASHINGTON STATE NURSERY AND LANDSCAPE ASSOCIATION. FOR MORE INFORMATION, CONTACT YOUR LOCAL NURSERY OR COUNTY EXTENSION OFFICE.

DSHS 22-646X (6/88)



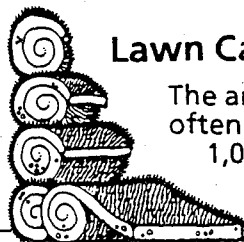
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**WATER SAVING**

*Guideline 3*

Timely Tips For

## Timely Tips FOR SAVING WATER OUTDOORS



### Lawn Care

The amount of water your yard needs depends on lawn size and how often you irrigate. Outdoor water consumption can be as much as 1,000 to 3,000 gallons for an average lawn during a peak summer day. Water is a precious and limited resource. *Let's use it wisely.*

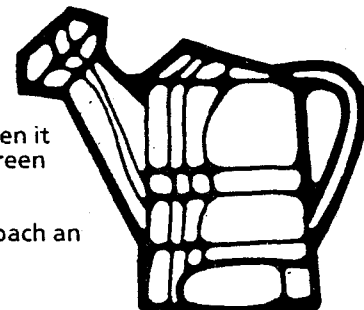
### THE MOISTURE NEEDS OF PLANTS

Gardening professionals generally agree that most landscaping receives more water than necessary. Your goal, if experiencing a water shortage, should be to water only enough to keep grasses and plants alive. By gradually extending the length of time between waterings, plants have a tendency to require less water and become more drought resistant.

### WATERING: WHEN AND HOW MUCH

Plant type and soil conditions play a large role in determining when and how much to water. Turf areas require more water than trees, shrubs, and groundcover. Different soil types have different water retention capabilities. Know your soil type. Ask your local nursery or county extension office to recommend low water-using plants and ways to increase your soil's water holding capacity.

- Your lawn needs water when it starts turning a dull gray/green and loses resiliency.
- Shrubs droop as they approach an absolute need for water.



### Water Efficient Irrigation & Landscape Techniques

*The object of efficient irrigation is to water only the soil surrounding the root area of the plant.*

- Do not apply water more rapidly than the soil can absorb it.
- Turn off your sprinkler system at the first sign of saturation or runoff to allow the first watering to soak in. Water again in an hour or two if needed.
- Watering should be done in the evening or during early morning hours when evaporation is least likely to occur. Unlike sprinklers, drip irrigation may be used during the day with minimal loss due to evaporation.
- Water only once a week. Weekly waterings should be sufficient. Water less often if your plants need less moisture.
- Do not water when windy.
- Consider alternate landscaping practices. Reduce turf area or use groundcovers or mulches instead of turf. Generally, groundcovers require less water than turf areas.
- Consider low water-using turf varieties. Avoid blue grass. Instead, try fescues, ryegrass, and buffalo grass.
- Remove thatch (dead grass) build-up in turf areas as soon as possible. Thatch restricts penetration of water, air, and nutrients.
- Aerate compacted soil to increase water penetration. Aeration should be done only during the spring months or after fall rains resume.
- Proper fertilizer application is important. Consult a nursery or landscape professional for a well-balanced fertilization program.
- Eliminate weeds. They compete with grass and other plant material for water.
- Use mulches, such as woven weed barrier, bark, sawdust, or compost to help planting beds retain moisture.
- Make sure that your sprinkler system is in good repair. Fix leaks, and adjust sprinkler heads to eliminate any over-spray on paved areas or buildings. Investigate the source of any unusual runoff, puddling or over-saturated areas.
- If you have an automated sprinkler system, make sure the controller is properly set to achieve minimum watering levels.
- When landscaping, a properly designed and installed irrigation system should be included as a water conservation tool. Automated irrigation systems offer the ultimate in both control and distribution of water over other watering systems.
- Consider water consumption when selecting plants. Some plants use more water than others. Consult a good gardening book to determine low water-using plants for your geographical region.
- Remember the importance of plant placement. Shade-loving plants will not do well if placed in full sun, and will require excessive watering to survive. Place plants of similar water needs in common areas so they can all benefit from the same application of water.

More information on back

# 12731

The standards are in two phases: When shopping for new fixtures, you may wish to purchase the more efficient fixtures, even though they are not required prior to July 1, 1993. It is illegal to sell or install (in any new construction and all remodelled facilities) a fixture that does not meet the current water use standard. Check the fixture packaging and the fixture itself for information on the amount of water the fixture uses.

Fixture	Phase 1 (effective until July 1, 1993)	Phase 2 (effective after July 1, 1993)
Tank-type toilet	3.5 gallons per flush	1.6 gallons per flush
Flushometer-valve	3.5 gallons per flush	1.6 gallons per flush
Flushometer-tank toilets	3.5 gallons per flush	1.6 gallons per flush
Electromechanical hydraulic toilets	3.5 gallons per flush	1.6 gallons per flush
Urinals	3.0 gallons per flush	1.0 gallons per flush
Showerheads	3.0 gallons per minute	2.5 gallons per minute
Bathroom faucets	3.0 gallons per minute	2.5 gallons per minute
Lavatory faucets	3.0 gallons per minute	2.5 gallons per minute
Kitchen faucets	3.0 gallons per minute	2.5 gallons per minute
Replacement aerators	3.0 gallons per minute	2.5 gallons per minute



92-BR-22  
OLYMPIA, WA 98504-7600

OLYMPIA, WA 98504-7822

WATER RESOURCES PROGRAM

DIVISION OF DRINKING WATER

DEPARTMENT OF  
ECOLGY  
WASHINGTON STATE

Health  
Washington State Department of

## WATER SAVING

# Guideline 4

More Efficient Landscaping and Plumbing Fixtures

This brochure was prepared to direct you to other sources of water conservation information. You also may contact your local water utility for information on their conservation activities. Some utilities are offering creative programs to help you save water, such as the distribution of efficient showerheads and educational materials on specific conservation topics.

## To improve the water efficiency of your yard...

When installing a new landscape or remodeling an old landscape, follow the seven principles of low water use landscaping to reduce water use and promote a healthier landscape:

1. Improve the soil so that it retains moisture, provides nutrients and encourages deep root growth.
2. Use lawn areas appropriately so they can be efficiently watered and maintained.
3. Use an efficient irrigation system and maintain it properly.
4. Use mulches to help protect soil from drying out.
5. Select plants that thrive in your regional environment without a lot of additional water.
6. Plan the placement of plants so that those with similar watering requirements are grouped together for more efficient irrigation.
7. Remove weeds to reduce your landscape's competition for water. Use fertilizers and herbicides sparingly.



Your county's Washington State University Cooperative Extension Service agent can refer you to information on efficient irrigation practices and how to change your yard from a water intensive landscape to a low water using landscape. The Extension Service also maintains a list of speakers and operates the Master Gardener program. The Master Gardener program can be contacted by phone to answer questions directly or callers can ask to hear one of several tapes on landscaping topics. Check your county government pages in your phone book for Cooperative Extension Service phone numbers.

The Center for Urban Horticulture at the University of Washington has an extensive library for low water use landscaping materials.

The Elisabeth C. Miller Library has made researching low water use landscaping easy by collecting relevant articles in easy-to-use subject files and preparing booklists on the subject. The Center also has a speakers bureau which can be accessed for lectures on aspects of low water use landscaping and offers classes related to water efficient gardening and landscaping. Contact the Center at (206) 543-8616 for more information.

## If you are building a new home or remodeling...

New amendments to the State's Plumbing Code, passed by the Legislature in 1989 and 1991, require that plumbing fixtures meet certain water consumption standards. These new standards apply to all new construction and remodeling projects involving the replacement of plumbing fixtures in all residential, hotel, motel, school, industrial, or commercial use buildings or other buildings as determined by the State Building Code Council.



12731

KING COUNTY WATER DISTRICT NO. 17  
OPERATION AND MAINTENANCE PROGRAM

## KING COUNTY WATER DISTRICT NO. 17 OPERATION AND MAINTENANCE PROGRAM

### WATER SYSTEM PERSONNEL

Chris Hagen, Manager, Part time employee  
Washington State Certification -  
Water Distribution Manager II

Business Telephone - (206) 286-4552

Emergence Telephone - (206) 286-4552

The above telephone numbers are printed on each billing sent to each customer.

The Water District has only the one part time employee who performs the following functions:

- \* Normal day-to-day operations
- \* Preventative maintenance
- \* Field engineering
- \* Trouble shooting
- \* Emergency response
- \* Implementation of the improvement program
- \* Budget formulation
- \* Response to complaints
- \* Billing

Water Quality monitoring is performed by the City of Seattle Water Department.

The District has no cross-connections with any other supply source other than the City of Bellevue master meter connection.

### SYSTEM OPERATION AND CONTROL

#### System Components

The District's facilities consist of a single water line approximately 5400 feet in length.

Water Valves are located as follows and as shown on the attached map.

- \* Adjacent to the City of Bellevue Master Meter, east side of Hunts Point Road, immediately north of the SR 520 on-ramp.
- \* At the District's south boundary, on the northwest corner of the intersection of Hunts Point Road and Hunts Point Circle.

- \* Two in-line valves are located on the west side of Hunts Point Road near the south boundary of the property at 3655 Hunts Point Road.

The above valves may be used to shut down or isolate the various sections of the water line for emergency repairs or any other required shut down.

The District's sole source of water supply is through the City of Bellevue master meter. Bellevue performs the operations of reading the master meter and billing the District for all water purchased by the District.

### Routine Operations

1. Customer meters are read bi-monthly.
2. Meter and meter box problems, service line and main line leaks are noted at the time of meter reading and scheduled for repair.
3. All valves are exercised once each year. Valve boxes are adjusted and any required maintenance work performed on the boxes.
4. All fire hydrants(7) are inspected and operated twice each year. This includes operating the hydrant and the foot or auxiliary valve, clearing of brush and painting the hydrant.
5. Flushing of the entire water main is performed once each year. Additional flushing may be required depending upon the results of the City of Seattle water quality monitoring.

### Equipment and Supplies

The District maintains no inventory of parts, supplies, equipment or chemicals.

### **EMERGENCY RESPONSE PROGRAM**

Emergencies can be reported through the telephone number shown below. The report is taken by an answering service who then notifies the District Manager.

EMERGENCY RESPONSE TELEPHONE - (206) 286-4552

The District Manager investigates all emergency calls, determines the appropriate action and initiates the required action to correct the problem.

Should a problem occur which requires the discontinued use or consumption of the water, the system is shut down and each customer is directly notified by personal contact or the placement of a written notice on the customers door.

# 12731

## **SAFETY PROCEDURES**

The District's water line is virtually all asbestos-cement (AC) pipe. When repairs require the cutting of the AC pipe, such cutting must be performed by an individual(s) certified to do such work. Chris Hagen, the District Manager has this certification. All OSHA and WISHA regulations must be followed.

## **RECORD KEEPING AND REPORTING**

All District records are currently kept on file at the home of the District Manager, including the following:

- \* Water quality reports received from the Seattle Water Department testing laboratory.
- \* Water Consumption records received from the City of Bellevue.
- \* Customer billing records and complaints.

## **WATER QUALITY MONITORING**

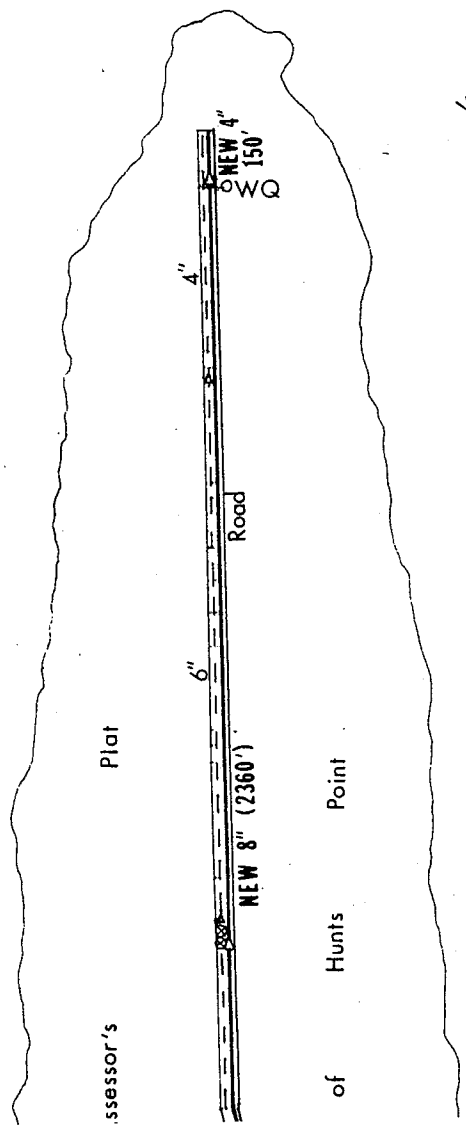
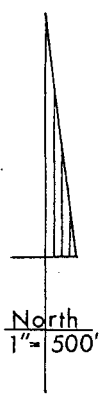
Water quality is currently monitored by the City of Seattle Water Department. Samples are taken from the District's facilities approximately five times per month. Laboratory tests are run on the samples and a written report of the test results are sent to the District. If a poor test result is obtained from any of the samples, the Seattle Water Department notifies the District immediately by telephone and appropriate corrective action is taken by the District.

The samples taken by the Seattle Water Department are taken as shown on the attached Coliform Monitoring Plan chart at the Routine site. If a positive result is obtained on the laboratory tests, then repeat samples must be taken after the system is flushed to determine if the problem has been corrected. The repeat samples are taken at the locations shown on the chart for Repeat samples. These samples are taken by the District manager and submitted to the Seattle Water Department laboratory for testing. The results of the repeat tests are returned to the District the same as with the routine tests.

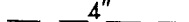









# 12731

LAKE  
WASHINGTON



**LEGEND**

-  4" EXISTING BELLEVUE LINE
-  4" EXISTING WD 17 LINE
-  EXISTING PRESSURE REGULATOR
-  EXISTING MASTER METER
-  NEW 12" PROPOSED WD 17 LINE
-  WATER DISTRICT BOUNDARY
-  EXISTING GATE VALVES
-  WATER QUALITY MONITORING STATION

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# COLIFORM MONITORING PLAN 12731

## System Information

<b>WATER SYSTEM NAME</b> King County Water District No. 17			<b>SYSTEM I.D. NUMBER</b> 38850X	
<b>PEAK POPULATION SERVED</b> 260			<b>SERVICE CONNECTIONS</b> 98	
<b>SOURCE</b>	<b>DOH SOURCE NUMBER</b> Seattle S02	<b>CATEGORY</b> Bellevue/Purchase		<b>WELL DEPTH</b> -
<b>TREATMENT</b>	<b>TREATMENT PROCESS</b> None	<b>PURPOSE</b> -	<b>STORAGE</b> None	<b>STORAGE CAPACITY</b>

## Sampling Information

<b>NUMBER OF ROUTINE SAMPLES REQUIRED BY REGULATION</b>		<b>1</b>	<b>NUMBER OF SAMPLE SITES NEEDED TO REPRESENT THE DISTRIBUTION SYSTEM</b>		<b>1</b>
	<b>TYPE</b>	<b>SITE #</b>	<b>LOCATION</b>		
<b>SAMPLE SITE GROUP</b>	ROUTINE	17-1	4208 Hunts Point Rd./Sample standpipe		
	REPEAT	17-1	4208 Hunts Point Rd./Sample standpipe		
	REPEAT	17-X	4312 Hunts Point Rd./Ext. hose faucet		
	REPEAT	17-X	4036 Hunts Point Rd./Ext. hose faucet		
<b>SAMPLE SITE GROUP</b>	ROUTINE				
	REPEAT				
	REPEAT				
	REPEAT				
<b>SAMPLE SITE GROUP</b>	ROUTINE				
	REPEAT				
	REPEAT				
	REPEAT				