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2001-0023

**WOODINVILLE WATER DISTRICT
COMPREHENSIVE WATER PLAN
APPENDICES**

Prepared for

Woodinville Water District

09031-001-002

Prepared by

HDR Engineering, Inc.

and

Financial Consulting Solutions Group, Inc.

April 2000

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Appendix A
Service Area Policies and Agreements

5/17/88

WOODINVILLE WATER DISTRICT

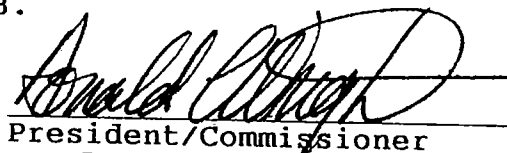
KING COUNTY, WASHINGTON

RESOLUTION NO. 2388

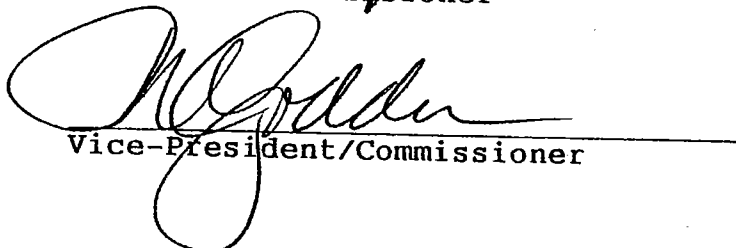
A RESOLUTION of the Board of Commissioners of Woodinville Water District, King County, Washington, adopting a policy regarding extension of water service outside of District boundaries into Snohomish County.

BE IT RESOLVED by the Board of Commissioners of Woodinville Water District, King County, Washington, that the policy statement that is attached to this resolution as Exhibit A and that pertains to the extension of water service outside of the boundaries of the District and into Snohomish County be, and it hereby is, adopted as a policy of Woodinville Water District, subject to the powers of the Board of Commissioners of Woodinville Water District to amend, add to, delete, or abrogate and adopt a new policy in place of, that policy.

ADOPTED by the Board of Commissioners of Woodinville Water District, King County, Washington at a regular meeting thereof on this 16th day of May, 1988.

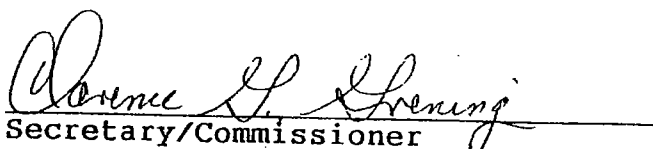


President/Commissioner



Vice-President/Commissioner

Attest:



Secretary/Commissioner

EXHIBIT A

POLICY STATEMENT REGARDING EXTENSION OF WATER SERVICE OUTSIDE OF DISTRICT BOUNDARY INTO SNOHOMISH COUNTY

1. The Woodinville Water District will only consider requests for water service into Snohomish County made by either Cross Valley Water Association or Alderwood Water District pursuant to the terms and conditions of an approved interlocal agreement.
2. Request for service extension will be considered on a case by case basis and will be approved following a determination that:
 - a) The proposed extension of service is consistent with the terms and conditions of the current Woodinville Water District/City of Seattle Purveyor Contract or as may be subsequently modified.
 - b) The fire flow requirements, minimum service pressure of the District (35 psi), and supply demand can be attained without the need to construct additional District facilities such as pump stations, reservoir capacity, transmission mains etc. by the District.
 - c) The property to be served is within the appropriate pressure zone and service area of the District from which service can be extended.
3. Following a determination that service can be extended by the District, extensions of service will be made only under the following conditions:
 - a) The property owner/developer submits an application to the District for a Developer Extension subject to the authorization by the District.
 - b) The extension of service will be made in accordance with the terms and conditions of the Developer Extension Agreement and District Standards and Specifications.
 - c) Service will be subject to the payment of the then current developer extension fees, meter connection charges, system development fee, applicable latecomer charges and water rates of the District.
 - d) The owner/developer will pay the cost of acquiring all Snohomish County permits and franchises as required by said extension. Such permits and franchises will be held by the District.
4. No ULID shall be formed in areas outside the boundaries of the District.

Ren Tick

Seattle Water Department

Robert P. Groncznack, Superintendent
Norman B. Rice, Mayor



RECEIVED

OCT 03 1991

September 30, 1991

Woodinville Water District

Mr. Bob Bandarra, General Manager
Woodinville Water District
P.O. Box 1390
Woodinville, Washington 98072

RE: Service Request/Cross Valley Water District

Dear Mr. Bandarra:

Thank you for your letter. We appreciate the opportunity to review this request for service from the Cross Valley Water District. As you know, we published an interim strategy in May last year indicating that we would not consider service area extensions until the Water Supply Plan had been reviewed and acted upon by the Seattle City Council. Therefore, the Seattle Water Department is unable at this time to approve your request to provide temporary water service at 100 gpm to the Cross Valley Water District.

Our key concerns in developing the interim strategy were our obligations to meet the water supply needs of our existing wholesale and retail customers, and the need to effectively plan for and provide an adequate supply now and into the future. As you know, our current water supply planning effort has focused on developing strategies to help us meet projected demand, including the issues associated with possibly extending water service to areas not currently having contracts for wholesale service. We are working to have the Water Supply Plan available for City Council review and action during the last half of 1992.

Apart from the lack of adopted revised policy direction on service area expansion, the other issue that influences our position on service to the Cross Valley Water District relates to the department's water right boundary. As it applies in the vicinity of Woodinville, our water right is currently bounded on the north by the King County line. It could be a violation of our water right to extend service to Cross Valley Water District without amending our water right, and it's not clear what would be involved or at risk if we undertook an amendment process.

Mr. Bob Bandarra
September 30, 1991
Page 2

The provision of the recently enacted intertie bill acknowledges the generally beneficial nature of interties and creates a one time only opportunity to revise water rights boundaries based on existing interties. This process takes into account those interties that existed, or were part of an approved water system plan, as of January 1, 1991. Given that Woodinville is already supplying two developments in Snohomish County, the intertie bill provides a means for accommodating existing situations through a de facto adjustment to the water right boundary. However, since Cross Valley Water was not connected to Woodinville as of January 1st of this year, service probably cannot be extended without changing the water right boundary.

The intertie bill does make special provisions for emergency interties. We would be willing to discuss with you the conditions under which an emergency intertie with Cross Valley Water District for fire protection only might be established.

If you have any questions or would like additional information, please call me at 684-5932.

Sincerely,



David B. Parkinson
Water Resources Manager

684-5932

7/13/88

INTERLOCAL AGREEMENT BETWEEN THE CITY OF REDMOND
AND
WOODINVILLE WATER DISTRICT

Whereas, the City of Redmond, Washington, (hereinafter "Redmond") and, the Woodinville Water District (hereinafter the "District") are desirous of settling the future common water and sewer utility service area boundary between Redmond and the District and providing means whereby water service may be provided to properties which are not now within the boundaries of the City of Redmond but which may in the future be within the city boundaries,

NOW, THEREFORE, IT IS HEREBY COVENANTED AND AGREED AS FOLLOWS:

1. AGREED COMMON SERVICE AREA BOUNDARY.

It is agreed that the common utility service area boundary between the District and Redmond will be N.E. 124th Street, King County, Washington as extended easterly and westerly. Each party hereto agrees that it will not provide water or sewer utility service which would be inconsistent with the agreed common boundary without the prior written consent of the other.

2. WATER SERVICE.

The District may provide water service to properties lying southerly of the agreed common boundary in either of the following ways:

- a. Upon agreement, the District shall sell water at the District's Wholesale Rate to the City of Redmond which shall, at its expense, install master meters or, with the prior consent of the District if no master meters are utilized, the aggregate meter readings of all properties served from an unmetered line will be reported monthly by Redmond to the District with payment for all water provided through such service. In that eventuality, the City of Redmond will meter and bill the individual customers. The District will establish a Wholesale Rate which will be applicable if a master meter is used to compute consumption. At the time of this agreement, the District's "Wholesale Rate" has been established as an amount equal to the District's "new water cost" under the District's Water Purveyor's Agreement with the City of Seattle, plus ten percent. The District retains the right to adjust the District's Wholesale Rate as established by the District's rate making procedures. If individual meters are utilized to compute consumption, the rates and charges for water sold

by the District to Redmond shall be the District's Wholesale Rate plus ten percent, or,

- b. Upon agreement, the District may furnish water service to individual customers for the area lying south of N.E. 124th Street. At the option of Redmond, upon the area which lies south of N.E. 124th Street being annexed to the City of Redmond, the City of Redmond can provide water service to customers in that particular area.

3. MUTUALITY.

Although the City of Redmond is presently unable to provide water service to properties which lie in the vicinity of N.E. 124th Street, the comparable provisions as set forth above for the furnishing of water by Woodinville Water District for the area lying south of 124th Street shall be applicable in the event the City of Redmond provides water service to areas lying within the boundaries of the District or north of N.E. 124th Street.

4. ULID AND LID.

Each person receiving water service shall, prior to commencement of service, be required to sign a written commitment not to protest the formation of a ULID or LID which includes as its purpose the financing of construction of utility improvements which will serve such person's property and further committing such person to sign the petition for the formation of such LID directly, or through an attorney-in-fact. Each such agreement shall be drafted to meet the requirements of Chapter 179, Laws of 1988.

5. ANNEXATION AGREEMENTS.

Each person receiving water service shall, prior to the commencement of service, sign an agreement obligating such person to sign a petition for annexation of such person's property to the City or District, as applicable, and appointing an appropriate official of the City or District as attorney-in-fact for the purpose of signing such petition. Such agreement shall include a waiver of the right of such person to protest or otherwise oppose such annexation.

6. STANDARDS.

In the event that either the City or District extends water service lines into the service areas lying south of the District boundaries and north of the City boundaries, the City or District standards and specifications shall be used, whichever is the more stringent.

7. UTILITY LOCAL IMPROVEMENT DISTRICTS.

No ULID or LID shall be formed by one party to this Agreement in the service area of the other party without prior written consent of the other party. King county franchises will be obtained and held by the operating entity. The operating entity is that entity which is providing service and maintenance to a particular section of the water system. All easements that are obtained by either the District or Redmond in connection with furnishing the water shall be drafted in a manner to provide that whoever is the operating entity, there shall be the permanent right to utilize the rights and powers authorized by said easement.

8. OWNERSHIP AND MAINTENANCE.

Ownership and maintenance of the water distribution system shall be vested in and performed by the operating entity.

9. RATES AND FEES.

Charges for service and fees to customers for hookups, meters, and for water shall be those of the operating entity.

10. CONSERVATION POLICIES.

Conservation policies will be prescribed by the operating entity.

11. APPROVAL.

All required permits or franchises shall be acquired by the operating entity.

12. FUTURE DEVELOPMENTS.

Future developments that would straddle the common boundary line as above defined shall be approved by an addendum on a case by case basis.

13. AUTHORIZATION AND APPROVALS.

This agreement was approved by the City of Redmond by Ordinance No. 1437, dated July 5, 1988, duly adopted at a regular meeting with authorization to the undersigned officer to execute this agreement on behalf of the City of Redmond.

This agreement was approved by the Woodinville Water District by Resolution No. 2407, dated June 27, 1988, duly adopted at a regular meeting with authorization to the undersigned officers to execute this agreement on behalf of the Woodinville Water District.

DATED 13 July, 1988.

CITY OF REDMOND

By Doreen Marchione
DOREEN MARCHIONE, Mayor

Attested:

Doris A. Schaible
DORIS A. SCHAIBLE, City Clerk 7/12/88

Approved as to Form:

By: Larry Martin
LARRY MARTIN,
City Attorney

WOODINVILLE WATER DISTRICT

By Ronald [Signature]
Its President

By Barbara [Signature]
Its Secretary

WAIVER OF RIGHT TO PROTEST LID. Owner acknowledges that the entire property legally described on Exhibit A would be specially benefited by the following improvements to the utility (specify):

Owner agrees to sign a petition for the formation of an LID or ULID for the specified improvements at such time as one is circulated and Owner hereby appoints the Mayor of the City as his or her attorney-in-fact to sign such a petition in the event Owner fails or refuses to do so.

With full understanding of Owner's right to protest formation of an LID or ULID to construct such improvements pursuant to RCW 35.43.180, Owner agrees to participate in any such LID or ULID and to waive his right to protest formation of the same. Owner shall retain the right to contest the method of calculating any assessment and the amount thereof, and shall further retain the right to appeal the decision of the City Council affirming the final assessment roll to the superior court. Notwithstanding any other provisions of this agreement, this waiver of the right to protest shall only be valid for a period of ten (10) years from the date this agreement is signed by the Owner.

EXHIBIT "D" TO ADDENDUM
TO INTERLOCAL AGREEMENT

AGREEMENT CONCERNING WATER SERVICE

WHEREAS, the undersigned are the owners of certain real property located in King County, Washington within the Utility Service Area Boundaries of the City of Redmond.

WHEREAS, said owners desire to obtain water service from the Woodinville Water District, and pursuant to an interlocal agreement between the Woodinville Water District and the City of Redmond dated October 1, 1992, a copy of which is attached hereto as Exhibit "A", ("the interlocal agreement") the consent of the City of Redmond is required for the District to provide water service within edmond's Utility Service Area south of N.E. 124th Street, and certain agreements on the part of the owners of property to be served relating to annexations and formation of local improvements districts or utility local improvement districts are required by the interlocal agreement, and

WHEREAS, in order to induce the City of Redmond to grant consent for the District to provide water service to that portion of the development located within Redmond's Utility Service Area and to comply with the requirements of the interlocal agreement relating to annexation and Local Improvement Districts (LID)/Utility Local Improvement Districts (ULID), the undersigned owners, on behalf of themselves, their heirs, successors and assigns, intending the City of Redmond to be a beneficiary of this agreement, hereby covenant and agree as follows:

1. Annexation to City of Redmond. The undersigned owners understand that at some future date the City of Redmond may desire to annex all or part of the property described on Exhibit "B" to the City and that annexation will result in the following consequences:
 - a. King County ordinances, resolutions, rules and regulations will cease to apply to the property upon the effective date of annexation;

WATER/SEWER UTILITY

PLEASE RETURN TO:
Mr. Brett Thomason
CITY OF REDMOND
15670 NE 85TH ST
REDMOND, WA 98052

21027-0802 09:04:00 AM KING COUNTY RECORDS 004 SH 10.00 5 270802

- b. City of Redmond ordinances, resolutions, rules and regulations will begin to apply to the property upon the effective date of annexation;
- c. Governmental services, such as police, fire and utility service, will be provided to the property by the City of Redmond upon the effective date of annexation;
- d. The property may be required to assume all or any portion of the City of Redmond indebtedness existing at the time of annexation and property tax rates and assessments applicable to the property may be higher or lower than those applicable prior to the effective date of annexation;
- e. Zoning and land use regulations applicable to the property after annexation may be different from those applicable to the property prior to annexation; and
- f. All or any portion of the property may be annexed and the property may be annexed in conjunction with, or at the same time as, other property in the vicinity.

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With full knowledge and understanding of these consequences of annexation and with full knowledge and understanding of owners rights to oppose annexation of the property to the City of Redmond, owners agree to sign a petition for annexation to the City of property including all or part of the property described on Exhibit "B" as provided in RCW 35.14.120, as it now exists or as it may hereafter be amended, at such time as the owners are requested by the City to do so. The owners also appoint the Mayor of the City as owners' attorney-in-fact to execute an annexation petition on owners' behalf in the event that owners shall fail or refuse to do so and agree that such signature shall constitute full authority from the owners for annexation as if owners had signed the petition themselves. Owners further agree not to litigate, challenge or in any manner contest, annexation to the City. This agreement shall be deemed to be continuing, and if owners' petitions for whatever reason, including a decision by the City not to annex, owners agree to sign any and all subsequent petitions for annexation. In the event that any property described on Exhibit "B" is subdivided into smaller lots, and/or ownership thereof is transferred, the purchaser or other transferee of each subdivided lot or other portion or the entirety of the property shall be bound

PLEASE RETURN TO:

WATER/SEWER UTILITY

CITY OF REDMOND
15670 NE 85TH ST
REDMOND, WA 98052

by the provisions of this paragraph and by purchasing or otherwise assuming an ownership interest designates the Mayor of Redmond as attorney-in-fact as provided above.

2. Waiver of Right to Protest Formation of LID/ULID. The undersigned owners acknowledge that the entire property legally described on Exhibit "B" would be specially benefited by the following utility improvements (specify):
1. Future storage facility to be constructed by Redmond or others to serve the property
 2. Future water supply connection by Redmond to City of Seattle Tolt Supply System
 3. Future water transmission/distribution mains which connect the site to City of Redmond water supply and storage facilities including, but not limited to water mains in the following streets, private roads or easements:
 - a. 184th Avenue N.E.
 - b. N.E. 124th Street extended
 - c. N.E. 123rd Street extended
 - d. N.E. 122nd Street extended
 - e. 172nd Avenue N.E. extended
 - f. 180th Avenue N.E. extended
 - g. N.E. 178th Street extended

Or by improvements providing substantially equivalent service to the property. Owners agree to sign a petition for the formation of an LID or ULID for all or any of the specified or substantially equivalent improvements at such time as one is circulated and owners hereby appoint the Mayor of the City as their attorney-in-fact to sign such a petition in the event owners fail or refuse to do so. By purchasing or otherwise acquiring an ownership interest in all or any part of the property, all transferees thereby so designate the Mayor of the City as attorney-in-fact.

With full understanding of owners' right to protest formation of an LID or ULID to construct such improvements pursuant to RCW 35.43.180, owners agree to participate in any such LID or ULID and to waive their right to protest formation of the same. Owners shall retain the right to contest the method of calculating any assessment and the amount thereof, and shall

PLEASE RETURN TO:

WATER/SEWER UTILITY

CITY OF REDMOND
15670 NE 85TH ST
REDMOND, WA 98052

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further retain the right to appeal the decision of the City affirming the final assessment roll to the superior court. Notwithstanding any other provisions of this agreement, this waiver of the right to protest shall only be valid for a period of ten (10) years from the date this agreement is signed by the owners.

- 3. Covenant Running With Land/Binding on Successors. The covenants and agreements set forth herein shall be covenants running with owners' land identified on Exhibit "B" hereto and shall be binding upon the parties, their heirs, assigns, and successors in interest. Owners acknowledge and stipulate that the agreements and covenants contained herein benefit utility and other property owned by the City by facilitating future expansion of redmond's water utility system. This agreement shall be recorded with the King county department of records and Elections.

DATED this 28th day of August, 1992.

OWNER(S)

Don A. Smith
Elaine F. Smith

9210270802

STATE OF WASHINGTON }
COUNTY OF King } ss:

I certify that I know or have satisfactory evidence that Don A. Smith & Elaine F. Smith signed this instrument and acknowledged it to be (his/her) free and voluntary act for the purposes mentioned in this instrument.

DATED this 28 day of August, 1992.

Arena M. Perry
NOTARY PUBLIC
My commission expires: 7-15-96

WATER/SEWER UTILITY

PLEASE RETURN TO:

CITY OF REDMOND
15670 NE 85TH ST
REDMOND, WA 98073

SMITH

WOODINVILLE WATER DISTRICT

KING COUNTY, WASHINGTON

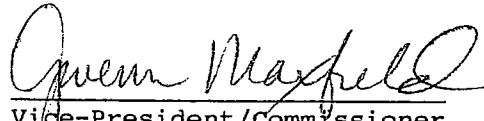
RESOLUTION NO. 2958

A RESOLUTION of the Board of Commissioners of Woodinville Water District, King County, Washington, approving and authorizing the President and Secretary of the Board of Commissioners of Woodinville Water District to execute, on behalf of the District, an addendum to the Interlocal Agreement between the City of Redmond and Woodinville Water District.


BE IT RESOLVED by the Board of Commissioners of Woodinville Water District, King County, Washington, that the President and Secretary of the Board of Commissioners of Woodinville Water District be, and they each hereby are, authorized to execute, on behalf of Woodinville Water District, an addendum to the Interlocal Agreement between the City of Redmond and Woodinville Water District in substantially the same form as that which is attached hereto as Exhibit A and incorporated herein by this reference, and that such instrument be, and hereby is, approved.

ADOPTED by the Board of Commissioners of Woodinville Water District, King County, Washington at a special meeting thereof on the 21st day of July, 1992.


President/Commissioner


Vice-President/Commissioner

Attest:


Secretary/Commissioner

10/1/92



RECEIVED

OCT 14 1992

Woodinville Water District

THE CITY OF REDMOND
PUBLIC WORKS DEPARTMENT

October 12, 1992

Bob Bandarra
Woodinville Water District
P.O. Box 1390
Woodinville, Washington 98072

SUBJECT: Addendum to Interlocal Agreement
Redmond/Woodinville

Dear Bob:

Enclosed please find two (2) copies of the signed agreement addendum between Redmond and Woodinville for water service to the area between 177th Avenue N.E. and 184th Avenue N.E. for you files. We have sent the Smith and Hussey Agreements for recording and will forward copies to you for your records when received back from the county.

If you should have further questions regarding these documents, please feel free to call me at 556-2829.

Sincerely,

Scott Thomasson
Utility Engineering Supervisor

Enclosures

C:\WINWORD\SHARON\REDWOOD.DOC

8/28/92
10/1/92

**ADDENDUM TO INTERLOCAL AGREEMENT BETWEEN
REDMOND AND WOODINVILLE WATER DISTRICT
WATER SERVICE TO AN AREA BETWEEN 177th Avenue N.E. AND
184TH AVENUE N.E.**

WHEREAS, the City of Redmond, Washington ("Redmond") and the Woodinville Water District ("the District") are parties to that certain interlocal agreement ("the interlocal agreement") dated July 13, 1988, which designates the common service area boundary between the District and Redmond, and

WHEREAS, Redmond and the District desire to supplement such agreement pursuant to paragraph 12 thereof to enable the District to provide water service to a portion of residential development south of the common service area boundary,

NOW, THEREFORE, IT IS HEREBY COVENANTED AND AGREED AS FOLLOWS:

1) Description of Service Area Boundary

Redmond and the District agree that the District may provide water service to the properties described in Exhibit "A", attached hereto.

2) Consent to Service by District

The City of Redmond hereby consents to allow the District to provide water service to those properties included within Redmond's water and sewer service area boundary per the method described in Section 2(b) of the July 13, 1988 Interlocal Agreement.

3) Service Extension, Approval of Plans and Specs.

Water service to said properties shall be subject to the terms of the form attached hereto as Exhibit "C" and depicted in Exhibit "B". Redmond and the District agree that the water improvements shall be designed and constructed in accordance with the standards of Redmond or the District, whichever is more stringent. The District shall submit plans and specifications for facilities which will be used to provide such service to the Redmond Utility Engineer for approval. Approval or rejection of the plans and specifications shall be based upon compliance with Redmond water service, fire flow, and construction standards.

4) Property Owner Agreement

Prior to making any commitment to extend facilities or provide service within Redmond's service area, the District shall procure and provide to Redmond written agreements signed by each owner of property within the Redmond service area which will be served pursuant to this agreement in the form attached hereto as Exhibit "D". The original of such agreements shall be provided to Redmond and Redmond shall record the agreement with the King County Department of Records and Elections.

5) Assumption of Service Area and Ownership of Facilities

- a. Upon annexation of all or a portion of the subject properties to the City of Redmond, or upon extension of Redmond's water facilities which will enable connection of the water facilities serving the properties to Redmond's facilities. Redmond, at its option, may elect to assume the rights and responsibilities of providing water service to any or all of the subject properties. This option may be exercised by giving written notice of such election to the District no less than 90 days prior to the proposed effective date of assumption of water serve by Redmond. Upon agreement with the District, Redmond may purchase water from the District required to service such portion of the development at the then current District wholesale rate, which is defined in the Interlocal Agreement.
- b. Upon the effective date of the transfer of rights and responsibility to provide water service to the City of Redmond pursuant to this section, the District shall quit claim and transfer to Redmond all of its rights in and title to all water mains, transmission and service lines, hydrants and other facilities located in Redmond's service area. Appropriate bills of sale and all other conveyances necessary to effectuate complete transfer of the District's interest shall be provided by the District to Redmond.
- c. The District shall cooperate in making a physical connection to the Redmond facilities and in performing such minor alterations to its facilities as may be required in order to complete the connection with

Redmond facilities at Redmond's sole expense. The District shall also cooperate in the transfer of all customer and billing information reasonably required for Redmond to assume and perform utility billing functions.

d. No connection fee or other charge shall be assessed by Redmond upon those customers receiving service at the time of transfer of responsibility for water service from the District to Redmond.

6. Remainder of Agreement Unchanged

Except as stated above, the interlocal agreement between the District and Redmond shall remain unchanged and in full force and effect.

DATED this 1st day of October, 1992.

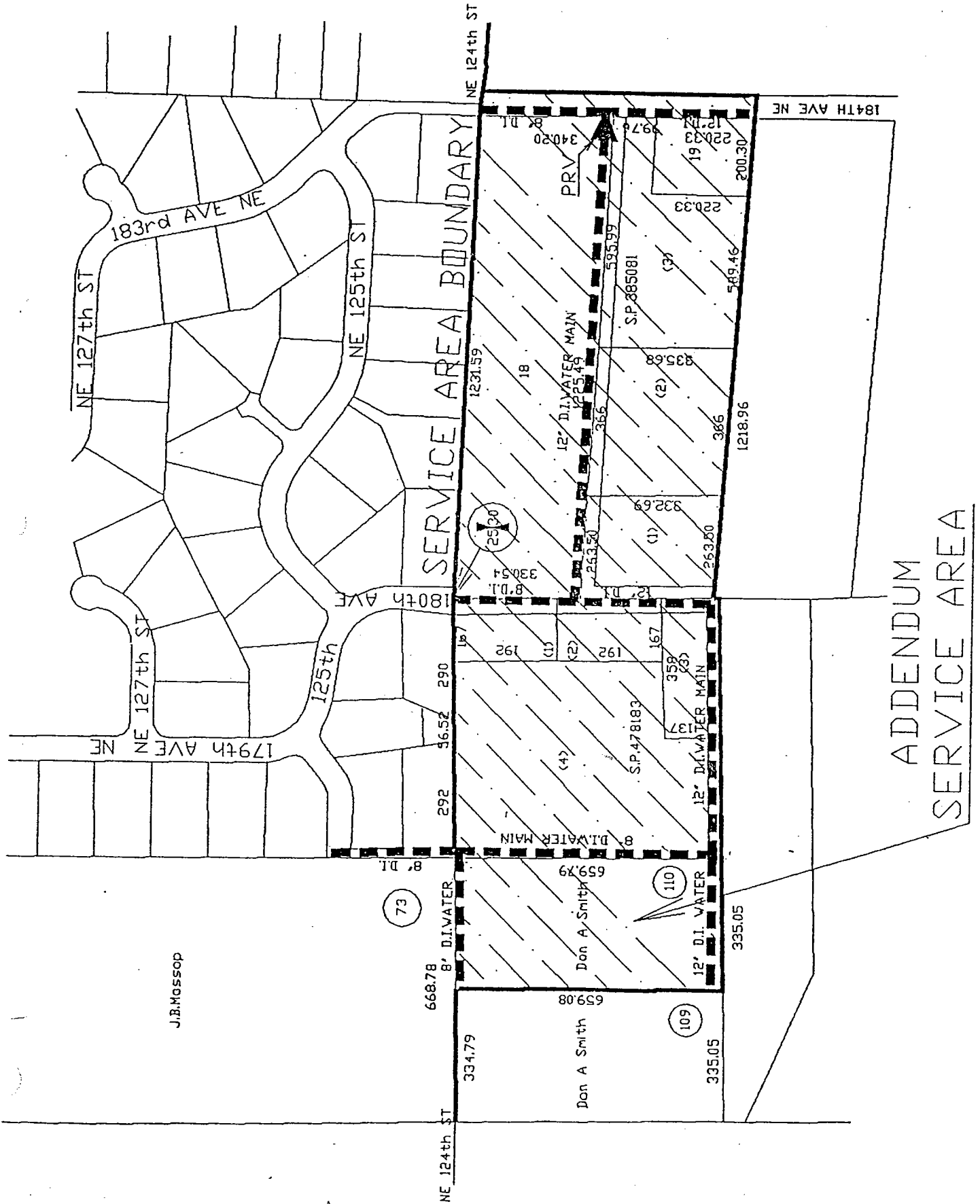
CITY OF REDMOND
By Rosemarie Duns
Its MAYOR

APPROVED AS TO FORM:
OFFICE OF THE CITY
ATTORNEY
BY [Signature]

WOODINVILLE WATER
DISTRICT
By [Signature]
Its President

By [Signature]
Its Secretary

EXHIBIT B



J.B. MOSSOP

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EXHIBIT "A"

1. East 5 acre parcel owned by Don A. Smith (Tax lot 110)
2. Lot 1 of S.P. 478183
3. Lot 2 of S.P. 478183
4. Lot 3 of S.P. 478183
5. Lot 4 of S.P. 478183
6. Lot 18 Richland Acres No. 3 (unrecorded)
7. Lot 1 of S.P. 385081
8. Lot 2 of S.P. 385081
9. Lot 3 of S.P. 385081
10. Portion of Lot 19 Richland Acres No. 3 (unrecorded)

EXHIBIT "C"

Subsequent to any future development or request for service each property shall construct that portion of the following improvements which is located on or adjacent to the property:

Connect to the existing main in N.E. 125th Street and extend an 8-inch main south in 178th Avenue N.E. (extended) to the south property line of Lot 4, S.P. 478183. Connect to this main at N.E. 124th Street (extended) and N.E. 122nd Street (extended) and extend an 8-inch and 12-inch main respectively to the west property line of Don A. Smith's east lot. Connect to the 8-inch main at the southwest corner of Lot 4, S.P. 478183 and extend a 12-inch main to 180th Avenue N.E. (extended). Continue the 12-inch main in 180th Avenue N.E. to N.E. 123rd Street (extended) then easterly in N.E. 123rd (extended) to the right-of-way of 184th Avenue N.E. Extend the 12-inch main south in 184th Avenue N.E. to the southerly property line of Lot 19. Connect to the 12-inch main in 184th Avenue N.E. and extend an 8-inch main north to the existing Woodinville main. Connect to the 12-inch main located northwest of Lot 1, S.P. 385081, and extend an 8-inch main north to the existing main located in 180th Avenue N.E. Install a pressure reducing station on the 12-inch main north of Lot 3, S.P. 385081. Provide all appropriate easements and right of way dedications to contain the waterline improvements.

Redmond recognizes that Woodinville currently provides water service to Lots 1, 2, and 3 of S.P. 478183 and Lots 1, 2, and 3, of S.P. 385081 and that service will continue without construction of these improvements.

Water service may be provided to the existing home on tax lot 110 (Smith) and the proposed home on Lot 4 S.P. 478183 (Hussey) by constructing an 8-inch main from N.E. 125th Street to 10 feet south of the north property line of the parcels with a fire hydrant. The mains in N.E. 124th Street (extended) and N.E. 122nd Street (extended) fronting these parcels and the main in 178th Avenue N.E. (extended) shall be constructed prior to any additional development or subdivision of the properties and an agreement between Redmond, Woodinville, and the property owners shall be recorded which establishes this covenant.

9/14/93

**ADDENDUM TO INTERLOCAL AGREEMENT BETWEEN
REDMOND AND WOODINVILLE WATER DISTRICT
WATER SERVICE TO AN AREA BETWEEN 167TH AVENUE N.E.
AND 172ND AVENUE N.E.**

WHEREAS, the City of Redmond, Washington ("Redmond") and the Woodinville Water District ("the District") are parties to that certain interlocal agreement ("the interlocal agreement") dated July 13, 1988, which designates the common service area boundary between the District and Redmond, and

WHEREAS, Redmond and the District desire to supplement such agreement pursuant to Paragraph 12 thereof to enable the District to provide water service to a portion of residential development south of the common service area boundary,

NOW, THEREFORE, IT IS HEREBY COVENANTED AND AGREED AS FOLLOWS:

- 1) Description of Service Area Boundary
Redmond and the District agree that the District may provide water service to the properties described in Exhibit "A", attached hereto.

- 2) Consent to Service by District
The City of Redmond hereby consents to allow the District to provide water service to those properties included within Redmond's water and sewer service area boundary per the method described in Section 2(b) of the July 13, 1988 Interlocal Agreement. Consent for service is only to serve existing single-family homes on the properties and is not for service for additional subdivision of the properties.

- 3) Service Extension, Approval of Plans and Specifications.
Water service to said properties shall be subject to the terms of the form attached hereto as Exhibit "C" and depicted in Exhibit "B". Redmond and the District agree that the water improvements shall be designed and constructed in accordance with the standards of Redmond or the District, whichever is more stringent. The District shall submit plans and specifications for facilities which will be used to provide such service to the Redmond Utility Engineer for approval. Approval or

rejection of the plans and specifications shall be based upon compliance with Redmond water service, fire flow, and construction standards.

4) Property Owner Agreement

Prior to making any commitment to extend facilities or provide service within Redmond's service area, the District shall procure and provide to Redmond written agreements signed by each owner of property within the Redmond service area which will be served pursuant to this agreement in the form attached hereto as Exhibit "D". The original of such agreements shall be provided to Redmond and Redmond shall record the agreement with the King County Department of Records and Elections.

5) Assumption of Service Area and Ownership of Facilities

a. Upon annexation of all or a portion of the subject properties to the City of Redmond, or upon extension of Redmond's water facilities which will enable connection of the water facilities serving the properties to Redmond's facilities. Redmond, at its option, may elect to assume the rights and responsibilities of providing water service to any or all of the subject properties. This option may be exercised by giving written notice of such election to the District no less than 90 days prior to the proposed effective date of assumption of water service by Redmond. Upon agreement with the District, Redmond may purchase water from the District required to serve such portion of the development at the then current District wholesale rate, which is defined in the Interlocal Agreement.

b. Upon the effective date of the transfer of rights and responsibility to provide water service to the City of Redmond pursuant to this section, the District shall quit claim and transfer to Redmond all of its rights in and title to all watermains, transmission and service lines, hydrants and other facilities located in Redmond's service area. Appropriate bills of sale and all other conveyances necessary to effectuate complete transfer of the District's interest shall be provided by the District to Redmond.

c. The District shall cooperate in making a physical connection to the Redmond facilities and in performing such minor alterations to its facilities

as may be required in order to complete the connection with Redmond facilities at Redmond's sole expense. The District shall also cooperate in the transfer of all customer and billing information reasonably required for Redmond to assume and perform utility billing functions.

d. No connection fee or other charge shall be assessed by Redmond upon those customers receiving service at the time of transfer of responsibility for water service from the District to Redmond.

6. Remainder of Agreement Unchanged

Except as stated above, the interlocal agreement between the District and Redmond shall remain unchanged and in full force and effect.

DATED this 14th day of September, 1993.

CITY OF REDMOND
By [Signature]
Its Mayor 9-14-93

APPROVED AS TO FORM:

OFFICE OF THE CITY
ATTORNEY
BY [Signature]

WOODINVILLE WATER
DISTRICT
By _____
Its President

By _____
Its Secretary

as may be required in order to complete the connection with Redmond facilities at Redmond's sole expense. The District shall also cooperate in the transfer of all customer and billing information reasonably required for Redmond to assume and perform utility billing functions.

d. No connection fee or other charge shall be assessed by Redmond upon those customers receiving service at the time of transfer of responsibility for water service from the District to Redmond.

6. Remainder of Agreement Unchanged

Except as stated above, the interlocal agreement between the District and Redmond shall remain unchanged and in full force and effect.

DATED this ____ day of _____, 19 ____.

CITY OF REDMOND

By _____
Its _____

APPROVED AS TO FORM:

OFFICE OF THE CITY
ATTORNEY

BY _____

WOODINVILLE WATER
DISTRICT

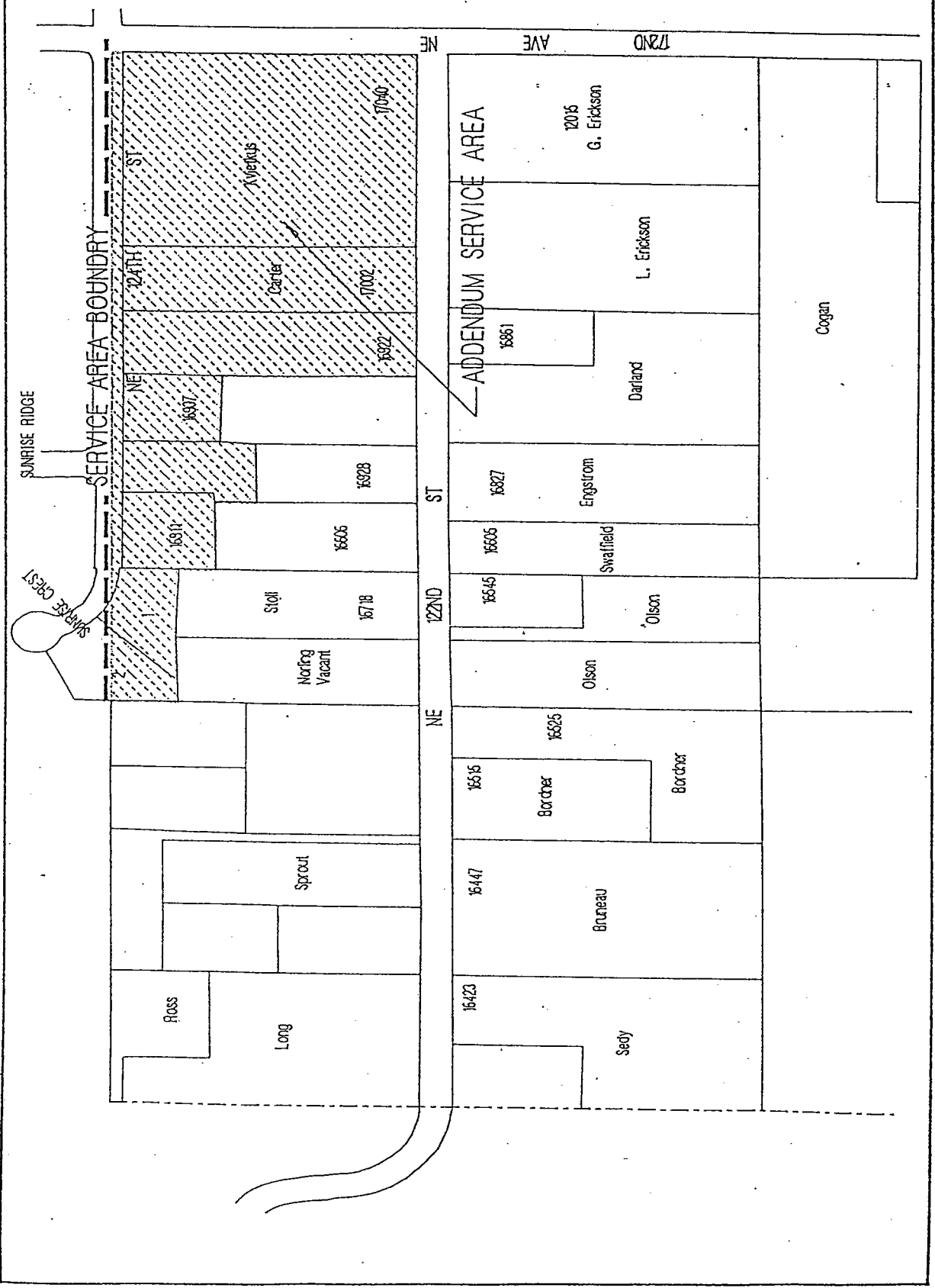
By *Queen Marfeld*
Its President

By *Ann M. Hoover*
Its Secretary

EXHIBIT "A"

1. Lot 1, Sunrise Crest
2. Lot 2, Sunrise Crest
3. Lot 2, King County Short Plat 677151
4. Lot 3, King County Short Plat 677151
5. Lot 2, King County Short Plat 986019
6. Tax Lot 9 - Section 25, Township 26N, Range 5E, WM
7. Tax Lot 119 - Section 25, Township 26N, Range 5E, WM
8. Tax Lot 59 - Section 25 , Township 26n, Range 5e, WM

WTAG001E.DLV Apr 28th, 1933



REDMOND-WOODINVILLE INTERLOCAL AGREEMENT 93-001



LEGEND:

NOT TO SCALE

WATER SERVICE TO AN AREA BETWEEN 167TH AVE NE AND 172ND AVE NE

EXHIBIT "C"

Redmond recognizes that Woodinville currently provides water service to Lots 1, and 2 of Sunrise Crest, Lot 2 of King County short plat 677151 and Lot 2 of King County Short plat 986019 and that service will continue to these four lots. Water service may be provided to the existing homes on Lot 3, KCSP 677151, tax lot 9, tax lot 119, and tax lot 59, by connecting to the existing Woodinville watermain in N.E. 124th Street.

Water service for additional subdivision of the properties is not provided for in this agreement and will be provided directly from Redmond or by addendum to the interlocal agreement.

**EXHIBIT "D" TO ADDENDUM
TO INTERLOCAL AGREEMENT**

AGREEMENT CONCERNING WATER SERVICE

WHEREAS, the undersigned are the owners of certain real property located in King County, Washington within the Utility Service Area Boundaries of the City of Redmond.

WHEREAS, said owners desire to obtain water service from the Woodinville Water District, and pursuant to an interlocal agreement between the Woodinville Water District and the City of Redmond dated _____, a copy of which is attached hereto as Exhibit "A", ("the interlocal agreement") the consent of the City of Redmond is required for the District to provide water service within redmond's Utility Service Area south of N.E. 124th Street, and certain agreements on the part of the owners of property to be served relating to annexations and formation of local improvements districts or utility local improvement districts are required by the interlocal agreement, and

WHEREAS, in order to induce the City of Redmond to grant consent for the District to provide water service to that portion of the development located within Redmond's Utility Service Area and to comply with the requirements of the interlocal agreement relating to annexation and Local Improvement Districts (LID)/Utility Local Improvement Districts (ULID), the undersigned owners, on behalf of themselves, their heirs, successors and assigns, intending the City of Redmond to be a beneficiary of this agreement, hereby covenant and agree as follows:

1. Annexation to City of Redmond. The undersigned owners understand that at some future date the City of Redmond may desire to annex all or part of the property described on Exhibit "B" to the City and that annexation will result in the following consequences:
 - a. King County ordinances, resolutions, rules and regulations will cease to apply to the property upon the effective date of annexation;

- b. City of Redmond ordinances, resolutions, rules and regulations will begin to apply to the property upon the effective date of annexation;
- c. Governmental services, such as police, fire and utility service, will be provided to the property by the City of Redmond upon the effective date of annexation;
- d. The property may be required to assume all or any portion of the City of Redmond indebtedness existing at the time of annexation and property tax rates and assessments applicable to the property may be higher or lower than those applicable prior to the effective date of annexation;
- e. Zoning and land use regulations applicable to the property after annexation may be different from those applicable to the property prior to annexation; and
- f. All or any portion of the property may be annexed and the property may be annexed in conjunction with, or at the same time as, other property in the vicinity.

With full knowledge and understanding of these consequences of annexation and with full knowledge and understanding of owners rights to oppose annexation of the property to the City of Redmond, owners agree to sign a petition for annexation to the City of property including all or part of the property described on Exhibit "B" as provided in RCW 35.14.120, as it now exists or as it may hereafter be amended, at such time as the owners are requested by the City to do so. The owners also appoint the Mayor of the City as owners' attorney-in-fact to execute an annexation petition on owners' behalf in the event that owners shall fail or refuse to do so and agree that such signature shall constitute full authority from the owners for annexation as if owners had signed the petition themselves. Owners further agree not to litigate, challenge or in any manner contest, annexation to the City. This agreement shall be deemed to be continuing, and if owners' petitions for whatever reason, including a decision by the City not to annex, owners agree to sign any and all subsequent petitions for annexation. In the event that any property described on Exhibit "B" is subdivided into smaller lots, and/or ownership thereof is transferred, the purchaser or other transferee of each subdivided lot or other portion or the entirety of the property shall be bound by the provisions of this paragraph and by purchasing or otherwise assuming an

ownership interest designates the Mayor of Redmond as attorney-in-fact as provided above.

2. Waiver of Right to Protest Formation of LID/ULID. The undersigned owners acknowledge that the entire property legally described on Exhibit "B" would be specially benefited by the following utility improvements (specify):
 1. Future storage facility to be constructed by Redmond or others to serve the property.
 2. Future water supply connection by Redmond to City of Seattle Tolt Supply System.
 3. Future water transmission/distribution mains which connect the site to City of Redmond water supply and storage facilities including, but not limited to water mains in the following streets, private roads or easements:
 - a. N.E. 122nd Street
 - b. 172nd Avenue N.E.

Or by improvements providing substantially equivalent service to the property. Owners agree to sign a petition for the formation of an LID or ULID for all or any of the specified or substantially equivalent improvements at such time as one is circulated and owners hereby appoint the Mayor of the City as their attorney-in-fact to sign such a petition in the event owners fail or refuse to do so. By purchasing or otherwise acquiring an ownership interest in all or any part of the property, all transferees thereby so designate the Mayor of the City as attorney-in-fact.

With full understanding of owners' right to protest formation of an LID or ULID to construct such improvements pursuant to RCW 35.43.180, owners agree to participate in any such LID or ULID and to waive their right to protest formation of the same. Owners shall retain the right to contest the method of calculating any assessment and the amount thereof, and shall further retain the right to appeal the decision of the City affirming the final assessment roll to the superior court. Notwithstanding any other provisions of this agreement, this waiver of the right to protest shall only be valid for a period of ten (10) years from the date this agreement is signed by the owners.

STATE OF WASHINGTON)

)ss:

COUNTY OF _____)

I certify that I know or have satisfactory evidence that _____
signed this instrument and acknowledged it to be (his/her) free and voluntary act for the
purposes mentioned in this instrument.

DATED this _____ day of _____, 19__.

NOTARY PUBLIC

My commission expires: _____

3. **Covenant Running With Land/Binding on Successors.** The covenants and agreements set forth herein shall be covenants running with owners' land identified on Exhibit "B" hereto and shall be binding upon the parties, their heirs, assigns, and successors in interest. Owners acknowledge and stipulate that the agreements and covenants contained herein benefit utility and other property owned by the City by facilitating future expansion of redmond's water utility system. This agreement shall be recorded with the King county department of records and Elections.

DATED this _____ day of _____, 19__.

OWNER(S)

STATE OF WASHINGTON)

COUNTY OF _____)ss:
)

I certify that I know or have satisfactory evidence that _____ signed this instrument and acknowledged it to be (his/her) free and voluntary act for the purposes mentioned in this instrument.

DATED this _____ day of _____, 19__.

NOTARY PUBLIC

My commission expires: _____



12/29/93
THE CITY OF REDMOND
PUBLIC WORKS DEPARTMENT

RECEIVED

JAN 06 1994

Woodinville Water District

January 4, 1994

Mr. Kenneth Pick, P.E.
Utility Planning Engineer
Woodinville Water District
P.O. Box 1390
Woodinville, Washington 98072-1390

SUBJECT: *Addendum to Interlocal Agreement
Water Service to an Area East of 184th Avenue N.E.
Woodinville 93-003*

Dear Ken:

On October 5, 1993, the Redmond City Council passed the Addendum to the Interlocal in regards to service to an area east of 184th Avenue N.E. Enclosed is a signed original of that agreement, please keep this original for your files.

If you should have any further questions in regards to this addendum please feel free to call me at 556-2829.

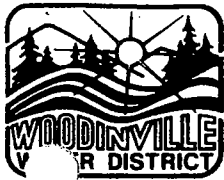
Sincerely,

Scott Thomasson
Utility Engineering Supervisor

sb

Enclosure

CASCOTLTRSVAD184TH.DOC



WOODINVILLE WATER DISTRICT
 17238 Woodinville-Duvall Road
 P.O. Box 1390
 Woodinville, WA 98072-1390
 (206) 483-9104

LETTER OF TRANSMITTAL

DATE	JAN 10, 1994	JOB NO.
ATTENTION		
RE:	Interlocal Agreement	
	Addendum	
	EXHIBIT B	

TO SCOTT THOMASSON
CITY OF REDMOND

WE ARE SENDING YOU Attached Under separate cover via _____ the following items:

- Shop drawings Prints Plans Samples Specifications
 Copy of letter Change order _____

COPIES	DATE	NO.	DESCRIPTION
1	1/10/94		SIGNED EXHIBIT "B" WATER SERVICE TO AREA EAST OF 184 th NE

THESE ARE TRANSMITTED as checked below:

- For approval Approved as submitted Resubmit _____ copies for approval
 For your use Approved as noted Submit _____ copies for distribution
 As requested Returned for corrections Return _____ corrected prints
 For review and comment _____
 FOR BIDS DUE _____ 19 _____ PRINTS RETURNED AFTER LOAN TO US

REMARKS HAND CARRIED BY DAVID BOSTIC

COPY TO _____ SIGNED: [Signature]

**ADDENDUM TO INTERLOCAL AGREEMENT BETWEEN
REDMOND AND WOODINVILLE WATER DISTRICT
WATER SERVICE TO AN AREA EAST OF 184TH AVENUE N.E.**

WHEREAS, the City of Redmond, Washington ("Redmond") and the Woodinville Water District ("the District") are parties to that certain interlocal agreement ("the interlocal agreement") dated July 13, 1988, which designates the common service area boundary between the District and Redmond, and

WHEREAS, Redmond and the District desire to supplement such agreement pursuant to Paragraph 12 thereof to enable the District to provide water service to a portion of residential development south of the common service area boundary,

NOW, THEREFORE, IT IS HEREBY COVENANTED AND AGREED AS FOLLOWS:

1) Description of Service Area Boundary

Redmond and the District agree that the District may provide water service to the properties described and shown in Exhibit "A", attached hereto.

2) Consent to Service by District

The City of Redmond hereby consents to allow the District to provide water service to those properties included within Redmond's water and sewer service area boundary per the method described in Section 2(b) of the July 13, 1988 Interlocal Agreement. Consent for service is only to one new single-family home on the property and is not for service for additional subdivision of the property.

3) Service Extension, Approval of Plans and Specifications.

Water service to said properties shall be subject to the terms in Exhibit "B" and shall be constructed as described in Exhibit "C". Redmond and the District agree that the water improvements shall be designed and constructed in accordance with the standards of Redmond or the District, whichever is more stringent. The District shall submit plans and specifications for facilities which will be used to provide such service to the Redmond Utility Engineer for approval. Approval or rejection of the plans and specifications shall be based upon compliance with Redmond water service, fire flow, and construction standards.

4) Property Owner Agreement

Prior to making any commitment to extend facilities or provide service within Redmond's service area, the District shall procure and provide to Redmond written agreements signed by each owner of property within the Redmond service area which will be served pursuant to this agreement in the form attached hereto as Exhibit "B". The original of such agreements shall be provided to Redmond and Redmond shall record the agreement with the King County Department of Records and Elections.

5) Assumption of Service Area and Ownership of Facilities

a. Upon annexation of all or a portion of the subject properties to the City of Redmond, or upon extension of Redmond's water facilities which will enable connection of the water facilities serving the properties to Redmond's facilities. Redmond, at its option, may elect to assume the rights and responsibilities of providing water service to any or all of the subject properties. This option may be exercised by giving written notice of such election to the District no less than 90 days prior to the proposed effective date of assumption of water service by Redmond. Upon agreement with the District, Redmond may purchase water from the District required to serve such portion of the development at the then current District wholesale rate, which is defined in the Interlocal Agreement.

b. Upon the effective date of the transfer of rights and responsibility to provide water service to the City of Redmond pursuant to this section, the District shall quit claim and transfer to Redmond all of its rights in and title to all watermains, transmission and service lines, hydrants and other facilities located in Redmond's service area. Appropriate bills of sale and all other conveyances necessary to effectuate complete transfer of the District's interest shall be provided by the District to Redmond.

c. The District shall cooperate in making a physical connection to the Redmond facilities and in performing such minor alterations to its facilities as may be required in order to complete the connection with Redmond facilities at Redmond's sole expense. The District shall also cooperate in the transfer of all customer and billing information reasonably required for Redmond to assume and perform utility billing functions.

d. No connection fee or other charge shall be assessed by Redmond upon those customers receiving service at the time of transfer of responsibility for water service from the District to Redmond.

6. Remainder of Agreement Unchanged

Except as stated above, the interlocal agreement between the District and Redmond shall remain unchanged and in full force and effect.

DATED this 29th day of December, 1993.

CITY OF REDMOND
By [Signature]
Its MAYOR

APPROVED AS TO FORM:

OFFICE OF THE CITY
ATTORNEY
BY [Signature]

WOODINVILLE WATER
DISTRICT

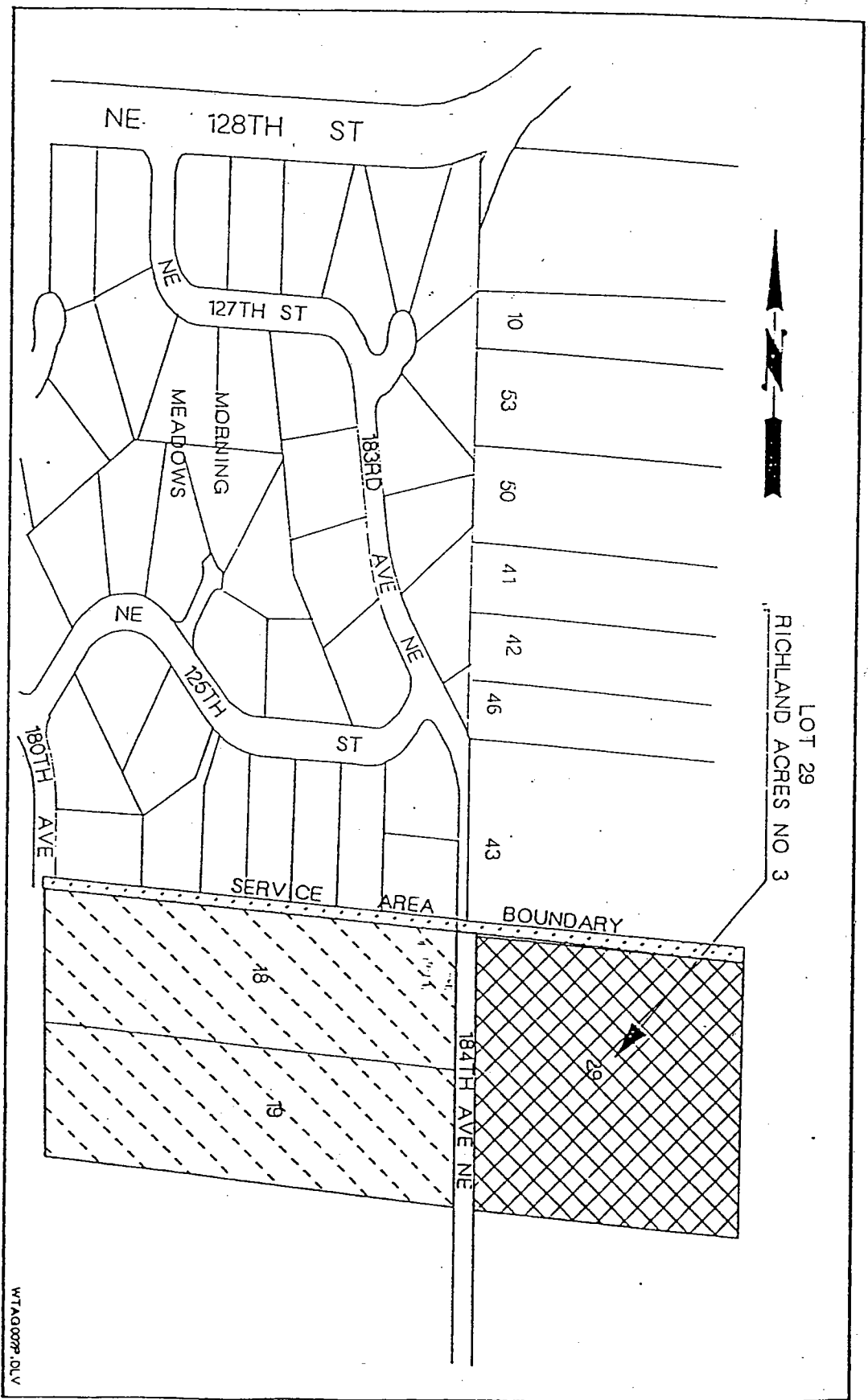
By _____
Its President

By [Signature]
Its Secretary



AMENDMENT TO INTERLOCAL
AGREEMENT 93-002
SERVICE WEST OF 184TH AVENUE NE

LEGEND:
[Cross-hatched box] SUBJECT AREA
[Dashed box] AREA COVERED BY
PREVIOUS AGREEMENT
DRAWING NOT TO SCALE



LOT 29
RICHLAND ACRES NO 3

WTAG007P.DLV

EXHIBIT "B"

AGREEMENT CONCERNING WATER SERVICE

WHEREAS, the undersigned are the owners of certain real property located in King County, Washington within the Utility Service Area Boundaries of the City of Redmond.

WHEREAS, said owners desire to obtain water service from the Woodinville Water District, and pursuant to an interlocal agreement between the Woodinville Water District and the City of Redmond dated Dec. 23, 1993, a copy of which is attached hereto as Exhibit "A", ("the interlocal agreement") the consent of the City of Redmond is required for the District to provide water service within Redmond's Utility Service Area south of N.E. 124th Street, and certain agreements on the part of the owners of property to be served relating to annexations and formation of local improvements districts or utility local improvement districts are required by the interlocal agreement, and

WHEREAS, in order to induce the City of Redmond to grant consent for the District to provide water service to that portion of the development located within Redmond's Utility Service Area and to comply with the requirements of the interlocal agreement relating to annexation and Local Improvement Districts (LID)/Utility Local Improvement Districts (ULID), the undersigned owners, on behalf of themselves, their heirs, successors and assigns, intending the City of Redmond to be a beneficiary of this agreement, hereby covenant and agree as follows:

1. Annexation to City of Redmond. The undersigned owners understand that at some future date the City of Redmond may desire toⁱⁿ annex all or part of Lot 29, Richland Acres, No. 3 (the Property) to the City and that annexation will result in the following consequences:
 - a. King County ordinances, resolutions, rules and regulations will cease to apply to the property upon the effective date of annexation;
 - b. City of Redmond ordinances, resolutions, rules and regulations will begin to apply to the property upon the effective date of annexation;

- c. Governmental services, such as police, fire and utility service, will be provided to the property by the City of Redmond upon the effective date of annexation;
- d. The property may be required to assume all or any portion of the City of Redmond indebtedness existing at the time of annexation and property tax rates and assessments applicable to the property may be higher or lower than those applicable prior to the effective date of annexation;
- e. Zoning and land use regulations applicable to the property after annexation may be different from those applicable to the property prior to annexation; and
- f. All or any portion of the property may be annexed and the property may be annexed in conjunction with, or at the same time as, other property in the vicinity.

With full knowledge and understanding of these consequences of annexation and with full knowledge and understanding of owners rights to oppose annexation of the property to the City of Redmond, owners agree to sign a petition for annexation to the City of property including all or part of the Property as provided in RCW 35.14.120, as it now exists or as it may hereafter be amended, at such time as the owners are requested by the City to do so. The owners also appoint the Mayor of the City as owners' attorney-in-fact to execute an annexation petition on owners' behalf in the event that owners shall fail or refuse to do so and agree that such signature shall constitute full authority from the owners for annexation as if owners had signed the petition themselves. Owners further agree not to litigate, challenge or in any manner contest, annexation to the City. This agreement shall be deemed to be continuing, and if owners' petitions for whatever reason, including a decision by the City not to annex, owners agree to sign any and all subsequent petitions for annexation. In the event that the Property is subdivided into smaller lots, and/or ownership thereof is transferred, the purchaser or other transferee of each subdivided lot or other portion or the entirety of the property shall be bound by the provisions of this paragraph and by purchasing or otherwise assuming an ownership interest designates the Mayor of Redmond as attorney-in-fact as provided above.

2. Waiver of Right to Protest Formation of LID/ULID. The undersigned owners acknowledge that the Property would be specially benefited by the following utility improvements (specify):
 1. Future storage facility to be constructed by Redmond or others to serve the Property.
 2. Future water supply connection by Redmond to City of Seattle Tolt Supply System.
 3. Future water transmission/distribution mains which connect the site to City of Redmond water supply and storage facilities including, but not limited to water mains in the following streets, private roads or easements:
 - a. 184th Avenue N.E.

Or by improvements providing substantially equivalent service to the property. Owners agree to sign a petition for the formation of an LID or ULID for all or any of the specified or substantially equivalent improvements at such time as one is circulated and owners hereby appoint the Mayor of the City as their attorney-in-fact to sign such a petition in the event owners fail or refuse to do so. By purchasing or otherwise acquiring an ownership interest in all or any part of the property, all transferees thereby so designate the Mayor of the City as attorney-in-fact.

With full understanding of owners' right to protest formation of an LID or ULID to construct such improvements pursuant to RCW 35.43.180, owners agree to participate in any such LID or ULID and to waive their right to protest formation of the same. Owners shall retain the right to contest the method of calculating any assessment and the amount thereof, and shall further retain the right to appeal the decision of the City affirming the final assessment roll to the superior court. Notwithstanding any other provisions of this agreement, this waiver of the right to protest shall only be valid for a period of ten (10) years from the date this agreement is signed by the owners.

3. Covenant Running With Land/Binding on Successors. The covenants and agreements set forth herein shall be covenants running with the Property and shall be binding upon the parties, their heirs, assigns, and successors in interest. Owners acknowledge and stipulate that the agreements and covenants contained herein benefit utility and other property owned by the City by facilitating future expansion

of Redmond's water utility system. This agreement shall be recorded with the King county department of records and Elections.

DATED this 10th day of January, 1994

OWNER(S)

Albert

STATE OF WASHINGTON)

COUNTY OF King)ss:
)

I certify that I know or have satisfactory evidence that David Bostic signed this instrument and acknowledged it to be (his/her) free and voluntary act for the purposes mentioned in this instrument.

DATED this 10th day of January, 1994.

Deanna Gilbert
NOTARY PUBLIC
My commission expires: 1-30-96

STATE OF WASHINGTON)

COUNTY OF _____

)ss:
)

I certify that I know or have satisfactory evidence that _____
signed this instrument and acknowledged it to be (his/her) free and voluntary act for the
purposes mentioned in this instrument.

DATED this _____ day of _____, 19____.

NOTARY PUBLIC

My commission expires: _____

EXHIBIT "C"

Water service to the subject property shall be provided by constructing a watermain in 184th Avenue N.E. generally along the entire frontage of the parcel with a connection to the Woodinville water system at N.E. 124th Street. Redmond may determine that the connection in 184th Avenue N.E. to the Woodinville system may not be required if the new main is extended and connected to the Woodinville system at 180th Avenue N.E. Water service for additional subdivision of the property is not provided for in this agreement. Any such subdivision of this property will be provided service directly from Redmond or through an additional addendum to the interlocal agreement.

1/27/94

**ADDENDUM TO INTERLOCAL AGREEMENT BETWEEN
REDMOND AND WOODINVILLE WATER DISTRICT
WATER SERVICE TO AN AREA EAST OF 176TH AVENUE N.E.
EXTENDED**

WHEREAS, the City of Redmond, Washington ("Redmond") and the Woodinville Water District ("the District") are parties to that certain interlocal agreement ("the interlocal agreement") dated July 13, 1988, which designates the common service area boundary between the District and Redmond, and

WHEREAS, Redmond and the District desire to supplement such agreement pursuant to Paragraph 12 thereof to enable the District to provide water service to a portion of residential development south of the common service area boundary,

NOW, THEREFORE, IT IS HEREBY COVENANTED AND AGREED AS FOLLOWS:

1) Description of Service Area Boundary

Redmond and the District agree that the District may provide water service to the properties described and shown in Exhibit "A", attached hereto.

2) Consent to Service by District

The City of Redmond hereby consents to allow the District to provide water service to those properties included within Redmond's water and sewer service area boundary per the method described in Section 2(b) of the July 13, 1988 Interlocal Agreement. Consent for service is only to one new single-family home on the property and is not for service for additional subdivision of the property.

3) Service Extension, Approval of Plans and Specifications.

Water service to said properties shall be subject to the terms in Exhibit "B" and shall be constructed as described in Exhibit "C". Redmond and the District agree that the water improvements shall be designed and constructed in accordance with the standards of Redmond or the District, whichever is more stringent. The District shall submit plans and specifications for facilities which will be used to provide such service to the Redmond Utility Engineer for approval. Approval or

rejection of the plans and specifications shall be based upon compliance with Redmond water service, fire flow, and construction standards.

4) Property Owner Agreement

Prior to making any commitment to extend facilities or provide service within Redmond's service area, the District shall procure and provide to Redmond written agreements signed by each owner of property within the Redmond service area which will be served pursuant to this agreement in the form attached hereto as Exhibit "B". The original of such agreements shall be provided to Redmond and Redmond shall record the agreement with the King County Department of Records and Elections.

5) Assumption of Service Area and Ownership of Facilities

a. Upon annexation of all or a portion of the subject properties to the City of Redmond, or upon extension of Redmond's water facilities which will enable connection of the water facilities serving the properties to Redmond's facilities. Redmond, at its option, may elect to assume the rights and responsibilities of providing water service to any or all of the subject properties. This option may be exercised by giving written notice of such election to the District no less than 90 days prior to the proposed effective date of assumption of water service by Redmond. Upon agreement with the District, Redmond may purchase water from the District required to serve such portion of the development at the then current District wholesale rate, which is defined in the Interlocal Agreement.

b. Upon the effective date of the transfer of rights and responsibility to provide water service to the City of Redmond pursuant to this section, the District shall quit claim and transfer to Redmond all of its rights in and title to all watermains, transmission and service lines, hydrants and other facilities located in Redmond's service area. Appropriate bills of sale and all other conveyances necessary to effectuate complete transfer of the District's interest shall be provided by the District to Redmond.

c. The District shall cooperate in making a physical connection to the Redmond facilities and in performing such minor alterations to its facilities as may be required in order to complete the connection with Redmond facilities at Redmond's sole expense. The District shall also cooperate in the transfer of all customer and billing information reasonably required for Redmond to assume and perform utility billing functions.

d. No connection fee or other charge shall be assessed by Redmond upon those customers receiving service at the time of transfer of responsibility for water service from the District to Redmond.

6. Remainder of Agreement Unchanged

Except as stated above, the interlocal agreement between the District and Redmond shall remain unchanged and in full force and effect.

DATED this 27th day of January, 19 94.

CITY OF REDMOND
By Rosemarie
Its MAYOR

APPROVED AS TO FORM:

OFFICE OF THE CITY
ATTORNEY



By [Signature]

WOODINVILLE WATER
DISTRICT

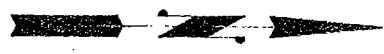
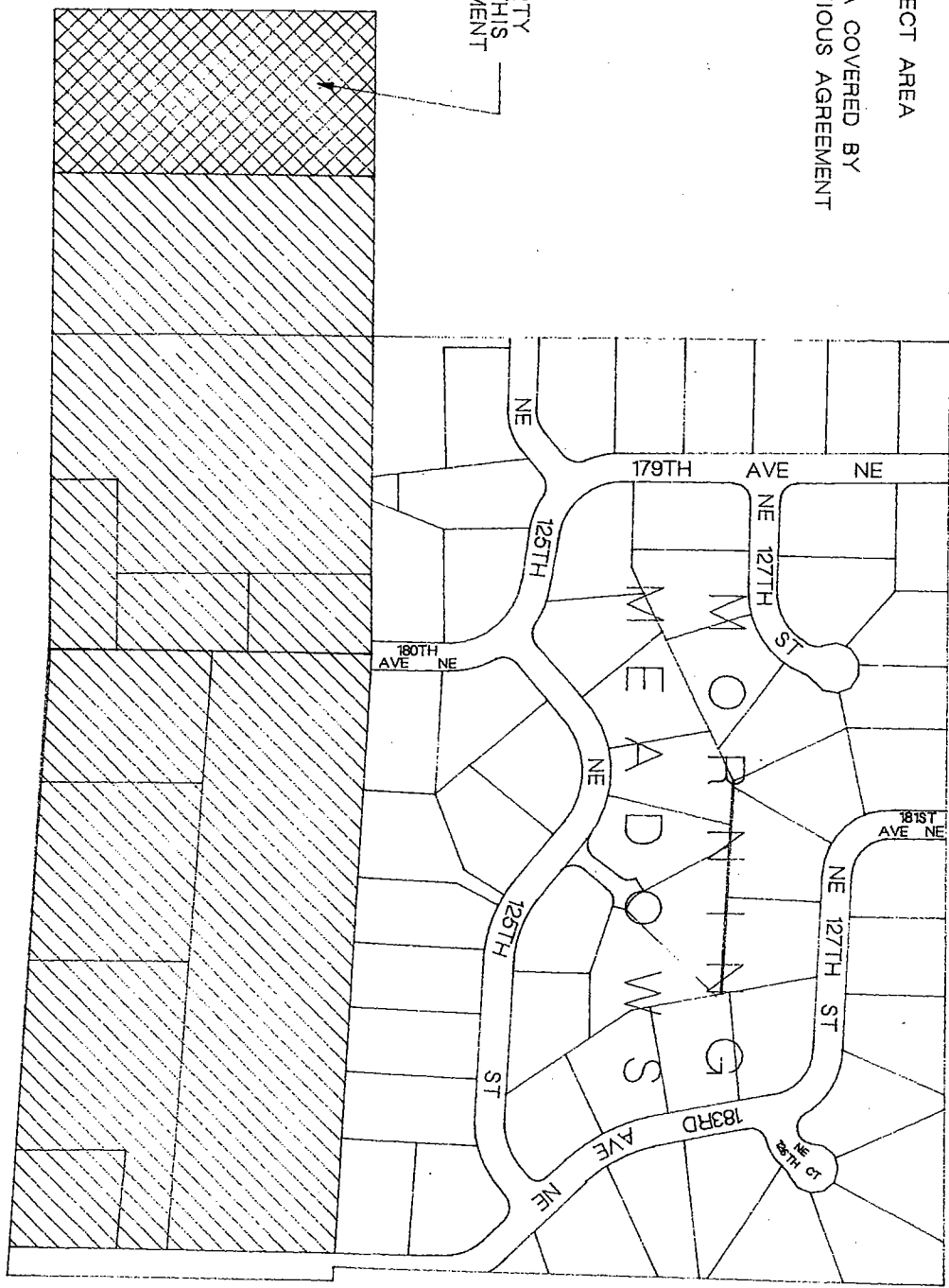
By Queen Maxfield
Its President

By [Signature]
Its Secretary

LEGEND:

-  SUBJECT AREA
-  AREA COVERED BY PREVIOUS AGREEMENT

PROPERTY FOR THIS AGREEMENT



DRAWING NOT TO SCALE



AMENDMENT TO INTERLOCAL AGREEMENT 93-003

SERVICE EAST OF 176TH AVENUE NE

EXHIBIT "B"

AGREEMENT CONCERNING WATER SERVICE

WHEREAS, the undersigned are the owners of certain real property located in King County, Washington within the Utility Service Area Boundaries of the City of Redmond.

WHEREAS, said owners desire to obtain water service from the Woodinville Water District, and pursuant to an interlocal agreement between the Woodinville Water District and the City of Redmond dated _____, a copy of which is attached hereto as Exhibit "A", ("the interlocal agreement") the consent of the City of Redmond is required for the District to provide water service within Redmond's Utility Service Area south of N.E. 124th Street, and certain agreements on the part of the owners of property to be served relating to annexations and formation of local improvements districts or utility local improvement districts are required by the interlocal agreement, and

WHEREAS, in order to induce the City of Redmond to grant consent for the District to provide water service to that portion of the development located within Redmond's Utility Service Area and to comply with the requirements of the interlocal agreement relating to annexation and Local Improvement Districts (LID)/Utility Local Improvement Districts (ULID), the undersigned owners, on behalf of themselves, their heirs, successors and assigns, intending the City of Redmond to be a beneficiary of this agreement, hereby covenant and agree as follows:

1. Annexation to City of Redmond. The undersigned owners understand that at some future date the City of Redmond may desire to annex all or part of the west 1/2 of the northwest 1/4 of the northeast 1/4 of the southeast 1/4 of Section 25, Township 26N, Range 5 east W.M. (the Property) to the City and that annexation will result in the following consequences:
 - a. King County ordinances, resolutions, rules and regulations will cease to apply to the property upon the effective date of annexation;

- b. City of Redmond ordinances, resolutions, rules and regulations will begin to apply to the property upon the effective date of annexation;
- c. Governmental services, such as police, fire and utility service, will be provided to the property by the City of Redmond upon the effective date of annexation;
- d. The property may be required to assume all or any portion of the City of Redmond indebtedness existing at the time of annexation and property tax rates and assessments applicable to the property may be higher or lower than those applicable prior to the effective date of annexation;
- e. Zoning and land use regulations applicable to the property after annexation may be different from those applicable to the property prior to annexation; and
- f. All or any portion of the property may be annexed and the property may be annexed in conjunction with, or at the same time as, other property in the vicinity.

With full knowledge and understanding of these consequences of annexation and with full knowledge and understanding of owners rights to oppose annexation of the property to the City of Redmond, owners agree to sign a petition for annexation to the City of property including all or part of the Property as provided in RCW 35.14.120, as it now exists or as it may hereafter be amended, at such time as the owners are requested by the City to do so. The owners also appoint the Mayor of the City as owners' attorney-in-fact to execute an annexation petition on owners' behalf in the event that owners shall fail or refuse to do so and agree that such signature shall constitute full authority from the owners for annexation as if owners had signed the petition themselves. Owners further agree not to litigate, challenge or in any manner contest, annexation to the City. This agreement shall be deemed to be continuing, and if owners' petitions for whatever reason, including a decision by the City not to annex, owners agree to sign any and all subsequent petitions for annexation. In the event that the Property is subdivided into smaller lots, and/or ownership thereof is transferred, the purchaser or other transferee of each subdivided lot or other portion or the entirety of the property shall be bound by the provisions of this paragraph and by purchasing or otherwise assuming an

ownership interest designates the Mayor of Redmond as attorney-in-fact as provided above.

2. Waiver of Right to Protest Formation of LID/ULID. The undersigned owners acknowledge that the Property would be specially benefited by the following utility improvements (specify):
 1. Future storage facility to be constructed by Redmond or others to serve the Property.
 2. Future water supply connection by Redmond to City of Seattle Tolt Supply System.
 3. Future water transmission/distribution mains which connect the site to City of Redmond water supply and storage facilities including, but not limited to water mains in the following streets, private roads or easements:
 - a. 124th Avenue N.E.
 - b. 172nd Avenue N.E.
 - c. N.E. 122nd Street extended
 - d. N.E. 178th Street extended
 - e. N.E. 176th Street extended

Or by improvements providing substantially equivalent service to the property. Owners agree to sign a petition for the formation of an LID or ULID for all or any of the specified or substantially equivalent improvements at such time as one is circulated and owners hereby appoint the Mayor of the City as their attorney-in-fact to sign such a petition in the event owners fail or refuse to do so. By purchasing or otherwise acquiring an ownership interest in all or any part of the property, all transferees thereby so designate the Mayor of the City as attorney-in-fact.

With full understanding of owners' right to protest formation of an LID or ULID to construct such improvements pursuant to RCW 35.43.180, owners agree to participate in any such LID or ULID and to waive their right to protest formation of the same. Owners shall retain the right to contest the method of calculating any assessment and the amount thereof, and shall further retain the right to appeal the decision of the City affirming the final assessment roll to the superior court. Notwithstanding any other provisions of this agreement, this waiver of the right to

protest shall only be valid for a period of ten (10) years from the date this agreement is signed by the owners.

3. **Covenant Running With Land/Binding on Successors.** The covenants and agreements set forth herein shall be covenants running with the Property and shall be binding upon the parties, their heirs, assigns, and successors in interest. Owners acknowledge and stipulate that the agreements and covenants contained herein benefit utility and other property owned by the City by facilitating future expansion of Redmond's water utility system. This agreement shall be recorded with the King county department of records and Elections.

DATED this _____ day of _____, 19__.

OWNER(S)

STATE OF WASHINGTON)

)ss:

COUNTY OF _____)

I certify that I know or have satisfactory evidence that _____ signed this instrument and acknowledged it to be (his/her) free and voluntary act for the purposes mentioned in this instrument.

DATED this _____ day of _____, 19__.

NOTARY PUBLIC

My commission expires: _____

STATE OF WASHINGTON)

)ss:

COUNTY OF _____)

I certify that I know or have satisfactory evidence that _____ signed this instrument and acknowledged it to be (his/her) free and voluntary act for the purposes mentioned in this instrument.

DATED this _____ day of _____, 19__.

NOTARY PUBLIC

My commission expires: _____

EXHIBIT "C"

Water service to the property shall be provided by constructing a watermain in N.E. 124th Street extended generally along the entire frontage of the parcel and adjacent parcel with a connection to the Woodinville water system approximately 150 feet east of 178th Avenue N.E. Water service for additional subdivision of the property is not provided for in this agreement. Any such subdivision of this property will be provided service directly from Redmond or through additional addendum to the interlocal agreement.

9/19/94

**AMENDMENT TO THE ADDENDUM TO THE INTERLOCAL
AGREEMENT BETWEEN REDMOND AND WOODINVILLE
WATER DISTRICT**

**WATER SERVICE TO AN AREA BETWEEN 177TH AVENUE N.E.
AND 184TH AVENUE N.E.**

WHEREAS, the City of Redmond, Washington ("Redmond") and the Woodinville Water District, ("District") are parties to that certain Interlocal Agreement dated July 13, 1988, which designates the common service area boundary between the District and Redmond, and

WHEREAS, Redmond and the District entered into an addendum dated October 1, 1992, providing for water service to an area between 177th Avenue N.E. and 184th Avenue N.E., and

WHEREAS, "Redmond" and the "District" desire to modify Exhibits B and C to the addendum,

NOW THEREFORE, IT IS HEREBY AGREED AS FOLLOWS:

- 1) Exhibit B is a map of the service area showing the proposed improvements and is hereby superseded and replaced by a new Exhibit B which is attached to this agreement.
- 2) Exhibit C is a narrative describing the water system improvements and is hereby superseded and replaced by a new Exhibit C which is attached to this agreement.
- 3) Remainder of Agreement of Change
Except as stated above the interlocal agreement between Redmond and the District and the addendum to the interlocal agreement shall remain unchanged and in full force and effective.

DATED this 19th day of September, 19 94.

CITY OF REDMOND
By [Signature]
Its MAYOR

APPROVED AS TO FORM:
OFFICE OF THE CITY
ATTORNEY
By [Signature]

WOODINVILLE WATER
DISTRICT
By [Signature]
Its President

By [Signature]
It Secretary

LEGEND:



SERVICE AREA

DRAWING NOT TO SCALE

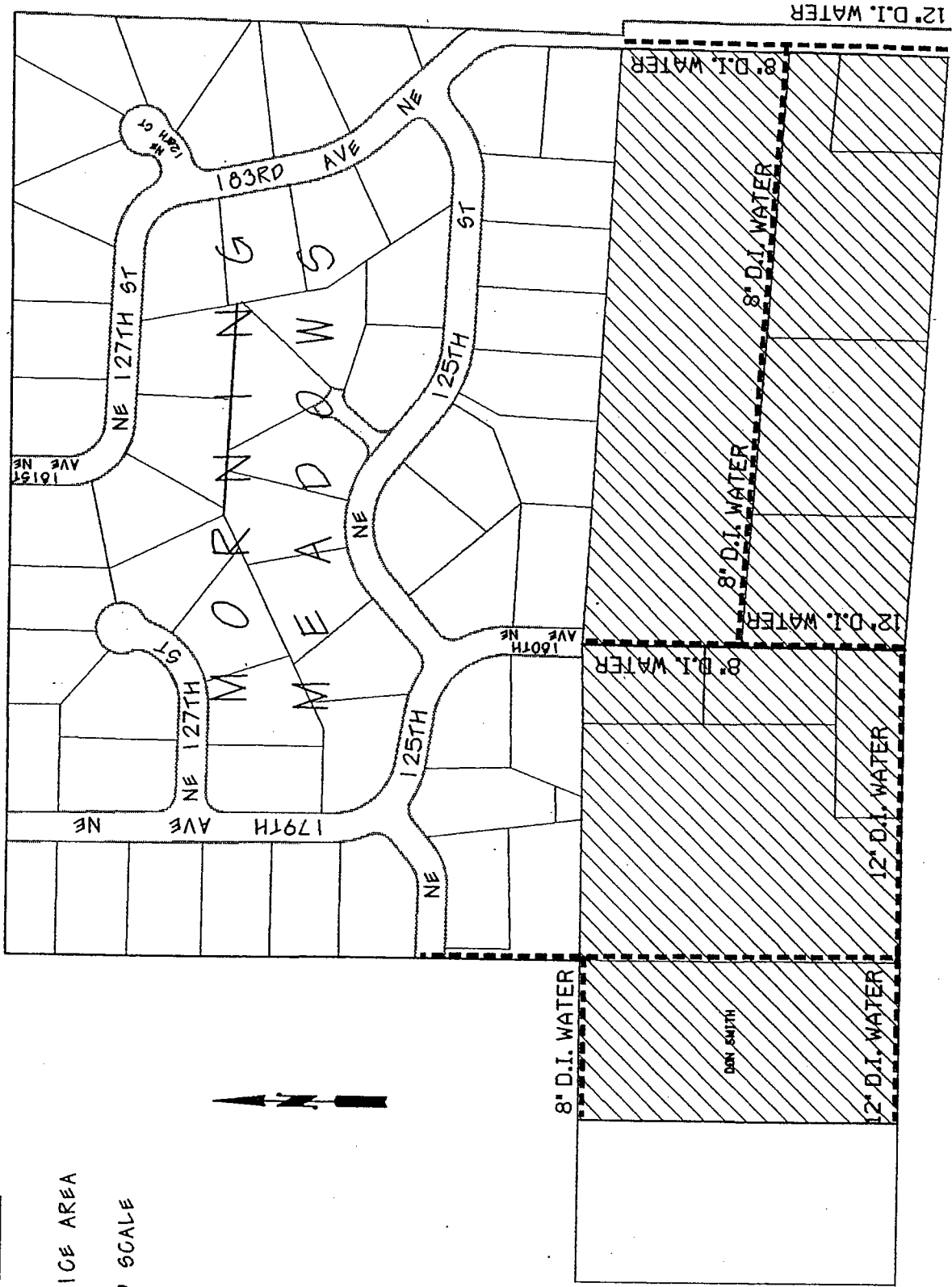


EXHIBIT "C"

Subsequent to any future development or request for service each property shall construct that portion of the following improvements which is located on or adjacent to the property:

Connect to the existing main between Lots 1 and 2, English Hill Estates. Extend an 8-inch main to the west property line of Don A. Smith's east lot. Extend an 8-inch main east to 178th Avenue N.E. (extended). Extend an 8-inch main to the south property line of Lot 4, S.P. 478183. Connect to this main at N.E. 122nd Street (extended) and extend a 12-inch main to the west property line of Don A. Smith's east lot. Connect to the 8-inch main at the southwest corner of Lot 4, S.P. 478183 and extend a 12-inch main to 180th Avenue N.E. Connect to the 12-inch main in 180th Avenue N.E. and extend an 8-inch main to N.E. 123rd Street (extended) then easterly in N.E. 123rd Street (extended) to the right-of-way of 184th Avenue N.E. Extend the 8-inch main south in 184th Avenue N.E. to the southerly property line of Lot 19. Connect to the 8-inch main in 184th Avenue N.E. and extend an 8-inch main north to the existing Woodinville main. Connect to the 8-inch main located northwest of Lot 1, S.P. 385081, and extend an 8-inch main north to the existing main located in 180th Avenue N.E. Provide all appropriate easements and right-of-way dedications to contain the waterline improvements.

Redmond recognizes that Woodinville currently provides water service to Lots 1, 2 and 3 of S.P. 478183 and Lots 1, 2, and 3 of S.P. 385081 through extended service agreement and that service will continue without construction of these improvement until such time as the extended service agreements are terminated. Water service may be provided to the existing home on Tax Lot 110 (Smith) and the existing home on Lot 4 S.P. 478183 (Hussey) by constructing an 8-inch main from English Hill Estates to 10 feet south of the north property line of the parcels with a fire hydrant. The mains in N.E. 124th Street (extended) and N.E. 122nd Street (extended) fronting these parcels and the main in 178th Avenue N.E. (extended) shall be constructed prior to any additional development or subdivision of the properties and an agreement between Redmond, Woodinville, and the property owners shall be recorded which established this covenant.

Appendix B
Water Purveyor Contract with the City of Seattle

WATER PURVEYOR CONTRACT

between

THE CITY OF SEATTLE

and

for the

SUPPLY OF WATER

VERSION B

November, 1981

Amended

February 3, 1982

February 26, 1982

VERSION B

WATER PURVEYOR CONTRACT

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WATER PURVEYOR CONTRACT

BETWEEN

THE CITY OF SEATTLE

AND

FOR THE

SUPPLY OF WATER

THIS CONTRACT between the CITY OF SEATTLE, a municipal corporation of the State of Washington, hereinafter called the "City", and herein individually referred to as the "Purveyor", witnesseth the following RECITALS:

1. The City owns and operates a system for the supply, transmission and distribution of water and is authorized to sell and distribute water to its own inhabitants and also to other persons and customers outside the corporate limits of the City.

2. The City has met the water needs of its purveyors outside its corporate limits in the past without written Long-term Contracts, and will make provision in its long-range plans for the continuing requirements of such service in the future for those purveyors signing Long-term Contracts, who have foregone and will forego long-range capital expenditures for supply and

wholesale distribution in reliance thereon in accordance with this Contract and except as otherwise provided for herein.

3. In the past, the City has supplied water to purveyors for resale pursuant to a general wholesale rate schedule established by the City, and it is now the purpose of both parties to establish by agreement certain rights and duties incident to future water service and supply.

4. It is contemplated that the City will enter into contracts similar to those designated Versions A or B dated November 1981 with other purveyors who agree to enter into Long-term Contracts.

5. The City is willing to continue to serve as a regional water supplier if this role does not place financial burdens on the Direct Service ratepayers of the City from which they would not receive a corresponding benefit.

6. It is the intent of both parties that this Contract will not preclude one or more purveyors from financing and/or constructing certain new water supply facilities for use or partial use by purveyors, with the understanding that the City would have to approve, by separate agreement, the financing and/or construction by such purveyor or purveyors of any such facility that the City would otherwise be required to provide in order to comply with the provisions of this Contract.

NOW, THEREFORE, in consideration of mutual covenants herein, it is agreed as follows:

SECTION I.

TERM OF CONTRACT AND GUARANTEES

I.A. Term of Contract

1. Subject to the other provisions contained herein, the original term of this Contract shall commence and this Contract shall become effective on the date of the City's execution hereof. This term shall continue and this Contract shall remain effective until January 1, 2012.

2. Subsequently, the contract term shall be extended for additional fifteen (15) year increments, provided both parties express their intent to do so in writing at least fifteen (15) years prior to the end of the contract term or extension thereof.

I.B. Agreement to Supply and Purchase Water

1. The City agrees to supply the water requirements of the Purveyor subject to conditions of this Contract. The Purveyor shall purchase water from the City as specified in Exhibit I-B except for the quantity of water presently obtained by the Purveyor from other sources or committed to be obtained from other sources, provided that documentation of such quantities and copies of such commitments have been transmitted to the City (along with this Contract) prior to the City's execution of this Contract.

2. In the event the Purveyor should annex to or transfer all or a portion of its service area

receiving City water, adjustments shall be made in the Purveyor's water requirements and costs to reflect that associated with these areas.

3. Should the entire water service area of the Purveyor be annexed to the City, then this Contract shall become null and void at the time of the annexation, and the City shall become responsible for that portion of the Purveyor's costs as set forth in Paragraph I.B.4.b. of this Section.

4. Also, the Purveyor may reduce the amount of water it has contracted for in Exhibit I-B under the following conditions, except that said conditions do not apply in the case of partial annexation by the City:

- a. At least five (5) years' written notice of the reduction is provided to the City and the Purveyor Committee.
- b. The Purveyor holds the City and other purveyors signing Long-term Contracts on the Regional Water Supply System harmless by compensating them for any increased capital costs allocated to them as a result of any such reduction in water contracted for.
- c. Such reduction schedule and compensation, subsequent to review by the Purveyor Committee, is subject to approval by the City. Such approval shall not be unreasonably withheld.

5. The Purveyor may also obtain water from other State-approved sources upon the prior written consent of the City, in those instances where:

- a. The City determines that the City's major supply facilities are not adequate to supply the Purveyor the amount of water specified in Exhibit I-B.
- b. The Purveyor interconnects with other purveyors' systems or the Purveyor develops other sources for summer water supply peaking purposes when said interconnection or development is for the purpose of avoiding a demand charge.

6. The Purveyor shall not enter into any new agreements for water supply with any other entity to either purchase or wholesale water without first having obtained the written consent of the City, which consent will not be unreasonably withheld.

I.C. Assignability

1. This Contract shall be binding upon all successors and assigns of the parties. Neither party may assign or transfer its interest in this Contract without the written consent of the other party, which shall not be unreasonably denied, except that such consent shall not be required when the assignment or transfer is mandated by State law. Subject to such limitation, the City and/or the Purveyor may assign its interest to a legally constituted regional water authority.

2. It is further agreed that the City shall not demand or receive any additional consideration for such an assignment as a result of the City and the purveyor having signed this Contract.

I.D. Continuity of Service

1. Continuity of service to the Purveyor shall be maintained by the City, to the extent feasible, in the same manner as service to the City's own inhabitants and other Direct Service consumers. In the event of a general emergency or water shortage affecting the entire Regional Water Supply System requiring restrictions on the delivery of water, general restrictions placed upon deliveries to the Purveyor shall be determined by a similar method to that used for restricting deliveries to the City's Direct Service consumers. In the event of localized emergency problems, temporary service interruptions may result.
2. It is recognized by both parties that emergency conservation measures may have to be implemented by the City on a regional basis in order to meet an emergency condition. The Purveyor shall assist and support such emergency conservation measures.
3. The City shall provide oral notice to purveyors, and may temporarily interrupt or reduce deliveries of water to any purveyor, if the City determines that such interruption or reduction is necessary or reasonable in case of system emergencies or in

order to install equipment, make repairs, replacements, investigations and inspections or perform other maintenance work on the City's water system or those parts of the system supplying the Purveyor. Except in cases of emergency, and in order that the Purveyor's operations will not be unreasonably interfered with, the City shall give the Purveyor reasonable written notice of any such interruption or reduction, the reason therefor, and the probable duration thereof.

4. If such interruption or reduction in service should occur, thus necessitating the Purveyor to draw supplies during peak demand times that might thus subject the Purveyor to demand charges, such charges shall not be applied to the Purveyor.

I.E. Water Quality

1. The quality of water delivered under this Contract shall comply with all applicable provisions of the State and Federal law and rules and regulations of the appropriate State and Federal agencies governing water quality; and shall be subject also to applicable provisions of City ordinances relating thereto and not inconsistent herewith.

2. Both parties agree that this provision will not be binding on the City in instances in which an emergency exists and best efforts and reasonable prudence have been exercised.

SECTION II. CONDITIONS OF SERVICE

II.A. Minimum Hydraulic Gradient

1. A minimum hydraulic gradient or head for each Service Connection shall be used as a criterion for the City's and Purveyor's comprehensive water planning efforts. If the City finds that it would benefit the Regional Water Supply System and purveyors as a class, the minimum hydraulic gradient or head in Exhibit II-A may be modified by the City only once during any fifteen (15) year period after review by the Purveyor Committee, provided that four (4) years' advance notice is given to the Purveyor.
2. The City will use its best efforts to supply water from its system to that of the Purveyor at the points of connection and at not less than the minimum hydraulic gradient or head at the inlet side of the Service Connection meter as shown on Exhibit II-A, except as noted in this Contract. It is understood that circumstances may prevent the City from providing, at all times, this minimum hydraulic gradient. In such cases, the City shall supply a volume of water equivalent to and delivered at the maximum 24-hour average flow rate, required by the Purveyor in accordance with Sections I.B. and V.A., for 24 hours.
3. Additional Service Connections between the Purveyor's and the City's water systems or adjusted minimum gradients may be established from time to time, by mutual agreement between the City and the

Purveyor, in which instance Exhibit II-A shall be appropriately amended to reflect such additional points of connection or adjusted minimum gradients.

II.B. Resale to Other Parties

The Purveyor may sell water supplied to it by the City to other parties outside its existing or future boundaries for resale to ultimate consumers, only upon written consent of the City (or oral, in case of emergency) except under existing written agreements which have been transmitted to the City (along with this Contract) prior to the City's execution of this Contract.

II.C. Flushing Allowance

An allowance for actual water used for watermain and tank flushing during the period November 1 through March 31 of each year during this Contract duration will be credited to the account of the Purveyor by the City in an amount not to exceed two percent of the Purveyor's water consumption during the previous month of October; provided, however, that the Purveyor shall furnish the City a certified statement of actual flushing water used by measurement, or calculated by formula acceptable to the City and the Purveyor Committee.

II.D. Interconnection With Other Systems

The Purveyor agrees during the term hereof not to interconnect any part of its system that is supplied with water from the City with water from

other systems without the written (or oral, in case of emergency) approval of the City, which approval shall not be unreasonably withheld. Said other systems must be in compliance with all applicable County, State and Federal laws and regulations, and must have been approved by the State. (Also see Section I.B. & II.B.)

II.E. Metering Equipment

The City shall own and maintain appropriate metering devices to measure the water flowing from the City's Regional Water Supply System to the water system of the Purveyor at each Service Connection. The City agrees that at the Purveyor's request it will install and maintain equipment selected by the Purveyor and approved by the City to transmit signals to the Purveyor's recording equipment (located elsewhere) of the amount of water delivered as measured by the City's meters, all at the Purveyor's expense.

SECTION III.

COST OF WATER

III.A.

Rate-making Principles and Policies

1. Existing rates shall apply until adjusted in accordance with Section III.E.
2. Future rates will be based on the following fundamental principles:
 - a. The City, in setting water rates, will treat the purveyors as a separate customer class from the customers to whom it provides Direct Service through its own distribution system.
 - b. All costs of serving the purveyors as a class will be recovered by water rates charged to the purveyors.
 - c. The cost of serving purveyors as a class will be determined by a rate study which allocates shares of costs to purveyors in accordance with accepted practices for cost allocation.
3. The following general policies are also intended to give guidance to rate-making studies and associated documentation performed during this Contract. These policies may unavoidably conflict in their applicability; however, these policies shall be considered in their entirety in an attempt to strike an overall balance among them and shall be followed to the extent feasible in setting rates.

- a. No expenses that would normally be allocated to power development shall be allocated to the purveyor class unless the purveyor class is allocated a commensurate share of revenue derived from such a development.
- b. Abrupt changes in financial policies should be minimized.
- c. The rate structure should:
 - 1) Discourage wasteful use or premature development of utility resources.
 - 2) Be innovative whenever it is cost-effective and when it is beneficial in furthering the rate-making policies.
 - 3) Be simple and understandable.
 - 4) Be fair and equitable.
- d. If, as a result of supplying water to any new purveyor customer, the City incurs capital costs which benefit only the new purveyor customer and which do not benefit the purveyors as a class then or in the future, such costs shall not be allocated to other purveyors who sign a Long-term Contract.

III.B. Net Revenue Requirements

1. The purveyors' portion of the City water utility's total revenue requirement will consist of allocated shares of maintenance and operation

expenses, personnel taxes and other allowable taxes, and capital costs. In establishing rates, the City water utility's most current accounting information together with other fiscal information will be utilized as a foundation to project costs.

2. For rate-making purposes, the individual maintenance and operation expenses will be aggregated in a manner similar to that used by the City in establishing water rates since 1968 as reflected in the 1970, 1974, and 1980 rate study reports of the City along with all supporting data and methodology. For determining capital costs, the City will maintain in its accounting records an aggregation of the original cost of each facility serving the purveyors, the value of all contributions, net additions and deletions and other pertinent data. ✓

3. The total expenses from the sources identified above shall be allocated to purveyors in a manner generally consistent with the methodologies utilized in previous rate studies. Watershed management and timber management expenses will be clearly delineated and their equitable distribution to purveyors will be demonstrated in each rate study. For all allocation calculations involving significant sums of money, numbers will be carried out to three decimal places.

4. All capital costs except those associated with New Expansion Facilities will be determined ✓

using the utility basis of rate-making where:

- a. Contributed capital and depreciation on contributed capital are excluded from capital cost calculations, leaving net original cost.
- b. The rate base is defined as the allocated net original cost of all capital assets and projected additions during the rate period, less retirements during the rate period, less accumulated depreciation, plus a working capital allowance.
- c. The rate of return to be applied to the rate base is derived from a weighted sum of the average cost of debt to the City's water utility during the rate period and the cost of equity capital. The cost of equity capital is the return on alternative investment opportunities available to the City's customers. The weights used above will be the ratios of debt-financed and revenue-financed capitalization to the City water utility's non-contributed plant. Other relevant indicators, such as comparative earnings of other utilities and the current cost of borrowed funds, may also be examined to support or modify the rate of return suggested by the weighted cost of capital.

d. The annual depreciation expense will be calculated by multiplying a depreciation rate reflecting the City's standard useful life for each allocated asset times the net original cost of the asset.

5. The capital cost to be recovered from the purveyors for New Expansion Facilities serving them will be determined on the cash basis, consisting of debt service and capital expenditures financed with revenues.

6. New Expansion Facilities costs will be allocated between purveyors and Direct Service customers on the basis of their ultimate shares of the design capacities of these facilities. The allocation of the costs of such facilities will be based on the projections made or reviewed by an independent consultant at the time of each rate study.

7. The purveyors' portion of the total revenue requirement, less projected net receipts from purveyor meter charges, demand charges, other charges and any emergency surcharges, and adjusted for the balance in the Purveyor Balance Account, will be termed Net Revenue Requirements.

III.C. Purveyor Rate Structure

1. Net Revenue Requirements will be recovered from purveyors through a commodity rate and/or rate schedule. This commodity rate and/or rate schedule may vary with consumption, peak demand, or other

variables to reflect differences in the City's cost of service associated with these variables.

2. In order to distribute the costs of Regional Water Supply System expansion equitably, the commodity rate and/or rate schedule may vary to reflect the differences in the costs of providing for "old" and "new" consumption. Old consumption will be defined as the average amount of City water consumed by each purveyor in a base period which shall be the 3-year period from January 1, 1979 to December 31, 1981. New consumption will be defined as each purveyor's actual consumption of City water less its average old consumption for a corresponding period of time.

3. In particular, annual new consumption will be defined as each purveyor's actual annual consumption of City water less average annual old consumption. The aggregate amount of old and new consumption billed during a year will be adjusted, if necessary, to equal the total annual old and new consumption as defined above.

4. If the Purveyor should annex or transfer service areas previously receiving City water, adjustments will be made in the Purveyor's old consumption to reflect that associated with these areas.

5. The City may establish an old consumption rate, and a growth charge, which combined with the old consumption rate, is defined as the new con-

sumption rate. The intent of the old consumption rate is to recover the costs of existing facilities, and replacements and improvements to these facilities, from total consumption. The intent of the growth charge is to allocate the costs of New Expansion Facilities to new consumption. Use of old consumption/new consumption rates for purveyors in no way affects the total revenue to be paid by the purveyor class.

6. If no new consumption is projected, total purveyor Net Revenue Requirements (old and new) will be recovered through a commodity rate and/or rate schedule based on total purveyor consumption. If there are no New Expansion Facilities costs, all consumption (old and new) will be charged at the old consumption rate.

7. The Purveyor may, by signing Exhibit III-C, opt to average its commodity billing with those of other purveyors who sign a substantially similar version of this Contract and also exercise the option set forth in Exhibit III-C. This option must be exercised within 90 days of the adoption of the first rate adjustment (see Section III.E.), but in no event any later than 10 days prior to implementation of this rate adjustment.

III.D. Provision for Emergency Surcharge

1. In the event of a severe drought, major catastrophe, or other extraordinary conditions that require emergency expenditures to maintain a sufficient water supply, it may be necessary for the City to impose, by Ordinance, an emergency surcharge

on purveyors in order to pay for such expenditures. An equitable portion of these costs will be allocated to purveyors in accordance with the principles set forth in Section III.A. and may be recovered through an emergency surcharge.

2. An emergency surcharge based on water usage may be implemented immediately upon passage of the authorizing Ordinance and apply to all regular billings thereafter transmitted and may continue as long as necessary to pay for emergency expenditures, which shall be accounted for by the City to the Purveyor.

III.E. Rate Adjustment Procedure

1. The City may adjust rates to purveyors upon one hundred eighty (180) days notice of intent to do so. Rate adjustments will be effected only after completion of a cost-of-service study including an allocation of operation, maintenance and capital costs between purveyors and Direct Service customers of the City. Such a study will be performed or thoroughly reviewed by an independent rate consultant. Nothing herein shall preclude phased implementation of a rate adjustment resulting from a single rate study, provided that the period between completion of the rate study and the effective date of any rate adjustment based upon that study shall not exceed five (5) years.

2. The independent rate consultant will be selected by the City. Recommendations from the

Purveyor Committee will be considered in making this selection. Detailed information and progress reports will be made by the City to the Purveyor and Purveyor Committee during the course of the study upon drafting of each major study section directly affecting the purveyors. Additionally, the City shall provide substantially completed purveyor-related sections of the study and, if requested, copies of the underlying computations to the Purveyor and the Purveyor Committee not less than thirty (30) days before formally transmitting any resulting rate adjustment proposal to the City Council. Any comments, analyses, reports, or recommendations by the Purveyor Committee concerning the rate study will be formally transmitted by the City staff to the City Council together with the rate study and proposed legislation, provided that such comments, analyses, reports or recommendations are formally approved by the Purveyor Committee prior to the date of such transmittal.

III.F. Purveyor Facilities Account

1. The cost and description of any New Expansion Facilities, as defined in Section IX.A., that have part or all of their costs allocated to Contract-signing Purveyors, will be recorded in a Purveyor Facilities Account (PFA) by the City. The purpose of the PFA is to protect the contract-signing purveyors from the potential of paying twice for facilities. ✓

2. If the City conveys all or part of its Regional Water Supply System to another water supply authority (hereafter called the purchaser) with the legal authority to take over and operate a part or all of the City's Regional Water Supply System, then the City shall also convey PFA facilities that are an integral part of the water system conveyed. Compensation to the City by the purchaser for these facilities shall be the conveyance value of such facilities determined at the time of transfer less the contract-signing purveyors' share of this conveyance value. The contract-signing purveyors' share shall be the percentage of the facilities' costs that have been allocated to and paid by the contract-signing purveyors since signing the contract.

3. If PFA facilities are conveyed to an agency that does not serve all of the purveyors that have signed Long-term Contracts and subsequently contributed to the payment of such facilities, then these purveyors shall be compensated by the purchaser according to their pro-rated share of the contract-signing purveyors' share of the conveyance value of such facilities. The compensation to these purveyors shall be made in a manner similar to that used to compensate the City.

4. It is understood that nothing herein shall obligate the City to compensate the purveyors directly for the conveyance of PFA facilities.

5. It is understood that the City retains full ownership of these PFA facilities until such time as they are conveyed.

III.G. Direct Service Rate-setting

Each party to this Contract shall have sole authority for establishing Direct Service rates within their respective jurisdictions.

III.H. Demand Charge

1. A demand charge will be made in accordance with the methodology described in Exhibit III-H. The demand charge rate (i.e., dollars per 1000 gallons of deficient storage) shall be based on the equivalent cost of providing the deficient storage. This rate will be determined as part of each rate study.

2. The proceeds of the demand charge will be treated in rate setting as a credit to the purveyor revenue requirements for new consumption.

III.I. Purveyor Balance Account and Annual Report

1. The City will maintain accounting records in accordance with the State Auditor's prevailing requirements. Annually, by August 31st, the City will provide to the Purveyor an accounting statement of the actual costs incurred to serve purveyors and the revenue derived from them, and a report of the status of the Purveyor Facilities Account. In determining the amount of revenue to be recovered from purveyors by subsequent rates, any balance of past purveyors' revenues over costs will be credited against gross revenue requirements or

any shortage due to failure to recover past costs from purveyors will be added to gross revenue requirements of purveyors.

2. Interest will be earned by purveyors on any accumulated balance or charged to purveyors on any shortage. Such interest will be simple interest, computed annually at the rate of return on equity established at the time of relevant rate formulation. The interest due or owed by the purveyors will be credited against or added to the gross revenue requirements determined in the subsequent rate study.

III.J. Cost of New or Changed Service Connection

The entire cost of each additional Service Connection, including the cost of meters, shall be paid by the Purveyor. If the City removes and replaces a Purveyor meter because it is under or over capacity (based on AWWA standards or factory rating criteria), or where the Purveyor desires to change, interrupt or discontinue a service connection, then the net cost of these changes shall be paid to the City by the Purveyor.

SECTION IV. REPRESENTATION - PURVEYOR COMMITTEE

IV.A. Seattle Water Purveyor Committee

1. In order that purveyors may, in an orderly way, be involved in the operation, expansion and financing of the City's Regional Water Supply System, there shall be established the Seattle Water Purveyor Committee, herein called the "Purveyor Committee". Each purveyor signing a Long-term Contract shall select a representative (with an alternate) on the Purveyor Committee.
2. The Purveyor Committee shall organize itself and become operational no later than July 1, 1982 and adopt such rules as are necessary for its operation. The number of votes for each purveyor shall equal its percent of total annual amount of water supplied to purveyors by the City during the preceding year (rounded to the nearest whole percent) provided that each purveyor shall have at least one (1) vote.
3. The Purveyor Committee shall have no authority to financially encumber contracting purveyors as a result of this Contract.
4. No activity by the Purveyor or the purveyors in conjunction with the Purveyor Committee shall affect the City's obligation to supply water to the Purveyor under this Contract.

SECTION V.

PLANNING

V.A. Reporting of Planning Data

1. The Purveyor agrees to report to the City:
 - a. Its annual and peak day total system demand for each year during the term hereof as December 31st of that year.
 - b. Its forecast of water requirements to be supplied by the City including estimates of annual and maximum 24-hour requirements for the ensuing calendar year, for the fifth, tenth, and fifteenth year in the future. Such forecasts shall reflect the best judgment of the Purveyor.

Such information shall be furnished to the City no later than the following April 1st of each year.

2. The Purveyor also agrees to report certain other data relating to water supply as may be requested by the City for water planning purposes, provided that supplying such data shall be reasonably within the means of the Purveyor.

3. Records relevant to water supply and consumption within the possession of the City or the Purveyor will be provided to the other upon reasonable request.

V.B. Submittal of Purveyor Comprehensive Plans

The Purveyor shall provide its water comprehensive plan and significant amendments thereto to the City for inclusion by the City in the City's Comprehensive Regional Water Plan.

V.C. Conservation Program

1. The City's regional water conservation program, as contained in its Comprehensive Regional Water Plan, is to be updated by the City and, subsequent to review by the Purveyor Committee, adopted by the City. This program shall be implemented by the City with the assistance and support of the Purveyor, except that the Purveyor shall not be required to adopt special rates with respect to this program. The basis for allocating costs of this conservation program shall be reviewed and evaluated by the independent rate consultant as part of each rate study.

2. The Purveyor shall develop and, subsequent to review by the City and Purveyor Committee, adopt its own conservation program that is supportive of the City's regional water conservation program. It is understood that the Purveyor retains final authority over the expenditure of funds needed to implement its program for its own service area.

V.D. City as Water Planning Agency

The City, as the lead agency, is herein considered the planning authority for the water supply requirements of this Contract. The City shall examine and investigate water supplies suitable and adequate for present and reasonable future needs thereof. The City shall prepare and adopt a plan for acquiring such water supplies in a

timely fashion. This plan shall include provision for the lands, waters and water rights and easements necessary therefor, and facilities for retaining and storing and delivering any such waters, including dams, reservoirs, aqueducts and pipelines to convey same throughout the system. In preparing or adopting its plan, the City shall consider as possible alternative or additional water supply sources the acquisition of water from sources controlled and/or developed by individual purveyors, legally-constituted groups of purveyors, and other utilities which are not presently supplied by the Regional Water Supply System.

V.E. Comprehensive Regional Water Plan

The City before ordering any major improvements to fulfill the requirements of this Contract shall adopt and maintain a comprehensive plan for its Regional Water Supply System; when said plan is updated or amended, it shall be reviewed by the Purveyor Committee prior to submission to the City council. This plan shall include facilities, for contract-signing purveyors, that are based on reasonable criteria, including, but not limited to, cost-effectiveness and environmental impact. The Committee shall respond within ninety (90) days of receipt of same or its approval is assumed to be given. The response submitted by the Committee regarding facilities substantially affecting purveyors will be seriously considered by the City.

A serious endeavor by the parties will be made to arrive at a mutually acceptable plan. Response by the City will be provided to the Committee within ninety (90) days. The Committee will be involved in developing the City's Comprehensive Regional Water Plan. However, the City has final determination responsibility for the plan and its ability to fulfill the conditions of this Contract and other City contracts and commitments.

V.F. Emergency Planning

An emergency plan shall be prepared and maintained by the City as part of its Comprehensive Regional Water Plan to provide for water supply in the event of drought or disaster. Such plans shall be prepared pursuant to the procedure outlined in Section V.E.

SECTION VI.

PAYMENT

VI.A. Collection of Money Due City

Each purveyor shall be billed by the City on a monthly basis for the supply of water delivered by the City. The Purveyor shall pay these water bills within sixty (60) days of the billing dates.

VI.B. Penalties for Late Payment

The City may assess a late charge on any purveyor for failure to make full and timely payment as provided in Section VI.A. This late charge shall be established by the City as a percentage of the late portion of the water charges owed; provided that the percentage rate shall not exceed the maximum amount permissible by law.

VI.C. Disputes

The Purveyor may dispute the accuracy of any portion of the water charges by taking the following two actions within the sixty (60) day payment period established in Section VI.A: (1) notifying the City in writing of the specific nature of the dispute, and (2) paying the undisputed portion of the water charges. The City shall consider and decide any billing dispute in a reasonable and timely manner. Late charges will start to accrue on any unpaid disputed water charges only after the City has rendered a final decision and after expiration of any additional "grace period" which may be established by the City as part of the final decision on the dispute.

SECTION VII.

AMENDMENTS TO PURVEYOR CONTRACT

VII.A. Procedure for Amending the Contract

1. Either party may request in writing the other to consider an amendment of this Contract. If the amendment is mutually acceptable to the City and the Purveyor, an amendment of this Contract shall be prepared in writing and become effective upon execution by both parties, provided that at least ninety (90) days prior notice has been given to the Purveyor Committee.

2. All the purveyors who have signed Long-term Contracts will be notified by the City of contract amendments thereof and will have the option of including same in their contract if they elect to do so within two (2) years of the date that notification is sent. This provision does not apply to amendments of Exhibits I-B and II-A which will be unique to each purveyor.

VII.B. Subsequent Contracts

The City, without having given ninety (90) days prior notice of its intent to so execute to the Purveyor and the Purveyor Committee, shall not execute Long-term Contracts for water supply with any purveyor after July 1, 1982 if that contract contains provisions inconsistent with or in addition to those contained in Contracts designated Version A and B dated November 1981. In the event that the City does execute any such contract, such provisions will be incorporated in this Contract

if the Purveyor elects to do so within two (2) years of the date notification was sent. This provision does not apply to Exhibits I-B and II-A which will be unique to each purveyor.

VIII.A. Notification

1. Whenever in this Contract, notice is required to be given, the same shall be given by the following representatives by United States mail (registered or certified with return receipt requested,) addressed to the respective parties at the following addresses:

CITY:

PURVEYOR:

Superintendent of Water
Seattle Water Department
Exchange Building, 11th Floor
821 Second Avenue
Seattle, WA 98104

unless a different representative or address shall be hereafter designated in writing by either of the parties given by the procedure set forth above.

2. The date of giving such notice shall be deemed to be the date of mailing thereof.

3. Billings for and payments of water bills may be made by regular mail.

4. The City shall notify the Purveyor and Purveyor Committee in writing, not less than one hundred eighty (180) days in advance of the effective date thereof, of proposed amendments to the City's Comprehensive Regional Water Plan that would have a financial impact on the purveyors.

5. In addition, the City shall send to the Purveyor and Purveyor Committee a copy of its proposed annual Water Capital Improvement Program

(CIP) not less than 60 days prior to submittal to the Seattle City Council.

VIII.B. Severability

The purpose of this Contract is to provide by long-term planning, certainty for both the City and the Purveyor through adoption of orderly plans calling for the expenditure of vast sums of money for regional water supply facilities. It is the intent of the parties that if any provision of this Contract or its application is held by a court of competent jurisdiction to be illegal, invalid, or void, the validity of the remaining provisions of this Contract or its application to other entities, purveyors or circumstances shall not be affected. The remaining provisions shall continue in full force and effect, and the rights and obligations of the parties shall be construed and enforced as if the Contract did not contain the particular invalid provision, provided, however, if the invalid provision or its application is found by a court of competent jurisdiction to be substantive and to render performance of the remaining provisions unworkable and infeasible and is found to seriously affect the consideration and is inseparably connected to the remainder of the contract, the entire Contract shall be invalid.

VIII.C. Consent

Whenever it is provided in this Contract that the prior written consent or approval of any

party or the Purveyor Committee is required as a condition precedent to any actions, in each such instance said consent or approval shall not be unreasonably withheld, and in each such instance where prior consent is sought, failure of the party to respond in writing within sixty (60) days of the request shall be deemed as that party's consent or approval unless otherwise provided for herein. This provision does not apply to amendments of this Contract.

VIII.D. Initial Implementation

The intent of both parties is to work together to take such actions as are necessary to implement full compliance with this Contract in as expeditious a manner as possible, provided that such full compliance shall occur no later than three (3) years after the effective date of this Contract.

VIII.E. Emergency Situations

Nothing in this Contract shall be deemed to preclude either party from taking necessary action to maintain or restore water supply in emergency situations, in accordance with Section I.D., and such action shall not be deemed a violation of this Contract.

VIII.F. Purveyors Not Joint Venturers - Individual Liability

This is not an agreement of joint venture or partnership, and no provision of this Contract

shall be construed so as to make the purveyors individually or collectively partners or joint venturers with each other or with the City. Neither party is an agent of the other, nor is any purveyor the agent for the City or for another purveyor. Neither the City nor any purveyor shall be liable for the acts of the other in any representative capacity whatsoever.

SECTION VIII. DEFINITIONS

VIII.A. Definition of Contract Terms

As used in this Contract:

1. "Long-term Contract" means a water purveyor contract with the City for the supply of water for a length of time of fifteen (15) years or greater.
- 2.a. "purveyor" means a water district, other municipality or utility (with the exception of the Sallal Water Association) authorized to and engaging in the distribution of water under the laws of the State, which distributes, on a retail basis, water directly supplied to it by the City.
- 2.b. "Purveyor" means the purveyor which has executed this Contract.
3. "Direct Service" means delivering water to user/consumer premises at retail water rates. (The City provides direct service both inside and outside the City.)
4. "Regional Water Supply System" means the City's water supply system consisting of dams, impounded water, supply and transmission mains, pumps, treatment facilities, and all facilities utilized in conveying water from its source to the City's water storage facilities and to the purveyors.

5. "Service Connection" means a short section of pipe, with a water meter and appurtenances, through which water is delivered from the Regional Water Supply System to a purveyor's system.
6. "Comprehensive Regional Water Plan" means the latest plan, and amendments thereto, prepared by the City to comply with the requirements for "water system plan" of WAC 248-54-580 and amendments thereto.
7. "New Expansion Facilities", for purposes of this Contract, means those new facilities that are constructed after March 1, 1982 and: 1) expand the capacity of the City Regional Water Supply System, and 2) do not in any way replace or rehabilitate existing facilities. New Expansion Facilities do not include new treatment facilities to treat existing supply sources.

SIGNATURE PAGE

IN WITNESS WHEREOF, the parties hereby execute this Contract.

PURVEYOR: _____

A _____ Corporation

BY: _____

BY: _____

(SEAL)

BY: _____

ATTEST: _____ DATE: _____

AUTHORIZING LEGISLATION: ORDINANCE/RESOLUTION _____

CITY: THE CITY OF SEATTLE
A MUNICIPAL CORPORATION

BY: _____
Mayor

(SEAL)

ATTEST: _____ DATE: _____
City Comptroller

AUTHORIZING LEGISLATION: ORDINANCE: _____

LIST OF EXHIBITS

- I-B Amount of Water to be Supplied/Purchased
- II-A Minimum Hydraulic Gradient of Water Supplied
- III-C Option to Average Commodity Billings
- III-H Demand Charge Methodology

NOTE: All exhibits attached hereto and referenced in this Contract are a part of this Contract.

AMOUNT OF WATER TO BE SUPPLIED/PURCHASED

The City shall plan for and construct facilities to supply the water requirements of the Purveyor as specified below and as forecast by the Purveyor according to Section V.A. The specified amount of water to be supplied by the City and purchased by the Purveyor will be:

All water requirements of the Purveyor conditioned by Sections I.B. and II.B. of this Contract.

List of documents, commitments, adjustments, reductions, agreements, and/or written City approvals regarding the supply, purchase and/or resale of water according to Sections I.B. and II.B. of this Contract:

	<u>ITEM</u>	<u>DATE</u>
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____

SEATTLE WATER DEPARTMENT

MINIMUM HYDRAULIC GRADIENT OF WATER SUPPLIED (1)

Water District No. 20

LOCATION	METER SERVICE	STATION NUMBER (2)	SIZE OF METER (In)	PIPELINE SEGMENT NUMBER (2)	MINIMUM HEAD FOR PLANNING PURPOSES AT STATIONS (FT.) (3)
S. 112th St. & 12th Ave. S.		19	16	.29	425
S. 120th St. & Military Rd.		129	6	.29	400
S. 125th St. & Military Rd.		128	6	.29	400
S. 112th St. & Des Moines Way		127	6	.29	430
S. 112th St. & 14th Ave. S.		130	6	.29	425
2nd Ave. S. & Aqua Way		131	4	.29	420
8th Ave. S. & Aqua Way		126	8	.29	420
S. 146th St. & 5th Pl. S.		137	4	.30	510
8th Ave. S. & S. 146th St.		136	10	.30	545
4th Ave. S.W. & S.W. 108th St.		132	8	.30	545
4th Ave. S.W. & S.W. 120th St.		133	10	.30	545
Ambaum Blvd. & S.W. 132nd St.		134	4	.30	515
14th Ave. S. & Director		135	6	.17	195

Notes: (1) The Minimum Hydraulic Gradient is based on historic use patterns for the connection, demand projections to 1995, and a maximum demand factor of 1.3.

(2) Station and Pipeline Segment Numbers pertain to demand metering program.

(3) All Minimum Head elevations are based on City of Seattle datum and are rounded to the nearest 5 feet.

SAMPLE

OPTION TO AVERAGE COMMODITY BILLINGS

The undersigned Purveyor hereby agrees to have its commodity billings averaged with those of other purveyors who participate by exercising an identical option.

The averaging will be performed by totalling the dollar amounts of the old consumption billings and the new consumption billings of all purveyors who participate in this option. Any individual purveyor's commodity billing under this option will be the purveyor's percentage of the total consumption of participating purveyors times the total dollar amount computed above.

In any case, the total amount billed under this procedure shall equal the total amount which would have been billed to all of the individual participants during the same billing period.

PURVEYOR: _____

BY: _____

BY: _____

BY: _____

ATTEST: _____

DATE: _____

ORDINANCE/RESOLUTION _____

DEMAND CHARGE METHODOLOGY

The demand charge and method of application thereof shall be as follows:

1. The policy of the City is to supply water to wholesale water purveyor customers (municipal water districts, other municipalities, and nonprofit water associations) at the twenty-four hour average flow rate. Water purveyors are expected to provide or pay for storage for peaking rates above such average flow rate.
2. A demand charge will be applicable to water purveyors who are found to have deficient storage as determined in the following paragraphs.
3. The water services (master meters) to purveyors will be monitored by the City to determine applicability of the demand charge. Demand metering equipment will be installed on master meters to purveyors at City expense.
4. Water services to a purveyor on a uniform segment of supply line may be considered as one water service in calculating storage deficiency.
5. A "day" for purposes of this schedule commences at nine a.m. and ends at nine a.m. the following calendar day.
6. The demand factor for each water service is determined by dividing the fifteen-minute peak flow rate by the twenty-four-hour average flow rate of the same day.

7. The ten maximum flow days for each water service will be used to determine the average demand factor from which storage deficiency will be calculated. The average demand factor is the average of the demand factors of the ten maximum flow days for each water service.
8. A demand charge for each water service shall be applied only when the average demand factor exceeds 1.3.
9. The deficient storage volume of each water service for demand charge calculation rate shall be $S = 0.22(F-1)Q$; where S = storage deficiency in gallons, F = average demand factor and Q = average daily quantity of water in gallons used in the ten maximum flow days for each water service.
10. The demand charge shall be calculated by applying a storage deficiency rate per month per thousand gallons of deficient storage. The total purveyor demand charge shall be the sum of the demand charges for each water service.
11. The demand charge will be calculated in the fall of each year based upon evaluation of the summer months (June, July and August) water delivery flow rates and upon the storage deficiency rate in effect at the time that those flows occurred. The monthly storage deficiency demand charge billing shall commence in January and continue for one calendar year until the following January at which time a new charge, if any, shall be applied.

12. Peak flow rates through master meters will be monitored during the summer months; however, if peak flow rates create adverse hydraulic conditions, demand metering may be applied year-round, after reasonable notice to purveyor customers.
13. Purveyors may use other sources of supply approved by the Superintendent of Water such as interconnection with other purveyors' systems or development of wells for summer water supply peaking purposes subject to the provisions of this Contract.
14. If purveyors formulate approved cooperative operating agreements, their services on uniform segments of supply line may be considered as one service in determining demand charge.
15. Peak flows caused by major accidents in a purveyor's water system will be excluded in determining the demand charge. Peak flows caused by other unusual situations may also be excluded at the discretion of the City. Documentation of such incidents shall be provided by purveyors to the City within thirty (30) days after an incident.
16. Artificially created daily flow rates which differ substantially from customers' daily consumption may be disallowed in calculating the demand charge.
17. Approved electrical sensing circuits (e.g. for telemetering) from City master meters may be made available to purveyors on a reimbursable cost basis. Such circuits shall be installed and main-

tained by the City; there will be no need for purveyors' representatives to enter City chambers.

18. The demand charge for a certain master meter(s) may be excused if lower pressure water (or gravity flow water) replaces City-pumped water (or higher flow water), provided that the peak flow rate through this service does not exceed the demand rate threshold which would occur without the replacement of water service flow.

19. In case of malfunction of metering equipment, the City shall estimate the charge, if any, from best available data.

CITY OF SEATTLE

MONTHLY WATER CONSUMPTION THRU LAKE YOUNGS AND TOLT METERS

TOTAL WATER CONSUMPTION BY MONTH (M.G.D.)

<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>MEAN</u>	<u>1987</u>	<u>87/86 % DIFF.</u>
130.4	133.0	151.9	144.9	134.0	140.9	139.1	144.7	150.1	153.4	142.2	155.4	+1.3%
128.6	133.5	143.4	146.1	134.5	140.4	132.5	138.6	150.0	149.7	139.7	157.2	+6.4%
123.4	134.3	145.4	142.4	138.0	142.8	137.6	142.9	143.8	154.5	140.5	155.4	+0.6%
142.9	134.3	151.3	147.1	138.3	144.7	149.1	154.9	145.7	156.4	146.5	167.4	+7.0%
138.8	148.2	173.4	169.7	147.8	163.7	171.7	164.7	165.9	167.5	161.1		
169.3	206.6	225.6	156.8	155.0	238.4	173.4	188.2	205.6	232.9	195.2		
194.7	211.6	236.9	200.6	185.0	199.5	185.4	257.4	*301.5	209.1	218.2		
219.1	190.3	207.5	195.1	248.6	210.8	215.2	248.2	226.5	260.2	222.2		
132.6	144.1	161.4	155.8	174.6	159.8	158.3	180.2	173.5	171.7	161.2		
125.1	148.7	156.9	148.0	141.4	144.1	147.0	152.3	162.0	143.7	146.9		
128.7	140.6	144.5	137.2	138.7	142.6	143.1	142.6	159.1	137.2	141.4		
126.9	139.3	134.7	136.6	138.7	145.9	153.2	145.7	156.4	147.4	142.5		
146.9	155.5	169.6	156.8	156.5	164.6	158.8	171.9	178.6	173.8	163.3		
132.4	130.8	145.8	145.2	138.1	141.1	141.6	146.3	147.2	155.9	142.4		
170.9	180.2	201.0	175.6	182.2	194.4	180.8	207.7	214.6	208.3	191.6		

cord highest monthly average.

2 MONTHS (Jan., Feb., Mar., Apr.) and (Oct., Nov., and Dec. of the preceding year)

3 MONTHS (May, Jun., Jul., Aug., and Sep.)

Appendix C
First Amendment to the Water Purveyor Contract
with the City of Seattle

June 6, 1994

FIRST AMENDMENT
to the
WATER PURVEYOR
CONTRACT

between

THE CITY OF SEATTLE

and

for the

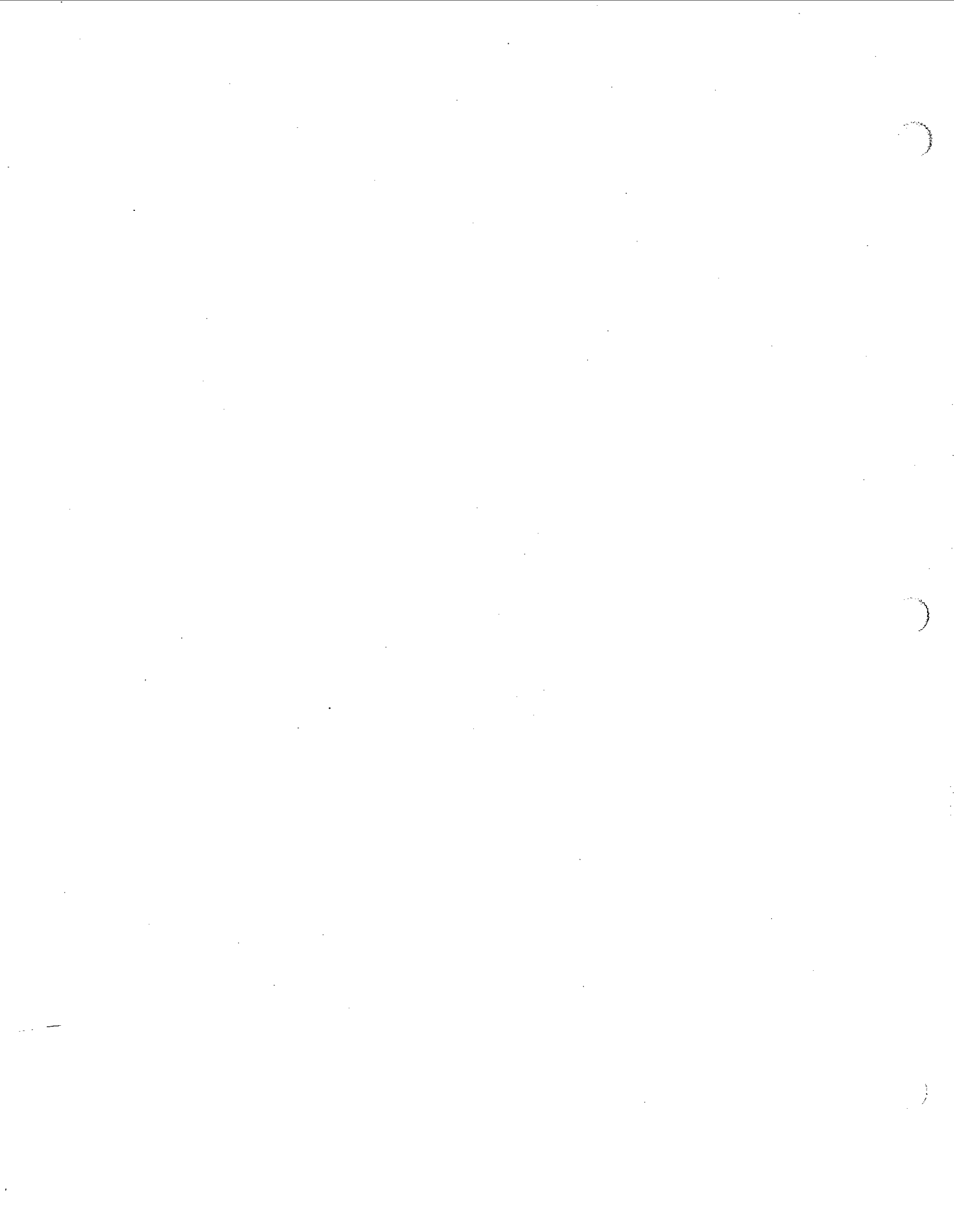
SUPPLY OF WATER

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**FIRST AMENDMENT TO THE
WATER PURVEYOR CONTRACT**

THIS AMENDMENT to the Water Purveyor Contract is entered between the CITY OF SEATTLE, a municipal corporation of the State of Washington, hereinafter the "City", and _____
_____ hereinafter the "Participating Purveyor."

SECTION 1. USE OF THIS AMENDMENT.

Because this Amendment deals with a number of complex concepts which may be understood only in relation to relevant background information, several devices have been used to assist the reader in understanding. Section 2 of the Amendment, "Background and Purposes," is intended to provide the reader basic information about the original Water Purveyor Contract and the reasons for this Amendment. Similarly, at the beginning of the most complex sections, an Introduction is provided to explain background issues and how the Amendment addresses those issues. The Amendment uses *italics* to identify specialized terms or phrases that are defined either in Section 2 (Definitions) or elsewhere in the Amendment. Further, descriptions of most financial computations have been stated as

algebraic formulas to add rigor and clarity. Lastly, examples are provided throughout the Amendment to illustrate formulas and complex provisions.

Section 2, Background and Purposes, and the Introductions and Examples contained in this Amendment may be considered in the event of a dispute over the interpretation of a formula or a provision of the Amendment; however, if a direct conflict arises between these materials and the express terms of a formula or a provision, the express terms shall govern.

SECTION 2. BACKGROUND AND PURPOSES.

The City of Seattle provides wholesale water service to a number of municipalities, water districts, and other entities referred to as "purveyors" in this Amendment. With a few exceptions, all of the purveyors and the City have separately entered into either Version A or B of the Water Purveyor Contract which provides for wholesale water service on a long-term basis. In this Amendment, Version B of the Water Purveyor Contract shall be referred to as the "Contract," and the purveyors that have signed Version B shall be referred to collectively as the "Purveyors" or individually as the "Purveyor."

The rates the City charges all purveyors for wholesale water service are determined using methods specified under the Contract. Rates are based on the projected costs of the Regional Water Supply System in a given time period and the projected amount of purveyor water consumption in the same time period. The Contract provides for two purveyor water rates, the old

water rate and the growth charge. The growth charge added to the old water rate is commonly referred to as the new water rate.

The old water rate is determined by adding up the projected purveyor costs associated with old water facilities, and dividing those costs by the projected amount of purveyor consumption. "Old water facilities" are Regional Water Supply System facilities which are not New Expansion Facilities, a term defined in the Contract as new facilities constructed after March 1, 1982, which expand the Regional Water Supply System and which do not replace or rehabilitate existing facilities. Likewise, the growth charge is determined by adding up the projected purveyor costs associated with New Expansion Facilities and dividing those costs by the projected amount of purveyor "new consumption" (a term also defined in the Contract). Projections are later reconciled with actual experience through the Purveyor Balance Account.

The Contract provides that the purveyor costs associated with old water facilities are to be determined using the utility basis, which establishes costs by totalling operation and maintenance expenses, depreciation, and the product of rate of return and the rate base. By contrast, the Contract provides that the purveyor costs associated with New Expansion Facilities are to be determined using the cash basis, which establishes costs by totalling operation and maintenance expenses, revenue financed capital, and debt service.

Under the Contract, costs are allocated between the purveyors and the City's direct service customers on a facility-by-facility basis. In most cases, the allocation factors for old water facility costs are based upon the percentage of water associated with a given facility that the purveyors use during specified times in the current year. Conversely, the allocation factors for New Expansion Facility costs are based on a one-time projection of the percentage of water associated with the facility that the purveyors will ultimately use when the facility is operated at full capacity. Unlike allocation factors for old water facilities, allocation factors for New Expansion Facilities are fixed for the life of the facility.

Several disputes have arisen with respect to purveyor water rates. In particular, disputes have arisen over the manner and method of determining the rate of return which is used to determine the purveyor costs associated with old water facilities. In addition, a dispute has arisen over whether the City should be permitted to allocate a portion of the costs of rehabilitating the *Tolt Pipeline* to the purveyors using the same allocation method applied to other old water facilities. The Amendment is intended to reach a settlement of these issues between the City and the Participating Purveyor which will avoid potentially costly and lengthy litigation.

The Amendment, in addition, is intended to provide greater specification of a number of general provisions of the Contract, including, among others, provisions of the Contract dealing with conservation program

costs, watershed costs, working capital, and the Purveyors' share of the conveyance value of New Expansion Facilities in the event of conveyance. The parties believe that such further specification is a reasonable interpretation of and fully consistent with the Contract.

Finally, the Amendment is intended to provide several new provisions to assist the City and the Participating Purveyor in carrying out the objectives of the Contract. Two notable additions are the provisions involving joint City and Purveyor funding of new projects through Joint Facility Agreements and the provisions allowing for payment of specified administrative expenses of the Purveyor Committee.

SECTION 3. DEFINITIONS.

Unless another meaning is expressly provided in this Amendment, all terms used in the Amendment shall have the same meaning as that given to such terms in the Contract. For purposes of this Amendment:

1. *Book value* means the original cost of an asset, plus additions and betterments, less accumulated depreciation and retirements.

2. *Conveyance value* of a facility shall be the monetary value of all consideration given for such facility under a conveyance agreement or a court order. If any part of the consideration is to be paid in installments, the value of such consideration, including any interest paid, shall be its present value at the time of conveyance.

3. *Equity interest* is the total compensation that all Participating Purveyors will receive under the terms and conditions of Section 6 below if the City conveys the *rehabilitated Tolt Pipeline* (or a portion thereof) to another entity.

4. *Involuntary conveyance* means any conveyance which occurs through condemnation or by mandate of law which the City is not legally authorized to override.

5. *Original Tolt Pipeline* means the water transmission pipeline constructed prior to 1987 that begins at the Tolt Regulating Basin and terminates at the Lake Forest Reservoir.

6. *Rehabilitated Tolt Pipeline* means any portion of the *original Tolt Pipeline* that is replaced or rehabilitated and substantially completed and put into service before January 1, 2002.

7. *Tolt Pipeline* means Tolt Pipeline #1, which is the water supply transmission pipeline that begins at the Tolt Regulating Basin and terminates at the Lake Forest Reservoir.

8. *Voluntary conveyance* means any conveyance which is not an *involuntary conveyance*.

SECTION 4. RATE OF RETURN.

Introduction:

Under the Contract the City is entitled to charge purveyors a return on the rate base which is allocated to purveyors. The rate of return is calculated from the weighted sum of two component rates, the *average cost of debt* and the *cost of equity capital*. The *average cost of debt* is the weighted average of interest rates paid by the City on outstanding Water Department

debt. The *cost of equity capital* is defined by Subsection III.B. of the Contract as "the return on alternative investment opportunities available to the City's customers." With respect to determining the rate of return, the Contract further states: "[o]ther relevant indicators, such as comparative earnings of other utilities and the current cost of borrowed funds, may also be examined to support or modify the rate of return suggested by the weighted cost of capital."

The purveyors and the City have disagreed about the appropriate method to use to determine the *cost of equity capital*. From 1980-1988, the City used the comparative earnings method, which bases the *cost of equity capital* on the average tax-adjusted return to private water utility stockholders. In 1984, the Purveyor Balance Account (PBA) as provided for in the Contract was implemented. The PBA reports actual costs and adjusts for any accumulated surplus or deficit, so that to the extent feasible the Purveyors will pay no more or less than their actual costs of service. The Purveyor Committee has contended that since the PBA was implemented the City has charged an excessive rate of return because the PBA eliminates some of the risks faced by a private utility. In 1988, in an attempt to address purveyor concerns about the rate of return, the City adjusted the Tolt River supply costs downward. Since 1989, the City has used an alternative method to calculate the *cost of equity capital* that falls between the comparative earnings method and the Purveyor Committee's 1988 recommendation of projected current cost of debt.

Subsections 4.A and 4.B amend the Contract to provide for use of that alternative method by adding greater specification to the definitions of the *average cost of debt* and the *cost of equity capital*. Subsection 4.C also provides for a credit to the Participating Purveyor based upon a recomputation of costs recovered in 1987 and 1988 using the alternative method to determine the rate of return. The recomputation includes a credit to the City to reverse the 1988 downward adjustment to Tolt River supply costs. The net credit to all Participating Purveyors will be recorded in the Tolt Pipeline Account and utilized to calculate the Participating Purveyor equity interest as provided for in Sections 5 and 6 below. Finally, Section 4.D provides for a mutual release of liability with respect to the methods previously used to determine the rate of return.

4.A. METHOD OF COMPUTING *AVERAGE COST OF DEBT*. The *average cost of debt* component of the rate of return, as referenced in Subsection III.B. of the Contract, shall be the weighted average of the coupon rates on all outstanding bond indebtedness of the Seattle Water Department, excluding defeased or advance refunded bonds, with the weights being the amount of debt outstanding at each rate divided by total bond debt outstanding.

4.B. METHOD OF COMPUTING *COST OF EQUITY CAPITAL*. The *cost of equity capital* component of the rate of return, as referenced in Subsection

III.B. of the Contract, shall be the greater of (a) the *average cost of debt* plus 30 basis points or (b) the *current cost of long-term debt*.

The *current cost of long-term debt* shall be the effective yield for a 20-year maturity from the Seattle Water Department's most recent debt issuance (including refinancing) if issued during the calendar year being accounted for. Otherwise, the *current cost of long-term debt* shall be estimated by adjusting the average yield of the weekly Bond Buyer 20-Bond Index (or a mutually agreed replacement) during the month of June by the difference between the Department's effective yield for a 20-year maturity and that Index (or replacement) as of the date of the Department's last debt issuance.

Example of computing *cost of equity capital*:

In 1991, the Seattle Water Department had outstanding 11 bond issues (excluding defeased and advanced refunded bonds), each with serial maturities carrying different coupon rates. The *average cost of debt* is the weighted average of the various coupon rates. For 1991, the weighted average was 6.46%, and plus 30 basis points was 6.76%.

In 1991, there was no Seattle Water Department bond issuance with a 20-year maturity. The most recent debt issuance with a 20-year maturity was on April 10, 1990; the effective yield for such maturity was 7.22%. The weekly Bond Buyer 20-Bond Index was 7.31% on April 11, 1990, for a difference of -0.09 percentage points. The average yield of the weekly Bond Buyer Indexes during the month of June 1991 was 7.13%. Adjusting this average by the difference of -0.09 produces a *current cost of long-term debt* for the Department in 1991 of 7.04%.

Accordingly, since the *current cost of long-term debt* was greater than the *average cost of debt* plus 30 basis points, the *cost of equity capital* for 1991 was 7.04%.

4.C. RECOMPUTATION OF PURVEYOR COSTS RECOVERED IN 1987-1988. The costs the City recovered from the purveyors in the years 1987 and 1988 were not computed using the method for computing the *cost of equity capital* set forth in Subsection 4.B. The amount of purveyor costs for the years 1987 and 1988 shall be recomputed using such method.

Further, in 1988, the City reduced the rate base for Tolt supply costs, with corresponding adjustments in depreciation and operation and maintenance expenses, to recognize purveyor concerns about the *cost of equity capital*. The recomputation of purveyor costs for 1988 shall include a credit to the City in an amount equal to the savings to the Participating Purveyors from such reduction and corresponding adjustments.

The difference between the amount of Participating Purveyor costs actually charged for 1987 and 1988 and the amount of Participating Purveyor costs as recomputed shall be recorded in the Tolt Pipeline Account established in Section 6 of this Amendment and utilized under Formula 1 (Subsection 6.A.1 *infra*) to calculate the Participating Purveyor equity interest. The amount so recorded shall include simple interest from January 1, 1988, through December 31, 1990, computed annually on the prior year's cumulative balance (including interest) at the *cost of equity capital* as applied in the Purveyor Balance Account. The parties hereby confirm that the *cost of equity capital* for the years 1989 through the effective date of this Amendment was computed using the method set forth in Subsection 4.B.

4.D. MUTUAL RELEASE OF LIABILITY FOR COST OF EQUITY CAPITAL.

The Participating Purveyor and the City release each other from all liability or claims that they have or could have asserted against each other with respect to the methods the City has used to calculate the *average cost of debt* and the *cost of equity capital* under the Contract. This release does not cover

any disputes which may arise over whether the methods set forth in Subsections 4.A and 4.B have been properly applied as distinguished from whether the methods are proper.

SECTION 5. ALLOCATION OF COSTS OF REHABILITATED TOLT PIPELINE.

Introduction:

Between 1958 and 1962, the City constructed the *Tolt Pipeline*, the 24 mile transmission line originating at the Tolt Regulating Basin. For depreciation purposes, its life was set at 50 years. Two breaks occurred in the pipeline respectively in 1987 and 1988. Following a study of the pipeline affected, it was determined that approximately 13 miles of the pipeline were subject to breaks from a hydrogen embrittlement condition of the spiral rods that support the pipeline. Beginning in 1990, the City rehabilitated through a combination of replacement, relining, and other means, all but a one-mile segment of the portion of the Tolt Pipeline affected by the hydrogen embrittlement, at an approximate cost of \$33 million. The remaining mile affected is scheduled for rehabilitation in the late 1990's, at an approximate cost of \$4-5 million.

Since 1990 the City has allocated the costs of the rehabilitation of the Tolt Pipeline using the same method used for other old water facilities. However, several Purveyors have contended that negligence of the City was a contributing cause of the premature failure of the Tolt Pipeline and that the City as owner of the regional water system should accept more responsibility for the rehabilitation costs.

The City denies all of these allegations; however, as a compromise resolution of this issue, Section 5.A provides that the costs of the *rehabilitated Tolt Pipeline* shall continue to be treated for ratemaking purposes as a standard old water facility, but if the City conveys the *rehabilitated Tolt Pipeline* (or a portion thereof) during its useful life, the Participating Purveyors shall be paid an *equity interest*. That interest is determined by the specific formulas and the terms and conditions set forth in Section 6.

Section 5.B also sets forth the method by which the City will treat losses associated with the premature retirement of the *original Tolt Pipeline*. Such losses will not be included in the rate base (and thereby charged a rate of return) but will be amortized and allocated to purveyors over a specified number of years. However, Section 5.C provides that all Participating Purveyors will receive a credit for such losses they pay through water rates from 1993 forward, and that Participating Purveyors who sign the Amendment before a specified date will receive a credit for such losses they have paid through past water rates from 1990 to 1992.

Section 5.D provides for a release of liability to the City associated with the allocation of costs of the *rehabilitated Tolt Pipeline* to the Participating Purveyor through old water rates and an acknowledgement that any portion of the *original Tolt Pipeline* that is rehabilitated after January 1, 2002, has served its useful life.

Finally, although there is provision for events should the City convey all or part of its water system, there is no intent by the City to do so and none should be inferred from the language in this Amendment.

5.A. METHOD OF COST ALLOCATION AND COMPENSATION IN EVENT OF CONVEYANCE. The costs of the *rehabilitated Tolt Pipeline* shall continue to be included in the old water rate base and allocated to purveyors in a manner generally consistent with the methodologies utilized in previous rate studies. However, in the event that the *rehabilitated Tolt Pipeline* (or a portion thereof) is conveyed to another entity or entities, the Participating Purveyor shall receive compensation equal to its percentage share of the *equity interest* of all Participating Purveyors in the pipeline as determined under the terms and conditions set forth in Section 6 below.

5.B. ALLOCATION OF LOSS RECORDED FOR THE TOLT PIPELINE. If a loss upon retirement is recorded for any portion of the *original Tolt Pipeline* which is replaced or rehabilitated before January 1, 2002, such loss shall not be included in the rate base but shall be amortized over the remaining life of such portion; however, if such a loss is recorded for any portion of the *original Tolt Pipeline* which is replaced or rehabilitated after January 1, 2002, such loss shall be included in the rate base and shall be amortized over the remaining life of such portion. The amortized expense shall be allocated to the purveyors using the same allocation factors as are used for the segment of the *Tolt Pipeline* on which the loss was incurred.

For purposes of this provision, the remaining life of any portion of the *Tolt Pipeline* which is replaced or rehabilitated shall be as follows:

i. Twenty years from the date of recording if a loss for that portion was recorded before the effective date of this Amendment; or

ii. Determined by subtracting the number of years the portion was in service from an original life of fifty years if a loss for that portion is recorded on or after the effective date of this Amendment.

5.C. ANNUAL CREDIT OF AMORTIZED PORTION OF ANY LOSS. Beginning with the year 1994, the City shall within one hundred and eighty days after the conclusion of each fiscal year credit the water bill of each Participating Purveyor for the amortized portion of any loss the Purveyor has paid in such year. Further, if the Participating Purveyor signs this Amendment no later than ninety days after the effective date of an ordinance authorizing the City to enter into this Amendment, the Participating Purveyor shall receive a credit on its water bill within one hundred and eighty days of the effective date of this Amendment from the City for the amortized portion of any loss the Participating Purveyor has paid through rates for the years 1990-1993.

5.D. RELEASE OF LIABILITY FOR REHABILITATION COSTS. The Participating Purveyor hereby releases the City from all liability or claims that it has asserted or could have asserted against the City arising out of the allocation to the purveyors through old water rates of the costs of (1) the *rehabilitated Tolt Pipeline*, (2) the emergency repairs of such pipeline in connection with pipeline breaks in 1987 and 1988 respectively, including any

claims or liability arising from such breaks, and (3) the losses associated with retirement of the *original Tolt Pipeline* before its expected life of 50 years. Further, any portion of the *original Tolt Pipeline* for which notice to proceed to rehabilitate (including replace) such portion is issued after January 1, 2002, shall be considered to have served its useful life, and the Participating Purveyor agrees to release the City from all liability or claims arising from or in any way connected to an express or implied allegation that such portion of the *original Tolt Pipeline* did not serve its useful life.

SECTION 6. *TOLT PIPELINE EQUITY INTEREST.*

Introduction:

Section 6 sets out the terms and conditions under which the Participating Purveyors shall receive payment of the *equity interest* provided for in Section 5 in the event that the *rehabilitated Tolt Pipeline* (or a portion thereof) is conveyed.

Subsection 6.A sets forth the alternative formulas which would be used to determine the amount of the *equity interest* if a *voluntary conveyance* occurs. The *equity interest* is to be the lesser amount determined by Formula 1 or Formula 2, but in no case less than Formula 3. Formula 1 credits the Participating Purveyors for depreciation they paid including interest and for the recomputation of purveyor costs for 1987-1988 provided for in Subsection 5.C. Formula 2 credits the Participating Purveyors for a percentage of the conveyance value of the *rehabilitated Tolt Pipeline*, the percentage being equal to the share of depreciation the Participating Purveyors have paid for the pipeline. Formula 3 also credits the Participating Purveyors for a percentage of the conveyance value of the *rehabilitated Tolt Pipeline*, the percentage being equal to the total depreciation paid by the Participating Purveyors divided by the original cost of the *rehabilitated Tolt Pipeline*.

Subsection 6.B sets forth the calculations which would be used to determine the amount of the *equity interest* if an *involuntary conveyance* occurs. In such case, the amount of the *equity interest* would be one-half of the amount provided under Subsection 6.A or a lesser amount if the amount determined by Formula 4 is less. Formula 4 subtracts from the *equity interest* computed under Subsection 6.A the Participating Purveyors' share of the outstanding debt of the *rehabilitated Tolt Pipeline*.

Subsection 6.C provides that if only a portion of the *rehabilitated Tolt Pipeline* is conveyed the amount of the equity interest as determined under Subsections 6.A and 6.B shall be based on values corresponding to the portion conveyed.

Subsection 6.D defines the individual share of the Participating Purveyor of the *equity interest*, and Subsection 6.E provides that any contract to convey the *rehabilitated Tolt Pipeline* shall provide for the purchaser to pay such individual share.

Subsection 6.F sets forth some general conditions for assigning a *conveyance value* to the *rehabilitated Tolt Pipeline* for the purposes of calculating the *equity interest*. It provides that the assigned value shall be reasonable in view of the estimated market value of the facility.

Subsection 6.G defines the term during which Participating Purveyors are entitled to obtain payment of the *equity interest* if the *rehabilitated Tolt Pipeline* is conveyed. That term ends at the end of the useful life of the facility, which in no case shall be longer than 60 years.

Subsection 6.H creates a special account (the Tolt Pipeline Account) to record the financial data necessary to compute the *equity interest* under Formula 1. Similarly, Subsection 6.H provides for an annual accounting to Participating Purveyors of consumption data which will allow calculation of each Participating Purveyor's individual share of the *equity interest*.

Finally, although there is provision for events should the City convey all or part of its water system, there is no intent by the City to do so and none should be inferred from the language in this Amendment.

6.A. COMPUTATION OF *EQUITY INTEREST* IF VOLUNTARY CONVEYANCE. Although it is not anticipated that a *voluntary conveyance* will occur, in the event of a *voluntary conveyance* of the *rehabilitated Tolt Pipeline* (or a portion thereof), the *equity interest* of all Participating Purveyors shall be the lesser of the amount determined by Formula 1 or Formula 2 below, except that in no case shall the *equity interest* be less than the amount determined by Formula 3. If Formula 1 is used to calculate the *equity interest*, then the City shall be entitled to recover a return and depreciation on the portion conveyed for the year of conveyance.

6.A.1. FORMULA 1.

$$E_1 = R(1+i_{1991}) \times (1+i_{1992}) \times \dots \times (1+i_{\text{year}}) \\ + [D_{1990} \times (1+i_{1991}) \times (1+i_{1992}) \times \dots \times (1+i_{\text{year}}) \\ + D_{1991} \times (1+i_{1992}) \times (1+i_{1993}) \times \dots \times (1+i_{\text{year}}) + \dots + D_{\text{year}}] \times (1 - .02n)$$

Where

E_1 = *equity interest* per Formula 1 at date of conveyance

R = Net difference in Participating Purveyor costs, including interest, as provided in Subsection 4.C.

i = *Cost of equity capital* for each year; in the year of conveyance, "i" will be calculated to the date of conveyance, and rounded to three decimal places

D = Depreciation expenses recovered from Participating Purveyors in a given year for the *rehabilitated Tolt Pipeline*; in the year of conveyance, depreciation expenses will be calculated to the date of conveyance

year = Year in which conveyance occurs

n = Number of years between January 1, 1991, and the date of conveyance, calculated to two decimal places

Example of Formula 1:

If the *rehabilitated Tolt Pipeline* were sold on January 1, 1994, and

the net difference in purveyor costs (R) is \$200,000, and

depreciation expenses recovered from Participating Purveyors in a given year (D) are \$600,000 for each year, and

the rate of return on the City's equity capital (i) is 7% for each year ($D_{1990\dots}$),

then $E_1 = \$200,000 \times 1.070^3 + (\$600,000 \times 1.070^3 + \$600,000 \times 1.070^2 + \$600,000 \times 1.070 + \$600,000) \times (1 - (.02 \times 3.00))$

and E_1 would equal \$2,749,136.

6.A.2. FORMULA 2.

$$E_2 = (P/T) \times C$$

Where

E_2 = *equity interest* per Formula 2 at date of conveyance

P = Cumulative depreciation expenses recovered from Participating Purveyors beginning in 1990 to date of conveyance for the *rehabilitated Tolt Pipeline*

T = Cumulative depreciation expenses of all purveyors and the City beginning in 1990 to date of conveyance for the *rehabilitated Tolt Pipeline*

C = Value assigned to the *rehabilitated Tolt Pipeline* conveyed per Subsection 6.F.

Example of Formula 2:

If the *rehabilitated Tolt Pipeline* were sold on January 1, 1994, and

the cumulative depreciation expenses recovered from Participating Purveyors beginning in 1990 to date of conveyance for the *rehabilitated Tolt Pipeline* (P) were \$2,400,000, and

the cumulative depreciation expenses of all purveyors and the City beginning in 1990 to date of conveyance for the *rehabilitated Tolt Pipeline* (T) were \$3,200,000, and

the *conveyance value* were \$36,800,000 (C),

then E_2 would equal \$27,600,000.

6.A.3. FORMULA 3.

$$E_3 = (P/O) \times C$$

Where

E_3 = *equity interest* per Formula 3 at date of conveyance

P = Cumulative depreciation expenses recovered from Participating Purveyors beginning in 1990 to date of conveyance for the *rehabilitated Tolt Pipeline*

O = Original Cost of the *rehabilitated Tolt Pipeline*

C = Value assigned to the *rehabilitated Tolt Pipeline* per Subsection 6.F.

Example of Formula 3:

If the *rehabilitated Tolt Pipeline* were sold on January 1, 1994, and

the cumulative depreciation expenses recovered from Participating Purveyors beginning in 1990 to date of conveyance for the *rehabilitated Tolt Pipeline* (P) were \$2,400,000, and

the original cost of the *rehabilitated Tolt Pipeline* were \$40,000,000 (O), and

the conveyance value were \$36,800,000 (C),

then E₃ would equal \$2,208,000.

Accordingly, in the example provided for Formulas 1-3 above, the value of the *equity interest* would be \$2,749,136, because the *equity interest* under Formula 1 (\$2,749,136) is less than the *equity interest* under Formula 2 (\$27,600,000), but greater than the *equity interest* under Formula 3 (\$2,208,000).

6.B. COMPUTATION OF EQUITY INTEREST IF INVOLUNTARY CONVEYANCE. Although it is not anticipated that an *involuntary conveyance* will occur, if an *involuntary conveyance* of the *rehabilitated Tolt Pipeline* (or a portion thereof) occurs, the *equity interest* shall be the lesser of: (a) fifty percent of the amount computed under Subsection 6.A, or (b) the amount determined by Formula 4 below.

6.B.1. FORMULA 4.

$$E_4 = E - [(P/T) \times B]$$

Where

- E_4 = *equity interest* per Formula 4 at date of conveyance
- E = Participating Purveyors' *equity interest* as computed under Subsection 6.A., i.e., the lesser of E_1 or E_2 , but in no case less than E_3
- P = Cumulative depreciation expenses recovered from Participating Purveyors beginning in 1990 to date of conveyance for the *rehabilitated Tolt Pipeline* conveyed
- T = Cumulative depreciation expenses of all purveyors and the City beginning in 1990 to date of conveyance for the *rehabilitated Tolt Pipeline*
- B = Total outstanding debt at date of conveyance for the portion of the *rehabilitated Tolt Pipeline* in question at the time of *involuntary conveyance*

If the *equity interest* computed under this Subsection is a negative number, the *equity interest* shall be considered to be zero.

6.C. EQUITY INTEREST IF PARTIAL CONVEYANCE. Although it is not anticipated that a conveyance will occur, in the event that a portion of the *rehabilitated Tolt Pipeline* is conveyed, the numbers used in the formulas shall include only such amounts as correspond to the portion conveyed. If only a portion is conveyed and the amount of depreciation recovered from Participating Purveyors for such portion cannot be reasonably determined, such amount shall be determined by using the ratio of the estimated original cost of the portion conveyed to the original cost of the entire *rehabilitated Tolt Pipeline*.

6.D. PERCENTAGE SHARE OF PARTICIPATING PURVEYOR. The percentage share of each Participating Purveyor of the *equity interest* shall be

equal to the ratio of the wholesale consumption by volume for the Participating Purveyor for the year 1990 through the year preceding the conveyance to the total wholesale consumption by volume for all Participating Purveyors during that same period of time.

6.E. METHOD OF COMPENSATING PARTICIPATING PURVEYORS.

Although it is not anticipated that a conveyance will occur, if the *rehabilitated Tolt Pipeline* or any portion thereof is conveyed, the City shall provide in any contract for conveyance that the acquiring entity or entities shall distribute to each Participating Purveyor its percentage share of the *equity interest*. Such contract of conveyance shall provide for direct payment by the acquiring entity (or entities) to the Participating Purveyor within 120 days of the conveyance or through any other arrangement agreed to by the Participating Purveyor and the acquiring entity. However, in no case shall the City be required to pay such compensation directly to the Participating Purveyor.

6.F. *CONVEYANCE VALUE OF REHABILITATED PORTION OF THE TOLT PIPELINE*. Although it is not anticipated that a conveyance will occur, any contract for conveyance of the *rehabilitated Tolt Pipeline* (or a portion thereof) shall assign a separate *conveyance value* to the facility for the purpose of determining the amount of compensation due the Participating Purveyors. The assigned *conveyance value* shall be reasonable in view of the estimated market value of the facility and shall be presumed to be not less

than the *book value* of the portion conveyed unless the City shows by an appraisal that a lesser value is appropriate. The City's appraisal shall be done by an independent appraiser and use methods that are generally accepted for appraisal of like facilities. It is understood that the assigned *conveyance value* shall not include the value of any interests in real property associated with the *rehabilitated Tolt Pipeline* or any value added as a result of the expansion of the capacity of the *Original Tolt Pipeline*. It is agreed that no rehabilitation or replacement done prior to the effective date of this Amendment has expanded the capacity of the *Original Tolt Pipeline*.

6.G. TERM OF *EQUITY INTEREST*. The right of the Participating Purveyor to obtain its percentage share of the *equity interest* in the event of a conveyance shall continue until the *rehabilitated Tolt Pipeline* has reached the end of its useful life. If a portion of the *rehabilitated Tolt Pipeline* reaches the end of its useful life, that portion shall no longer be considered a portion of the *rehabilitated Tolt Pipeline* for purposes of computing the *equity interest*. For purposes of this Section, "useful life" means the period of time that the portion of the *rehabilitated Tolt Pipeline* in question is in service for its intended purpose; however, the useful life of the *rehabilitated Tolt Pipeline* shall in no case exceed sixty years from the date the portion of such pipeline in question is first put into service. The *equity interest* in the *rehabilitated Tolt Pipeline* provided under this Section shall not be affected by the termination of the Contract; however, the provisions of this Section shall

not furnish evidence of the original intent of the parties with respect to duration of the term of the Purveyor Facilities Account interest under the Contract.

6.H. TOLT PIPELINE ACCOUNT. The City shall establish a new accounting statement entitled the Tolt Pipeline Account. The purpose of this accounting statement is to record amounts which shall be used to determine the *equity interest* if Formula 1 is used. This accounting statement is similar in concept to the Purveyor Facilities Account ("PFA") under the Contract. The following amounts shall be recorded in the Tolt Pipeline Account: (a) the difference associated with the recomputation of purveyor costs for the years 1987 and 1988, including interest, provided for in Subsection 4.C., together with the amount of return earned annually by applying the *cost of equity capital* to this difference; and (b) the annual depreciation expenses on the *Tolt Pipeline* rehabilitation project recovered from the Participating Purveyors as provided for in Subsection 5.A., together with the amount of return earned annually by applying the *cost of equity capital* to these depreciation expenses.

6.I. ANNUAL ACCOUNTING TO PARTICIPATING PURVEYORS. The City shall provide an annual accounting to each Participating Purveyor of the status of the Tolt Pipeline Account. This accounting will include consumption data for determining each Participating Purveyor's share of compensation in the event of a conveyance of a portion of the *rehabilitated*

Tolt Pipeline. This accounting may be included with the statements for the Purveyor Balance Account or the Purveyor Facilities Account.

SECTION 7. JOINT FACILITY AGREEMENTS

Introduction:

Section 7 sets forth a procedure by which the City and Participating Purveyors may enter into Joint Facility Agreements for joint funding of future projects which are approved for such funding by the Seattle City Council. The terms of Joint Facility Agreements will be determined on a project-by-project basis. It is anticipated that such agreements would provide for a rate of return or other compensation to investing Participating Purveyors and additionally provide an equity interest, which would be realized in the event the project is conveyed.

7.A. PURPOSE OF JOINT FACILITY AGREEMENTS. Joint Facility Agreements are for the purpose of allowing interested Participating Purveyors to invest in specific Capital Improvement Program ("CIP") facilities and thereby to obtain certain financial benefits. The Joint Facility Agreement shall specify the payments that the City shall make to Participating Purveyors that invest in a facility and the compensation due to such Participating Purveyors in the event that the facility is conveyed at a future date. Nothing in this Section shall preclude the City from entering into agreements with other investors for purposes of financing a CIP.

7.B. GENERAL PROCEDURE FOR ENTERING JOINT FACILITY AGREEMENTS.

- i. If the City has identified any CIP projects that the City proposes to offer for joint investment, the City shall provide the Participating Purveyor with a copy of a proposed Joint Facilities Plan at the time of mailing the proposed CIP pursuant to Section VIII.A.5 of

the Contract. The Joint Facilities Plan shall identify the facilities proposed for joint investment and state the proposed amount of investment. The City shall provide any Participating Purveyor an opportunity to comment on and propose changes to the proposed Joint Facilities Plan.

ii. After making any changes to the Joint Facilities Plan which the City deems appropriate, the City shall submit the proposed Joint Facilities Plan, including copies of any proposed changes which have not been incorporated into the plan, to its City Council for approval as submitted or as may be modified. Such submission shall be made at the time the CIP is submitted for approval.

iii. If a Joint Facility Plan is authorized and if the City ultimately decides to pursue joint funding of a facility so authorized, it shall submit a proposed Joint Facility Agreement for such facility to all Participating Purveyors.

iv. The allocation of the amount of equity subscription offered to Participating Purveyors in a Joint Facility Agreement shall be determined as follows:

a. Initially, the amount of equity subscription available to each Participating Purveyor shall be limited to the percentage share of the Purveyor of the total water purchases by volume of all Participating Purveyors in the most recent calendar year.

Example:

If the City invites \$10 million in equity subscription in a given project, and if a given Purveyor's share of total water purchases by volume of Participating Purveyors in the most recent calendar year is 15 percent, then this Purveyor's equity participation would be limited to \$1.5 million.

b. If any of the offered equity in a joint facility is not subscribed, the City may at its discretion offer any portion of such unsubscribed equity to purveyors who have already subscribed to an equity portion of the facility.

7.C. ANNUAL ACCOUNTING TO SUBSCRIBING PURVEYORS. The City shall provide an annual accounting to all subscribing purveyors which shall identify all contributions to a joint facility and the percentage share of each subscribing purveyor and the City in such facility.

SECTION 8. PURVEYOR FACILITIES ACCOUNT ("PFA").

Introduction:

The Contract provides that financial data for New Expansion Facilities be recorded in a Purveyor Facilities Account (PFA). Further, although the City is not contemplating conveyances, the Contract provides that in the event of the sale of a New Expansion Facility either the City will provide a credit to the purchaser or the purchaser will make a payment to the Purveyors to compensate for Purveyor contributions to such facility. Section 8 is intended to clarify two terms used in the Contract with regard to the payment of compensation to Purveyors if a New Expansion Facility is conveyed and to provide the Purveyors with financial data to determine their individual share of such compensation.

The first term clarified is the "contract-signing purveyors' share of . . . conveyance value," as referred to Subsections III.F.2 and III.F.3 of the Contract. Subsection III.F.2 defines that term as follows: "[t]he contract-signing purveyors' share shall be the percentage of the facilities' costs that have been allocated to and paid by the contract-signing purveyors since signing the contract." This definition, however, does not state the basis for determining the "facilities' costs." Subsection 8.A. provides that the "facilities' costs" are to be based upon the original cost of those facilities, unadjusted for inflation and depreciation.

The second term clarified is the "pro-rated share of the contract-signing purveyors' share of the conveyance value" as referred to in Subsection III.F.3 of the Contract. Subsection 8.B. of the Amendment defines the prorated share of each Purveyor in terms of the ratio of the total

new water revenue ("growth charges") paid by the Purveyor beginning in 1984 through the year preceding the facility conveyance to the total new water revenue paid by all Purveyors during that same period of time.

8.A. CUMULATIVE SHARE OF ALL PURVEYORS. The purpose of this Subsection is to clarify the method of determining the cumulative share of all Purveyors of the conveyance value of New Expansion Facilities, otherwise referred to as PFA facilities. The cumulative share of all Purveyors is referred to as the "contract signing purveyors' share of . . . conveyance value" in Subsections III.F.2 and III.F.3 of the Contract. Such cumulative share shall be determined by multiplying the total conveyance value of the facilities upon sale times the ratio of Purveyor payments on principal recorded in the PFA for those facilities to the original cost of those facilities.

Example of 8.A:

Assume that the Highline Well Field was conveyed on January 1, 1992, for the amount of \$5,000,000. Using data for the Highline Well Field from the 1991 PFA, the amount paid for the facility by all Purveyors since the Contract signing (\$690,841) divided by total capital expenditures for the facility (5,744,137) is 12%. Accordingly, the cumulative share of all Purveyors would be \$5,000,000 x 12% or \$600,000.

8.B. INDIVIDUAL SHARE OF EACH PURVEYOR. The purpose of this Subsection is to clarify the method for determining the individual share of each Purveyor of the cumulative share of all Purveyors defined in Subsection 8.A. The individual share of each Purveyor is referred to as the "pro-rated share of the contract signing purveyors' share of the conveyance value" in Subsection III.F.3. of the Contract. Although the City is not contemplating conveyances, such individual share shall be determined by multiplying the

"contract signing purveyors' share of . . . conveyance value," as defined in Subsection 8.A. of this Amendment, times the ratio of the total new water revenue ("growth charges") paid by the Purveyor beginning in 1984 through the year preceding the conveyance to the total new water revenue paid by all Purveyors during that same period of time.

Example of 8.B:

Assume the Highline Well Field were conveyed on January 1, 1992, and it is necessary to determine the individual share of the City of Bellevue of the cumulative share of \$600,000 of all Purveyors for the Highline Well Field as calculated in the example for Subsection 8.A. The 1991 Purveyor Statements indicate that the City of Bellevue paid \$2,623,520 in growth charges from 1984 through 1991 and that all Purveyors paid \$10,013,291 in growth charges for the same period. Thus, the individual share of the City of Bellevue for the Highline Well Field would be $\$2,623,520/\$10,013,291$ or 26.2%, times \$600,000, which is \$157,200.

8.C. RECORD KEEPING FOR NEW EXPANSION FACILITIES. Although the City is not contemplating conveyances, the City shall maintain detailed records of the contributions of each Purveyor with respect to each New Expansion Facility included in the PFA so that if such facilities are conveyed, information is available to determine the percentage share of each Purveyor.

SECTION 9. CONSERVATION PROGRAM COST ALLOCATION.

Introduction:

Under the Contract, the City's regional water conservation program is to be implemented with the assistance and support of the Purveyors. The Contract also provides that the City's basis for allocating costs of its regional conservation program is to be reviewed and evaluated by an independent rate consultant as a part of each rate study. However, the Contract does not supply any specific principles by which conservation cost allocation shall occur. The purpose of this Section is to provide such principles.

Section 9 classifies conservation programs for purposes of cost allocation as *local conservation*, *base conservation*, and *supply conservation*. *Local conservation* costs are allocated only to the local entity involved. *Base conservation* costs are allocated using the allocation factor used to allocate the operation and maintenance expenses of existing old water supply facilities. *Supply conservation* costs, with certain limitations, are allocated using a similar allocation method to that used for New Expansion Facilities. Since *Supply Conservation* programs are generally to be treated as New Expansion Facilities, Section 9 accordingly provides for an equity payment to Purveyors in the event that such programs or other non-conservation New Expansion Facilities are conveyed.

9.A. CLASSIFICATION OF CONSERVATION PROGRAMS. Programs which are substantially related to the conservation of water shall be classified for cost allocation purposes in one of the following categories:

9.A.1. *LOCAL CONSERVATION*. *Local conservation* programs are those initiated, administered, and financed by the City or a purveyor that are not offered or applied, or intended to be offered or applied, to all similarly situated customers in the *region*. A pilot program for a *base conservation* or a *supply conservation* program shall be classified in the same manner as the potential regional program would be classified regardless whether the pilot program is offered or applied to the *region*. For purposes of Section 9, the term *region* shall refer to the direct service area of the City and of the purveyors to the extent supplied by the City.

9.A.2. *BASE CONSERVATION.* *Base conservation* programs are those offered or applied, or intended to be offered or applied, to all similarly situated customers in the *region* that provide education, information, technical policy analysis, and/or support services associated with water conservation. Further, non-local conservation programs which do not qualify as *supply conservation* will be considered *base conservation*. Generally, the costs of these programs will not be funded as capital improvement projects. Programs conducted under this category may provide demand reduction, but the savings are difficult or impossible to quantify.

9.A.3. *SUPPLY CONSERVATION.* *Supply conservation* programs are those offered or applied, or intended to be offered or applied, to all similarly situated customers in the *region* that provide for conservation measures which produce a reasonably quantifiable amount of water savings on a cost effective basis as cost effectiveness is defined in the Comprehensive Regional Water Plan. Except for unusual cases, programs under this category will be identified and funded through the City's Capital Improvement Program.

9.B. IMPLEMENTATION OF CLASSIFICATION. No later than the preparation and audit of the annual Purveyor Statements for a year in which related costs are being recorded, the City's classification of conservation programs will be submitted for approval to the Purveyor Committee.

If the City and the Purveyor Committee cannot reach agreement on the classification of an ongoing program that is listed on Appendix A within 60

days of the date of submission to the Committee, the classifications on Appendix A shall remain in effect for such program.

If the City and Purveyor Committee cannot reach agreement on the classification of a program that is not listed on Appendix A to this Amendment within 60 days of the date of submission to the Committee or within such other time as the Committee and the City may agree upon, an impasse will be deemed to have occurred and the City shall submit the question of classification to the independent rate consultant, who shall make a determination within 30 days of such submission. If no independent rate consultant is currently under contract, the City shall select a qualified independent rate consultant within 60 days after an impasse is reached. In making a determination on classification, the independent rate consultant shall give serious consideration to classifications given to similar programs as set forth in Appendix A and shall base such determination on the definitions and principles contained in this Section.

9.C. ALLOCATION OF CONSERVATION PROGRAM COSTS.

9.C.1. *LOCAL CONSERVATION* PROGRAMS. The City shall not allocate the costs of local programs to the purveyors pursuant to the Contract.

9.C.2. *BASE CONSERVATION* PROGRAMS. The City shall treat the costs of *base conservation* programs as old water costs and allocate such costs to the purveyors based on the weighted average of purveyor shares of total

system peak season flows and average annual flows, with the weights reflecting the portions of existing old water supply facilities that are related to peak season versus annual flows. The balance of *base conservation* program costs shall be allocated to the City's direct service customers.

9.C.3. *SUPPLY CONSERVATION* PROGRAMS. Subject to the limitations provided in Subsection 9.D below, the City shall treat the costs of *supply conservation* programs as new water costs and allocate such costs to the purveyors based on the purveyors' share of growth in the City's wholesale and retail sales since 1980 measured by water volume. It is agreed that relative shares of growth in sales from 1980 to 1990 result in allocation factors of 77.6% to purveyors and 22.4% to the City's direct service customers. The above percentages will be used for all *supply conservation* programs initiated during the 1992-94 period. The allocation factors assigned a program shall remain unchanged for the accounting life of the program. Allocation factors for a new program will be set for the life of the program in the Purveyor Balance Account statement for the first year in which expenditures occur for the program.

9.C.4. RECLAIMED WATER AND RELATED PROGRAMS. Section 9 and the cost allocation provisions therein shall not apply to programs which involve the use of reclaimed water (as defined under RCW title 90), well water that does not meet state or federal drinking water standards, storm water, or any non-potable water; however, programs which involve the reuse

and treatment of non-potable water on the same site where the prior use occurred shall be covered by this Section. The City and the Purveyors may enter a separate agreement with respect to any program excluded from the coverage of this Amendment under this Subsection.

9.D. LIMITATIONS ON ALLOCATION OF SUPPLY CONSERVATION PROGRAM COSTS.

9.D.1. MARGINAL COST LIMITATION. If the summer new water rate charged to the purveyors exceeds wholesale peak season marginal cost as a result of the allocation of the costs of *supply conservation* costs pursuant to Subsection 9.C.3, the costs of new *supply conservation* programs (or portions thereof) will be allocated as *base conservation* programs until such point that the new water rate is equal to wholesale peak season marginal cost, as defined by the most recent rate study.

9.D.2. COST SHARING LIMITATION.

Introduction:

Most *Supply Conservation* programs will produce a direct financial benefit to program participants through reduced water consumption and related energy, sewer, or other savings. In designing such programs, a decision must be made whether, and to what extent, to recover some of the costs of such programs from participating water users or to offer incentives to such participants. The Water System is said to "share the costs" of the program with the participants to the extent that the participants pay some of the costs associated with the conservation device or measure from which they receive a direct benefit. This Subsection sets forth a procedure for purveyor input on program cost sharing and establishes principles of allocation in the event the City and the Purveyor Committee are unable to agree on the appropriate level of cost sharing.

Prior to implementation of a *supply conservation* program, the City shall consult with the Purveyor Committee about the level of Regional Water

Supply System and participant cost sharing that is appropriate for the program. Following such consultation, the City shall provide a written proposal to the Purveyor Committee that sets forth a proposed level of cost sharing for the program in question. If the Purveyor Committee objects to the City's proposal, the Committee shall within 60 days from receipt of the City's proposal submit a good faith alternative proposal. If such alternative proposal is not timely submitted, all relevant program costs shall be allocated as new water costs pursuant to subsection 9.C.3. The Purveyor Committee shall in writing approve or disapprove any subsequent City counter-proposal within 45 days of receipt, and the failure to act within this period shall be construed to be an approval. If the City elects to proceed with the program at a level of cost sharing other than one approved by the Purveyor Committee, the costs of the *supply conservation* program in question shall be allocated according to the following principles:

(1) To the extent that a *supply conservation* program meets either one or both of the following two conditions, net programs costs for such portion of the program shall be allocated as *supply conservation* under Subsection 9.C.3:

(a) The program is offered or applied, or intended to be offered or applied, to residential customers. For purposes of this provision, residential customers shall mean (1) customers paying for or using service at single family dwellings or multifamily dwellings of

four or fewer units; and (2) customers paying for or using service at multi-family dwellings of more than four units that are individually metered.

(b) The program is offered or applied, or intended to be offered or applied, to non-residential customers that are federal, state, or local governmental entities or schools or an organization exempt from federal taxation under section 501(c)(3) of title 26 of the United States Code; however, programs directed toward purveyor utility management, such as billing system enhancements, shall not be covered by this condition.

(2) To the extent that a *supply conservation* program does not meet condition a or b as set forth above, programs costs for such portion of the program shall be allocated one half as *supply conservation* under Subsection 9.C.3 and one half as *base conservation* under Subsection 9.C.2.

(3) If the Purveyor Committee and the City disagree over whether, or the extent to which, a program meets the above conditions, the dispute shall be submitted to the independent rate consultant, selected pursuant to Subsection 9.B above, for a determination within 30 days of such submission.

(4) It is agreed that notwithstanding the provisions of this Subsection, that all costs of the City's existing Home Water Savers

program shall for the accounting life of the program be allocated as *supply conservation* under Subsection 9.C.3.

9.E. AMORTIZATION AND FINANCING OF PROGRAM COSTS. If a *supply conservation* program is expected to produce conservation savings for longer than one year, and if appropriate under generally accepted accounting practices, the City shall capitalize and amortize the capital costs of such program over the period during which the benefits are expected to be realized or the accounting period used for amortization. Such programs may be partially or entirely debt financed with debt maturities consistent with the period of benefit.

9.F. NEW EXPANSION FACILITY DESIGNATION FOR *SUPPLY CONSERVATION* PROGRAMS. To the extent the costs of *supply conservation* programs are allocated as new water costs pursuant to subsection 9.C.3, such programs shall be considered as New Expansion Facilities under the Contract and the costs of such programs shall be recorded in the PFA. Such facilities shall be subject to the following special provisions:

9.F.1. EQUITY VALUE UPON CONVEYANCE. Although it is not anticipated that a conveyance will occur, if a *supply conservation* program is conveyed to another entity, the equity value of such program shall be distributed to the Purveyors in the same manner as provided for other PFA facilities under the Contract. The equity value of the program shall be determined by multiplying the program's total conveyance value, as defined

in Subsection 9.F.3 below, times the ratio of Purveyor payments recorded in the PFA to the total original cost of the conservation facility.

9.F.2. CONSTRUCTIVE CONVEYANCE OF SUPPLY CONSERVATION PROGRAMS. Although it is not anticipated that a conveyance will occur, *supply conservation* programs that do not involve assets that are owned by the City shall be deemed to be constructively conveyed in whole or part if the Regional Water Supply System is conveyed or if water facilities that are directly involved with the supply of water to the Purveyors are conveyed. If the entire Regional Water Supply System is not conveyed, such programs shall be deemed to be conveyed in proportion to the ratio of the *book value* of the portion of the Regional Water Supply System conveyed to the *book value* of the entire Regional Water Supply System. The City shall maintain detailed records so that if such conveyance occurs information will be available to Purveyors to determine the individual share of each Purveyor of the Equity Value.

9.F.3. CONVEYANCE VALUE OF SUPPLY CONSERVATION PROGRAMS. *Supply conservation* programs (or portions thereof) shall be deemed to have a *conveyance value* equal to their depreciated original cost. If a program has been fully depreciated, the *conveyance value* shall be zero.

9.F.4. DISCLAIMER OF BASIS FOR DETERMINING VALUE. Nothing in Section 9 shall be interpreted or relied on to establish a basis for

determining the *conveyance value* of water facilities that are not part of a *supply conservation* program.

SECTION 10. WORKING CAPITAL AND INTEREST THEREON.

Introduction:

As part of determining revenue requirements in the setting of rates, the City has included amounts for funding a cash balance to cover the time lag between payment of expenses and collection of revenue. This cash balance is commonly referred to as "working capital." The purpose of Section 10 is to clarify the methods used to determine the purveyors' share of the revenue requirement for working capital on new water and old water expenses and to credit the purveyors for interest that would be earned on working capital if invested.

Section 10.A provides for the City to set a reasonable target for purveyor working capital for each rate period. The purveyor target for the current rate period is one-eighth of the purveyors' share of operation and maintenance expenses, but the City may change that target in future rate periods as long as the target does not become negative.

Section 10.B sets forth the method for determining purveyor working capital revenue requirements for old water expenses. Under the established practice, the City contributes the funds needed to meet the working capital target on old water expenses and the purveyors compensate the City for contributing such funds by paying a rate of return on the funds. The City has in the past charged the purveyors using the rate of return provided in the Contract; several purveyors have contended that rate is too high since it does not take into account the interest the City could earn on the working capital funds it contributes. Section 10.B provides that the City's average rate of interest earnings from working capital is to be subtracted from the rate of return.

Section 10.C sets forth the method for determining purveyor working capital revenue requirements for new water expenses. Unlike the practice for old water, the purveyors contribute the funds needed to meet the working capital target for new water expenses. As Section 10.C provides, the amount of new water working capital purveyors contribute for each rate period is carried over to the next, so in the current rate period the purveyors contribute only any difference between the prior target and the current target. If the current target is lower than the prior target, the purveyors receive a credit to revenue requirements. Section 10.C also provides that purveyors are to be given a credit for interest the City would earn on new water working capital that the purveyors contribute if such funds were invested.

10.A. TARGET FOR PURVEYOR WORKING CAPITAL. For each rate period, the City shall set a reasonable target for purveyor working capital. The current purveyor target is one-eighth (45 days worth) of annual operation and maintenance expenses allocated to the purveyors; however, the

City may change the target in future rate periods, provided that the purveyor working capital target is not negative.

Target working capital rather than projected or actual cash balances will be used for both rate making and Purveyor Balance Account calculations. Accordingly, target working capital based on purveyor operation and maintenance expenses, rather than the purveyor share of the average cash balance of the Water Department, shall be used to determine the actual revenue requirements for purveyor working capital.

10.B. OLD WATER WORKING CAPITAL. The purveyor revenue requirement for old water working capital shall be determined by multiplying the working capital target for purveyor old water expenses times the rate of return on working capital as set forth below. In order to credit the purveyors for interest that the City could earn on purveyor old water working capital, the rate of return on such working capital shall be based on the net difference of the rate of return provided under the Contract and the *average yield the City realized on working capital*.

The *average yield the City realized on working capital* shall be the interest earned on cash and investments divided by total cash and investments.

If the City finds that developing or maintaining the above data proves overly burdensome, the City may alternatively use a rate of return on working capital based on the difference between the rate of return and the 90-day Treasury bill rate.

Example of 10.B:

Assume that old water expenses allocated to purveyors for a given year are \$6,000,000, and that the current target for working capital is one-eighth of such expenses. Assume further the rate of return is 7% and the *average yield the City realized on working capital* is 4%. For that year, the purveyor revenue requirement for old water working capital would be \$750,000 ($\$6,000,000/8$) times 3% ($7\%-4\%$) for a total of \$22,500.

10.C. NEW WATER WORKING CAPITAL. The purveyor revenue requirement for new water working capital shall be the increase or decrease in cash necessary to bring working capital for purveyor new water expenses from its prior target to its current target.

In order to credit the purveyors for interest that the City could earn on purveyor new water working capital, the purveyors shall receive a credit against purveyor revenue requirements for new water based on their cumulative contributions to working capital attributable to new water activities and facilities. The credit shall be equal to the *average yield realized by the City on working capital* (or alternatively, the 90-day Treasury bill rate) as provided in Subsection 10.B times the cumulative purveyor working capital contributions for new water.

Example of 10.C:

Assume that new water expenses allocated to purveyors for a given year are \$160,000, and that the current target for working capital is one-eighth of such expenses. Assume further that the target for new water working capital for the prior year is \$15,000, and that the *average yield the City realized on working capital* for the current year is 4%. For the current year, the purveyor target for new water working capital would be \$20,000 ($\$160,000/8$). Accordingly, the purveyor revenue requirement for new water for such year would be \$5,000 ($\$20,000 - \$15,000$). The purveyor interest credit would be \$800 ($\$20,000 \times 4\%$).

10.D. INTEREST EXPENSES FOR CASH MANAGEMENT. If the City charges the purveyors for working capital, the City shall not in addition

allocate to the purveyors any interest expenses associated with short-term borrowing for working capital; provided that interest expenses on balances in the Purveyor Balance Account shall not be affected by this provision.

SECTION 11. ALLOCATION OF COSTS FOR REGIONAL FACILITIES INSIDE CITY DIRECT SERVICE AREA.

The costs associated with any facilities, whether located inside or outside the limits of the City direct service area, which are used in supplying water to purveyors may be proportionately allocated to the purveyors. Such allocation shall not be precluded because such costs have not been so allocated in past rate studies.

SECTION 12. ALLOCATION OF WATERSHED COSTS.

The primary purpose of the City's mountain watersheds is to secure and safeguard the supply of high quality water entering the system. Recognizing that these large watershed areas and their multiple resources have been subject to environmental losses associated with water supply facilities and are unavailable for general public access, the City's watershed management policies provide for certain secondary uses which do not interfere with the City's ability to carry out its primary purposes and which provide mitigation for such losses and lack of access. These secondary use policies allow such activities as cultural resource protection, research and public education programs, habitat preservation, and controlled timber harvest. The capital and operation and maintenance costs associated with the adopted primary

and secondary uses represent costs of water supply and shall therefore be allocated to purveyors in a manner consistent with other water supply costs, except that direct and indirect costs which would not be incurred absent revenue generating activities (commercial timber harvest, hydropower generation) shall not be allocated to purveyors, unless a corresponding share of the resulting revenues is credited to purveyors. Before changing any policies regarding secondary uses for the Cedar River Watershed or establishing such policies for the Tolt River Watershed, the City will describe to the Purveyors the scope of the proposed change, any cost or revenue implications, and the basis for concluding that the proposed change will not interfere with the City's ability to protect water quality. The City will seriously consider the Purveyors' comments and concerns.

SECTION 13. FUNDING PURVEYOR COSTS.

The City shall budget and reimburse administrative support expenses of the Purveyor Committee through an agreement with the Purveyor whose representative serves as Chair, providing such an agreement can be reached. Such agreement shall specify the administrative support services planned and eligible for reimbursement, the maximum amount of reimbursement, and the form of documentation required. Compensation paid to the Chair of the Purveyor Committee or other representatives to the Committee is not eligible for reimbursement. All reimbursed administrative support costs shall be allocated to the purveyors and recovered through the wholesale rates.

The agreement between the City and the Purveyor Committee Chair's individual jurisdiction assumes that the reimbursable administrative support services will be provided by and through the individual jurisdiction. Unless specifically authorized by the Chair and a reimbursable type of expense, expenditures of other Purveyors will not be eligible under this agreement.

Professional, technical, legal or other expert services are not covered by this agreement and are not eligible for the reimbursement arrangements described here. However, nothing herein precludes individual Purveyors, groups of Purveyors, or the Purveyor Committee from raising funds independently of the City and engaging such services.

SECTION 14. SECONDARY BENEFITS TO SPECIFIC PURVEYORS

Before entering into a bilateral agreement with an individual Purveyor, or a multilateral agreement with a number of Purveyors, to undertake a joint action or project involving more than \$15,000 in direct costs, the City will notify the Purveyor Committee and fully describe the proposed terms of such agreement, including any proposed allocation of costs based on anticipated benefit. The City will seriously consider any comments or concerns expressed by the Purveyor Committee before entering into the agreement and will inform the Purveyors of the reasons for its decision.

Some projects or actions, either joint or unilateral, may not require a specific site within the service area in order to meet their intended system-wide purposes. If such projects or actions are also likely to provide

significant secondary benefits to a specific Purveyor, the City will consider "siting" the project or action through a process that "auctions" the opportunity among interested Purveyors.

SECTION 15. INFORMATION TO BE SUPPLIED TO PURVEYORS WITH RATE STUDIES.

As part of each rate study, the City will provide the Participating Purveyors with the following information in addition to other information which may be required:

i. Information on the amount of and basis for allocating costs to purveyors for projects which are not specifically plant-in-service but which produce benefits lasting more than one year and which are capitalized and amortized over the life of the assets involved.

ii. Information on the basis for general fund service charges, on the dollar amounts involved, and on the basis for allocating portions of these costs to the purveyors.

iii. Information on any changes in the employer contribution to the City Retirement Fund and an estimate of the impact of such changes on the amount of revenue required from purveyors.

SECTION 16. TERM OF THIS AMENDMENT.

This Amendment shall take effect upon the later date that this Amendment is signed by the Participating Purveyor or by the Mayor of the City, as appears on the Signature Page of this Amendment, and shall

continue in effect until the termination of the Contract, except as specifically provided in Subsection 6.F. of this Amendment.

SECTION 17. EFFECT OF THIS AMENDMENT.

Except as may be expressly provided herein, the rights and the duties provided for in the Contract shall remain unchanged by this Amendment. Further, except as may be expressly provided herein, the language and the provisions herein shall not be used as proof or evidence of the intent of the parties under the Contract. Further, except as may be expressly provided herein, the definitions and the provisions of this Amendment are applicable only to the provisions of this Amendment and do not affect or alter the Contract. If any provision of this Amendment is held by a court of competent jurisdiction to be illegal, invalid, or void, the remaining provisions shall be given full force and effect, unless the invalid portion is found by such court to render performance of the Amendment unworkable or to seriously affect consideration, in which case, the entire Amendment shall be invalid and void.

SECTION 18. DISCLAIMER.

Nothing in this Amendment shall obligate the City, or be construed to indicate an intent on part of the City, to sell, convey, or transfer, voluntarily or involuntarily, the Regional Water Supply System, the *Tolt Pipeline* or any part thereof. Further, nothing in this Amendment shall diminish or limit the City's exclusive right to operate and maintain the Regional Water Supply

System or any part thereof. This Disclaimer is applicable to each and every section of this Amendment and shall be controlling in any forum or court of law.

SECTION 19. CONVERSION OF VERSION A OF THE WATER PURVEYOR CONTRACT TO VERSION B.

The City and any Participating Purveyor that has entered Version A, and any amendments thereto, hereby agree to convert Version A to Version B, as amended on February 3, 1982, and February 26, 1982. This conversion shall be deemed to relate back to the date that Version A became mutually binding, and this Amendment shall apply to the Participating Purveyor as if such purveyor had initially entered Version B; except that pursuant to this Amendment and conversion no equity interest in the Purveyor Facilities Account under Section III.F of Version B shall be conferred for New Expansion Facility costs allocated prior to January 1 of the year in which this Amendment takes effect.

SIGNATURE PAGE

IN WITNESS WHEREOF, the parties hereby execute this First Amendment to the Water Purveyor Contract.

Participating

Purveyor: _____

A _____ corporation

BY: _____

ITS: _____ (SEAL)

DATE: _____

AUTHORIZING LEGISLATION: _____

CITY: THE CITY OF SEATTLE
A MUNICIPAL CORPORATION

BY: _____ (SEAL)

MAYOR

DATE: _____

AUTHORIZING LEGISLATION: ORDINANCE _____

CONSERVATION PROGRAM CLASSIFICATION

- (LC) LOCAL CONSERVATION
- (BC) BASE CONSERVATION
- (SC) SUPPLY CONSERVATION

Regulatory Programs

- Rate Incentives (BC)
- Landscaping and Water Use Codes (BC)
- Code Enforcement (LC)
- Water Watchers (LC)

Seasonal Programs

- Water Calendars (BC)
- Media Campaign (BC/LC)
- Water Shortage Response (note 1) (BC/LC)
- Local Customer Interface (LC)

Education-Training

- School Curriculum (note 2) (BC/LC)
- School Programs (LC)
- Home Show Demonstrations (BC)
- Demonstration Gardens (LC)
- Training Programs (BC/LC)

Technical Assistance

- Residential Audits (LC)
- Commercial/Industrial Audits (note 3) (SC/BC)
- Irrigation Audits/ET Systems (note 3) (SC/BC)
- Technical Studies (note 4) (SC/BC)

Programmatic

- Commercial Toilet Retrofit (SC)
- Residential Toilet Retrofit (SC)
- Home Water Savers Program (SC)
- Non-Revenue Water Reduction (note 5) (SC/LC)
- Leak Detection and repair (note 5) (SC/LC)
- Reuse (note 6) (SC)

Administration

Data Base and Program Monitoring (note 4)	(SC/BC/LC)
Retail Customer Inquiries	(LC)
Media Coordination (note 4)	(SC/BC/LC)
Market Surveys	(BC/LC)
Coalition Membership	(LC)

Drought/Emergency Response (BC)

Notes:

1. The coordination of the development of local plans through providing consistent formats, and plan review and approval would be BC. The actual development of local plans would be LC.

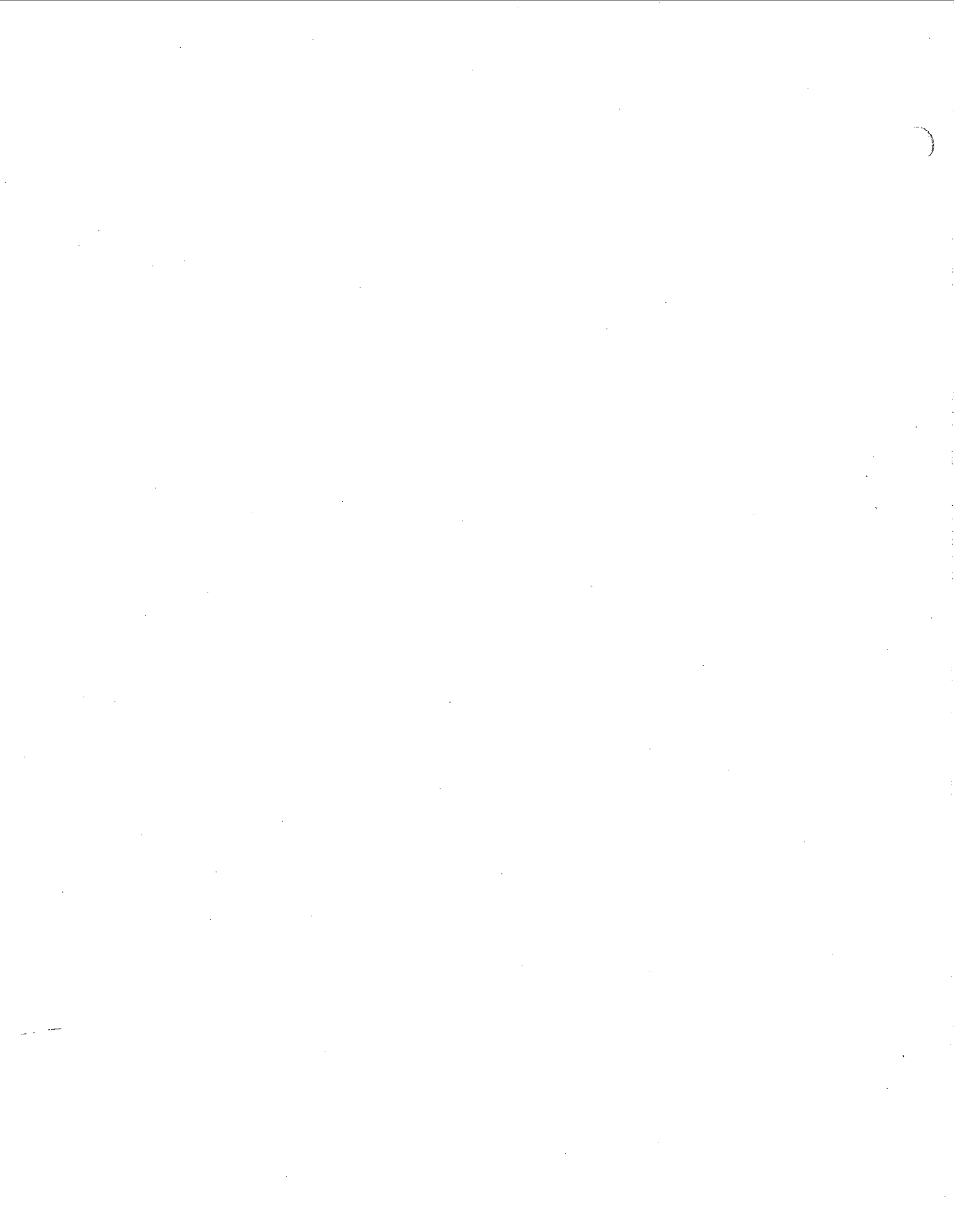
2. Coordination on state programs or the development of model programs would be BC. Coordination with individual school districts would be LC.

3. The costs of audits that lead directly to SC program implementation will be treated as a SC program cost. The costs of audits that are preformed for educational or informational purposes, or that expect that participants will fund program implementation, will be treated as a BC program cost.

4. Costs are to classified the same way as the program being studied, monitored, or promoted.

5. Water saving efforts on the regional system shall be SC. Distribution system costs shall be LC.

6. The Amendment covers only a narrowly defined category of reuse. See Section 9.C.4.



Appendix D
Standard Water Specifications of the Woodinville Water District

STANDARD WATER SPECIFICATIONS

OF THE

WOODINVILLE WATER DISTRICT

FOR

DEVELOPER EXTENSIONS

**PROJECT
WATER DEVELOPER EXTENSION**

DE **_**

Approved: July 21, 1992

Resolution No. 2959

Last Revised: 7/11/97

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2. FIRE HYDRANT ASSEMBLY (11/97)
3. VALVE MARKER POSTS (1/97)
4. AIR-RELIEF ASSEMBLY (1/97)
5. BLOW-OFF ASSEMBLY (6/99)
6. SINGLE-FAMILY RESIDENTIAL SERVICE CONNECTION (8/99)
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7. 1" COMMERCIAL SERVICE CONNECTION (9/99)
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9. THRUST BLOCK DETAILS (1/97)
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11. SACKED SLOPE RETAINER (1/97)
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15. CASING DETAIL (1/97)
16. 3" AND 4" METER INSTALLATIONS (9/99)
17. REDUCED PRESSURE BACKFLOW ASSEMBLY (9/99)
18. FIRE SPRINKLER SERVICE CONNECTION (2/00)

GENERAL PROVISIONS

GP-1 DEFINITIONS

- A. "Concerned Parties" means those persons, companies, or agencies designated by the District to attend the preconstruction conference.
- B. "Contractor" means the person or firms employed by the Developer to do any part of the work, all of whom shall be considered agents of the Developer.
- C. "Design" means the preparation of the Plans for the extension to the District's water distribution and/or sewer collection system.
- D. "Developer" means the owner(s) of property to be benefitted by the proposed extension, or that person or organization in charge of developing the project, either on behalf of the owner(s) or pursuant to an agreement to purchase the property, and includes the Developer's agents.
- E. "Developer Engineer" means the engineering firm, and that firm's representatives, retained by Developer to Design the Plans for the work to be performed under this agreement, and which shall be considered agent of the Developer.
- F. "District" means WOODINVILLE WATER DISTRICT and its employees.
- G. "District Engineer" means the engineering firm, and that firm's representatives, which may be retained by the District Board of Commissioners to act as the Engineer for the work to be performed under this agreement.
- H. "Extension" means the water and/or sewer system to be constructed according to this Agreement and connected to the District's water distribution and/or sewer collection system and transferred to the District for operation and maintenance.
- I. "Otherwise Specified," or "As Specified" means the directions contained in the Plans, Special Specifications, if any, and otherwise as given by the District incident to the performance of the work other than in these General Specifications.
- J. "Plans" means drawings, including reproductions, of the work to be done as an extension to the District's water distribution and/or sewer collection

system, prepared or approved by the District's Engineers, and approved by the District Board of Commissioners.

- K. "Specifications" means the directions, provisions, standards and requirements as approved by the District Board of Commissioners for the performance of the work and for the quantity and quality of materials.
- L. "Standard Specifications" are the Standard Specifications for Road, Bridge and Municipal Construction by WSDOT/APWA, including the "Division 1 APWA Supplement," except as herein supplemented or modified.
- M. "Work" means the labor, materials, superintendence, equipment, transportation, supplies and other facilities necessary or convenient to the completion of the proposed extension.

GP-2 PURPOSE

WOODINVILLE WATER DISTRICT, as a municipal corporation, is responsible to the public for insuring that water and sewer mains laid in public streets or easements are constructed in accordance with currently accepted standards for public work. The requirements imposed upon developers and contractors herein are intended by the District as a contract with the Developer, which incorporates minimum standards prerequisite to acceptance of the work by the District as a part of its water and sewer systems. Privately constructed extensions will not be permitted to connect to the District's systems unless the work is performed and paid for in accordance with this Agreement.

GP-3 AUTHORITY OF DISTRICT

The District shall have authority to approve, reject or require changes in Plans designed by Developer's Engineer. The District shall have authority to require such changes in the Plans during the course of work. The District shall have authority to inspect the work and shall have authority to stop work whenever necessary to insure compliance with the approved Plans and Specifications. The District shall have authority to reject work and materials which do not conform to the Plans and Specifications and to decide questions which may arise in the execution of the work. The District shall have the authority to impose fines for violation of District policies adopted pursuant to resolution.

GP-4 DEVELOPER TO BE INFORMED

The Developer is expected to be fully informed regarding the nature, quality and extent of the work to be done, and if in doubt, to secure specific instructions from the District.

The Developer shall keep a competent supervisor on the work during its progress who shall represent the Developer, and to whom instructions may be given as though to the

Developer. The Supervisor shall be familiar with the Plans and Specifications and shall promptly report to the District any error, inconsistency or omission which may be discovered.

GP-5 PLANS AND SPECIFICATIONS ACCESSIBLE

The Developer shall have one copy of the Plans and Specifications constantly accessible on the job.

GP-6 FINAL INSPECTION

All material and completed work are subject to final inspection by the District, to determine whether the work complies with the Plans and Specifications.

GP-7 "AS-BUILT" DRAWINGS

The District will maintain "as-built" information about the project as it is constructed. This information will be available to the Developer's Engineer for preparation of "as-built" drawings to be prepared at the Developer's expense.

GP-8 OWNERSHIP OF PLANS

The originals of all "as built" Plans prepared by Developer's Engineer shall be delivered to the District as a condition of and prior to acceptance of the project, and shall become the property of the District. Neither Developer nor Developer's Engineer shall have any rights of ownership, copyright, trademark or patent in the Plans.

GP-9 QUALITY OF MATERIALS AND WORKMANSHIP

All materials shall be new, and workmanship and materials shall be of the highest quality commonly used. The Developer shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

GP-10 MATERIAL AND EQUIPMENT LIST

The Developer shall file a material and equipment list with the District prior to the preconstruction meeting, including the quantity, manufacturer and model number, acceptability under any specified inspections and/or tests required by ASTM and/or AWWA specification if applicable of material and equipment to be installed as part of the work. The District retains the right to reject materials and equipment which do not conform to District specifications and the approved Plans. Failure of the District to reject materials and equipment at the time the list is filed shall not be a waiver of the District's right to reject such materials or equipment at a later time.

GP-11 DETERMINATION OF "AS EQUAL"

The District and its Engineer shall be the sole judge whether supplies or material qualify "as equal" substitutions under the Plans and Specifications.

GP-12 OMISSIONS AND DISCREPANCIES

Minor items of work or materials omitted from Plans and Specifications prepared by the District, District's Engineer, or Developer's Engineer, but clearly inferable therefrom and which are called for by accepted good practice, shall be provided and/or performed by the Developer as part of the construction. In case of doubt, the District's decision shall be determinative.

GP-13 INSPECTION AND TESTS

All work shall be subject to inspection by the District. The District shall have access to the work at all times, and the Developer shall provide proper facilities for such access and inspection. The Developer shall make reasonable tests of the work at the Developer's expense upon the District's request. Whenever work must be specially tested or inspected for compliance with public regulations, or with the Plans and Specifications, the Developer shall give the District reasonable notice of the readiness of the work for such test or inspection. The District shall make inspections within 24 hours of notification by the Developer. Work shall not be covered up without consent of the District, or it must be uncovered for inspection at the Developer's expense. Such inspections and tests shall not relieve the Developer of any of its responsibilities under this Agreement.

The presence or absence of a District inspector on any job will be at the sole discretion of the District, and neither presence nor absence of a District inspector will relieve the Developer of responsibility to obtain the construction results specified in this agreement.

The District is not a safety expert, and is not engaged in that capacity whenever performing inspections and tests. The authority of the District to perform inspection and tests shall not relieve the Developer of the responsibility for safety, as specified in GP-33.

GP-14 COMPLIANCE WITH PUBLIC AUTHORITY

The work shall be performed in accordance with regulations of each public authority which may have jurisdiction over the manner and quality of performance of the work. The Developer shall be responsible for investigating and ascertaining the requirements of each public authority. The public shall not be inconvenienced unnecessarily in its use of the public streets. The Developer shall enforce discipline and good order among its employees and shall not employ on the work any unfit person or anyone not skilled in the work assigned. Employees or agents of the Developer who may impair the quality of the construction shall be removed from the work upon the written request of the District.

Construction in public roads or rights-of-way shall be performed in accordance with the standards and requirements of the governmental agency having jurisdiction, and in accordance with requirements of the franchise or permit therefor. The District will apply for and obtain the permits required for construction of the water main, and the Developer and Contractor shall be responsible to ascertain these requirements and fulfill them in all respects.

The Developer shall be responsible for assuring compliance with the requirements of all permits, franchises, and licenses.

The Developer shall be responsible for coordinating construction activity with all interested parties and agencies.

GP-15 CROSS-CONNECTION CONTROL

Developer shall comply with all government and District rules and regulations prohibiting cross-connections. Developer shall install and maintain backflow prevention devices as required by the District. In addition, an inspection or test report from a State-approved inspector shall be required as a condition of receiving final acceptance of the extension improvements and utility service from the District.

GP-16 PRECONSTRUCTION CONFERENCE

Work shall not begin on the extension(s) until the Developer has held a preconstruction conference with all concerned parties at the District office. The Developer shall arrange for the conference and for the attendance of concerned parties.

GP-17 PRECONSTRUCTION PHOTOS

Preconstruction photos acceptable to the District shall be submitted to the District at the preconstruction meeting.

GP-18 PERMITS

The Developer shall not hold a preconstruction conference until all necessary permits have been issued by public authority and are in District possession. The District shall apply for and obtain the public right-of-way permit. The Developer shall obtain all other required permits. The Developer shall pay the cost of obtaining all permits, and shall reimburse the District for all costs incurred by the District for permits, inspection fees and other charges imposed by public authority because of the work. The Developer shall be responsible for assuring compliance with the requirements of all permits, franchises and licenses.

GP-19 SURVEY CONTROL

The Developer shall provide all horizontal control, including property corners and street centerline stakes, for locating and staking the lines and appurtenances and shall provide reasonable and necessary opportunities and facilities for setting points and making measurements, including any easements which require staking. The work shall not commence until the Developer has made provision to establish such points as may be necessary for the work. The work shall be done in strict conformity with such points and instructions. Accuracy of such horizontal control is the sole responsibility of the Developer, and any modification of horizontal location of any facility shall be at the Developer's expense. The Developer shall carefully preserve bench marks, reference points and stakes, and, in case of destruction, shall pay for any resulting expense and shall be responsible for any errors that may be caused by their absence or disturbance.

GP-20 RESTORATION OF IMPROVEMENTS

All existing improvements removed or disturbed in the course of the work shall be restored to their original condition. A signed release from the affected property owner will be required. As a minimum requirement, all restoration shall be made to the condition of the area prior to construction. All restoration shall be performed at Developer's expense.

GP-21 ACCESS

Bridging shall be provided across private driveways and roadways during the period when trenches are open to avoid interference with normal traffic flow.

GP-22 SPECIFICATIONS INCORPORATED BY REFERENCE

Where any specifications are referenced or included by reference herein the latest issue and/or amendment thereto published at the date of approval of the agreement by the District shall be incorporated into the contract as if set forth herein in full. Should a conflict exist between the approved design drawings and any specifications or details referenced herein, the District shall determine which shall prevail.

GP-23 USE OF COMPLETED PORTIONS

The District shall have the right to take possession of and use any completed or partially completed portions of the work, and this shall not be deemed acceptance of any of the work.

GP-24 EXISTING UTILITIES OR OBSTRUCTIONS

A. Preparation of Plans by District Engineer.

When the Design and Plans are prepared by the District Engineer, existing utilities and obstructions are shown on the Drawings so far as known to the District Engineer and the District, but such information is not guaranteed and is provided only for such value as it may have. Incomplete or erroneous information shall not be the cause of claim against the District Engineer or the District and shall not relieve the Developer of responsibility for repairing any damage caused to such utilities during performance of the work.

B. Preparation of Plans by Developer Engineer.

If Developer's engineer designs the Plans, then the District shall provide to the Developer any information it may have regarding existing utilities and obstructions. Such information is not guaranteed but is provided only for such value as it may have. Incomplete or erroneous information shall not be the cause of claim against the District Engineer or the District and shall not relieve the Developer of responsibility for repairing any damage caused to such utilities during performance of the work.

C. Notification of Utilities.

The Developer shall be responsible for contacting all utilities and determining what existing utilities and obstructions may exist. The Developer shall reimburse the District for damage to the property of the District or damage to property of others for which the District is liable caused by the Developer and for other expenses, including reasonable attorneys' fees and court costs incurred by the District because of such damage. Whenever the Developer fails to repair or restore existing improvements damaged by its contractors within 72 hours of notice, the District may order the work done by others and all costs incurred shall be paid by the Developer; provided that whenever the District determines an emergency exists, it may notify the Developer who shall commence repair or restoration work immediately, or undertake the work itself or through another contractor at the Developer's expense.

GP-25 CLEANUP

The construction site shall be kept clear during the progress of the work. Before the work shall be considered complete, the Developer shall clean out ditches filled during the work, replace damaged surfacing, remove surplus materials and trash and dispose of brush, repair all damages, and otherwise leave the job in a neat, orderly and workmanlike condition. Dust control shall be provided during the progress of the work and during

cleanup. The Developer shall keep existing roads and streets adjacent to or within the limits of the project open to and maintained in a good and safe condition for traffic at all times. The Developer shall remove, on a daily basis, any deposits or debris which may have accumulated on the roadway surface as a result of construction operations. Removal shall be performed on a more frequent basis should the District determine that such removal is necessary.

GP-26 PUBLIC HAZARD OR INCONVENIENCE

If performance of the work results in hazard or substantial inconvenience to the public, then the District may correct the same, and the Developer shall reimburse the District for expense incurred. The Developer shall also reimburse the District for the expense incurred in complying with any order of public authority lawfully made with respect to the work during the performance of the work or within two years after acceptance of the same.

GP-27 PROTECTION OF WORK AND PROPERTY

The Developer shall exercise due care to protect property and the work addressed by this agreement, and shall supervise the project to ensure the Contractor exercises such care. The Developer shall be solely responsible for any loss or damage to property or the work herein occurring prior to the completion of and acceptance of the work by the District.

GP-28 ROYALTIES AND PATENTS

Developers shall pay all royalties and license fees and defend all suits or claims for infringement of any patent rights and shall save the District harmless on account thereof, except the District shall be responsible for all such loss if a particular process or the product of a particular manufacturer is specified by the District, unless either the Developer or its Contractor has information that the process or article is an infringement of a patent and fails to promptly notify the District thereof, in writing.

GP-29 OTHER WORK

The District has the right to let contracts for other work which may affect the work hereunder. Persons performing such other work shall be afforded reasonable opportunity by the Developer herein for introduction and storage of their materials and execution of their work. The work hereunder and such other work shall be properly coordinated and connected.

GP-30 CONTRACTORS

Only contractors licensed and bonded with the State of Washington shall install water and/or sewer extensions; a copy of the license shall be provided to the District. Developer shall submit in writing not less than fifteen (15) days before the preconstruction conference, the name(s), address(es) and telephone number(s) of all contractors and subcontractors the Developer proposes to use in doing the work. If the District disapproves, then it shall notify Developer within ten (10) days. Nothing contained in this agreement shall create any contractual rights between the District and any person or firm employed to do the work.

GP-31 TRAFFIC MAINTENANCE AND PROTECTION

All work shall be performed with due regard for the safety and convenience of the public and so that interference with automotive and pedestrian traffic will be minimized. Flagging personnel, barricades, signs and traffic control shall be furnished as required by appropriate agency. Emergency vehicles shall be provided access at all times.

GP-32 SANITATION

Necessary sanitation convenience, properly secluded from public observation, shall be provided and maintained during the performance of the work as required by appropriate agency.

GP-33 SAFETY

The Developer and Developer's Contractor will be solely and completely responsible for conditions of the job site, including safety of all persons and property during the performance of the work, and for compliance with all federal, state and local safety laws and regulations. This requirement will apply continuously and will not be limited to normal working hours.

The right of the District or the District Engineer to conduct construction review of the Contractor's performance or inspection of the work or the site is not intended to include review of the adequacy of the Contractor's safety measures in, on or near the construction site.

GP-34 CONFINEMENT OF CONTRACTOR'S OPERATIONS

The Developer is responsible to ensure that the contractor confines construction activities within the property of the Developer and the limits of easements and construction permits outside of the Developer's property. The Developer is responsible to ensure that all work on easements and permit areas outside the Developer's property shall be performed in strict compliance with the provisions of the easement or permit with which provisions the Contractor shall be familiar. Damage to property or persons from any encroachment beyond these limits shall be the responsibility of the Developer.

GP-35 TAPS, CUT-INS AND LARGE METER TESTS

All taps and cut-ins to existing water mains shall be made by the District at fees established by the Board of Commissioners. If extensions require meters three inches or larger, then meter installation, including valves, piping, vaults, drain lines and meters shall be performed by the Developer's Contractor conforming to District standards. The Developer shall pay the meter test fee established by the District and shall sign a District meter application form and pay all fees and charges due at that time. Connections to existing water mains shall only be made after notification of, and approval by, the District.

GP-36 RECORDING

The District will not approve the Plat for recording until all of the underground portion of the water and/or sewer facilities have been installed, tested and in the case of sewers, televised; and a copy of the final plat to be recorded is delivered to the District for review of adequacy of easements. A copy of the final recorded plat and all necessary recorded easements shall be delivered to the District before service connections will be allowed to the extension.

GP-37 COST OF WATER

Developer shall pay the cost of water furnished by the District for testing, flushing or purifying the system based upon the District's estimates of the quantity of water use, which estimates shall be conclusive; provided, however, that the District shall furnish a reasonable amount of water without cost for the initial testing, flushing and purifying of the system. Construction water shall be furnished at District's regular rates through a temporary meter rented to Developer at rates established by District resolution. Return of the meter(s) is a condition of acceptance.

MATERIALS

MW-1 GENERAL

The Developer shall furnish all materials.

MW-2 DUCTILE-IRON PIPE AND FITTINGS

Ductile iron pipe shall conform to ANSI/AWWA C151/A21.51, standard thickness, Class 52. The pipe shall be lined with cement mortar conforming to ANSI/AWWA C104/A21.4 and coated with an asphaltic coating. Each length shall be plainly marked with the manufacturer's identification, year cast, class of pipe, and weight. Type of joint shall be rubber gasket, push-on type or mechanical joint conforming to ANSI/AWWA C111/A21.11. Pacific States pipe is conditionally approved for use on looped water systems provided the pipe has been treated for Seattle water and bears the factory "SEATTLE" stamp. Pacific States pipe shall not be installed on closed/dead end water mains within the District.

All fittings shall be short-bodied, compact ductile iron with a minimum rating of 250 psi working pressure conforming to ANSI/AWWA C153/A21.53 except flanged fittings shall conform to ANSI/AWWA C110/A21.10. All fittings shall have a cement mortar lining conforming to ANSI/AWWA C104/A21.4. The fittings shall be furnished with flanged ends or mechanical joints as shown.

Restrained joints shall be made up with push-on joint pipe and fittings. The push-on joint restraint device shall be ductile iron with a 350 psi working pressure and shall be U.S. Pipe TR FLEX, Griffin Pipe Products Company SNAP-LOK, Pacific States Lock Joint if Pacific States pipe is allowed, or MEGALUG.

Alternatively, pipe joints may be restrained using shackle rods and pipe clamps. All shackle rods and associated materials shall be COR-TEN or corrosion resistant equal. Pipe clamps shall be "Star" or approved equal.

Solid sleeve pipe couplings shall be long pattern sleeves constructed of ductile iron with a minimum pressure rating of 250 psi working pressure.

Flexible transition couplings shall be Rockwell International, or equal.

Pipe which will not be buried, or in a vault, shall be insulated. Insulation shall be 2-inch thickness of fiberglass pipe insulation, with 0.16 stucco embossed sheet aluminum weather cover with a self-seal lap and #8 x 1/2-inch stainless steel screws on 6-inch centers. Exposed flanges shall be insulated with a removable insulation pad fabricated with 2-inch thermal insulating wool (TIW) fiberglass insulation inside

of silicone-impregnated cloth and secured with lacing hooks. Submittals are required for the material intended to be used.

MW-3 GATE VALVES

A. Through 8-Inch Diameter

Gate valves shall conform to AWWA C509. The valves conforming to AWWA C509 shall be iron-bodied, resilient-seated, nonrising stem with flanged ends or mechanical joint as shown. The operating stem shall be bronze with O-ring stem seals. The valve shall open to the left and be equipped with a 2-inch-square operating nut. The resilient wedge assembly shall be fully encapsulated by the approved resilient material. Resilient seated gate valves shall be U.S. Pipe Metroseal, Waterous, American-Darling, ITT Kennedy, Clow, M&H, Mueller, or American Flow Control Series 500.

B. 10-Inch and 12-Inch Diameters

Gate valves shall conform to AWWA C509. The valves shall be iron-bodied, resilient-seated, nonrising stem with flanged ends or mechanical joint as shown. The operating stem shall be bronze with O-ring stem seals. The valve shall open to the left and be equipped with a 2-inch-square operating nut. The resilient wedge assembly shall be fully encapsulated by the approved resilient material. Resilient seated gate valves shall be U.S. Pipe Metroseal, Waterous, American-Darling, ITT Kennedy, Clow, M&H, Mueller, or American Flow Control Series 2500.

MW-4 BUTTERFLY VALVES

All valves larger than 12 inches shall be butterfly valves.

Butterfly valves shall conform to AWWA C-504. The valves shall be short-body type, Class 150B, suitable for direct burial installation. The valves shall have no moving bearing or contact surfaces of iron in contact with iron. Contact surfaces shall be machined and finished in the best workmanlike manner, and all wearing surfaces shall be easily renewable.

The valve operators shall be manual, fully enclosed, and suitable for buried service. The valve shall open to the left and be equipped with a two-inch-square operating nut.

MW-5 TAPPING TEE AND TAPPING VALVE

The tapping tee shall be cast iron or stainless steel with a ductile iron or stainless steel flange. The tapping valve shall meet the specifications of the gate valves.

MW-6 VALVE BOXES

The valve boxes shall be adjustable two-piece cast-iron valve box of 5 inches minimum inside diameter. The top section shall be 18 inches minimum length with a valve cover marked "WATER" as manufactured by Rich Manufacturing Company, Series 940, or equal. Lids shall be short skirted, 3-inch maximum total depth if tapered and 2-inch maximum total depth if straight.

MW-7 VALVE STEM EXTENSIONS

The materials for the valve stem extension shall be 1-inch solid bar. See Standard Detail 1.

MW-8 FIRE HYDRANTS

Fire hydrants shall be a breakaway type and shall conform to AWWA C502. The fire hydrants shall be furnished with a 6-inch mechanical joint inlet connection, 1-1/4-inch pentagon operating nut opening to the left, positive acting drain valve, and shall include extensions, if necessary, for the depth of cover on the main at each installation.

Hydrants installed in King County shall have a minimum main valve opening of 5-1/4 inches, two 2-1/2-inch hose nozzles and one 4-inch pumper nozzle with threads in accordance with the District Standards.

Hydrants installed in Snohomish County shall have a minimum main valve opening of 5 inches, two 2-1/2-inch NST hose outlets, and one 4-1/2-inch NST pumper port outlet. "NST" means national standard thread with seven and one-half threads per inch for two and one-half-inch hose outlets and four threads per inch for four and one-half-inch pumper port outlets.

All nozzles shall be fitted with cast iron threaded caps with operating nuts of the same design and proportions as the hydrant stem nuts. Caps shall be threaded to fit the corresponding nozzles and shall be fitted with suitable neoprene gaskets for positive water tightness under test pressures.

A pavement marker and glue cartridge shall be paid for and furnished by the Developer to King County Fire District No. 36 for each hydrant installed in King County. Pavement markers shall be blue, 2-way reflective markers, 4 inches by 4

inches by 0.75 inches, Stimsonite part No. 88AB or equivalent. Glue cartridge shall be a single-use epoxy cartridge, Dispensing Technology Corporation, part No. RPS-1001 Epoxy Cartridge, compatible with the Fire District's glue dispensing tools. King County Fire District No. 36 shall be responsible for installation of the pavement markers.

MW-9 VALVE MARKER POSTS

The marker posts shall be concrete with 4 inches minimum square section, 42 inches long, and shall be reinforced with one 3/8-inch x 37-inch bar of reinforcing steel. Posts shall be painted and labeled with die-cut adhesive letters, as described in Section 11, PAINT FOR FIRE HYDRANTS AND POSTS.

MW-10 FIRE HYDRANT GUARD POSTS

The guard posts shall be precast reinforced concrete, nine inches in diameter, six feet long.

MW-11 PAINT FOR FIRE HYDRANT AND POSTS

The following paints shall be used for the fire hydrants, valve lids, and posts.

<u>Item</u>	<u>Paint</u>	<u>Color</u>
Hydrant and Valve Lids and B.O. Hydrant	Preservative Paint Luxlite Industrial & Equip. Enamel	Safety Yellow #655
Bonnet Flange on Hydrant (only if an in-line gate valve is installed on the hydrant tee - see Standard Detail 2)	Preservative Paint Luxlite Industrial & Equip. Enamel	Safety Red #314
Valve Marker Hydrant Guard Posts	Preservative Paint Luxlite Industrial & Equip. Enamel	Safety Yellow #655

2" Notations for Hydrants and Valves and all Marker Posts	2" die-cut adhesive numbers and letters by EMED Co., P.O. Box 369, Buffalo, NY 14240-0369 (Ph. 1-800-442-3633) (item No. DKVL-Z, color: black)
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MW-12 AIR-RELIEF ASSEMBLIES

The materials for the air-relief assembly shall be as shown on the standard detail.

MW-13 BLOW-OFF ASSEMBLY

The materials for the blow-off assembly shall be as shown on the standard detail.

MW-14 CUSTOMER SERVICE CONNECTION

The materials for Single Family Residential and for Commercial installations shall be as shown on the standard detail.

MW-15 FOUNDATION GRAVEL

Foundation gravel shall be coarse graded gravel with 100% passing a 3-inch-square sieve, 90% passing a 2-inch-square sieve and not more than 20% passing a 1/2-inch-square sieve.

MW-16 GRAVEL BACKFILL

The gravel backfill shall consist of naturally occurring or screened gravel. It shall be essentially free from wood, roots, bark, or other extraneous material. It shall have such characteristics of size and shape that it will compact readily to a firm, stable course.

Gravel backfill shall meet the following requirements:

Maximum particle size	3 inches	
% passing 1/4-inch-square opening		25 min.
% passing No. 200 sieve		10 max.

Dust ratio:

<u>% passing No. 200 sieve</u>	2/3 max.
% passing No. 40 sieve	

Sand equivalent	30 min.
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Gravel backfill material retained on a 1/4-inch-square sieve shall contain not more than 0.20 percent by weight of wood waste.

MW-17 CRUSHED SURFACING

Crushed surfacing shall be manufactured from ledge rock, talus, or gravel. The materials shall be uniform in quality and substantially free from wood, roots, bark, and other extraneous material and shall meet the following test requirements:

Los Angeles Wear, 500 Rev.	35% Max.
Degradation Factor - Top Course	25% Min.

Crushed surfacing of the various classes shall meet the following requirements for grading and quality:

	<u>Top Course</u>
% passing 5/8-inch-square sieve	100
% passing 1/4-inch-square sieve	55 to 75
% passing No. 40 sieve	8 to 24
% passing No. 200 sieve	10.0 max.
% fracture	75 min.
All percentages are by weight.	
Sand equivalent	40 min.

The fracture requirement shall be at least one mechanically fractured face and will apply to material retained on each sieve size No. 10 and above if that sieve retains more than 5 percent of the total sample.

The portion of crushed surfacing retained on a 1/4-inch-square sieve shall not contain more than 0.15 percent wood waste.

MW-18 ASPHALT CONCRETE

Asphalt concrete shall be Class B asphalt concrete and shall conform to Section 5.04 of the 1994 Standard Specifications for Road, Bridge, and Municipal Construction. The paving asphalt shall be viscosity grade AR 4000W.

Asphalt sealer for tacking joints shall be SS-1 emulsified asphalt.

Asphalt sealer for sealing joints shall be AR-4000.

MW-19 SEED

The seed mixture for restoration of unimproved areas shall have the following composition, proportion and quality:

<u>Kind and Variety of Seed in Mixture</u>	<u>% by Weight</u>	<u>Min. % of Pure Seed</u>	<u>Min. % of Germination</u>
Colonial Bent Grass: (Highland or Astoria)	10%	9.8%	85%
Creeping Red Fescue: (Illahee Rainier or Pennlawn)	40%	39.2%	90%
Perennial Rye Grass:	30%	29.4%	90%
White Clover: (Preinoculated)	20%	19.6%	90%
Maximum Percentage of Weed Seed: 1.0%			
Maximum Inert and Other Crops: 1.0%			

MW-20 FERTILIZER

The fertilizer shall be a standard commercial grade of inorganic fertilizer with 10/20/20 mix of nitrate, phosphate and potash.

MW-21 MULCH

Wood cellulose fiber mulch shall be specially processed wood fiber containing no growth or germination inhibiting factors and shall be dyed a suitable color to facilitate inspection of the placement of the material. It shall be manufactured in such a manner that after addition and agitation in slurry tanks with water, the fibers in the material will become uniformly suspended to form a homogenous slurry. When hydraulically sprayed on the ground, the material shall allow the absorption and percolation of moisture.

MW-22 PRESSURE-REDUCING STATION

A. PRECAST CONCRETE UTILITY VAULT

The vault shall be constructed of reinforced concrete with a minimum strength of 4500 psi at 28 days. The vault including joints and pipe penetrations shall be totally watertight and shall show no evidence of seepage or damp spots. Interior walls and ceiling finish of the concrete shall be smooth, hard and uniform texture. Finish shall be removed and ground smooth. Tie holes and defects larger than 1/8-inch shall be neatly patched with mortar. Floor finish shall be hand steel trowel and lightly brushed to produce a nonslip texture.

Floor shall be sloped to drain to the sump. All walls, floor, ceiling, hatch and joints shall be water-tight and not leak. Ceiling and walls shall be painted as described in FINISHES.

The vault shall be furnished with an aluminum ladder. All aluminum and dissimilar metals shall be insulated from each other.

The vault shall be furnished with a continuous sump. The drain from the sump shall be removable, and installed to be one inch (1") higher than the floor of the sump to minimize silting of the drain line.

The precast vault shall be Utility Vault Co. No. 612-LA or approved equal.

B. PIPE AND FITTINGS

The pipe and fittings shall be as specified in Ductile Iron Pipe and Fittings, except flanged pipe shall be ductile iron ANSI/AWWA C151/A21.51, standard thickness, Class 53.

Adjustable flanges to adapt to plain end pipe shall be Series 400 manufactured by Uni-Flange Corporation, or approved equal. Adjustable flanges shall only be allowed inside of the station.

Pipe supports shall be adjustable saddle supports with cast iron saddle, locknut nipple and cast-iron reducer. The pipe hangers shall include an adjustable wrought iron ring and hanging rods. The pipe supports and pipe hanger assemblies shall be ITT Grinnell or approved equal.

C. PVC DRAIN PIPE

Polyvinyl chloride (PVC) drain pipe shall be in accordance with WSDOT Section 9-05.1(5). Pipe shall be 4 inches in diameter. A metallic location "tracer" wire shall be wrapped around the drain pipe. Connect drain line to storm pipe or drainage ditch in a manner which is protected from damage and which will not back up into the vault when the pipe/ditch is full. Install flapper-type check valve, if necessary.

D. VALVES

The gate valves shall be as specified in Gate Valves, with hand wheels and nonrising stems.

The pressure-reducing valves shall maintain constant downstream pressure regardless of varying inlet pressure. The valves shall be a hydraulically

operated, diaphragm-actuated globe valve. The main body shall be cast iron with stainless steel seats, stainless steel trim and the pilot control system shall be cast bronze with stainless steel trim. The valves shall include position indicator, flow clean strainer, and shut-off cocks.

The pressure-reducing valves shall be Model 90G-01AB, manufactured by Cla-Val Co. or approved equal.

The pressure relief valve shall maintain constant upstream pressure by bypassing or relieving excess pressure, and shall maintain close pressure limits without causing surges. The valve shall be a hydraulically operated, diaphragm-actuated angle globe valve. The main body shall be cast iron with stainless steel seats, stainless steel trim, and the pilot control system shall be cast bronze with stainless steel trim. Pilot control piping shall face away from the wall and be easily accessible for maintenance and repair. The valves shall be flanged and include position indicator, shut-off cocks and flow control.

The pressure relief valve shall be Model 50A-01BS, manufactured by Cla-Val Co., Roll Seal Style 120BP, or approved equal.

E. VALVE MARKER POSTS

Valve marker posts, as described in item 9 of MATERIALS, shall be installed for all pressure-reducing valve stations, and labeled as "PRV" and the station number, using 2-inch die-cut adhesive letters.

F. ACCESS DOORS

Door leaf shall be aluminum diamond pattern to withstand H-20 wheel loadings. Channel frame shall be 1/4-inch aluminum with an anchor flanged around the perimeter. Doors shall be equipped with stainless steel hinges, pins, spring operators for easy operation and protection against slamming, and an automatic hold-open arm with release handle. A snap lock with removable handle shall be provided. A 1-1/2-inch drainage coupling shall be located in the front right corner of the channel frame. Drainage shall be directed to the inside of the structure through 1-1/2-inch pipe or as directed by the Engineer. Hardware shall be stainless steel and mill finish shall be bituminous coating applied to the exterior of the frame. Manufacturer shall guarantee against defects in material or workmanship for a period of five years. Access door shall be Type J as manufactured by The Bilco Co., or equal.

G. DEHUMIDIFIER

The dehumidifier shall be a EBAC hot gas exchange dehumidifier (model CD30), appropriately sized and wall-mounted in the station a minimum of 6 feet from the sump. Power shall be from available electrical outlet, installed to serve the unit. A drain line shall be installed from the dehumidifier to the sump.

H. ELECTRICAL (GENERAL)

All electrical work shall conform to the latest edition of the National Electrical Code.

All electrical outlets shall have ground fault interrupt protection.

I. LIGHTS

Ceiling lights shall be 4' FRS enclosed and gasketed nonmetallic florescent luminaires with clear molded acrylic plastic lens, suitable for wet and damp locations. Lamps shall be cool white fluorescent lamps by same manufacturer. Ballasts shall be cold weather, high-power factor-type in accordance with ANSI C82.1. Lights shall automatically come on when access door is opened, and shall include a manual override to allow operation with door closed.

J. CONDUITS (ELECTRICAL/TELEPHONE)

All conduits shall be noncorrosive and shall be sealed water-tight and protected from moisture. A pull cord shall be installed of permanent material and sufficient strength to pull any cable through the conduit. Conduits shall be oversized to accommodate future wires, cables or condition.

K. GAUGES

The pressure gauges shall be as manufactured by 3D Instruments, Model #25502-XX-B11, 2-1/2-inch diameter, with brass socket and oil filled. The pressure range shall be as shown on the Drawings. The pressure gauges shall be furnished with isolation cocks, to allow for replacement or removal, a pressure equalizing snubber, and stainless steel piping. (Gauges are not to be installed prior to pressure testing.)

L. AIR VENT

All stations shall be vented to the atmosphere by a protected pipe sufficient to allow air movement, and screened against birds, bugs and foreign objects.

M. FINISHES

Surface	Finish	Preparation	Color
Interior walls and ceiling	One coat TNEMEC Series 66, Hi-Build Epoxoline, 4 to 6 mils dry film thickness.	Concrete cured for 28 days, clean and dry with no contaminants.	White (AA90)
	and One coat TNEMEC Series 73, Endura-Shield III, 3-5 mils dry film thickness.	Clean and dry	White (AA90)
Exposed water main and valves (excluding pilot controls on control valves)	Two coats TNEMEC Series 66, Hi-Build Epoxoline, 4-6 mils dry film thickness per coat.	Equal to commercial blast cleaning (SP6)	Safety blue

Alternatives may be allowed with prior approval.

N. MISCELLANEOUS

Woodinville Water District retains the right to require such other safety or functional items as may be necessary to provide for the proper operation of the station.

O. OPERATION AND MAINTENANCE MANUALS

The contractor shall furnish three bound copies of operation and maintenance data for the pressure relief and pressure reducing valves.

The data shall be bound in heavy, permanent type binders and shall be indexed so that information on any piece of equipment can be easily found.

These manuals shall include:

1. Assembly and disassembly instructions.
2. Parts list with diagrams and cut-away sections.
3. Operating and maintenance instructions for equipment along with recommendations for preventive maintenance.
4. Equipment specifications and guaranteed performance data.
5. Name, address, telephone number of manufacturers, vendors and spare parts sources.
6. Manufacturers' warranties.
7. Step-by-step start-up and operating procedures.
8. Factory parts listed with listings of all component sources, original manufacturer's part number, and interchangeability listings.
9. Lubrication charts.
10. Wiring diagrams of all control circuits actually supplied.

P. START-UP TESTING

The Contractor shall furnish a proposed testing and start-up schedule and procedure to the Engineer a minimum of three (3) weeks prior to such testing. A factory representative may be required to be present for some equipment. Sufficient tools and supplies shall be furnished to maintain isolation from the District system until approved for permanent connection and operation.

CONSTRUCTION

CW-1 CLEARING AND GRUBBING

Clearing, grubbing, and grading where required shall be performed within the public right of way or easements as permitted by the governing agencies or property owners. Construction work in forested and native unimproved areas shall be conducted with extra precaution. Construction activity, stored materials and piles of earth shall not extend beyond the designated work limits. Trees and foliage which are not to be removed in construction shall be protected. Finish grades after completion shall match original grades, sloped to prevent ponding. Remove any surplus dirt or over burden piled around trees to prevent future damage; remove such material by hand if necessary. Clear and fell trees with sufficient care to prevent damage.

All trees which are removed by the Developer shall become the property of the Developer and shall become the Developer's responsibility to remove from the site, unless otherwise noted in the easement stipulations or elsewhere in these specifications. Removal of clearing and grubbing debris shall be subject to the approval of the District and shall in no way constitute a hazard to the continuous operation of any existing utilities.

All clearing and grubbing debris shall be disposed of by hauling to a site selected and obtained by the Developer and approved by King County.

CW-2 TRENCH EXCAVATION AND BACKFILL

Trench excavation shall be unclassified. The terms earthwork or excavation include all materials excavated or removed regardless of material characteristics. The Developer shall estimate the kind and extent of materials which will be encountered in the excavation.

All trenches shall be dug to true line and smooth bottom grades. Surface grading, including cut, fill and compaction, shall be accomplished prior to trench excavation. In pavement sections, grading to subgrade may be sufficient for areas to be newly paved. The trench width from the bottom of the trench to the crown of the pipe shall not exceed 40 inches for 15-inch-diameter and smaller pipe. For 18-inch-diameter or larger pipe, the trench width from the bottom of the trench to the crown of the pipe shall not exceed 1.5 times the inside diameter of plus 18 inches. If these widths are exceeded, a stronger grade of pipe and/or a higher classification and amount of bedding material shall be furnished, as directed by the District.

Minimum cover over all water lines shall be 36 inches over the top of the pipe. Maximum cover shall be 6 feet, unless otherwise authorized by Woodinville Water District. Deeper excavation may be required due to localized breaks in grade, or installing the new main under existing culverts or other utilities where necessary.

Where it is necessary to cross sanitary sewer or storm sewer trenches, all trench backfill shall be removed and replaced with mechanically compacted granular material to provide a uniform support for the full length of the pipe.

The Washington State Department of Health and the Washington State Department of Ecology require a 10-foot horizontal separation between all sanitary sewer lines and water lines. A five-foot minimum horizontal separation shall be maintained between all water facilities and underground power, gas and telephone facilities, unless otherwise approved.

The root systems of all trees not to be removed which are located on or near the easements and right-of-way shall not be cut or disturbed, but shall be tunneled or otherwise protected by the Developer to ensure that no damage is done.

During trenching, installing of pipe lines and appurtenances, and the placing of backfill, trenches shall be kept free of water. The Developer shall furnish all equipment necessary to dewater the trench and shall dispose of the water in such a manner as not to cause a nuisance or menace to the public. All water lines, new or existing, shall be protected against the intrusion of foreign material.

When so directed by the District, the trench shall be extended below the pipeline grades to permit the placing of foundation gravel. All areas of overexcavation, to remove unsuitable, or for any other reason, shall be brought to grade with approved foundation material, and compacted.

Maximum amount of open trench on streets shall be 300 linear feet. At the end of each day all ditches must be backfilled or covered with steel plates and barricaded with flashing warning lights to prevent people or animals from falling into the trench.

All shoring and bracing or sheeting required to perform and protect the trench and to safeguard the employees, shall be designed and furnished by the Developer. No timber bracing, lagging, sheathing or other lumber shall be left in any excavation except with the permission of the District.

Pipe bedding and initial backfill to 12 inches over the top of the pipe shall be completed before subsequent backfilling operations are started.

The Developer shall take all necessary precautions to protect the pipe from any damage, movement or shifting. In general, backfilling shall be performed by placing the material so as not to damage the pipe.

The backfill material to be used in the trench section shall be free draining granular material free of debris and clay. This material shall be compacted by mechanical compaction to 95% of maximum density, ASTM D-698, to finished grade in all locations, and shall be in accordance with County requirements in all County rights-of-way.

The Developer shall be responsible for providing the proper size and type of compaction equipment and selecting the proper method of utilizing said equipment to attain the required compaction density. In all cases, equipment shall be selected and used so as to not damage the pipe or other utilities and structures.

Compaction testing will be required for all backfilled trenches. A minimum of one testing location shall be chosen for each 200 feet of water main installed. A separate test shall be performed for each two (2) feet of depth. The Developer, or the Contractor, shall contract the services of a qualified and approved geotechnical consultant to perform the compaction testing. All testing (and retesting) shall be at the Developer's expense. Testing locations shall be chosen by the field inspector. Compaction results shall be furnished prior to paving. Recomposition and retesting will be required for any tests which do not pass the compaction testing. Satisfactory compaction tests do not relieve the Contractor of the responsibility to provide trenches which will not fail. Subsurface settlements within the warranty period will remain the responsibility of the Contractor.

Materials excavated from trenches are not guaranteed to be suitable to meet the standards for trench backfill. Where original excavated material is unsuitable for trench backfill, imported gravel backfill shall be placed. The unsuitable material shall be removed by the Developer to a disposal area, in accordance with County requirements.

CW-3 INSTALLATION OF WATER MAINS AND FITTINGS

The trench shall be excavated to the depth required so as to provide a uniform and continuous bearing and support for the pipe on solid and undisturbed ground at every point between bell holes.

All pipe, fittings, valves and hydrants shall be carefully lowered into the trench in such a way as to prevent damage to water main materials and protective coatings and linings. Under no circumstances shall materials be dropped or dumped into trench.

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. Pipe shall be laid with bell ends facing in the direction of laying, unless directed otherwise by the District. After placing a length of pipe in the trench, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with bedding material tamped under it. No pipe shall be laid in water, or when, in the opinion of the District, trench conditions are unsuitable. Wherever it is necessary to deflect pipe from a straight line, the amount of deflection allowed shall not exceed pipe manufacturer's recommendations for mechanical and push-on joints, and shall be approved by the District.

For connection of push-on joint, the jointing shall be done according to manufacturer's recommendations with special care used in cleaning gasket seat to prevent any dirt or sand from getting between the gasket and pipe. Lubricant to be used on the gasket shall be nontoxic and free from contamination. When a pipe length is cut, the outer edge of the cut shall be beveled with a file to prevent injury to the gasket during jointing.

For connection of mechanical joints, the socket, plain end of each pipe and gasket shall be cleaned of dirt before jointing and shall be jointed according to manufacturer's directions. Bolts shall be tightened alternately at top, bottom, and sides so pressure on gasket is even.

The cutting of pipe for installing valve, fitting or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the axis of the pipe.

At times when pipe laying is not in progress, the open ends of pipe shall be closed by a water-tight plug or other means approved by the District. If water is in the trench when work resumes, the seal shall remain in place until the trench is pumped completely dry.

CW-4 INSTALLATION OF GATE VALVES

The valves shall be set with the stems vertical. The axis of the valve box shall be common with the axis projected off the valve stem. The tops of the adjustable valve boxes shall be set to the existing or established grade, whichever is applicable.

CW-5 INSTALLATION OF BUTTERFLY VALVES

The valves shall be installed in the same manner as gate valves.

CW-6 INSTALLATION OR RELOCATION OF FIRE HYDRANTS

Hydrants shall be set plumb and to established grade utilizing hydrant extensions if necessary, to result in the center of nozzle being between 18 and 24 inches above final grade. Hydrants shall be backfilled with gravel under and around the barrel drain. The barrel shall be supported on a concrete bearing block. The hydrant shall be painted with two coats of yellow paint. When shown on the Plans or as directed by the District, a culvert shall be installed in the roadway ditch in front of the hydrant assembly. Length and diameter shall be as specified.

Relocated fire hydrants shall meet the same requirements as new fire hydrants for grade, backfill, blocking and culverting. After relocation, the fire hydrant shall be painted like new. Relocated fire hydrants shall be subject to the same hydrostatic pressure and purity tests as new fire hydrants.

CW-7 INSTALLATION OF VALVE MARKER POSTS

Valve markers shall be installed for all valves except fire hydrant valves and valves located in paved areas at the location as directed by the District. The markers shall be set to leave 18 inches exposed above ground. The exposed portion of the markers shall be painted with concrete primer and two coats of yellow paint. The valve size and the distance to the valve, rounded off to the nearest foot, shall be on the marker in two-inch-high numbers using die-cut adhesive letters. See Standard Detail 3.

CW-8 INSTALLATION OF FIRE HYDRANT GUARD POSTS

When directed by the District, guard posts shall be set with the tops of the posts at the same elevation as the top of the pumper port of the hydrant. The exposed portion of the posts shall be painted with concrete primer and two coats of yellow paint.

CW-9 INSTALLATION OF AIR-RELIEF ASSEMBLIES

The air-relief assemblies shall be installed as shown on the standard details at the location as directed by the District.

CW-10 INSTALLATION OF BLOW-OFF ASSEMBLIES

The blow-off assemblies shall be installed as shown on the standard details at the location as directed by the District.

CW-11 INSTALLATION OF CUSTOMER SERVICES

The services shall be installed as shown on the standard details. Services shall be installed in one piece with no splices, unless approved otherwise by Woodinville Water District for special conditions. Under no circumstances will splices be allowed for polyethylene services.

CW-12 CONCRETE THRUST BLOCKING

Concrete thrust blocking shall be cast in place and have a minimum of 1/4-square-foot bearing against the fitting and 2 square feet of bearing against undisturbed soil and shall be clear of joints so as to permit taking up or dismantling joint. All poured in place blocking shall have a minimum measurement of 12 inches between the pipe and the undisturbed bank. All blocking configurations and sizes shall be per the standard detail. All blocking as shown on the standards are considered as minimums, and consideration should be given to unusual circumstances and topography.

CW-13 AUGERED OR BORED CASINGS

Water mains installed in casing pipe shall be made by jacking, driving, or augering a steel casing pipe beneath the surface. No open excavation shall be made closer than six feet from the edge of pavement. The diameter of the casing shall be sufficient to allow installation of the water main and also to provide allowance for adjustment of the water main to proper line and grade. Wall thickness shall be sufficient to withstand installation force and highway loading and shall not be less than 3/8-inch. After installation of the water main, and with the approval of the inspector, sand shall be placed in the casing pipe to fill all voids. Casing ends shall be sealed using linkseal, mortar, or other approved method.

Restrained mechanical joint pipe shall be installed in all casings. Approved stainless steel casing insulators (Cascade Water Works Manufacturing, or equal) shall be used to protect the pipe and adjust it to proper grade. The water main may be pushed or pulled into the casing pipe, unless MEGALUGS are used for joint restraint, in which case the water main should be pulled into and through the casing pipe.

All bore pits or related excavations shall be closed at the end of each day. Ditches must be backfilled or covered with steel sheets and, within public or private rights-of-way, barricaded with minimum 5-foot high chain link fencing and flashing warning lights to prevent people or animals from falling into the trench.

The requirements of the roadway agency as contained in the construction permit, or as issued by oral instructions of the authorized representative of the roadway agency shall be followed by the Developer.

CW-14 CONSTRUCTION ON STEEP SLOPES

Where construction occurs on slopes 20% or greater, the developer shall install sacked slope or other approved slope retainers as shown on the standard details.

CW-15 TESTING AND DISINFECTING

All pipelines shall be tested and disinfected prior to acceptance of work. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished, installed, and operated by the Developer. Feed for the pump shall be from a barrel or other container so that the actual amount of "makeup" water can be measured periodically during the test period.

The pipeline shall be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and time allowed for the concrete to cure before testing. Where permanent blocking is not required, the Developer shall furnish and install temporary blocking.

As soon as pipe is adequately secured against movement under pressure, it may be filled with water.

Water supply for filling, testing and flushing of the new mains will be available from the existing distribution system at no cost for one testing and flushing cycle. However, if water is needed for additional tests, the Developer shall be billed for water used at the current rate of the District. High volume flushing of the system will occur after the permanent full diameter connection is made. The Developer shall obtain specific permission from the District during the months of June through August before any high volume flushing will be allowed.

After the pipe is filled and all air expelled, it shall be pumped to a test pressure equal to 150 psi in excess of the operating pressure, and this pressure shall be maintained for a period of 1/2 hour. In accordance with manufacturer's recommendation, all valves may be limited to a pressure differential equal to the rated pressure of the valve (200 psi minimum), but shall not restrict the test pressure of the main. Mainline testing shall be made with the hydrant auxiliary gate valves open and pressure against the hydrant valve. Hydrant ports shall also be tested to hold static pressure without any visible leaks. Hydrostatic tests shall be performed on every complete section of water main between two valves.

In addition to the hydrostatic pressure test, a leakage test shall be conducted on the pipeline. The leakage test shall be conducted at the same pressure as the hydrostatic pressure test for a period of not less than 1/2 hour. The quantity of water lost from the main shall not exceed the number of gallons per hour determined by the formula:

$$L = \frac{ND(P)^{0.5}}{7,400}$$

in which L = Allowable leakage, gallons/hour

N = No. of joints in length of pipeline tested

D = Nominal diameter of the pipe in inches

P = Avg. test pressure during leakage test, psi

Defective materials or workmanship, discovered as a result of the tests, shall be replaced by the Developer at the Developer's expense. Whenever it is necessary to replace defective material or correct the workmanship, the tests shall be rerun at the Developer's expense until a satisfactory test is obtained.

As sections of pipe are constructed and before pipelines are placed in service they shall be sterilized in conformance with the requirements of the State of Washington, Department of Social and Health Services.

Chlorine shall be applied in one of the following manners, listed in order of preference, to secure a concentration in the pipe of at least 50 ppm:

- (1) Injection of chlorine-water mixture from chlorinating apparatus through corporation cock at beginning of section after pipe has been filled and with water exhausting at end of section at a rate controlled to produce the desired chlorine concentration.
- (2) Injection similarly of a hypochlorite solution.
- (3) Placement of dry chlorinated lime throughout pipeline as constructed in proper quantities to produce the desired dosage. Filling of pipeline with this method should be at a very slow rate. Pipeline should be filled within 2 days of placing sterilizing agent.

After the desired chlorine concentration has been obtained throughout the section of line, the water in the line shall be left standing for at least 24 hours. Following this, the line shall be thoroughly flushed and a water sample collected. The line must not be placed in service until a satisfactory bacteriological report has been received. At no time shall chlorinated water from a new main be flushed into a body of fresh

water or any drainage system discharging to fresh water. This is to include lakes, rivers, streams, and any and all other waters where fish or other natural water life can be expected.

District representatives only shall be allowed to operate existing and new tie-in valves. Developer's personnel are expressly forbidden to operate any valve on any section of line which has been accepted by the District.

CW-16 CONNECTION TO EXISTING WATER MAIN

Wet tap connections shall be installed as shown on the Plans and the standard detail and the tapping valve shall remain closed.

Cut-in tees and crosses shall be installed as shown on the plans and the valves on the branches of the tee or cross shall remain closed.

At connections of new piping to existing piping all of the new piping, appurtenances and blocking shall have been installed, disinfected and tested. The contractor is required to use a state approved backflow prevention device for filling, testing and flushing of the new water system prior to cutting into the existing line.

The District shall be notified three (3) working days in advance of all scheduled connections. No cut-in connections or connections of new piping to existing piping will be scheduled on Fridays or Mondays.

All equipment and material necessary to make the connections shall be delivered to the site prior to the start of work. Bolts, flanges, gaskets, couplings and all accessories shall be checked and assembled where possible by the Developer and verified by the District prior to shut down of the water system. Before connection or cut-in, the fittings, pipes, valves, and couplings shall be cleaned and sterilized with chlorine solution in the same manner as provided for the pipeline. The cleaning and sterilizing shall be done immediately prior to installation and in the presence of the District. Once the water has been shut off, the Developer shall proceed rapidly and without interruption to complete the connection.

After connection to the existing system, the opening of valves shall be done with the authorization of, and in the presence of, the District's authorized representative.

CW-17 ASBESTOS/CEMENT WATER PIPE

Any work to be performed upon existing asbestos/cement water pipe shall be in conformance with the latest edition of "Recommended Standard Asbestos/Cement (AC) Pipe Work Practice Procedures and Training Requirements," adopted and published by the Pacific Northwest Section of the American Water Works Association, which is included herein by reference, and Chapter 296-65 of WAC,

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except as revised herein. Any AC pipe which is removed from service and is not disturbed may be capped and abandoned in place. Any exposed and disturbed pipe to be removed from service shall be removed and disposed of at an appropriate waste site. The disturbed pipe may not be relocated in the trench or otherwise disposed of on site. No new or used AC pipe is to be installed in the District. Disposal of any removed materials shall be at an approved off-site facility, in accordance with the above publications. All materials, equipment and safety gear shall be on site prior to cutting, tapping or removing any AC pipe.

CW-18 RESTORATION OF DISTURBED AREAS

Restoration of public and private improvements shall be performed by experienced contractors or by employees of the Developer who are qualified in this type of work.

The Developer shall be responsible to maintain all roadway areas until the permanent repair is accomplished.

The Developer shall limit construction time on each easement to the very minimum possible, including the time required for installation and testing. Restoration work shall follow immediately after pipe testing with due allowance for weather and season of year.

Asphalt Pavement

The existing asphalt concrete shall be cut on a neat line with a cutting disc or similar approved tool prior to excavation. Before the end of each day the trench shall be backfilled and compacted and a temporary cold mix patch shall be placed and maintained in good condition until replaced.

Immediately prior to permanent resurfacing of bituminous surfaced roads, the edges shall be retrimmed 18 inches wider than the excavation with straight vertical edges free from irregularities and the cold mix shall be removed. Edges of the trimmed surfacing shall be thoroughly tacked with an emulsified asphalt and asphalt concrete shall then be placed and compacted to the grade of the original surface. All asphalt joints shall be sealed with an approved sealer.

Crushed Surfacing

The existing gravel roadway shall be restored by grading the surface to a uniform grade to the width of the roadway prior to construction.

Where ditch sections are disturbed during construction, the ditch shall be restored to the same cross sections as existed prior to construction and shall be restored prior to placement of the crushed surfacing.

The Developer shall spread the crushed surfacing as each load is placed and shall compact the crushed surfacing after the material has been spread.

Landscaped and Improved Areas

All improvements and landscaping within the construction area which are damaged, destroyed or the use thereof interfered with due to the operation of the Developer shall be immediately restored to their former conditions by the Developer at the Developer's expense, using the services of a qualified nursery and/or sod installation company, except where noted otherwise. Notice should be given to the property owners along the route of construction by the Developer advising them of the methods to be used to preserve and restore the improvements.

Unimproved Areas

All areas disturbed by this construction for which no other restoration is specified, and for which there were no private improvements existing prior to construction, shall be seeded for erosion control.

Seeding shall not be done during windy weather or when the ground is frozen, excessively wet, or otherwise untillable. Seed shall be placed at a minimum rate of 120 pounds per acre.

Seeding, fertilizing and mulching shall be installed using an approved type hydroseeder. If hand seeding is used with prior approval, evidence of vigorous growth, in the opinion of the District, will be required prior to final acceptance.

Fertilizer shall be applied in accordance with the procedures and requirements for seeding at a minimum rate of 500 pounds per acre.

Wood cellulose fiber mulch shall be applied in accordance with the procedures and requirements for seeding at a minimum rate of 2,000 pounds per acre.

CW-19 INSTALLATION OF PRESSURE-REDUCING STATION

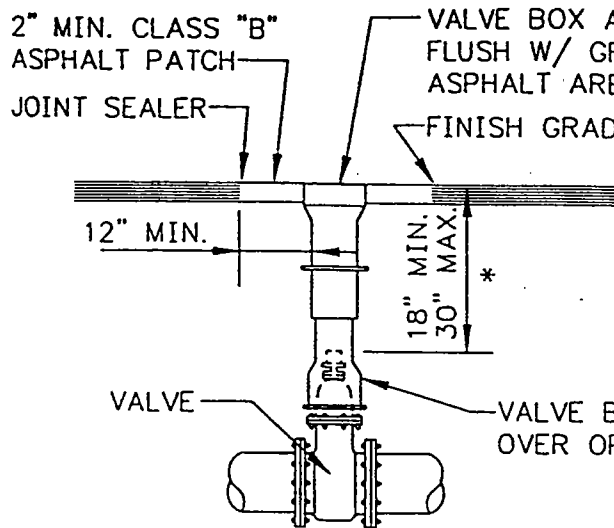
Excavation shall be carried to the proper grade and to a dense undisturbed firm foundation. Grade shall be as shown on drawings, but in no case shall the top slab extend higher than adjoining road grades. The vault shall be carefully placed on a prepared foundation of foundation gravel. The excavation shall be kept free of ground and surface water during installation. The Contractor shall use caution at all times to prevent flotation of the vault.

Backfill around the structure shall be carefully placed in layers not over 12 inches thick and mechanically compacted. No brush, topsoil, organic material or asphalt shall be used in backfilling. Where original excavated material is unsuitable for backfill, as determined by the Engineer, imported gravel backfill shall be placed. The unsuitable material shall be removed by the Contractor to a disposal site, in accordance with County requirements. The backfill shall be compacted by mechanical compactors to 95% of maximum density, ASTM D-698, to finished grade.

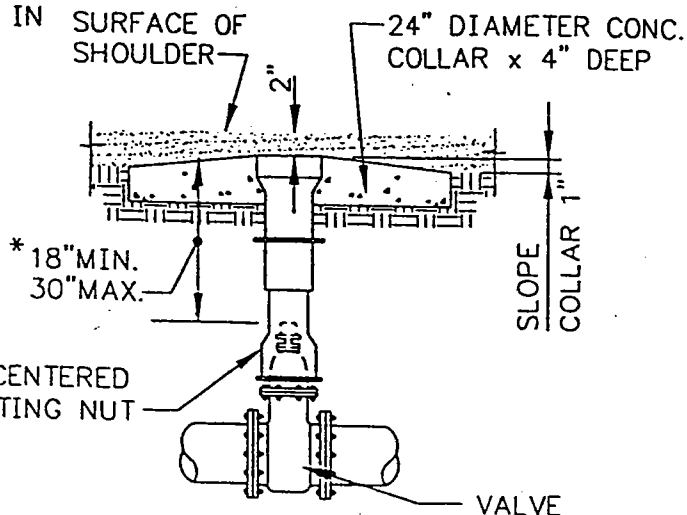
The piping, vault and metal items shall be painted as described under MATERIALS. All surfaces shall be clean and dry. No painting shall be done before the prepared surfaces are approved by the Engineer. The pipe shall be empty and the surfaces shall be free of all moisture and condensation before application begins.

Upon completion of the installation the Contractor shall furnish the services of a technical manufacturer's representative for the pressure relief and pressure reducing valves. The technical representative shall check the installation, test the equipment, place it in operation and train the District's representative.

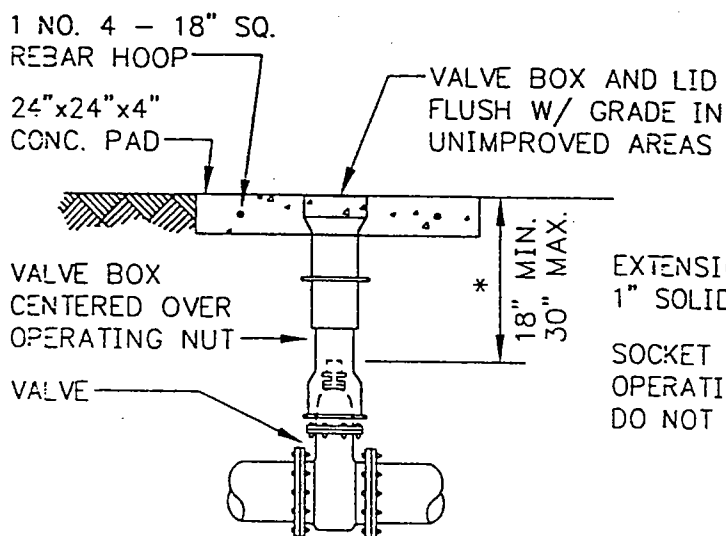
STANDARD WATER DETAILS
OF THE
WOODINVILLE WATER DISTRICT



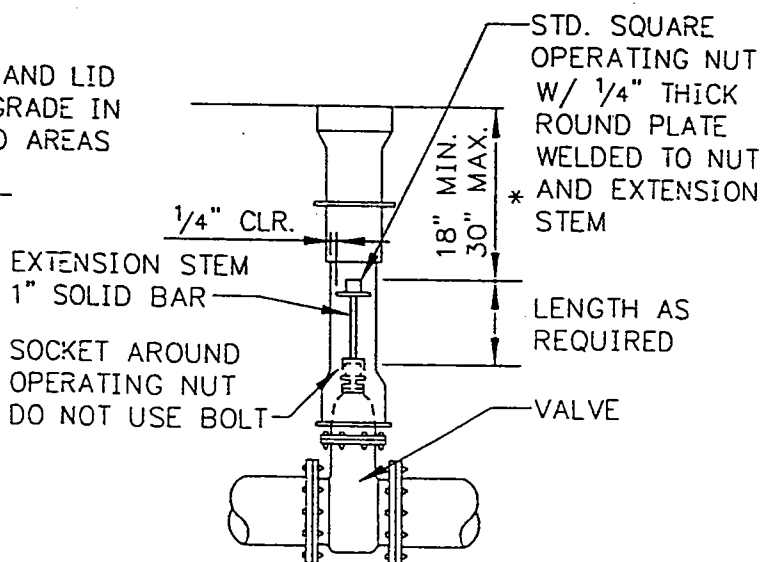
VALVE BOX IN ASPHALT AREA



VALVE BOX IN GRAVELED SHOULDER AREA



VALVE BOX IN UNIMPROVED AREA

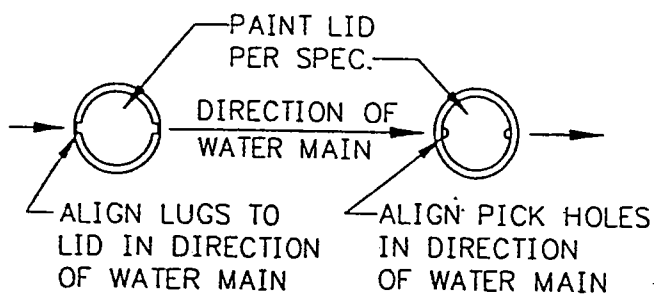


OPERATING NUT EXTENSION

* OPERATING NUT EXTENSION REQUIRED OVER 30"

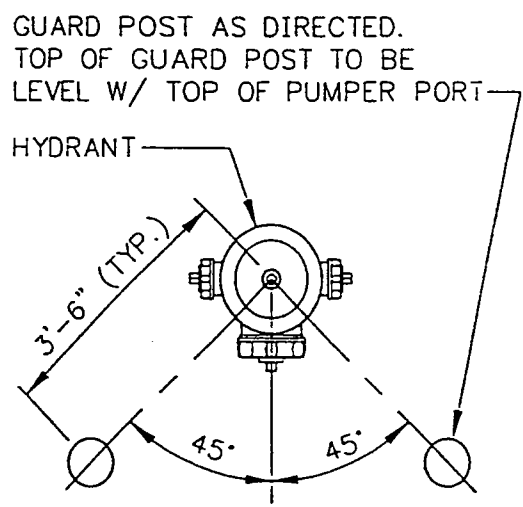
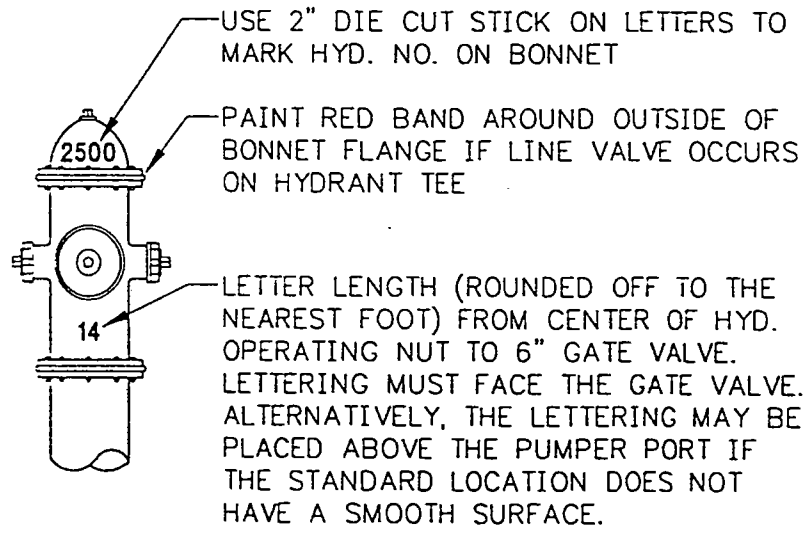
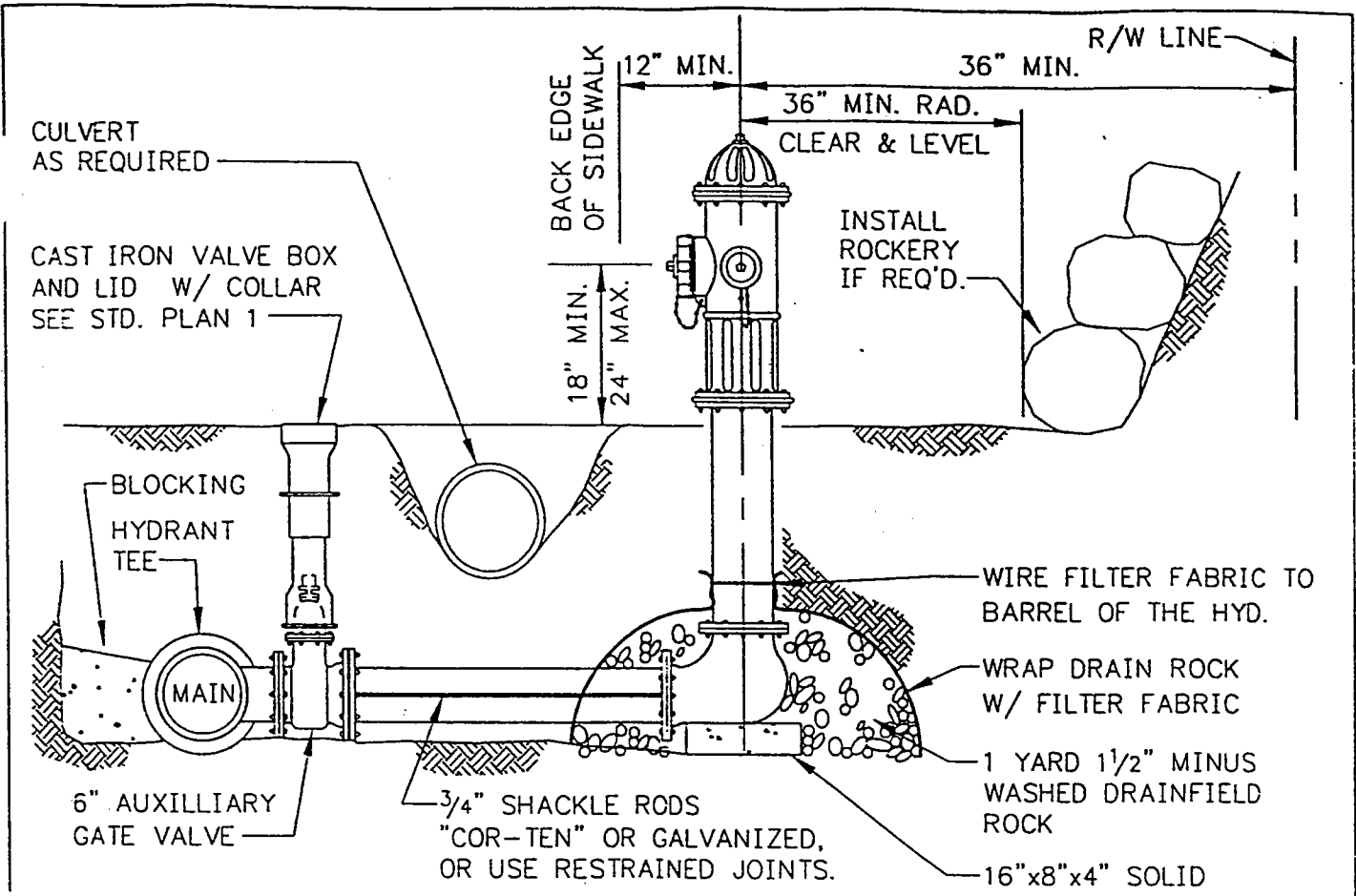
NOTES

1. WHEN VALVE BOXES ARE LOCATED IN GRAVEL SHOULDER AREA WITHIN 6" OF ASPHALT, EXTEND ASPHALT 12" AROUND VALVE BOX AND FLUSH WITH ASPHALT GRADE.
2. AVOID PLACING VALVES IN DITCHES. HOWEVER, WHEN VALVE BOXES MUST BE LOCATED IN DITCH AREA, THEY MUST BE ACCESSIBLE AND PROTECTED FROM DITCH MAINTENANCE.



VALVE BOX LID ALIGNMENT

**1. WOODINVILLE WATER DISTRICT STANDARD PLAN
VALVE BOX & LID DETAILS**



HYDRANT RUN

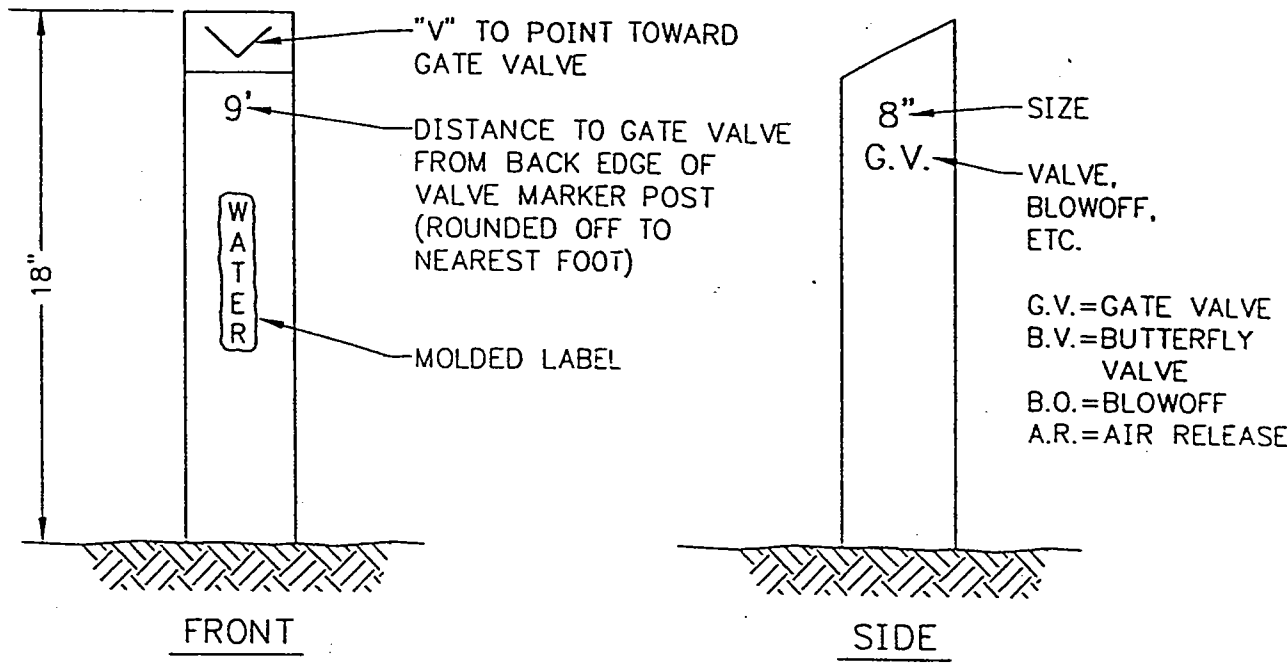
LENGTH ESTABLISHED ON SITE, APPROVED BY ENGINEER. USE 6" D.I. PIPE WITH 2 EA. 3/4" SHACKLE RODS OR RESTRAINED JOINTS.

PAINTING & COLOR SUMMARY

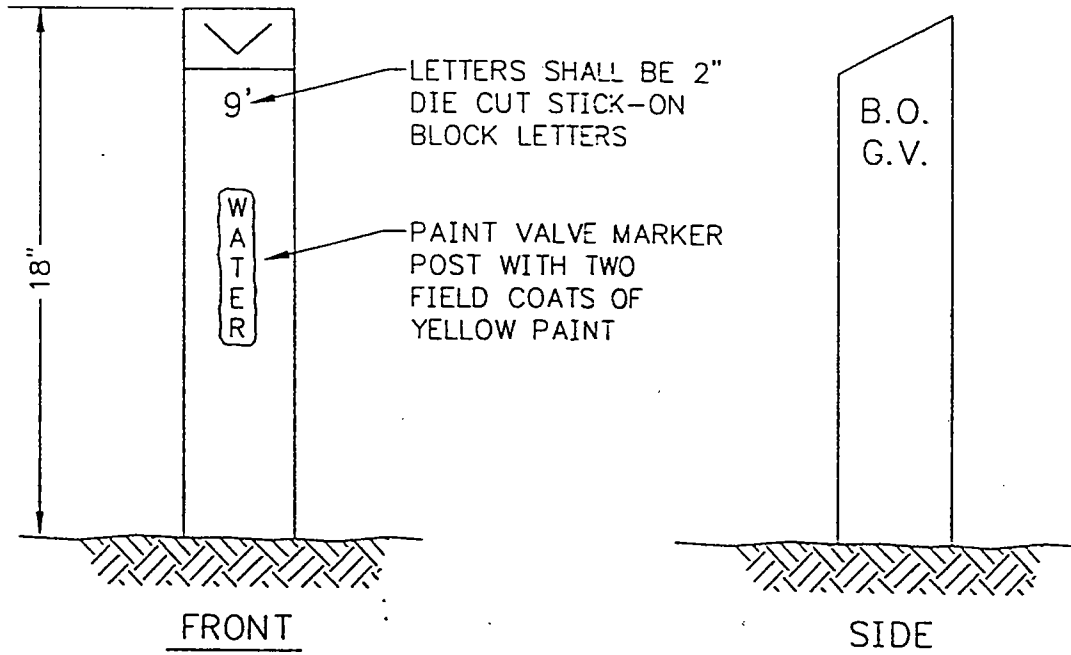
HYDRANT: 2 FIELD COATS OF YELLOW PAINT. GUARD POSTS: 2 FIELD COATS OF YELLOW PAINT. VALVE LID: 2 FIELD COATS OF YELLOW PAINT. LETTERING: 2" HIGH BLACK LETTERS

2

**WOODINVILLE WATER DISTRICT STANDARD PLAN
FIRE HYDRANT ASSEMBLY**



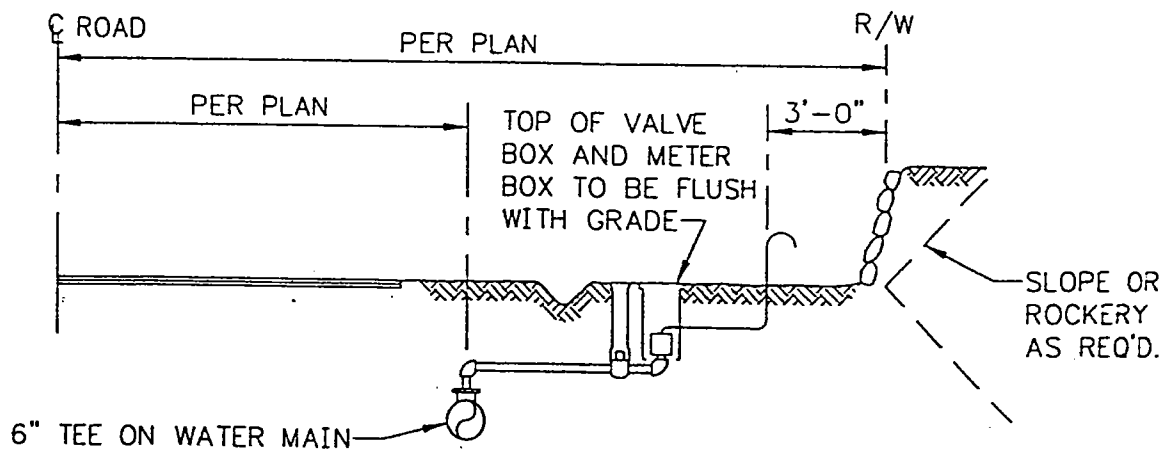
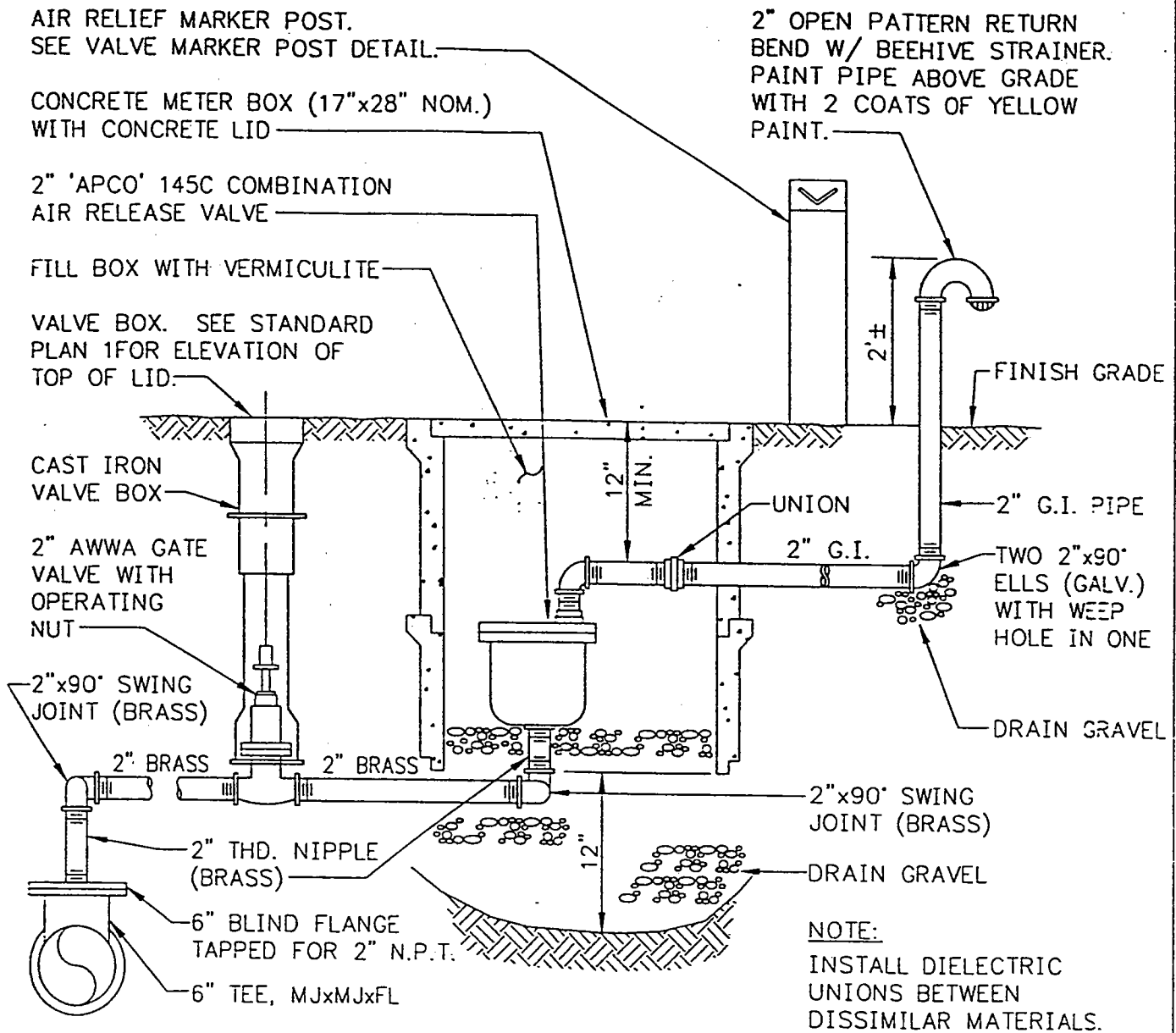
VALVE MARKER POST



2" BLOW OFF ASSEMBLY MARKER POST

3

**WOODINVILLE WATER DISTRICT STANDARD PLAN
VALVE MARKER POSTS**



4

**WOODINVILLE WATER DISTRICT STANDARD PLAN
AIR RELIEF ASSEMBLY**

FOG TITE B-9 CONCRETE BOX
W/ HINGED METAL COVER
LOCATE BLOW-OFF BOX
AWAY FROM DRAINAGE OR
HIGH WATER AREAS.

CENTER BLOW-OFF
CAP IN BOX

BLOW OFF
MARKER POST SEE
STANDARD PLAN 3.

CONCRETE COLLAR 4" THICK AND TO DIMENSIONS
SHOWN. PLACE TOP OF COLLAR AND BLOW-OFF
BOX 1" ABOVE FINSH GRADE.

SEE THRUST
BLOCK DETAILS

4" GATE VALVE,
FLxMJ

MJ PLUG

4" CL 52
RESTRAINED PIPE

(SEE NOTE 1)
LENGTH AS REQUIRED

DIA. x4" TEE,
MJxMJ

D.I. WATER
MAIN

PLAN

DETAIL 'A'

CENTER MOUNT 1/4" BALL
VALVE IN CAP FOR MANUAL
PRESSURE RELEASE

R/W OR PROP. LINE

4'-0"

2'-0"

BLOW OFF MARKER POST.
SEE STANDARD PLAN #3.

FINISH GRD.

C.I. VALVE BOX.
SEE STANDARD PLAN 1

2" PVC QUICK
DISCONNECT
FITTING & CAP
W/ 1/4" BALL
VALVE PRESSURE
RELEASE (SEE
DETAIL "A")

36"
(MIN.)

1/4 YARD 1 1/2"
WASHED ROCK

2" ϕ (LENGTH AS
NECESSARY)
SCHEDULE 80 PVC

2" x 90° BEND

2" ϕ x 9" \pm SCHEDULE
80 PVC NIPPLE

4" GATE VALVE, FLxMJ
4" BLIND FLANGE
TAPPED 2" (I.P. THREADS)

NOTES:

- MECH. JOINTS TO BE RESTRAINED WITH EBBA IRON MEG-A-LUGS. INSTALL FIELD LOK GASKETS IN PIPE JOINTS IF MORE THAN (1) PIPE LENGTH IS REQUIRED.

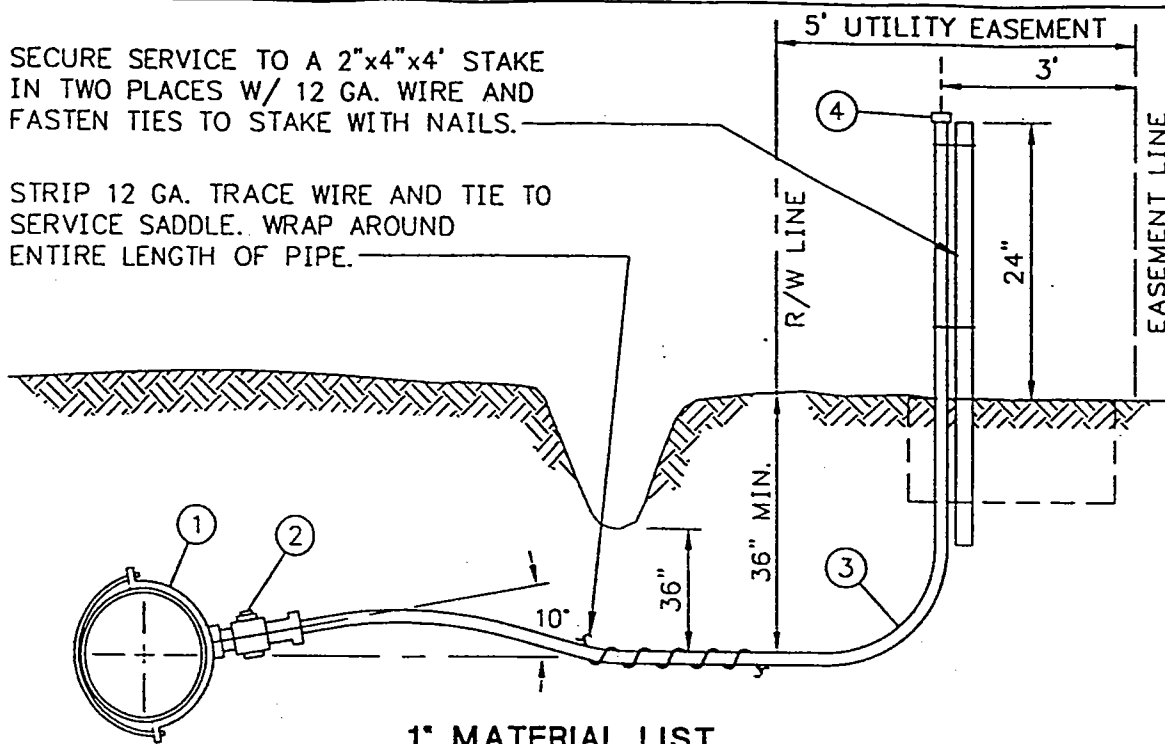
5

WOODINVILLE WATER DISTRICT STANDARD PLAN BLOW OFF ASSEMBLY

6-99

SECURE SERVICE TO A 2"x4"x4' STAKE
IN TWO PLACES W/ 12 GA. WIRE AND
FASTEN TIES TO STAKE WITH NAILS.

STRIP 12 GA. TRACE WIRE AND TIE TO
SERVICE SADDLE. WRAP AROUND
ENTIRE LENGTH OF PIPE.



1" MATERIAL LIST

- | | | |
|---|-----------------|---|
| ① | SERVICE SADDLE | ROMAC 101-S, FORD FS101, OR ROCKWELL 315 W/ 1" I.P. THREADS AND STAINLESS STEEL STRAP. |
| ② | BALL CORP. STOP | FORD FB500 x C1644G W/ 1" I.P. THREADS.
MUELLER B-20013 x H15456 (INSTA-TITE) W/ 1" I.P. THREADS.
MCDONALD 3131B W/ 4754-3T COMP. FITTING |
| ③ | SERVICE PIPE | 1" DRISCOPIPE ULTRA LINE 5100 HIGH DENSITY POLYETHYLENE SERVICE PIPE MEETING AWWA C901 REQUIREMENTS; PE 3408 MATERIAL, SDR7, PRESSURE CLASS 200 PSI, I.P.S. |
| ④ | PIPE END CAP | GALVANIZED M.I.P.T. IRON PIPE INSERT ADAPTER W/
GALVANIZED CAP AND TWO S.S. CLAMP BANDS |

NOTES

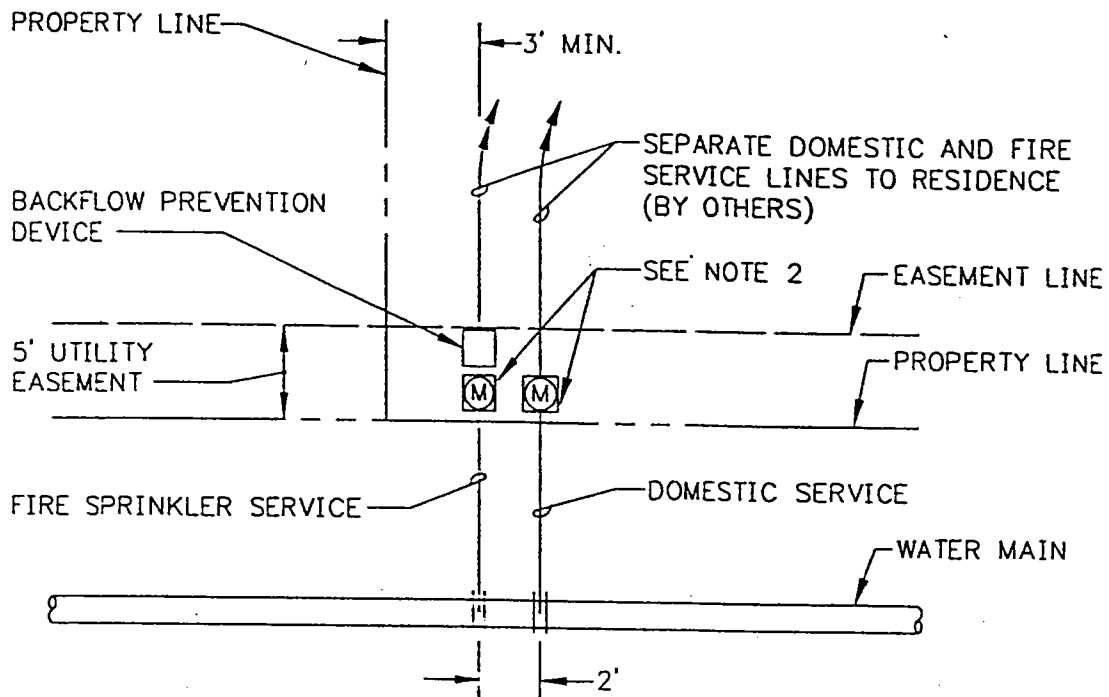
1. LOT CORNERS AND PROPERTY LINES MUST BE ESTABLISHED BEFORE SERVICES ARE INSTALLED.
2. SERVICE LINES SHALL BE TESTED WITH MAINLINE. EACH SERVICE SHALL BE WITHOUT JOINT FROM CORP STOP TO PIPE END CAP. PIPE SHALL BE CUT WITH NEAT 90° CUTS USING A PIPE CUTTER AND ENDS BEVELED WITH A BEVELING TOOL. INSTALL STIFFENERS IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS
3. LOCATIONS FOR CUSTOMER SERVICES SHALL BE 3' FROM LOT CORNERS OR AS SHOWN ON THE PLANS, BUT IN NO CASE CLOSER THAN 18". SERVICE SHALL NOT BE INSTALLED IN PAVED AREAS AND MUST BE BEHIND DITCH.
4. THE ANGLE METER STOP, AND METER BOX WILL BE INSTALLED BY THE DISTRICT AFTER PROJECT ACCEPTANCE AND PAYMENT OF METER SET FEES.
5. A PERMANENT 5' UTILITY EASEMENT WILL BE REQUIRED FOR INSTALLATION OF METERS.
6. A CLEAR AND LEVEL AREA IS REQUIRED AT LOCATION OF SERVICE INSTALLATION.
7. SERVICE PRESSURE REDUCING VALVE MAY BE REQUIRED (WHEN MAIN PRESSURE IS OVER 80 PSI) AND SHALL BE INSTALLED AND MAINTAINED BY THE PROPERTY OWNER.
8. CUSTOMER PRV NOT ALLOWED IN METER BOX.

6

WOODINVILLE WATER DISTRICT STANDARD PLAN

SINGLE FAMILY RESIDENTIAL SERVICE CONNECTION

1-00



NOTES:

1. INSTALL AND TEST DOMESTIC SERVICE AND FIRE SPRINKLER SERVICE TO THE EASEMENT LINE IN ACCORDANCE WITH STANDARD PLAN 6.
2. AFTER PROJECT ACCEPTANCE AND METER SET FEES HAVE BEEN PAID, THE ANGLE METER STOPS, METERS AND METER BOXES WILL BE INSTALLED BY THE DISTRICT.
3. IT SHALL BE THE OWNER'S RESPONSIBILITY TO INSURE THAT THE SERVICE LINES AND METER SIZES ARE ADEQUATE TO SERVE THE FIRE SPRINKLER SYSTEM AND DOMESTIC WATER SYSTEM REQUIREMENTS.
4. THE BACKFLOW PREVENTION DEVICE SHALL BE A DOUBLE CHECK ASSEMBLY AS APPROVED BY THE WASHINGTON STATE DEPARTMENT OF HEALTH.
5. NO CHEMICALS ARE ALLOWED IN THE FIRE SPRINKLER PIPING SYSTEM.
6. THE BACKFLOW PREVENTION DEVICE SHALL BE INSTALLED BY THE OWNER. THE DEVICE WILL BE INSPECTED AND INITIALLY TESTED BY THE DISTRICT PRIOR TO ESTABLISHING WATER SERVICE.
7. THE FIRE SPRINKLER SYSTEM & DOMESTIC SERVICE SHALL BE SEPARATE SYSTEMS; NO CONNECTION ALLOWED BETWEEN SYSTEMS.
8. FIRE SPRINKLER SYSTEMS SHALL BE DESIGNED IN ACCORDANCE WITH THE LOCAL FIRE MARSHAL'S REQUIREMENTS.

6A

**WOODINVILLE WATER DISTRICT STANDARD PLAN
SINGLE FAMILY RESIDENTIAL FIRE SERVICE CONNECTION**

12 GAUGE TRACER WIRE WRAP
AROUND ENTIRE LENGTH OF PIPE
W/ 2'± EXTRA IN METER BOX

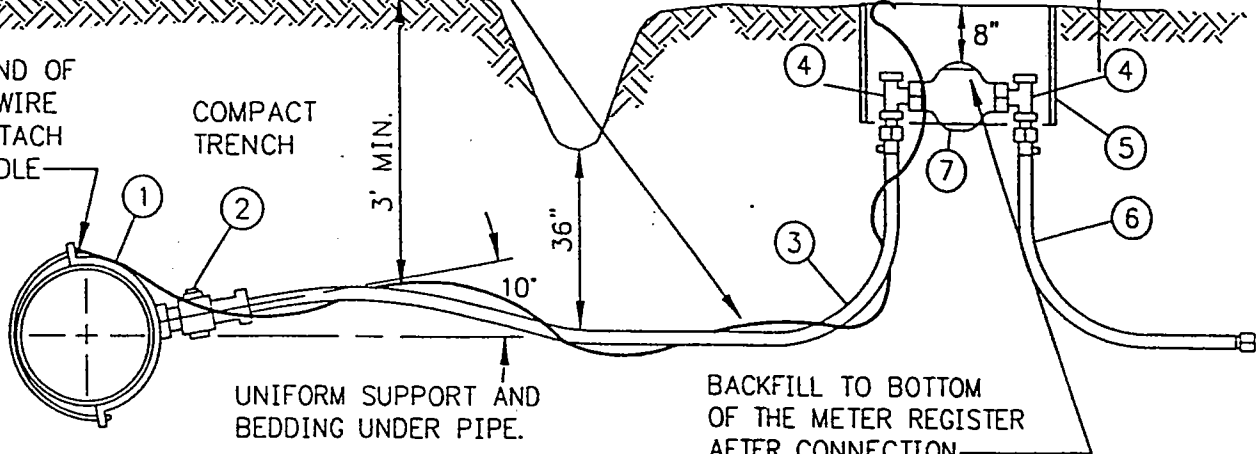
BARE END OF
TRACE WIRE
AND ATTACH
TO SADDLE

COMPACT
TRENCH

UNIFORM SUPPORT AND
BEDDING UNDER PIPE.

BACKFILL TO BOTTOM
OF THE METER REGISTER
AFTER CONNECTION

R/W OR PL → 6"



1* SERVICE MATERIAL LIST

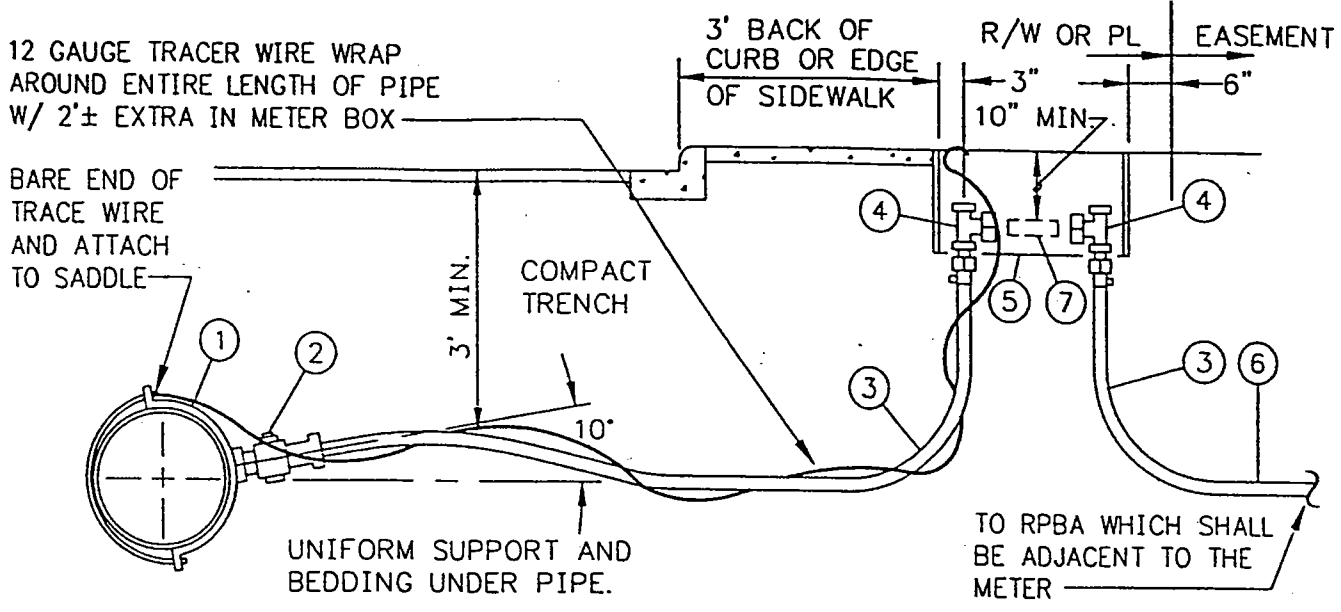
- ① SERVICE SADDLE
ROMAC 101-S W/ I.P. THREADS & STAINLESS STEEL STRAP
- ② BALL CORP. STOP (W/ 1" I.P. THREADS)
FORD FB 500 W/ C16-44G COMP. FITTING
MCDONALD 3131B W/ 4754-3T COMP. FITTING
MUELLER B-20013 W/ H-15456 INSTA-TITE
- ③ SERVICE PIPE
1" DRISCOPIPE ULTRA LINE 5100 HIGH DENSITY POLYETHYLENE SERVICE PIPE MEETING AWWA C901 REQUIREMENTS; PE 3408 MATERIAL, SDR7, PRESSURE CLASS 200 PSI, I.P.S.
- ④ BALL ANGLE METER STOP (W/ 1" I.P. THREADS)

<u>FOR 1" METER</u> 1"x1" FORD BA13-444W W/ C86-44G COMP. FITTING 1"x1" MUELLER B-24265 W/ H-15426 INSTA-TITE 1"x1" MCDONALD 4604B W/ 4753-3T COMP. FITTING	<u>FOR 3/4" METER</u> 3/4"x1" FORD BA13-342W W/ C86-44G COMP. FITTING 3/4"x1" MUELLER B-24265 W/ H-15426 INSTA-TITE 3/4"x1" MCDONALD 4604B W/ 4753-3T COMP. FITTING
--	--
- ⑤ METER BOX - FOR 1" METER
CARSON 1220-12-5 (OR APPROVED EQUAL)
- FOR 3/4" METER
CARSON 1419 (OR APPROVED EQUAL)
- ⑥ CONTRACTOR TO CHECK EXISTING SERVICE MATERIALS AND PROVIDE THE NECESSARY FITTINGS FOR RECONNECTION OF THE EXISTING SERVICE.
- ⑦ EXISTING METERS TO BE REUSED EXCEPT THOSE IDENTIFIED BY THE DISTRICT TO BE REPLACED. NEW METERS WILL BE SUPPLIED BY THE DISTRICT AND INSTALLED BY THE CONTRACTOR.

NOTES

1. CONTRACTOR TO PROVIDE ALL MATERIALS AS SHOWN EXCEPT METERS (SEE ITEM 7 ABOVE).
2. SERVICE LINES SHALL BE TESTED WITH MAINLINE. EACH SERVICE SHALL BE WITHOUT JOINT FROM CORP STOP TO METER STOP. PIPE SHALL BE CUT WITH NEAT 90° CUTS USING A PIPE CUTTER AND ENDS BEVELED WITH A BEVELING TOOL. DO NOT USE STIFFENERS IN POLY CONNECTORS.
3. EXISTING SERVICE SHALL BE MAINTAINED UNTIL THE NEW SYSTEM IS PRESSURE TESTED, FLUSHED AND SATISFACTORY BACTERIOLOGICAL TEST RECEIVED. THEN THE CONTRACTOR SHALL COORDINATE WITH THE INDIVIDUAL OWNERS AND THE DISTRICT TO SCHEDULE CONNECTION TO THE NEW SYSTEM.

6B WOODINVILLE WATER DISTRICT STANDARD PLAN SINGLE FAMILY RESIDENTIAL SERVICE RE-CONNECTION



1" SERVICE MATERIAL LIST

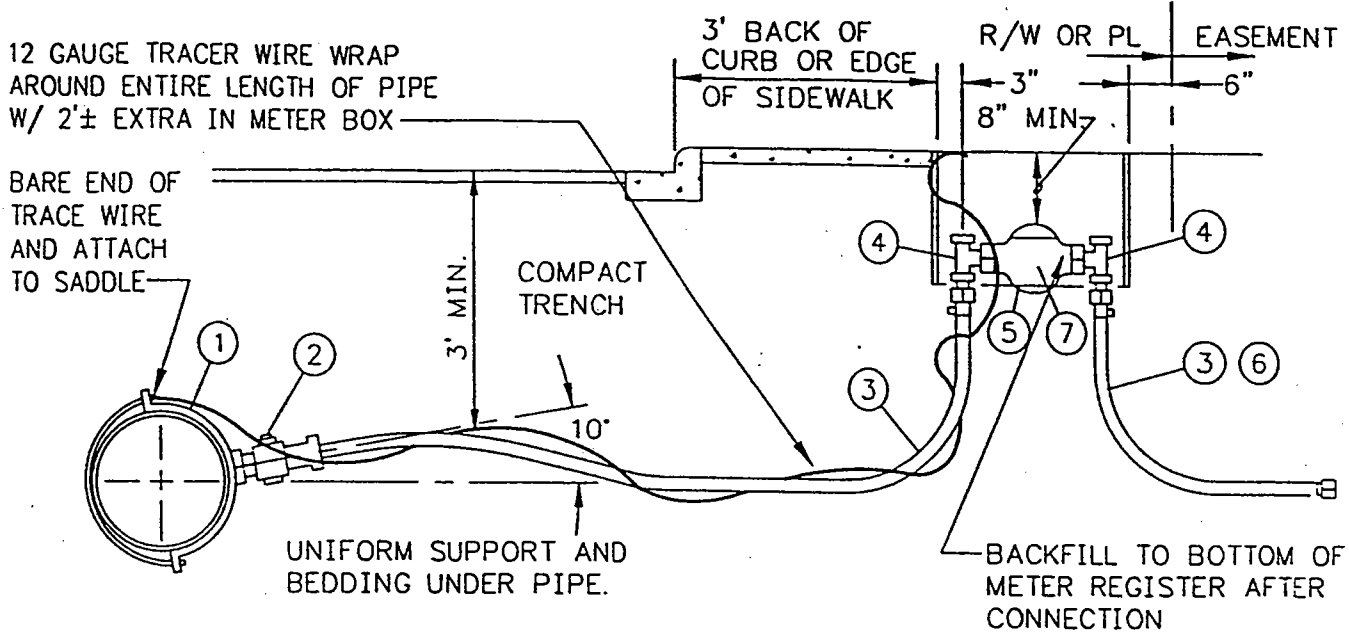
- ① SERVICE SADDLE
ROMAC 101-S W/ I.P. THREADS & STAINLESS STEEL STRAP
- ② BALL CORP. STOP (W/ 1" I.P. THREADS)
FORD FB 500 W/ C16-44G COMP. FITTING
MCDONALD 3131B W/ 4754-3T COMP. FITTING
MUELLER B-20013 W/ H-15456 INSTA-TITE
- ③ SERVICE PIPE
1" DRISCOPIPE ULTRA LINE 5100 HIGH DENSITY POLYETHYLENE SERVICE PIPE MEETING AWWA C901 REQUIREMENTS; PE 3408 MATERIAL, SDR7, PRESSURE CLASS 200 PSI, I.P.S.
- ④ BALL ANGLE METER STOP (W/ 1" I.P. THREADS)

<u>FOR 1" METER</u> 1"x1" FORD BA13-444W W/ C86-44G COMP. FITTING 1"x1" MUELLER B-24265 W/ H-15426 INSTA-TITE 1"x1" MCDONALD 4604B W/ 4753-3T COMP. FITTING	<u>FOR 3/4" METER</u> 3/4"x1" FORD BA13-342W W/ C86-44G COMP. FITTING 3/4"x1" MUELLER B-24265 W/ H-15426 INSTA-TITE 3/4"x1" MCDONALD 4604B W/ 4753-3T COMP. FITTING
--	--
- ⑤ METER BOX - FOR 1" METER
CARSON 1220-12-5 (OR APPROVED EQUAL)
- FOR 3/4" METER
CARSON 1419 (OR APPROVED EQUAL)
- ⑥ END OF DISTRICT RESPONSIBILITY. OWNERS RESPONSIBILITY TO EXTEND SERVICE LINE TO REDUCED PRESSURE BACKFLOW ASSEMBLY PER STD. PLAN 17
- ⑦ METER IDLER (AVAILABLE UPON REQUEST FROM THE DISTRICT)

NOTES

- 1. SERVICE LINES SHALL BE TESTED WITH MAINLINE. EACH SERVICE SHALL BE WITHOUT JOINT FROM CORP STOP TO METER STOP. PIPE SHALL BE CUT WITH NEAT 90° CUTS USING A PIPE CUTTER AND ENDS BEVELED WITH A BEVELING TOOL. INSTALL STIFFENERS IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
- 2. METER WILL BE FURNISHED AND INSTALLED BY DISTRICT AFTER PROJECT ACCEPTANCE AND PAYMENT OF METER SET FEES.
- 3. SERVICE PRESSURE REDUCING VALVE MAY BE REQUIRED (WHEN PRESSURE IS OVER 80 PSI) AND SHALL BE INSTALLED AND MAINTAINED BY THE PROPERTY OWNER.
- 4. CUSTOMER PRV NOT ALLOWED IN METER BOX.

**7 WOODINVILLE WATER DISTRICT STANDARD PLAN
1" COMMERCIAL SERVICE CONNECTION**



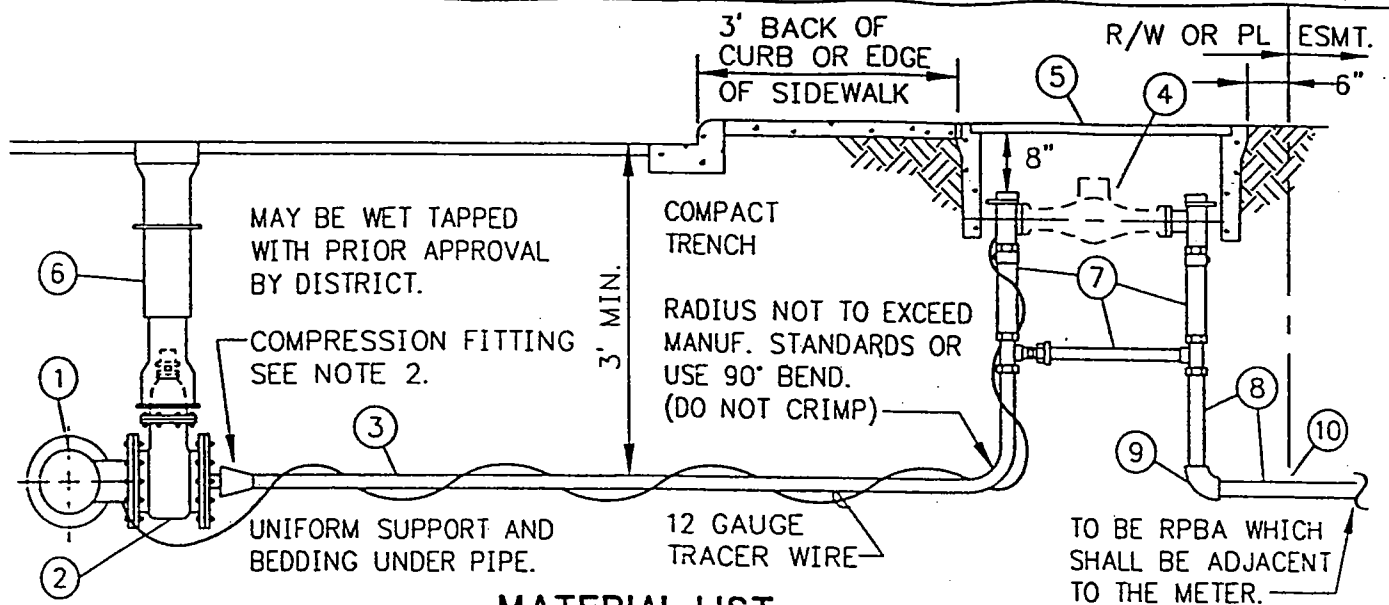
1" SERVICE MATERIAL LIST

- ① SERVICE SADDLE
ROMAC 101-S W/ I.P. THREADS & STAINLESS STEEL STRAP
- ② BALL CORP. STOP (W/ 1" I.P. THREADS)
FORD FB 500 W/ C16-44G COMP. FITTING
MCDONALD 3131B W/ 4754-3T COMP. FITTING
MUELLER B-20013 W/ H-15456 INSTA-TITE
- ③ SERVICE PIPE
1" DRISCOPIPE ULTRA LINE 5100 HIGH DENSITY POLYETHYLENE SERVICE PIPE MEETING AWWA C901 REQUIREMENTS; PE 3408 MATERIAL, SDR7, PRESSURE CLASS 200 PSI, I.P.S.
- ④ BALL ANGLE METER STOP (W/ 1" I.P. THREADS)

<u>FOR 1" METER</u> 1"x1" FORD BA13-444W W/ C86-44G COMP. FITTING 1"x1" MUELLER B-24265 W/ H-15426 INSTA-TITE 1"x1" MCDONALD 4604B W/ 4753-3T COMP. FITTING	<u>FOR 3/4" METER</u> 3/4"x1" FORD BA13-342W W/ C86-44G COMP. FITTING 3/4"x1" MUELLER B-24265 W/ H-15426 INSTA-TITE 3/4"x1" MCDONALD 4604B W/ 4753-3T COMP. FITTING
--	--
- ⑤ METER BOX - FOR 1" METER
CARSON 1220-12-5 (OR APPROVED EQUAL)
- FOR 3/4" METER
CARSON 1419 (OR APPROVED EQUAL)
- ⑥ CONTRACTOR TO CHECK EXISTING SERVICE MATERIALS AND PROVIDE THE NECESSARY FITTINGS FOR RECONNECTION OF THE EXISTING SERVICE.
- ⑦ EXISTING METERS TO BE REUSED EXCEPT THOSE IDENTIFIED BY THE DISTRICT TO BE REPLACED. NEW METERS WILL BE SUPPLIED BY THE DISTRICT AND INSTALLED BY THE CONTRACTOR.

NOTES

- 1. SERVICE LINES SHALL BE TESTED WITH MAINLINE. EACH SERVICE SHALL BE WITHOUT JOINT FROM CORP STOP TO METER STOP. PIPE SHALL BE CUT WITH NEAT 90° CUTS USING A PIPE CUTTER AND ENDS BEVELED WITH A BEVELING TOOL. DO NOT USE STIFFENERS IN POLY CONNECTORS.
- 2. CONTRACTOR TO PROVIDE ALL MATERIALS AS SHOWN EXCEPT METERS (SEE ITEM 7 ABOVE).
- 3. EXISTING SERVICE SHALL BE MAINTAINED UNTIL THE NEW SYSTEM IS PRESSURE TESTED, FLUSHED AND SATISFACTORY BACTERIOLOGICAL TEST RECEIVED. THEN THE CONTRACTOR SHALL COORDINATE WITH THE INDIVIDUAL OWNERS AND THE DISTRICT TO SCHEDULE CONNECTION TO THE NEW SYSTEM.



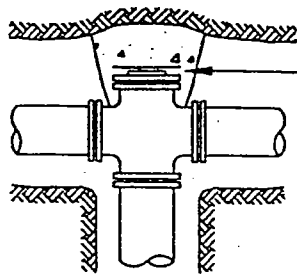
MATERIAL LIST

- | 1-1/2" SERVICE | 2" SERVICE |
|--|--|
| ① DIA. x 4" TEE, MJ x FL | ① DIA. x 4" TEE, MJ x FL |
| ② 4" RESILIENT SEATED GATE VALVE WITH 4" BLIND FLANGE AND 1 1/2" TAP (SEE GATE VALVES). | ② 4" RESILIENT SEATED GATE VALVE WITH 4" BLIND FLANGE AND 2" TAP (SEE GATE VALVES). |
| ③ SERVICE PIPE SOFT COPPER TYPE "K" | ③ SERVICE PIPE SOFT COPPER TYPE "K" |
| ④ METER FURNISHED BY WWD | ④ METER FURNISHED BY WWD |
| ⑤ METER BOX FOG-TITE NO. 2, CARSON NO. 1730 | ⑤ METER BOX PWWS #3 OR EQUAL, CARSON NO. 1730 |
| ⑥ VALVE BOX STYLE 940 WITH SHORT SKIRT LID | ⑥ VALVE BOX STYLE 940 WITH SHORT SKIRT LID |
| ⑦ METER SETTER WITHOUT BYPASS, WITHOUT SPRING ANGLE CHECK 1 1/2" FORD NO. VBB 86-12-11-66 1 1/2" MUELLER B-2422 X 12 W/ VERTICAL BALL VALVE INLET AND OUTLET | ⑦ METER SETTER WITHOUT BYPASS, WITHOUT SPRING ANGLE CHECK 2" FORD NO. VBB 87-12-11-77 2" MUELLER B-2422 X 12 W/ VERTICAL BALL VALVE INLET AND OUTLET |
| ⑧ 1 1/2" x 12" NIPPLE | ⑧ 2" x 12" NIPPLE |
| ⑨ 1 1/2" x 90° BEND, BRASS | ⑨ 2" x 90° BEND, BRASS |
| ⑩ END OF DISTRICT RESPONSIBILITY. OWNER TO EXTEND SERVICE LINE TO RPBA. SEE STD PLAN 17. | ⑩ END OF DISTRICT RESPONSIBILITY. OWNER TO EXTEND SERVICE LINE TO RPBA. SEE STD PLAN 17. |

NOTES

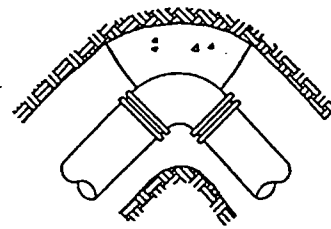
- SERVICE PRESSURE REDUCING VALVE MAY BE REQUIRED (WHEN MAIN PRESSURE IS OVER 80 PSI) AND SHALL BE INSTALLED AND MAINTAINED BY THE PROPERTY OWNER. CUSTOMER PRV NOT ALLOWED IN METER BOX.
- FITTINGS SHALL BE MUELLER 110 COMPRESSION OR FORD C84-66, C84-77.
- AVOID SPLICING COPPER PIPE. SPLICING MAY BE ALLOWED, WITH PRIOR APPROVAL FROM THE DISTRICT, USING THREE PART COPPER FLARE UNION OR MUELLER 110 COMPRESSION UNION.
- INSTALL DIELECTRIC UNIONS BETWEEN DISSIMILAR MATERIALS.
- METER WILL BE FURNISHED AND INSTALLED BY THE DISTRICT AFTER PROJECT ACCEPTANCE AND PAYMENT OF METER SET FEES.
- METER BOX NOT ALLOWED IN PAVEMENT OR CONCRETE.

8 WOODINVILLE WATER DISTRICT STANDARD PLAN 1 1/2" & 2" COMMERCIAL SERVICE CONNECTION

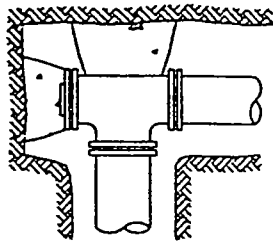


STEEL PLATE.
FORM TO ALLOW
FOR BOLT REMOVAL

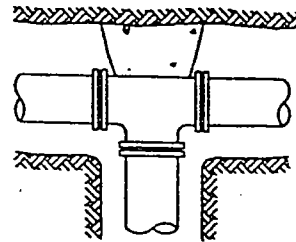
CROSS WITH PLUG



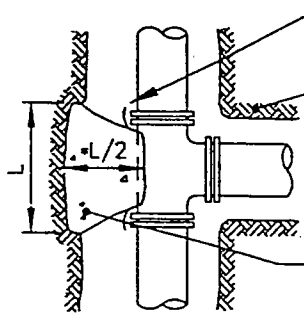
HORIZONTAL BEND



PLUGGED TEE



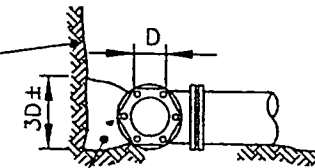
TEE



PLAN

20 LB. BUILDING
PAPER
UNDISTURBED
EARTH

2000 PSI CONCRETE
FORMED TO ALLOW FOR
REMOVAL OF BOLTS



ELEVATION

THRUST BLOCK TABLE

PIPE SIZE	TEE OR END PLUG	90°	45°	22 1/2°	11 1/4°
4" OR 6"	3	4	2	2	2
8"	6	7	4	2	2
12"	12	16	9	5	3
16"	21	29	16	8	4

MINIMUM BEARING AREA AGAINST UNDISTURBED EARTH (SQURE FEET)

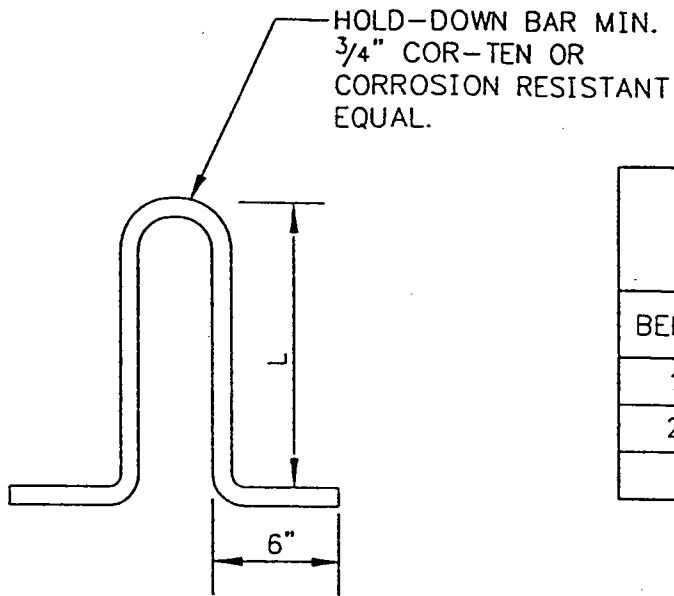
NOTES

1. BEARING AREA OF CONC. THRUST BLOCK BASED ON 200 PSI PRESSURE AND SOIL BEARING LOAD OF 2000 POUNDS PER SQUARE FOOT.
2. AREAS MUST BE ADJUSTED FOR OTHER SIZE PIPES, PRESSURES AND SOIL CONDITIONS.
3. CONCRETE BLOCKING SHALL BE CAST IN PLACE AND HAVE A MINIMUM OF 1/4 SQUARE FOOT BEARING AGAINST THE FITTING.
4. THRUST BLOCK SHALL BEAR AGAINST FITTING ONLY AND SHALL BE CLEAR OF JOINTS TO PERMIT TAKING UP OR DISMANTLING JOINT.
5. CONTRACTOR SHALL INSTALL BLOCKING ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATION PRESSURE UNDER ALL CONDITIONS OF SERVICE.

* USE 12" OR L/2, WHICHEVER IS GREATER.

9

**WOODINVILLE WATER DISTRICT STANDARD PLAN
THRUST BLOCK DETAILS**



BEND SIZE	MINIMUM CONCRETE VOLUME, CY GRAVITY THRUST BLOCK	
	8"	12"
11 1/4°	0.7	1.3
22 1/2°	1.5	2.7
45°	3.0	5.2

BASED ON 100 PSI

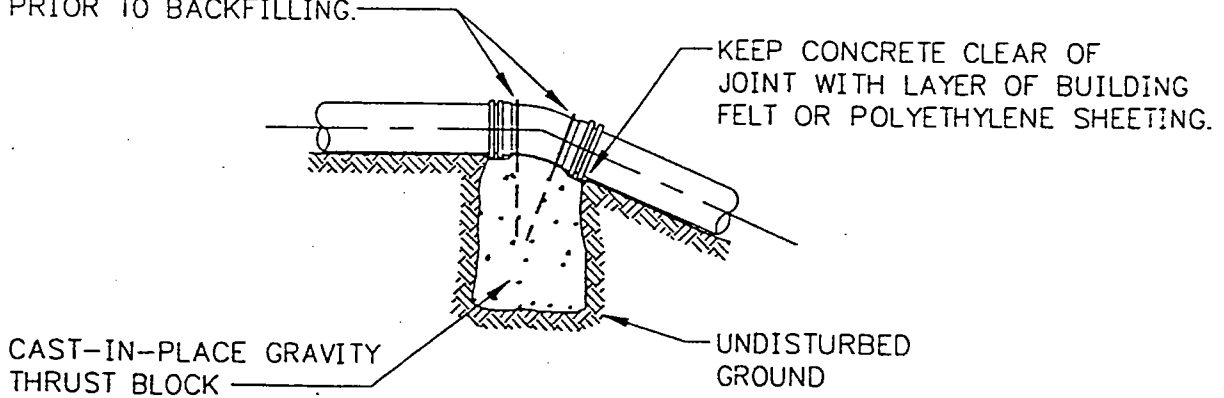
HOLD-DOWN BAR

NOTE:

FOR 8" PIPE, L = 2'-0"

FOR 12" PIPE, L = 3'-0"

HOLD-DOWN BAR
PLACE 2 LAYER OF 15 LB.
BUILDING FELT UNDER BAR
PRIOR TO BACKFILLING.

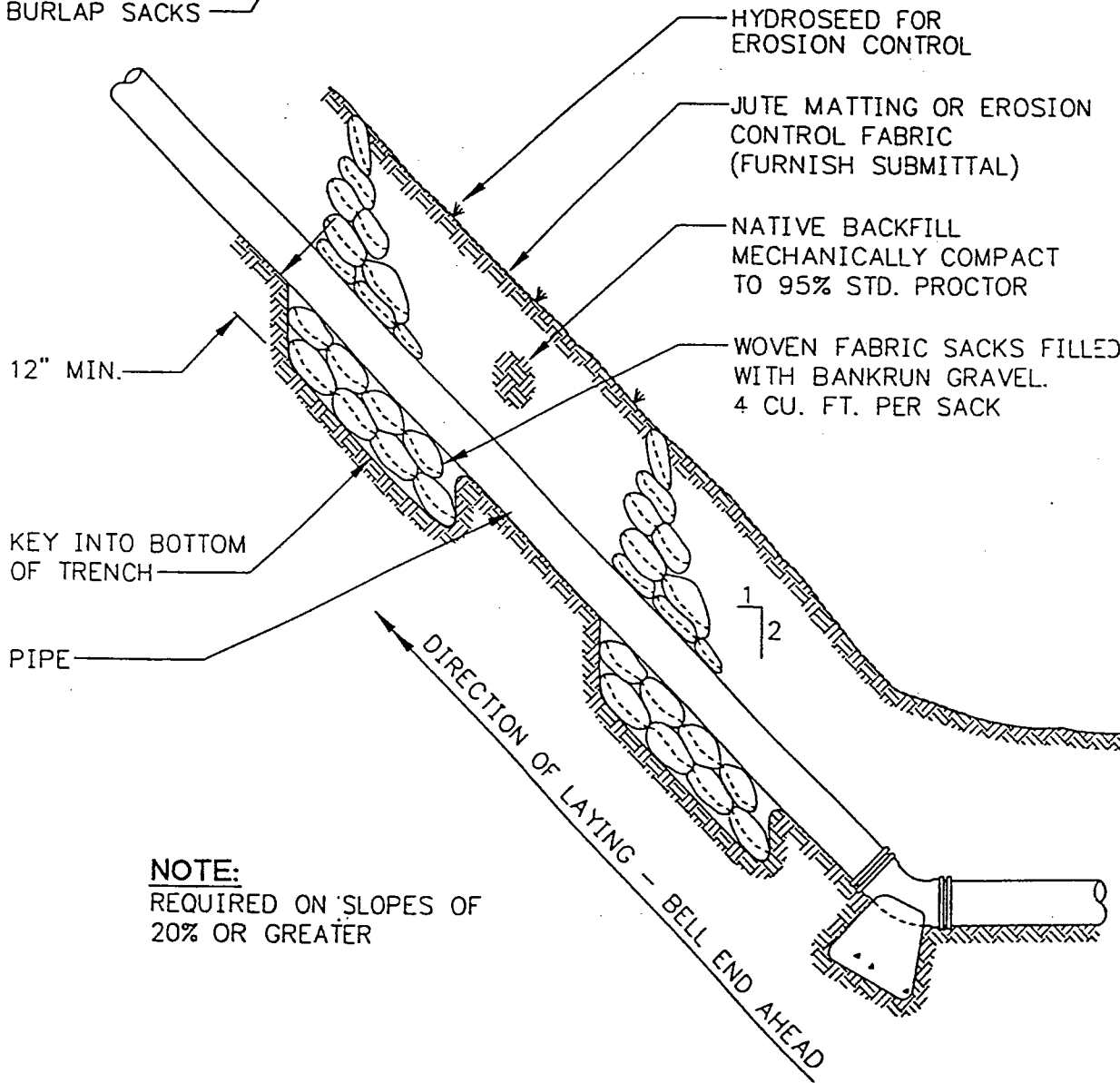
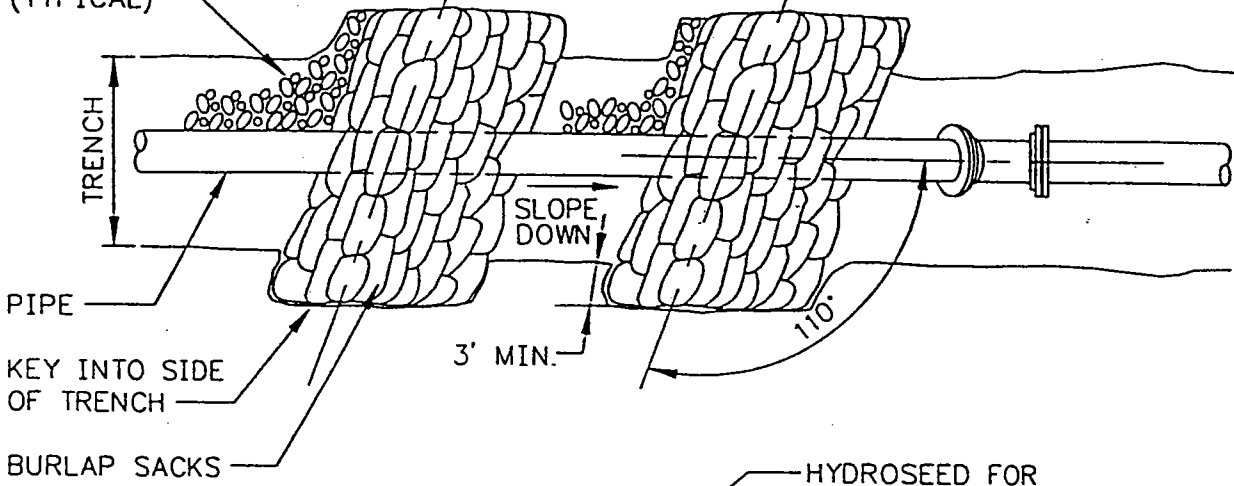


10

**WOODINVILLE WATER DISTRICT STANDARD PLAN
GRAVITY THRUST BLOCK**

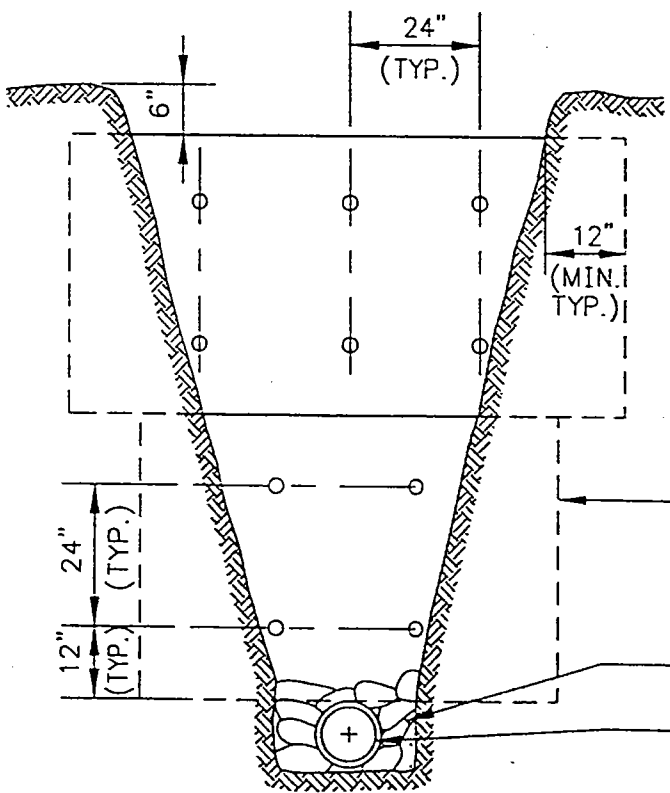
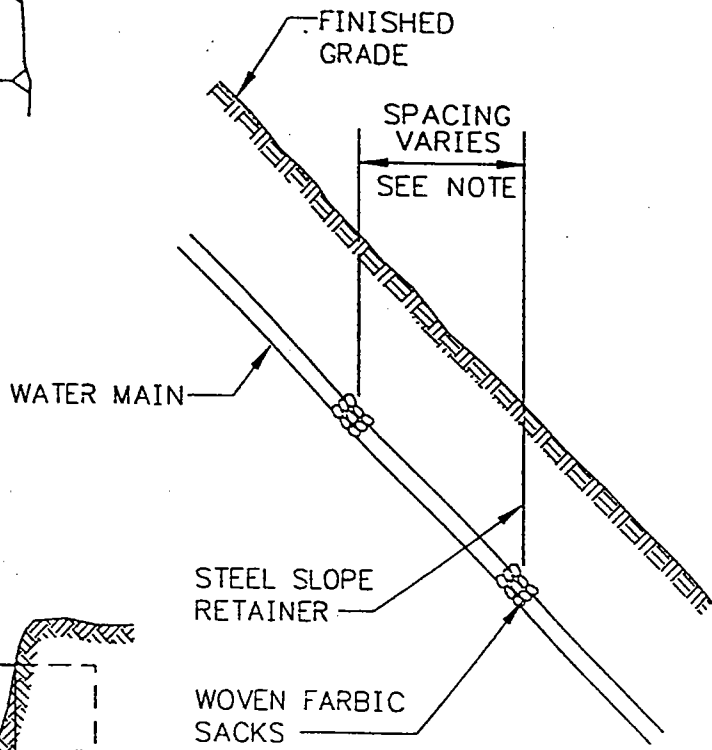
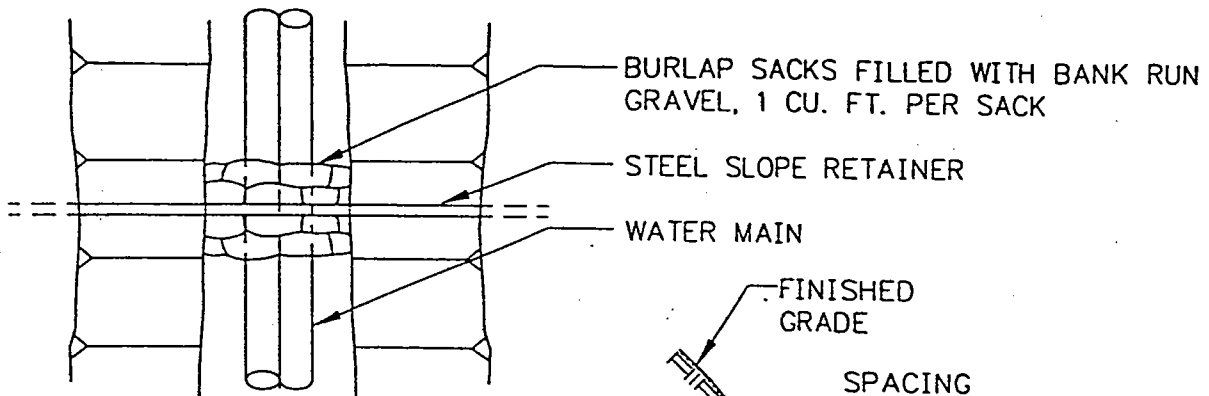
FRENCH DRAIN FROM PIPE
BEDDING TO SURFACE
(TYPICAL)

SPACING AS REQ'D.
BY DISTRICT



NOTE:
REQUIRED ON SLOPES OF
20% OR GREATER

**11 WOODINVILLE WATER DISTRICT STANDARD PLAN
SACKED SLOPE RETAINER**

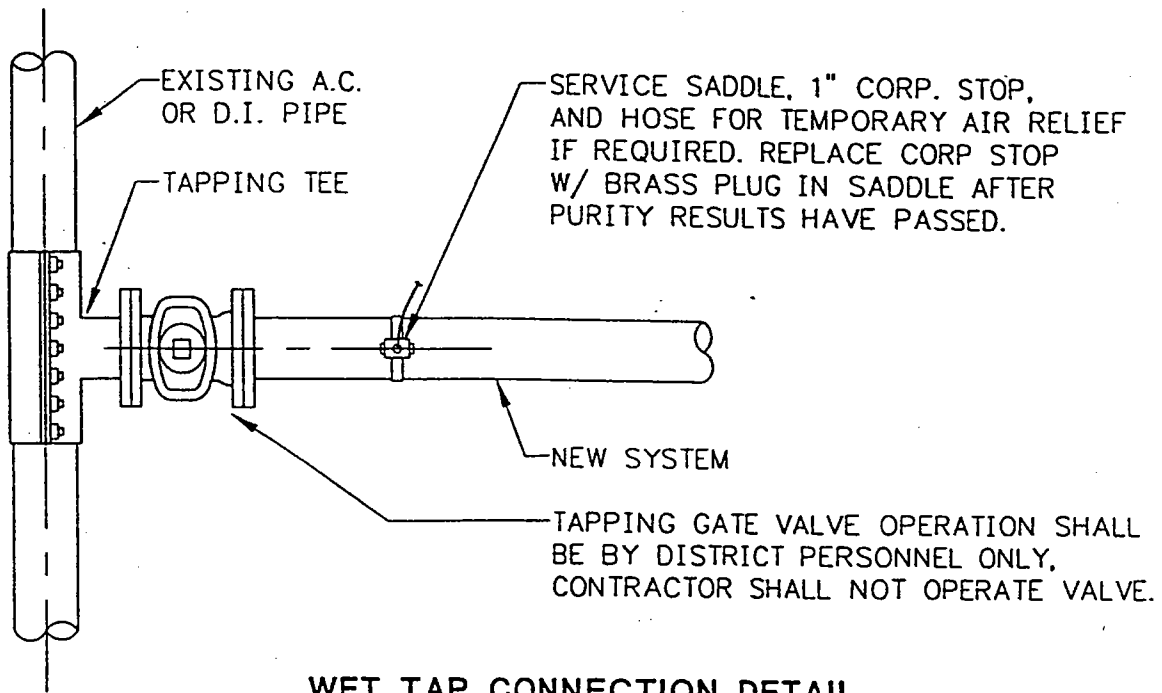


3/8" MIN. STEEL THICKNESS
SLOPE RETAINER W/ 1"Ø HOLES
(SPACING AS SHOWN) BURY 12"
MIN. IN UNDISTURBED EARTH

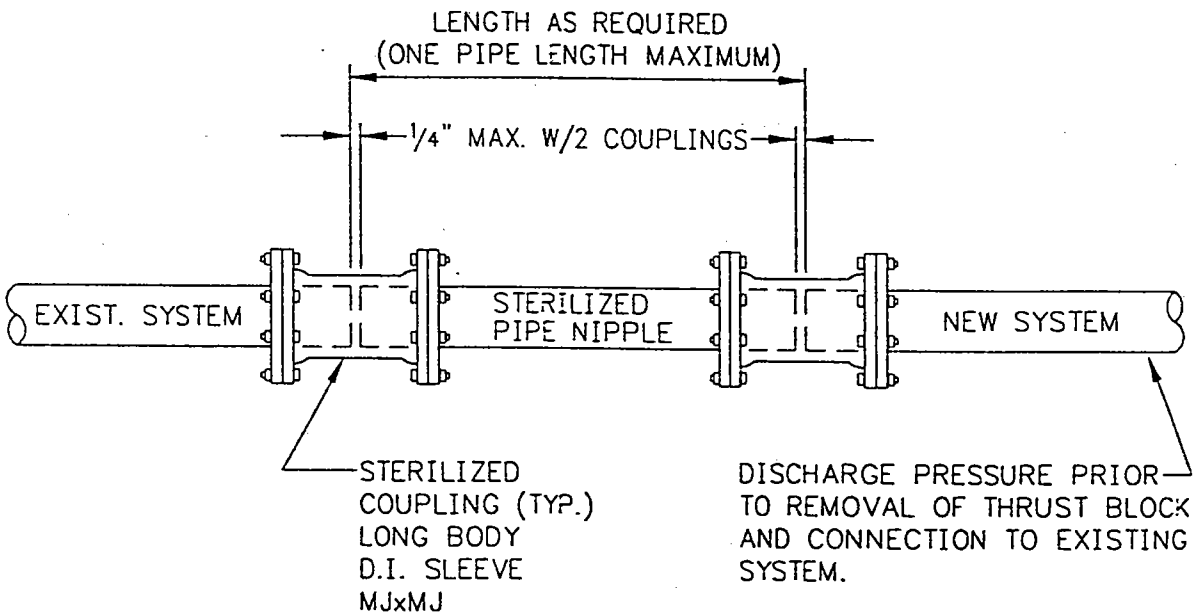
WOVEN FABRIC SACKS
WATER MAIN

NOTE:
SPACE AS REQUIRED IN THE
FIELD BY THE DISTRICT.

12 WOODINVILLE WATER DISTRICT STANDARD PLAN
SLOPE RETAINER ALTERNATIVE



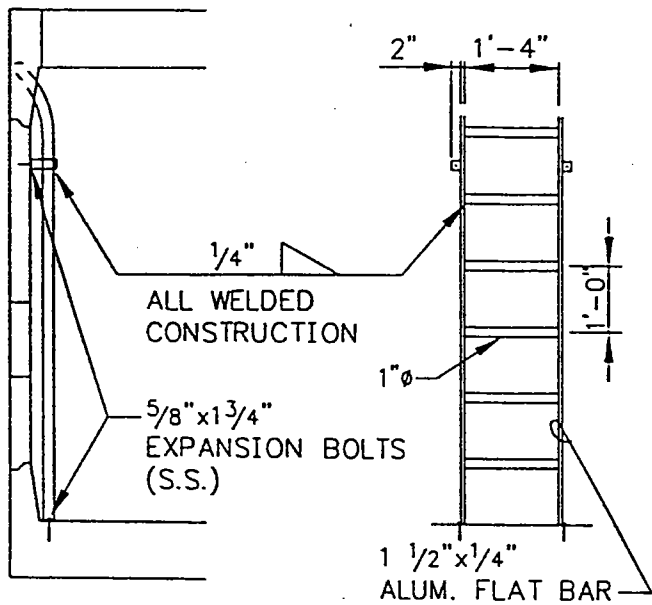
WET TAP CONNECTION DETAIL



NOTE:

NO DEFLECTION SHALL BE ALLOWED AT EITHER COUPLING.

CUT IN CONNECTION DETAIL



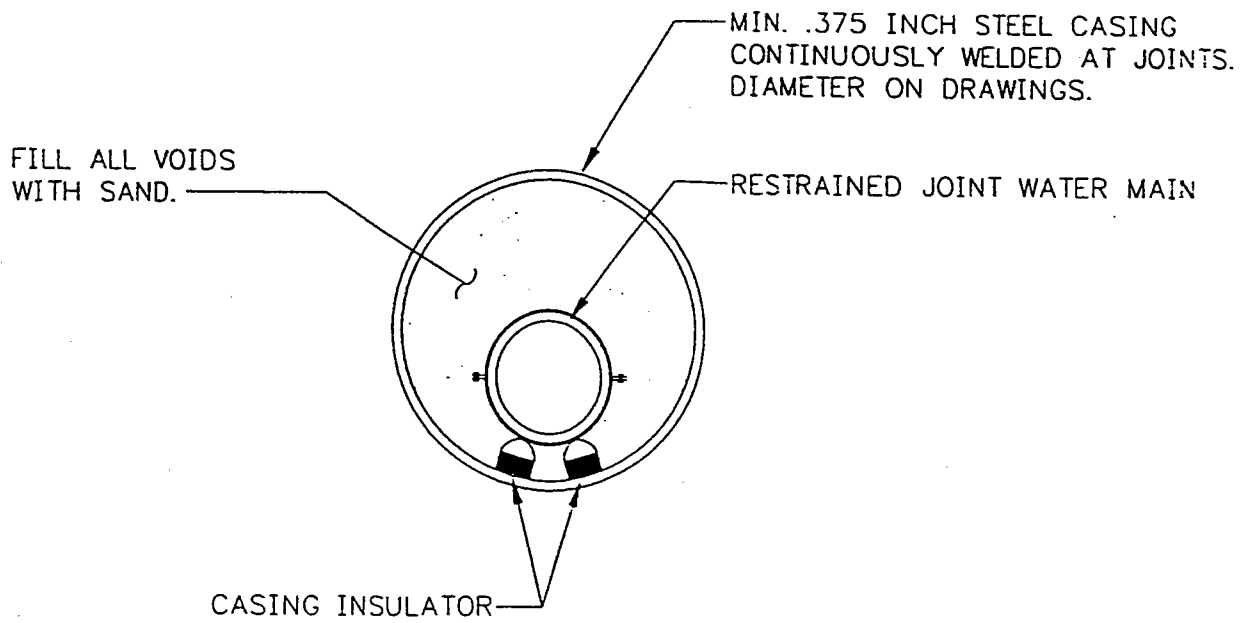
LADDER DETAIL

MATERIAL LIST

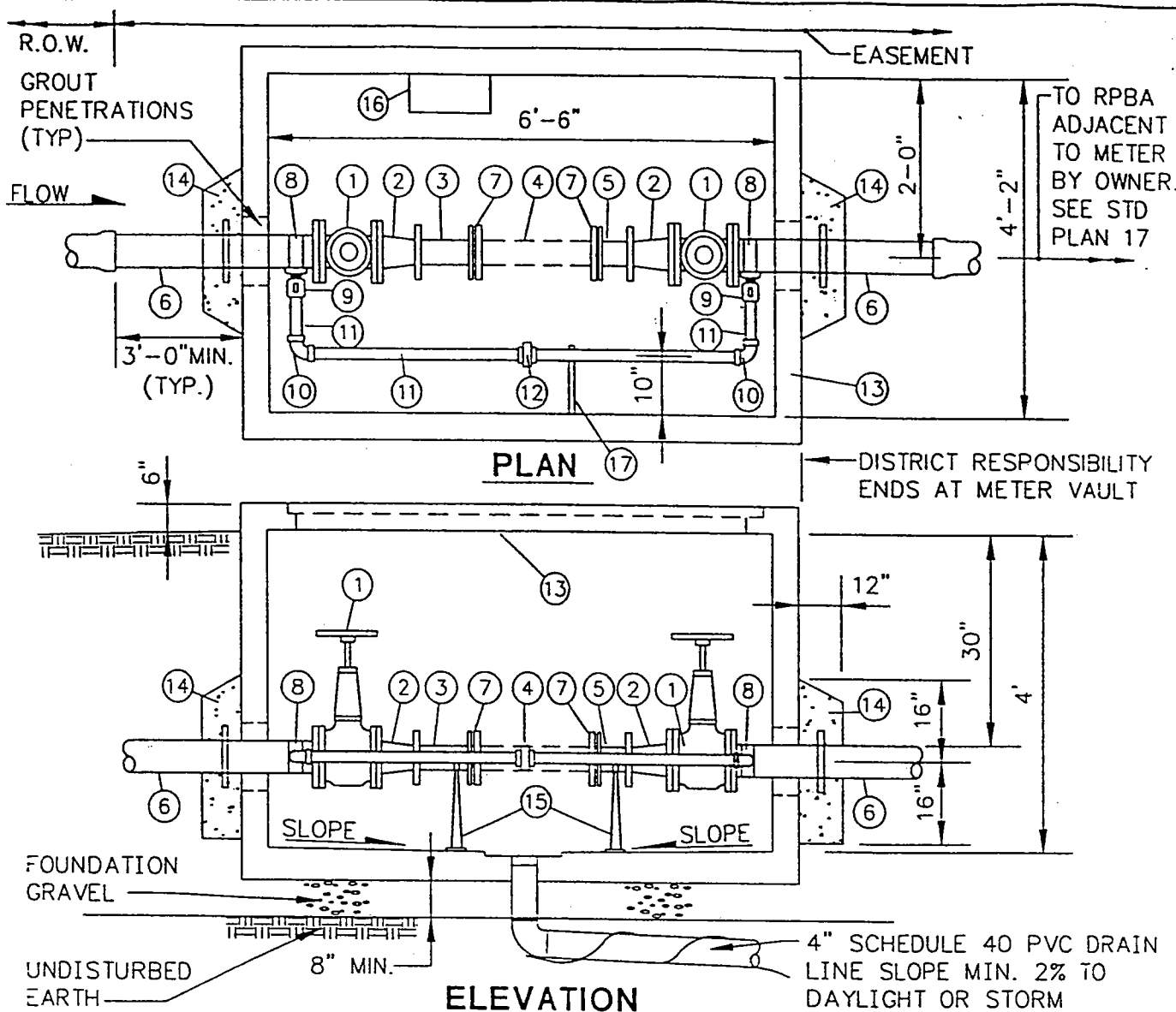
1. UTILITY VAULT
2. BILCO COVER, 30" SQUARE MIN. OR AS SHOWN ON DWG. (DWG. GOVERNS)
3. ALUMINUM LADDER (SEE DETAIL)
4. 8" x 6" REDUCER (MJxMJ)
5. 6" WALL FLANGE SPOOL (FLxPE)
6. 6" WYE STRAINER (FLxFL)
7. 6" SPOOL (FLxFL) LENGTH AS REQUIRED
8. 6" GATE VALVE W/ WHEEL (FLxFL)
9. 6" PRESSURE REDUCING VALVE (FLxFL)
10. 6" FLANGE COUPLING ADAPTER
11. ADJUSTABLE PIPE SUPPORT AS REQUIRED
12. 6" SPOOL (PExFL) LENGTH AS REQUIRED
13. 3" ROLL SEAL PRESSURE RELIEF VALVE
14. 4" GATE VALVE W/ WHEEL (FLxFL)
15. PRESSURE GAUGE
16. 6" x 4" TEE (FLxFL)
17. 6" x 4" TEE (MJxMJ)
18. 6" x 18" D.I. NIPPLE
19. 3" SCH. 40 GALV. SPOOL W/ 3" COMPANION FLANGE x 3" I.P. THREAD
20. 4" x 3" REDUCER (FLxFL). INSTALL BASKET STRAINER FOR 3" ROLL SEAL VALVE ON 4" SIDE OF REDUCER.
21. 4" SPOOL (PExPE) LENGTH AS REQUIRED
22. 4" 90° BEND (MJxMJ)
23. 4" FLANGED COUPLING ADAPTER (FCA)
24. 4" x 3" REDUCER (FLxFL)
25. 3" PRESSURE REDUCING VALVE (FLxFL)
26. PIPE HANGER AS REQUIRED
27. 4" WALL FLANGE SPOOL (FLxPE) LENGTH AS REQUIRED
28. REMOVABLE SUMP DRAIN (W/ 1" LIP)
29. 3/4" CORP STOP W/ HOSE BIB
30. 2" WHEEL VALVE
31. 4" SPOOL (FLxPE) LENGTH AS REQUIRED
32. GALVANIZED GRATING (2 PIECES)
33. 4" WYE STRAINER (FLxFL)

NOTE:

1. THIS IS A GENERIC MATERIAL LIST. FITTINGS AND VALVE SIZES MAY DIFFER, AND ARE SHOWN ON PROJECT DETAILS.



15 WOODINVILLE WATER DISTRICT STANDARD PLAN
CASING DETAIL



MATERIAL LIST FOR 3" AND 4" METER

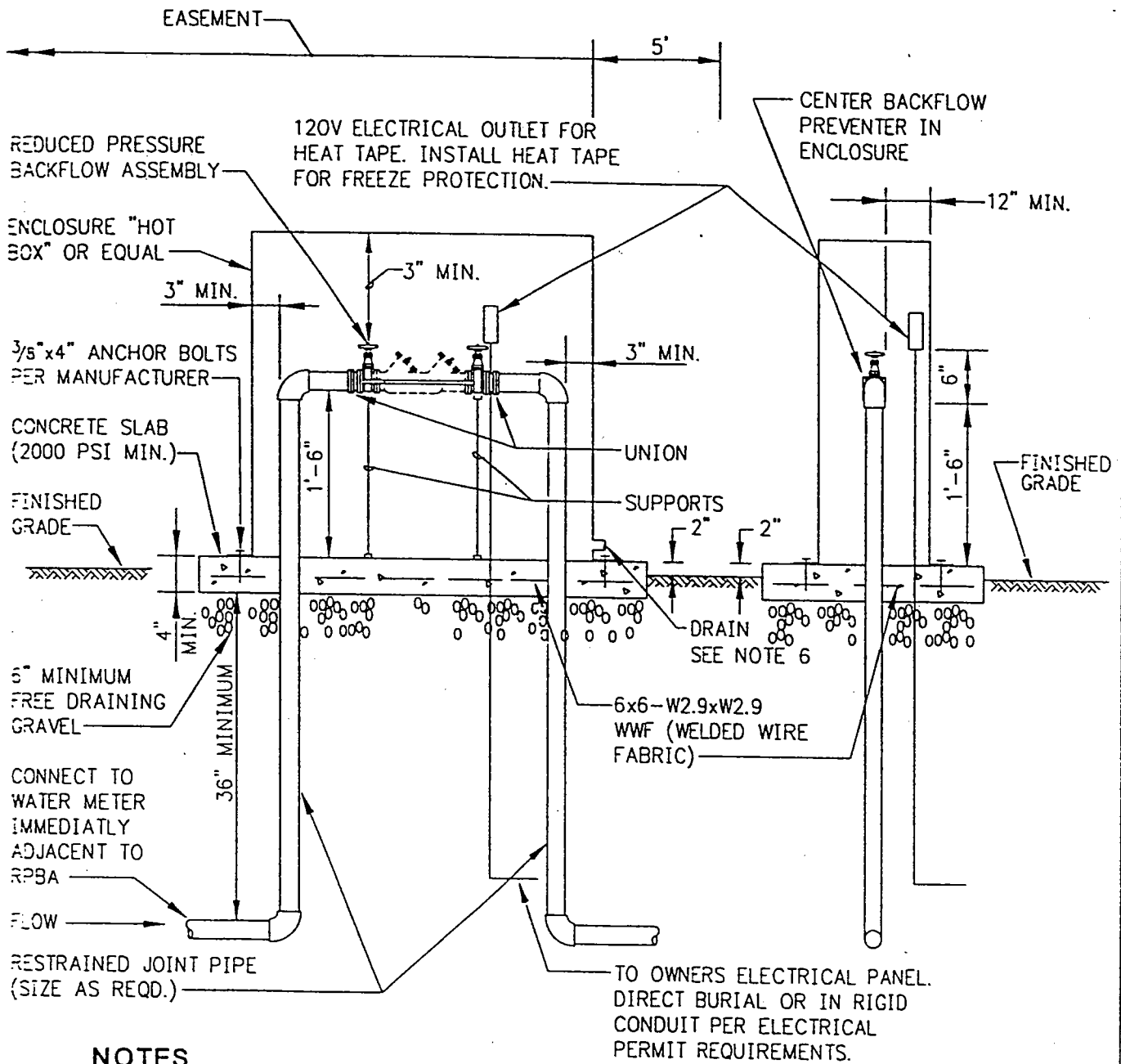
- | | |
|---|---|
| <ol style="list-style-type: none"> 1. 4" G.V., FLxFL 2. 4"x3" REDUCER, FLxFL
(NOT REQUIRED FOR 4" METER) 3. FLxPE SPOOL (LENGTH TO FIT) 4. METER IDLER—PROVIDED BY DISTRICT
(METER AND BASKET STRAINER
SUPPLIED BY THE DISTRICT) 5. FLxPE SPOOL (LENGTH TO FIT) 6. FLxPE SPOOL WITH WALL FLANGE 7. FLANGED COUPLING ADAPTER 8. FORD 202BS OR APPROVED EQUAL
1 1/2" SADDLE | <ol style="list-style-type: none"> 9. 1 1/2" BALL VALVE WITH LOCK CAP
MIPxFIP FORD B81-666-W
OR APPROVED EQUAL 10. 1 1/2"x90° BEND W/ I.P. THREADS 11. 1 1/2" BRASS PIPING 12. 1 1/2" BRASS UNION 13. UTILITY VAULT 575-LA W/ DUAL LOCKING
STEEL COVERS NO. 57TL-2-332P
OR APPROVED EQUAL 14. CONCRETE BLOCKING (CAST IN PLACE) 15. ADJUSTABLE PIPE SUPPORT 16. ACCESS LADDER 17. PIPE BRACKET |
|---|---|

NOTES:

1. VAULT LOCATION SHOWN IS IN A LANDSCAPED OR UNIMPROVED AREA. INSTALLATIONS IN ASPHALT AREAS WILL NOT BE ALLOWED WITHOUT PRIOR APPROVAL.
2. VAULT SHALL BE WATERTIGHT.

16

**WOODINVILLE WATER DISTRICT STANDARD PLAN
3" AND 4" METER INSTALLATIONS**

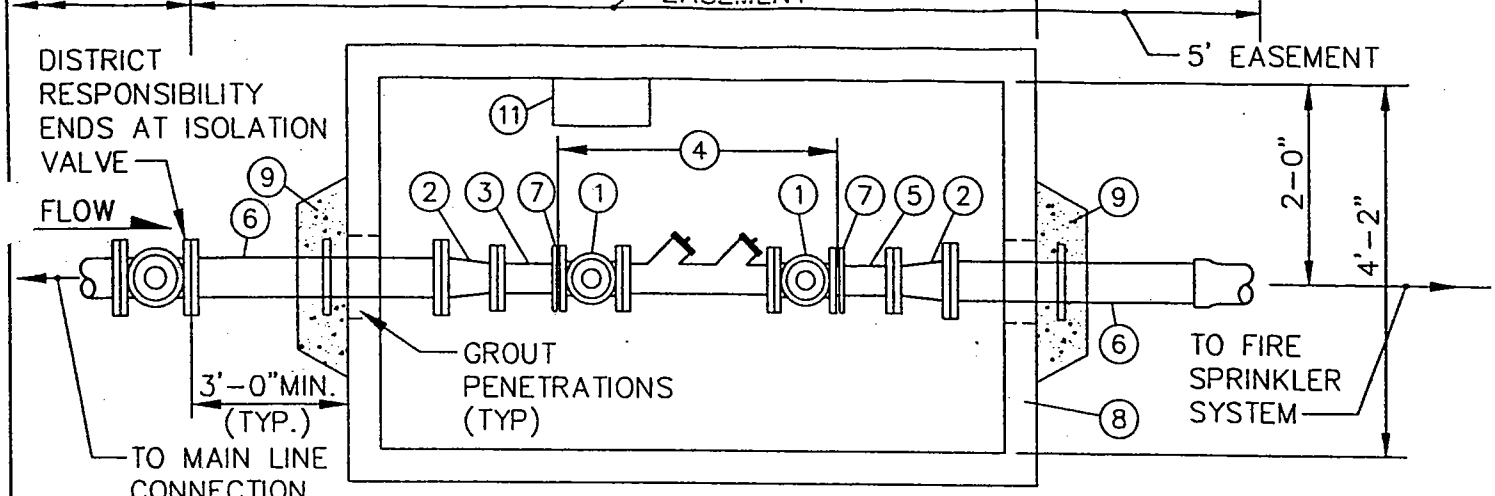


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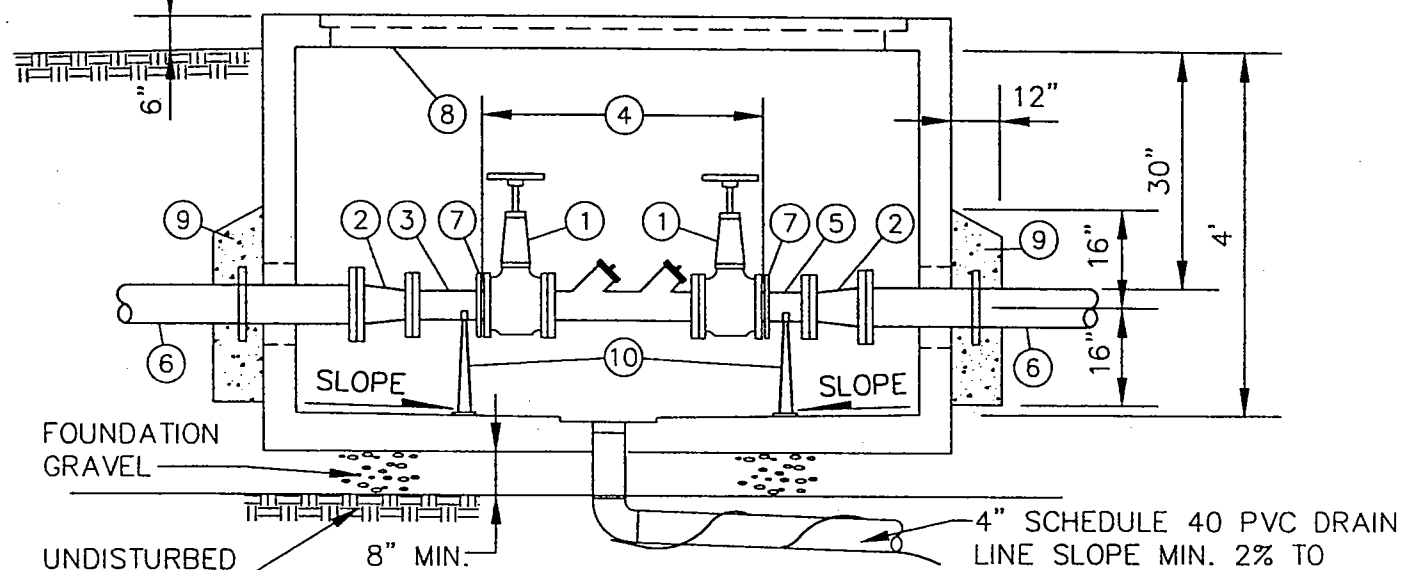
1. PROVIDE DISTRICT APPROVED SUPPORT FOR DEVICES LARGER THAN 1" DIAMETER.
2. OWNER SHALL FURNISH, INSTALL AND MAINTAIN THE RPBA AND ALL PIPING AND APPURTENANCES SHOWN ON THIS PLAN.
3. DISTRICT WILL PROVIDE INSPECTION AND INITIAL TEST OF THE RPBA PRIOR TO ESTABLISHMENT OF WATER SERVICE.
4. REDUCED PRESSURE BACKFLOW ASSEMBLIES SHALL BE STATE APPROVED DEVICES.
5. SUBSEQUENT ANNUAL TESTING OF RPBA REQUIRED BY OWNER.
6. DRAIN SHALL BE SIZED IN ACCORDANCE WITH AWWA CROSS CONNECTION CONTROL MANUAL FIGURE 6-8.

17

WOODINVILLE WATER DISTRICT STANDARD PLAN
REDUCED PRESSURE BACKFLOW ASSEMBLY



PLAN



ELEVATION

MATERIAL LIST

- | | |
|---------------------------------|--|
| 1. G.V., FLxFL (SIZE AS REQ'D) | 7. FLANGED COUPLING ADAPTER |
| 2. REDUCER, FLxFL (IF REQ'D) | 8. PRE CAST VAULT WITH DUAL LOCKING STEEL COVERS |
| 3. FLxPE SPOOL (LENGTH TO FIT) | 9. CONCRETE BLOCKING (CAST IN PLACE) |
| 4. DOUBLE CHECK VALVE ASSEMBLY | 10. ADJUSTABLE PIPE SUPPORT |
| 5. FLxPE SPOOL (LENGTH TO FIT) | 11. ACCESS LADDER |
| 6. FLxPE SPOOL WITH WALL FLANGE | |

NOTES:

1. OWNER SHALL FURNISH, AND INSTALL THE DCVA AND ALL PIPING AND APPURTENANCES SHOWN ON THIS PLAN.
2. DISTRICT WILL PROVIDE INSPECTION AND INITIAL TEST OF THE DCVA PRIOR TO ESTABLISHMENT OF WATER SERVICE.
3. VAULT LOCATION SHOWN IS IN A LANDSCAPED OR UNIMPROVED EASEMENT AREA. INSTALLATIONS IN ASPHALT AREAS WILL NOT BE ALLOWED WITHOUT PRIOR APPROVAL.
4. VAULT SHALL BE WATERTIGHT.
5. NO CHEMICALS ARE ALLOWED IN THE FIRE SPRINKLER PIPING SYSTEM.
6. IT SHALL BE THE OWNERS RESPONSIBILITY TO SIZE THE FIRE SPRINKLER SERVICE LINE.
7. SUBSEQUENT ANNUAL TESTING OF DCVA REQUIRED BY OWNER.

**18 WOODINVILLE WATER DISTRICT STANDARD PLAN
FIRE SPRINKLER SERVICE CONNECTION**

Appendix E
DOH WSP Checklist

Water System Plan Submittal Form

This form is required to be submitted along with the Water System Plan (WSP). It will serve to expedite review and approval of your WSP. WSPs will not be reviewed until the submittal form and checklist are completed.

1) SYSTEM NAME Woodinville Water District	2) SYSTEM ID # 41600Y	3) SYSTEM OWNER Municipal
4) CONTACT NAME FOR UTILITY Bob Bandarra	PHONE NUMBER (425) 483-9104 ext. 303	TITLE General Manager
ADDRESS 17238 Woodinville-Duvall Rd. PO Box 1390	CITY Woodinville	STATE Washington
		ZIP 98072-1390
5) PROJECT ENGINEER Jim Peterson	PHONE NUMBER (425) 453-1523	TITLE Project Manager
ADDRESS 500 - 108 th Ave. NE, Suite 1200	CITY Bellevue	STATE Washington
		ZIP 98004-5538

6. How many services are presently connected to the system? approximately 12, 400
7. Is the system expanding? (seeking to extend service area or increase number of approved connections) Yes No
8. If number of services is expected to increase, how many new connections are proposed in the next six years? ~50
9. If the system is private-for-profit, is it regulated by the State Utilities and Transportation Commission? Yes No
10. Is the system located in a Critical Water Supply Service Area? Yes No
11. Is the system a customer of a wholesale water purveyor? Yes No
12. Will the system be pursuing additional water rights from the Sate Department of Ecology in the next 10 years? Yes No
13. Is the system proposing a new intertie? Yes No
14. Do you have projects(s) currently under review by Department of Health? Yes No
15. Are you requesting distribution main project report and construction document submittal exception, and if so, does the WSP contain standard construction specifications for distribution mains? Yes No
16. Are you requesting distribution related project report and construction document submittal exception, and if so, does the WSP contain distribution facilities design and construction standards, including internal engineering review procedures? Yes No
17. Have you sent copies of the draft WSP to adjacent purveyors and the County for their review and comment? Yes No

If yes, list adjacent utilities/entities that have received a copy of the draft WSP King County, Seattle Public Utilities, City of Woodinville

18. Is this plan an: Initial Submittal Revised Submittal

Please enclose the following number of copies of the WSP:

- 2 copies for Department of Health Review
- 1 additional copy if you answered "YES" to question 9
- 1 additional copy if you answered "YES" to question 12 and/or 13

3 Total Copies Attached

WSP Checklist

	Content Description	*Must Be Submitted (√)	(Page #) in WSP
Chapter 1	Description of Water System		
	• Ownership and Management	(√)	1-1; 1-3
	• System History and Background	(√)	1-1
	• Inventory of Existing Facilities	(√)	1-3 to 1-23
	• Related Plans (e.g., CWSP, local land use plans)	(√)	1-29 to 1-30
	• Service Area and Characteristics	(√)	1-5
	• Agreement (signed in accordance with CWSP)	()	1-24 to 1-25
Chapter 2	Basic Planning Data		
	• Map	(√)	1-3
	• Service Area Policies (Including SMA policy and conditions of service)	(√)	1-25 to 1-29
	• Current Population, Number of Service Connections, and ERUs	(√)	2-1; 2-7
	• Current Water Use and Data Reporting	(√)	2-2 to 2-6
	• Current and Future Land Use	(√)	1-5 to 1-6
	• Future Population and Number of Service Connections and ERUs (6 and 20 years)	(√)	2-7 to 2-11
Chapter 3	System Analysis		
	• Future Water Use (Demand forecast for 6 and 20 years)	(√)	2-11
	• System Design Standards	(√)	7-1 to 7-2
	• Water Quality Analysis	(√)	3-1 to 3-4
	• System Inventory, Description and Analysis	(√)	Ch. 1 and Ch. 3
	• Source	(√)	1-7; 1-8; 3-1
	• Treatment	()	3-2 to 3-4
	• Storage	(√)	3-6 to 3-10
	• Distribution System/Hydraulics	(√)	3-4 to 3-10
	• Summary of System Deficiencies	(√)	3-10
	• Analysis of Possible Improvement Projects	(√)	3-6; 3-9; 8-1 to 8-2
Chapter 4	Conservation Program and Source of Supply Analysis		
	• Conservation Program	(√)	Ch. 4.2
	• Water Right Assessment	(√)	4.1-2
	• Source of Supply Analysis and evaluation of supply alternatives	()	Ch. 4.1
	• Water Supply Reliability Analysis With Water Shortage Response Plan	(√)	1-29
Chapter 5	Interties	()	1-9
	Source Water Protection (Check One or Both)		
Chapter 6	• Wellhead Protection Program	()	=
	• Watershed Control Program	()	=
Chapter 7	Operation and Maintenance Program		
	• Water System Management and Personnel	(√)	6-1 to 6-7
	• Operator Certification	(√)	6-1
	• Routine Operating Procedures, Preventive Maintenance and Record Keeping	(√)	6-8 to 6-11
	• Water Quality Sampling Procedures (Comprehensive Monitoring Plan)	(√)	6-12 to 6-15
	• Coliform Monitoring Plan	(√)	Appendix G
	• Emergency Response Program	(√)	6-15
	• Safety Procedures	(√)	6-16
	• Cross-Connection Control Program	(√)	6-15 to 6-16
	• Service Reliability in accordance with WAC 246-290-420	()	=
Chapter 8	Distribution Facilities Design and Construction Standards		
	• Standard Construction Specification for Distribution Mains	()	Appendix D
Chapter 9	• Design and Construction Standards for distribution Related Projects	()	Appendix D
	Improvement Program		
Chapter 10	• Capital Improvement Schedule (6 and 20 years)	(√)	8-4 to 8-12
	Financial Program		
	• Summary of past income and expenses	(√)	9-4 to 9-6
	• Balanced Operating Budget (1 year if >1,000 connections / 6 year if < 1,000 connections)	(√)	9-7
	• Demonstration of revenue and cash flow stability to fund CIP and emergency improvements	(√)	9-7 to 9-8
Chapter 11	• Rate Structure that considers affordability of rates and water conservation	(√)	9-11
	• Systems < 1,000 connections may do DOH Financial Viability Test to complete above reqs.	()	=
	• UTC Financial Viability and Feasibility Test (for UTC regulated systems)	()	=
	Miscellaneous Documents		
	• For Community Systems, Meeting of the Consumers (date and description)	()	=
Chapter 12	• County/Adjacent Utility Correspondence	(√)	Inc. with final
	• Documentation of State Environmental Policy Act (SEPA) Compliance	()	Appendix L
	• Agreements	()	Appendices A-C
	• Satellite Management Program	()	1-28 to 1-29

* Requirement will be determined at the pre-plan conference.

Appendix F
Projected Connections

Projected Connections for Woodinville Water District							
	1997	2000	2002	2004	2006	2010	2020
Service Zone	Single Family						
1	2,168	2,333	2,442	2,552	2,662	2,881	3,429
2	179	215	239	263	287	335	455
3	368	474	545	616	687	829	1,184
4	143	168	185	201	217	250	333
5	385	403	415	428	440	465	526
6	257	257	257	258	258	258	259
7	404	407	409	411	413	416	426
8	314	373	413	452	492	571	768
9	2,571	2,644	2,693	2,742	2,791	2,888	3,132
10	1,688	1,704	1,714	1,725	1,735	1,757	1,810
11	685	686	686	686	687	687	689
12	12	16	18	21	24	29	42
13	167	168	170	171	172	174	179
14	545	546	546	547	548	549	552
15	461	474	482	491	500	517	560
16	206	222	231	242	252	273	324
17	241	242	243	243	244	245	248
18	164	166	167	169	170	173	180
19	60	66	71	75	79	88	109
20	16	16	16	17	17	17	18
21	14	23	28	34	40	51	80
22	24	25	25	26	26	27	30
23	100	100	100	100	100	100	100
Blakely Ridge	-	-	-	400	800	1,083	1,083
Future	-	35	59	83	106	153	271
Sum	11,172	11,763	12,154	12,953	13,747	14,816	16,787
	Multi-family						
1	1,419	1,419	1,419	1,419	1,419	1,419	1,419
2	-	-	-	-	-	-	-
3	1,289	1,463	1,578	1,694	1,810	2,041	2,620
4	-	-	-	-	-	-	-
5	148	196	228	260	292	356	515
7	1	1	1	1	1	1	1
9	1	3	4	5	6	8	14
10	1	10	16	22	28	41	71
21	119	119	119	119	119	119	119
Sum	2,978	3,211	3,365	3,520	3,675	3,985	4,759

Projected Connections for Woodinville Water District							
	1997	2000	2002	2004	2006	2010	2020
Commercial							
1	32	33	34	34	34	35	36
3	283	301	308	316	323	338	350
5	123	124	124	124	124	125	125
7	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1
9	13	14	14	14	15	15	16
10	18	19	20	20	21	22	23
15	1	1	1	1	1	1	1
17	2	2	2	2	2	2	2
Sum	474	496	505	513	522	540	555
Industrial							
3	6	7	7	8	8	9	11
5	1	1	1	1	2	2	3
Sum	7	8	8	9	10	11	14
Municipal							
1	6	6	6	6	6	6	6
2	1	1	1	1	1	1	1
3	8	8	9	9	9	9	10
4	2	3	3	3	4	4	5
5	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1
9	6	7	7	7	7	8	8
10	11	11	11	11	11	11	11
14	1	1	1	1	1	1	1
15	1	1	1	1	1	1	1
18	1	1	1	1	1	1	1
Sum	39	41	42	42	43	44	46
Irrigation							
1	17	17	18	18	18	18	18
2	2	2	2	2	2	2	2
3	56	64	64	67	69	75	79
5	25	25	25	25	25	26	26
6	1	1	1	1	1	1	1
7	2	2	2	2	2	2	2
8	5	5	5	5	5	5	5
9	15	15	15	15	16	16	16
10	15	15	16	16	16	16	17
11	1	1	1	1	1	1	1

Projected Connections for Woodinville Water District							
	1997	2000	2002	2004	2006	2010	2020
14	10	10	10	10	10	10	10
15	3	3	3	3	3	3	3
16	2	2	2	2	2	2	2
17	3	3	3	3	3	3	3
18	2	2	2	2	2	2	2
19	1	1	1	1	1	1	1
21	1	1	1	1	1	1	1
22	2	2	2	2	2	2	2
Sum	163	171	173	176	179	186	191
P:\WATER\09031.001\Demand Projections\[Projected Connections.xls]Sheet1							
03/14/00							

Appendix G
Woodinville Water District Coliform Monitoring Plan



STATE OF WASHINGTON

DEPARTMENT OF HEALTH SEATTLE WATER DEPARTMENT

1511 Third Ave., Suite 719 • Seattle, Washington 98101-1632

RECEIVED
BY QUALITY CONTROL

JUN 22 1997

June 20, 1997

MR ROBERT BANDARRA
WOODINVILLE WATER DISTRICT
PO BOX 1390
WOODINVILLE WA 98072-1390

Subject: Woodinville Water District - ID# 41600Y
King County
Coliform Monitoring Requirements

Dear Mr. Bandarra:

This department has reviewed the Coliform Monitoring Plan for the Woodinville Water District which was received on June 19, 1997. The Coliform Monitoring Plan includes all of the essential elements identified in WAC 246-290-300(2)(b) and is found to be satisfactory.

Also enclosed is a signed copy of your 1997 request for reduced coliform monitoring. We are modifying our records to reflect a reduced coliform monitoring frequency of 28 routine samples per month for the remainder of 1997.

Thank you for all your efforts regarding this matter. If you should have any questions please contact this office in Seattle at 464-7671.

Sincerely,

Robert E. James, P.E.
Regional Engineer
N.W. Drinking Water Operations

enclosure

cc: Seattle-King County Department of Public Health
Jennifer Prodzinski, DOH
Seattle Public Utilities - Water Quality Division w/enclosure

Regional Reduced monitoring Continuation Request for 1997

Water District Name: Woodinville Water Dist Contact Name: Ken Kunk
 Current Population (consistent w/ WFN) 40,000 Contact Phone #: 425 91004 x 35

COLIFORM AND CHLORINE RESIDUAL MONITORING

Samples req'd. per WAC Table 2: _____

Samples collected under the existing Regional Plan: _____

40 /month

28 /month

Coliform MCL Compliance

Have you violated the TCR in the past 18 months?(nonacute or acute)

Yes

No

Coliform Monitoring Plans

Do you have a coliform monitoring plan on file with WDOH?

Yes

No

Date Submitted: _____

Does Seattle Water have a copy?

Yes

No

Date forwarded: _____

Flushing Program

What events trigger flushing in your system? _____

What coordination work do you do prior to a flush? _____

What resources do you have budgeted in support of your flushing program? (# staff hours/year or # FTEs or \$/year) _____

Cross Connection Control Program (CCCP)

Does your utility have enforcement authority for the CCCP? (via an ordinance or other similar document)

Yes

No

Do you have a process for notifying customers and tracking the status of annual backflow assembly testing?

Yes

No

Do you have a surveillance mechanism for identifying and tracking new backflow assemblies?

Yes

No

Construction Practices

Do you have WRITTEN procedures that include proper disinfection practices for repairs and new construction?

Yes

No

Do you take bacteriological samples, beyond the "routine" TCR compliance samples at sample stands, to ensure microbiological quality of new and repaired mains?

Yes

No

Satisfactory completion of the questions above will be the basis for granting concurrence for continued reduced coliform and chlorine residual monitoring under a regional coliform monitoring plan for the next year.

Utility Manager/Requester

Name Bob Bandarra

Signature [Signature]

Date 12-11-96

Seattle Water Concurrence?

Yes No

Name _____

Signature _____

Date _____

WDOH Concurrence?

Yes No

Name Robert James

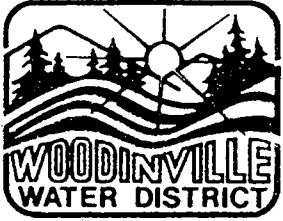
Signature [Signature]

Date 6-20-97

This document is intended to constitute the written agreement required IAW WAC 248-290-300(1)(g)(iv).

Reason(s) for Non-Concurrence _____

This document must be fully completed with signatures before December 1, 1996



WOODINVILLE WATER DISTRICT

17238 N.E. Woodinville-Duvall Road
P.O. Box 1390
Woodinville, Washington 98072-1390
(206) 483-9104
FAX (206) 486-9244

COMMISSIONERS

Walter Backstrom
Kenneth Goodwin
Gail C. Harrell
Maureen Jewitt
Gwenn Maxfield

GENERAL MANAGER

Bob Bandarra

May 19, 1997

Mr. Robert E. James, P.E.
State of Washington Department of Health
1511 Third Ave., Suite 719
Seattle WA 98101-1632

Subject: Woodinville Water District - ID # 41600Y
King County
Coliform Monitoring Requirements

Dear Bob,

First let me thank you for the extended time on this project. As you know, your request for the update did not reach my desk until the day before the due date through no fault of DOH. I believe the plan addresses all your questions, if it does not, please contact me at 425/483-9104 x303.

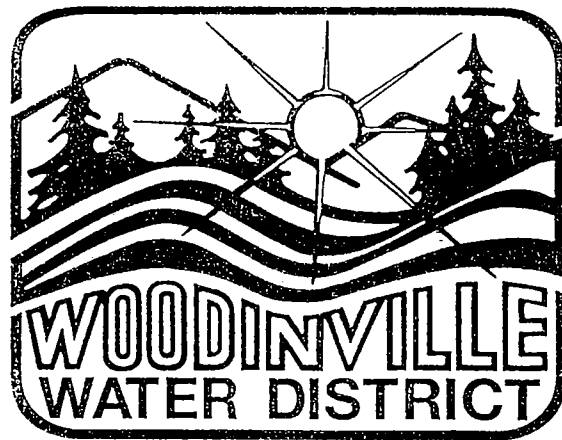
Sincerely,

WOODINVILLE WATER DISTRICT

Robert Bandarra
General Manager

cc: Betty Meyers, Seattle Public Utilities

WOODINVILLE WATER DISTRICT
WATER QUALITY REGULATORY COMPLIANCE
TOTAL COLIFORM PLAN



WOODINVILLE WATER DISTRICT
PO BOX 1390
WOODINVILLE WA 98072

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Background on the Rule

In June 1989, the Environmental Protection Agency (EPA) promulgated a revised regulation for total coliform.* Where the previous regulation was based on the density of coliform in a given volume of water, the revised rule is based on the presence/absence of coliforms. Under the TCR, (Total Coliform Rule) utilities must develop a monitoring plan to collect representative samples of water throughout the distribution system. Monitoring frequency is based on population served. For a Group A system, *compliance is based on no more than 5% of the samples collected for systems collecting greater than 40% samples. Additionally, coliform positive samples must be analyzed for fecal coliform and/or E.Coli.* Repeat samples collected for positive coliform, must also be analyzed for fecal coliform and/or E. Coli. The TCR was effective December 31, 1990. The TCR was implemented and enforced in Washington under the federal Rule on September 1, 1991. The TCR was adopted and effective in the Washington Drinking Water Regulations in February 1992.

The Maximum contaminant Level (MCL) for total coliforms is as follows:

1. For a system collecting more than 40 samples per month, a non-acute* violation occurs when more than five (5.0%) of the samples collected during the month are coliform-positive.
2. For systems collecting less than 40 samples per month, non-acute violations occur when there is more than one positive coliform sample in a given month.

*See Glossary, page 20

3. ACUTE MCL. An acute MCL for coliform bacteria occurs when there is:
 - a. Fecal coliform presence in a repeat sample
 - b. E. Coli presence in a repeat sample; or
 - c. Coliform presence in a set of repeat samples collected as a follow-up to a sample with fecal coliform or E. Coli presence.

Concerns were raised about the TCR because no variances or exemptions were allowed. The concern was that biofilm in the distribution system may lead to violations of the TCR even though there would not be a demonstrable risk to public health. In August 1989, the American Water Works Association (AWWA) filed a legal petition to review the rule in the U.S. Court of Appeals. As a result of those activities, EPA agreed to allow variances to systems not at risk for fecal or pathogenic contamination. EPA developed interim criteria as guidance to states seeking to identify systems that could operate under a variance without posing an unreasonable risk to health. In the future, EPA will establish variance criteria.

Public notification is required for a Group A system operating under a variance.

The state can invalidate a positive total coliform sample under three conditions: 1) the laboratory determines that improper sample analysis caused the total coliform-positive result, 2) the state determines that the positive total coliform sample resulted from a domestic or other non-distribution system plumbing problem (the state cannot invalidate a sample on the basis of repeat sample results unless all repeat samples collected at the same tap as the original total coliform-positive sample are also total

coliform-positive, and all repeat samples collected within five service connections of the original tap are total coliform-negative), or 3) the state has substantial grounds to believe that a total coliform positive result is due to a circumstance or condition which does not reflect water quality in the distribution system. A laboratory must invalidate a total coliform sample (unless total coliforms are detected) if the sample produces a turbid culture in the absence of gas production, using an analytical method where gas formation is examined.

Local Sampling and Monitoring Program

Routine Sampling

Under the Washington State Board of Health Drinking Water Regulations for total coliform, the number of samples a utility is required to collect each month to determine compliance under the total coliform rule, is based on population served (resident and non-resident population). Based on population served, the Woodinville Water District would be required to test at least 28 routine samples. In response to a 1972 request from the Washington Department of Health (Washington Department of Social and Health Services in 1972) the City of Seattle developed a coliform rule monitoring plan for its direct customers and for the wholesale distribution areas. Under the agreement with the State, the City of Seattle water quality laboratory is responsible for collecting and analyzing drinking water samples from all of the direct and wholesale services areas. This area represents approximately 1.3 million people in King and Snohomish Counties. Under this agreement Seattle and its purveyors sample at a rate of at least 0.7 sample per 1000 customer samples per month.

Special Sampling

A. Developer Extensions - Testing and Disinfecting

All pipelines shall be tested and disinfected prior to acceptance of work. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished, installed, and operated by the Developer. Feed for the pump shall be from a barrel or other container so that the actual amount of "makeup" water can be measured periodically during the test period.

As soon as pipe is adequately secured against movement under pressure, it may be filled with water.

High volume flushing of the system will occur after the permanent full diameter connection is made. The Developer shall obtain specific permission from the District during the months of June through August before any high volume flushing will be allowed.

After the pipe is filled and all air expelled, it shall be pumped to a test pressure equal to 150 psi in excess of the operating pressure, and this pressure shall be maintained for a period of 1/2 hour. In accordance with manufacturer's recommendation, all valve may be limited to a pressure differential equal to the rated pressure of the valve (200 psi minimum), but shall not restrict the test pressure of the main. Mainline testing shall be made with the hydrant auxiliary gate valves open and pressure against the hydrant valve. Hydrant ports shall also be tested to hold static pressure without any visible leaks. Hydrostatic tests shall be performed on every complete section of water main between two valves.

In addition to the hydrostatic pressure test, a leakage test shall be conducted on the pipeline. The leakage test shall be conducted at the same pressure as the hydrostatic pressure test for a period of not less than 1/2 hour.

As sections of pipe are constructed and before pipelines are placed in service they shall be sterilized in conformance with the requirements of the State of Washington Department of Social and Health Services.

Chlorine shall be applied in one of the following manners, listed in order of preference, to secure a concentration in the pipe of at least 50 ppm:

1. Injection of chlorine-water mixture from chlorinating apparatus through corporation cock at beginning of section after pipe has been filled and with water exhausting at end of section at a rate controlled to produce the desired chlorine concentration.

2. Injection similarly of a hypochlorite solution.

3. Placement of dry chlorinated lime throughout pipeline as construction in proper quantities to produce the desired dosage. Filling of pipeline with this method should be at a very slow rate. Pipeline should be filled within 2 days of placing sterilizing agent.

After the desired chlorine concentration has been obtained throughout the section of line, the water in the line shall be left standing for at least 24 hours. Following this, the line shall be thoroughly flushed and a water sample collected. The line must not be placed in service until a satisfactory

bacteriological report has been received. At no time shall chlorinated water from a new main be flushed into a body of fresh water. This is to include lakes, rivers, streams, and any and all other waters where fish or other natural water life can be expected.

District representatives only shall be allowed to operate existing and new tie-in valves. Developer's personnel are expressly forbidden to operate any valve on any section of line which has been accepted by the District.

Sample Analysis / Reporting to the State

According to the Washington drinking water regulations, the Department of Health must be notified:

- * Within 10 days of the presence of coliform in a sample.
- * By the end of the day, when the purveyor is notified by the laboratory for the presence of fecal coliform or E-coli.

Note: Notification to the Health Dept. will be made by SWD if they do the purveyors sample analysis/monitoring.

Special Sampling

B. Woodinville Water District Broken Main Procedures

We maintain a chlorine residual through out our district and have always relied on the chlorine and large amounts of flushing before service is restored to the customers. If new piping is required it is swabbed with a chlorine solution before installation is completed.

When a water main is taken out of service due to a break, the District always isolates the homes or businesses affected by shutting off their meters. During a break we always isolate the homes or businesses by shutting off their meters. We also excavate with a Vac-con which keeps the mud and water down below the break. The meters remain off until all repairs are made and the line has been flushed.

Our history proves so far that the steps we take to avoid contamination are effective.

In restoring service to those affected homes or businesses, the District draws water into the isolated section by flushing and monitoring the chlorine residual. When the residual meets distribution standards the District restores service. The District has considered collecting bacti for the affected area but, it is not feasible to take bacti samples because we do not have a lab. We would not be able to get results back soon enough to be of any assistance, and be able to restore service to our customers in a timely manner.

Water System Overview

Woodinville Water District

Woodinville Water District buys its water from City of Seattle. Seattle Water provides drinking water to approximately 1.3 million people in the Puget Sound area on a wholesale and retail (direct service) basis. In 1975 EPA agreed to the implementation of a regional coliform monitoring plan for the total Seattle served system on the basis that the direct service and wholesale areas share the same sources, primary treatment plants, and transmission grid.

Sample stands are used to overcome the problems of gaining daily access to public and private premises for water quality sampling. These stands are located to represent different population concentrations, sources of supply, pressure zones and storage facilities so that representative water samples can be taken.

Woodinville Water District's service area includes 12,000 water customers. This area is located in North King County. The surrounding purveyors include the City of Redmond to the South, Northshore Utility District to the West along with the City of Bothell, Cross Valley Water to the North & City of Duvall to the East. The District has 1 intertie with the City of Bothell for use in an emergency situation only. The direct service areas covers approximately 40 square miles.

Woodinville Water District has 4 Reservoirs & 3 Steel Standpipe Tanks in the direct service area to provide equalizing storage and fire flows.

Woodinville Water District currently has no form of gaseous or hypochlorination to boost residuals in the system. We currently provide no treatment.

Woodinville Water District's distribution system is comprised of over 245 miles of water supply and distribution mains, nearly 2,800 hydrants and 44 pressure reducing stations. Woodinville Water District has no lead service lines within the distribution system and very few copper lines. Woodinville Water District has 9 sample stands that City of Seattle uses for routine coliform compliance monitoring. 26% of our mains are Asbestos/Cement, 24% cast iron & 50% ductile iron.

Woodinville Water District Main Sizes

5% are 4"	15% are 6"
62% are 8"	6% are 10"
7% are 12"	3% are 16"
less than 1% are 18"	

Operational Responses to Unsatisfactory Samples

Repeat samples must be collected whenever a sample is determined to be coliform positive. Within 24 hours of being informed by the laboratory of a coliform presence sample, repeat samples must be collected. One sample must be collected from the same sample site that the original coliform presence result came from. Plus, a sample must be taken from each of three repeat sites identified below. The original Routine sample sites and the three associated Repeat sample sites constitutes a Sampling Site Grouping. Due to the requirement for Repeat sample sites, Routine sampling at the source and the service connection farthest from the source should be avoided.

Sample Site Group (Three repeat samples needed if more than one routine sample collected)

After the Routine sampling site selection, 3 additional sites (Repeat sites) must be identified for each Routine site. Each of these four sites are to be at a different service connection. **Do not select the same site twice.**

From the Routine sample site:

- *Select one site within 5 service connections down the distribution pipeline in one direction.
- *Select a second site within 5 service connections down the distribution pipeline the other direction.

Flushing Options, System Analysis

Flushing Options: (Unsatisfactory Samples)

After unsatisfactory samples have been confirmed, it is best to thoroughly flush the suspect area before resampling. Take a chlorine residual before and immediately after flushing has taken place. If a low CL2 residual (below 0.3) is found, take appropriate measures to boost the chlorine in the system by flushing. Research recent activities within area of the bad sample, it is possible a cross-connection may have taken place, new construction or hydrant use may also cause problems.

System Analysis:

Analyze the system for possible problem areas before a MCL violation occurs. Dead end lines are potentials for low chlorine residuals as well as MCL violations. Valves that are turned down or off could cause dead water and flow problems. Tanks and reservoirs need to be cleaned and/or inspected on a yearly or as needed basis.

A thorough knowledge of your water system will allow you to better understand what is happening when a violation takes place.

Purveyor Contacts

Seattle Water Department Key Contacts

<u>Name</u>	<u>Phone Number</u>
Dave Hilmoe (Water Quality Director)	684-7414
Betty Meyer (Lab-sample analysis)	386-1999
Karen Lanning (Water Quality Insp.)	684-2633
Julie Hutchins (Regulatory Compliance)	684-7880
Mike Schaefer (Water Quality)	684-4607

Woodinville Water District Key Contacts

<u>Name</u>	<u>Phone Number</u>
Kenneth R. King (Operations Manager)	483-9104 x315
Bob Bandarra (General Manager)	483-9104 x303
Kathy Caldwell (Water Quality Coord.)	483-9104 x321

Sample Stand Locations/Tank reservoir cleaning plan:

Sample Stands (Woodinville Water District)

<u>Sample stand #</u>	<u>Location</u>	<u>Address</u>
104-1	136 Ave NE & NE 190 PL	Emerald Lake
104-2	NE 195 ST & 168 Ave NE	Leota Lake
104-3	132 Ave NE & NE 132	Totem Lake
104-4	172 & Mink Rd NE	Ringhill
104-5	228 Ave NE & NE 150 ST	Ringhill
104-6	198 Dr NE & NE 128	Tuscany
104-7	NE 153 ST & 152 Ave NE	Hollywood Hill
104-8	194 Ave NE & NE 194	Reintree
104-9	NE 142 ST & 180 Ave NE	English Hill

Note: Seattle currently takes 32 monthly samples from Woodinville Water at the above combined locations to conform with the regional monitoring plan.

Tank & Reservoir cleaning plan:

On a continually rotating basis, (5 year program) we empty & clean our tanks and inspect internal integrity.

<u>Tank # (size)</u>	<u>Address</u>	<u>Inspected</u>	<u>Cleaning</u>
Sammamish, 2.6 mg	15006 132 NE	yearly	Five years
Ringhill, 1.8 mg	227 Ave NE & 169	yearly	Five years
S. Hollywood, 1.7 mg	176 Ave NE & NE 144	yearly	Five years
Hollywood, 2.5 mg	15700 168 Ave NE	yearly	Five years
Brookside, 2.5 mg	15003 180 PL NE	yearly	Five years
Kingsgate, 1.1 mg	130 NE & NE 144	yearly	Five years

Sample Stand Cleaning Plan

The following is a listing of the items which would need to be addressed in a sample stand maintenance schedule:

1. Disinfect: Yearly or when a sample is positive for coliform.
2. Painting: Every three years or as needed.
3. Trim brush: Yearly or as needed.
4. Replace Valves: Inspect yearly and replace as needed.
5. Piping and Hose: Inspect yearly and replace as needed.
6. Meter Box: Inspect yearly and clean as needed.

The following is a listing of the items which would need to be purchased to disinfect sample stands:

1. Garden Spray Pump
2. 5' of Tygon clear plastic tubing
3. (2) hose clamps
4. Safety glasses
5. CL2 Bleach (5 to 1 solution of water to bleach)

When disinfecting stand let water/bleach solution sit in stand for approximately 5-10 minutes.

PRV / Pump Station Locations

<u>PRV STATION #</u>	<u>LOCATION</u>	<u>MAIN</u>
1	124th NE & NE 151st	6 & 3
2	124th NE & NE 165th	6 & 3
3	124th NE & NE 171st	6 & 3
4	NE 171st & 146 PL NE	6 & 3
5	168th NE & NE 143rd	6 & 3
6	164th NE & NE 175th	6 & 3
7	155th PL NE & NE 175th	6 & 3
8	NE 173rd & 151st NE	6 & 3
9	NE 150th & 220th NE	6 & 3
10	NE 165th & 212th NE	6 & 3
11	Avondale & NE 150th	
	(#11 Replaced by Avondale Reintree Flow Vault)	
12	171st NE & NE 185th	6 & 3
13	148th NE & NE 190th	8 & 4
14	NE 190th & 142nd NE	8 & 4
15	NE 156th & 183rd NE	8 & 4
16	NE 140th & 132nd NE	6 & 3
17	148th NE & NE 159th	6 & 3
18	130th NE & NE 195th	4 & 2
19	NE 132nd & 125th NE	8
20	135th NE & Tolt	
21	200th NE & NE 197th	6 & 3
22	153rd NE & Tolt	6 & 3
23	NE 132nd & 172nd NE	6 & 3

WOODINVILLE WATER DISTRICT
TOTAL COLIFORM PLAN
MAY 20, 1997

24	NE 184th PL & 147th CT	6 & 3
25	140th Way NE & 226th NE	6 & 2
26	NE 160th & 160th NE	6 & 3
27	NE 200th & 146th NE	6 & 3
28	NE 200th & 142nd NE	6 & 3
29	162nd NE & NE 141st	6 & 3
30	NE 142nd & 209th NE	6 & 3
31	165th NE & NE 135th	
32	NE 132nd PL & 187 PL NE	6 & 2
33	156th NE & NE 186th	6 & 3
34	NE 182nd & 156th NE	6 & 3
35	154th NE & NE 173rd	6 & 3
36	NE 147th PL & 134th NE	6 & 2
37	NE 150th & 205th NE	6 & 2
38	NE 133rd & 202nd NE	6 & 2
39	222 Way NE & NE 222 Ave	
40	Woodvl-Duvall & 194th NE	6 & 3
41	194th NE & NE 188th	12 & 3
42	NE 168th & 226th NE	6 & 3
43	133rd NE & Tolt	10 & 4
44	NE 133rd & 210th NE	8 & 3

Pump Station

Location

Hollywood Pump Station

15700 - 168 Ave NE

Ringhill Pump Station

232 Ave NE & NE 140

Lake of the Woods East Pump Station

NE 144 & 232nd NE

Public Notification for Non-Compliance

Key Contacts for Utility Decisions / Response

Seattle Water Department Contacts

Phone Number

Betty Meyer

386-1999

Julie Hutchins

684-7880

Mike Schaffer

684-4607

Newspaper Contacts

Eastside Journal

455-2222

Seattle Post - Intelligencer

464-2994

Woodinville Weekly

483-0606

Television Contacts

KING TV (Channel 5)

448-5555

KSTW TV (Channel 11)

572-5789

KIRO TV (Channel 7)

728-7777

KOMO TV (Channel 4)

443-4000

Radio Contacts

KIRO (AM 710)

728-5450

KOMO (AM 1000)

443-4010

KLSY (FM 92.5)

455-1540

Response to the public to be made only after confirmation with Seattle Water Department and coordination with management of utility.

Public Notification for Non-Compliance

Response to the public is to be made only after confirmation of an MCL violation with WDOH, Seattle Water Department and coordination with management of utility.

Non-Acute MCL Violations (see page #1)

The purveyor shall notify the water system users when the system has a non-acute MCL violation:

Notification may be by newspaper, mail, or hand delivery to all customers of the system. Notification to water system users must occur within 14 days of the violation.

Notification to newspapers, means publication in a daily newspaper of general circulation or in a weekly newspaper of general circulation if a daily newspaper does not serve the area. The purveyor may substitute a community or homeowner's association newsletter or similar periodical publication if the newsletter reaches all affected consumers within the specified time.

Content of Notification:

Mandatory language:

- a. A clear concise and simple explanation of their violation
- b. Discussion of potential adverse health effects and any segment of the population that may be at a higher risk.
- c. A list of steps the purveyor has taken or is planning to take to remedy the situation.

- d. A list of steps the consumer should take, including advice on seeking an alternative water supply if necessary.
- e. The purveyor's name and phone number.
- f. When appropriate, notices shall be multi-lingual (Spanish).
- g. The purveyor may provide additional information to further the situation.

Note: Copy of the violation must be sent to DOH immediately.

Acute Violations - Radio / TV Notification (see page #2)

The purveyor shall notify the water users when the system has an acute MCL violation. The purveyor shall also contact DOH immediately.

The following steps must be taken to notify all utility customers of an acute MCL violation.

- Notice to radio and television stations serving the area within seventy-two hours of an acute MCL violation.
- The purveyor will consider additional notification by newspaper, mail, or hand delivery.

Non-Acute Violations - Radio / TV Notification

Public Notification Language for Non-Acute MCLS

"The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the presence of total coliform is a possible health concern. Total coliform are common in the environment and are generally not harmful themselves. The presence of these bacteria in drinking water, however, generally is the result of a problem with water treatment or the pipes which distribute the water, and indicates that the water may be contaminated with organisms that can cause disease.

Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These symptoms however are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. EPA has set an enforceable drinking water standard for total coliform to reduce the risk of these adverse health effects. Under this standard, no more than 5.0 percent of the samples collected during a month can contain these bacteria, except that systems collecting fewer than 40 samples/month that have one total coliform-positive sample per month are not violating the standard. Drinking water which meets this standard is usually not associated with a health risk from disease-causing bacteria and should be considered safe".

Public Notification Language for Acute MCL Violations

"The United States Environmental Protection Agency (EPA) sets drinking water standards and has determined that the presence of fecal coliform or E. Coli is a serious health concern. Fecal coliform and E. Coli are generally not harmful themselves, but their presence in drinking water is serious because they usually are associated with sewage or animal wastes. The presence of these bacteria in drinking water is generally a result of a problem with water treatment or the pipes which distribute the water and indicates that the water may be contaminated with organisms that can cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. EPA has set an enforceable drinking water standard for fecal coliforms and E. Coli to reduce the risk of these adverse health effects. Under this standard all drinking water samples must be free of these bacteria. Drinking water which meets this standard is associated with little or none of the risk and should be considered safe. State and local health authorities recommend that consumers take the following precautions:

Customers boil their water or seek an alternative water supply (bottled water) during this incident. Customers undergoing chemotherapy or customers with compromised immune systems should refrain from drinking the water until it is deemed safe. Woodinville Water District is working with

Glossary of terms

ACUTE - posing an immediate risk to human health.

AWWA - American Water Works Association.

BIOFILM - biological regrowth of bacterial or organic nature that can use up CL2.

COLIFORM - are one of a group of microbiological contaminants regulated as part of the Safe Drinking Water Act (SDWA) written by the US Protection Agency (EPA). The many types of coliform, including fecal coliforms, are usually not disease causing (pathogenic). However their presence in drinking water indicates the potential presence of pathogens associated with waterborne disease outbreaks. In particular, the presence of fecal coliform in drinking water indicates that an urgent public health problem may exist.

COLIFORM SAMPLE - a sample of water collected from the distribution system at or after the first service and analyzed for coliform presence.

CONTAMINANT - a substance present in drinking water which may adversely affect the health of the consumer or the aesthetic qualities of the water.

DISTRIBUTION SYSTEM - that portion of a public water system which conveys water from the source and/or treatment facilities to consumers.

DOH - Department of Health

E-COLI - Fecal Coliform Bacteria

EPA - Environmental Protection Agency.

GROUP A WATER SYSTEM - a public water system with fifteen or more service connections, regardless of the number of people; or serving any average of twenty-five or more people per day for sixty or more days within a calendar year, regardless of the number of service connections.

MCL - Maximum Contaminant Level

NON-ACUTE - posing a possible or less than immediate risk to human health.

NTNC - Non-Transient non community

POTABLE - water suitable for drinking by the public

PRV - Pressure reducing station

PURVEYOR - agency, subdivision of the state, municipal corporation, firm, company, mutual or cooperative association, institution, partnership, or person or other entity owning or operating a public water system. Purveyor also means authorized agents of such agencies.

REPEAT SAMPLE - a sample collected to confirm the results of a previous analysis.

ROUTINE SAMPLE - a sample collected on a monthly or regular basis, as part of the monitoring plan.

SAMPLE SITE - a designated site to collect samples for analysis.

SERVICE CONNECTION - a connection to a public water system designed to provide potable water to a single family residence, or other residential or non-residential population.

SOURCE - the origin of the water that the purveyor is receiving.

TURBID - measurable indication of water clarity. High levels can indicate water quality problems.

Appendix H
Model Output

West Side of District - Existing Conditions - Data Summary

* * * * * K Y P I P E 3 * * * * *
* University of Kentucky Hydraulic Analysis Program *
* Distribution of Pressure and Flows in Piping Networks *
* 1000 PIPE VERSION - 1.00 (04/15/97) *
* * * * *

DATE: 11/03/99
TIME: 08:59:05.01

INPUT DATA FILENAME ----- C:\KYTMP\DATA\WEST98.DAT
TABULATED OUTPUT FILENAME ----- C:\KYTMP\DATA\WEST98.OUT
POSTPROCESSOR RESULTS FILENAME --- C:\KYTMP\DATA\WEST98.RES

SUMMARY OF ORIGINAL DATA

U N I T S S P E C I F I E D

FLOWRATE = gallons/minute
HEAD (HGL) = feet
PRESSURE = psig

R E G U L A T I N G V A L V E D A T A

Table with 5 columns: RV LABEL, VALVE TYPE, POSITION JUNCTION, CONTROLLED PIPE, VALVE SETTING (ft or gpm). Rows include R1 through R9 with corresponding valve types (PRV-1), junction numbers, pipe numbers, and valve settings.

RA	PRV-1	937	3260	425.00
RB	PRV-1	419	443	265.00
RC	PRV-1	961	3268	415.00
RD	PRV-1	3505	3507	510.00
RE	PRV-1	508	521	260.00
RF	PRV-1	404	442	260.00
RG	PRV-1	1109	1156	420.00
RH	PRV-1	609	625	420.00
RI	PRV-1	995	3271	420.00
RJ	PRV-1	2937	3273	420.00
RK	PRV-1	175	221	420.00
RL	PRV-1	615	628	575.00
RM	PRV-1	1904	1907	560.00
RN	PRV-1	414	445	260.00
RO	PRV-1	977	3279	420.00
RP	PRV-1	3538	3104	420.00
RQ	PRV-1	997	1602	420.00
RR	PRV-1	1066	3051	340.00
RS	PRV-1	3536	933	570.00
RT	PRV-1	2100	2122	340.00
RU	PRV-1	900	3274	420.00
RV	PRV-1	1131	1137	575.00
RW	FCV-1	3504	3501	600.00

PIPELINE DATA

STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PU -PUMP LINE
 CV -CHECK VALVE RV -REGULATING VALVE

PIPE NUMBER	NODE NOS. #1	NODE NOS. #2	LENGTH (ft)	DIAMETER (in)	ROUGHNESS COEFF.	PUMP LABEL	MINOR LOSS COEFF.	FGN-HGL (ft)
100	102	100	1200.0	8.0	115.00		0.00	
101	101	100	1500.0	8.0	115.00		0.00	
102	101	152	500.0	8.0	130.00		0.00	
103	100	150	1490.0	8.4	126.00		0.00	
104	102	101	550.0	6.0	125.00		0.00	
105	102	152	800.0	8.0	130.00		0.00	
106	101	150	400.0	6.0	115.00		0.00	
107	103	102	600.0	8.0	125.00		0.00	
108	102	153	800.0	8.0	125.00		0.00	
109	103	153	800.0	8.0	115.00		0.00	
110	103	105	1500.0	8.0	125.00		0.00	
111	104	153	750.0	8.0	115.00		0.00	
112	105	107	600.0	10.0	125.00		0.00	

113	106	107	1200.0	8.0	115.00	0.00
114	152	154	400.0	8.0	130.00	0.00
115	106	108	1500.0	8.0	115.00	0.00
116	107	108	500.0	10.0	125.00	0.00
117	146	145	1450.0	6.0	130.00	0.00
118	108	109	1100.0	6.0	105.00	0.00
119	108	113	900.0	10.0	105.00	0.00
120	154	150	1400.0	8.0	130.00	0.00
121	108	114	300.0	10.0	105.00	0.00
122	107	109	600.0	10.0	105.00	0.00
123	104	103	1700.0	6.0	125.00	0.00
124	109	110	600.0	8.0	105.00	0.00
125	109	113	700.0	10.0	105.00	0.00
126	145	104	1000.0	8.0	130.00	0.00
127	110	112	800.0	6.0	105.00	0.00
128	110	112	800.0	6.0	105.00	0.00
130	111	146	700.0	6.0	105.00	0.00
131	111	122	1400.0	12.0	110.00	0.00
133	112	117	900.0	6.0	105.00	0.00
134	112	146	800.0	6.0	105.00	0.00
136	113	114	900.0	10.0	105.00	0.00
137	113	148	400.0	10.0	105.00	0.00
139	114	147	600.0	10.0	105.00	0.00
140	115	118	1000.0	10.0	105.00	0.00
142	115	147	700.0	10.0	105.00	0.00
143	115	147	450.0	8.0	115.00	0.00
145	116	148	400.0	10.0	105.00	0.00
146	116	117	300.0	10.0	105.00	0.00
148	116	120	600.0	10.0	105.00	0.00
149	117	121	500.0	10.0	105.00	0.00
151	118	119	200.0	10.0	105.00	0.00
152	118	149	950.0	8.0	105.00	0.00
154	119	120	200.0	10.0	105.00	0.00
155	119	123	950.0	10.0	105.00	0.00
157	120	121	650.0	10.0	105.00	0.00
158	121	122	800.0	10.0	105.00	0.00
160	122	123	650.0	12.0	125.00	0.00
163	123	124	1700.0	12.0	125.00	0.00
164	124	125	800.0	6.0	125.00	0.00
166	124	132	1200.0	12.0	125.00	0.00
167	124	133	1350.0	8.0	115.00	0.00
169	125	126	1000.0	6.0	115.00	0.00
170	125	128	400.0	8.0	105.00	0.00
172	125	149	1400.0	8.0	105.00	0.00
173	126	149	1350.0	8.0	105.00	0.00
175	126	127	900.0	8.0	105.00	0.00
176	127	128	1000.0	6.0	105.00	0.00

178	127	129	1050.0	8.0	105.00	0.00
179	128	129	700.0	8.0	105.00	0.00
181	129	130	300.0	8.0	105.00	0.00
182	129	131	950.0	6.0	105.00	0.00
184	130	131	600.0	8.0	105.00	0.00
185	130	138	1300.0	8.0	115.00	0.00
187	130	140	2370.0	10.0	115.00	0.00
188	131	134	350.0	8.0	115.00	0.00
190	132	133	950.0	8.0	115.00	0.00
193	132	134	700.0	12.0	125.00	0.00
194	134	135	500.0	12.0	125.00	0.00
196	135	136	950.0	6.0	115.00	0.00
197	135	137	300.0	12.0	125.00	0.00
199	136	137	1000.0	6.0	125.00	0.00
206-RV	211	210	900.0	8.0	125.00	0.00
207	210	310	900.0	8.0	125.00	0.00
210	200	202	500.0	8.0	115.00	0.00
211	202	211	550.0	8.0	115.00	0.00
220	122	175	1600.0	8.0	125.00	0.00
221-RV	175	201	500.0	8.0	125.00	0.00
235	137	143	1000.0	6.0	125.00	0.00
240	133	176	700.0	8.0	125.00	0.00
241	132	176	1000.0	8.0	125.00	0.00
242	134	176	1300.0	8.0	125.00	0.00
250	221	151	1000.0	8.0	125.00	0.00
251	151	200	1000.0	8.0	125.00	0.00
252	151	220	800.0	8.0	115.00	0.00
253-XX	154	220	900.0	8.0	125.00	0.00
254	202	220	1200.0	8.0	125.00	0.00
255	150	221	5.0	8.0	125.00	0.00
301	300	301	600.0	8.0	115.00	0.00
302	300	336	1700.0	8.0	115.00	0.00
304	301	303	2600.0	8.0	125.00	0.00
307	302	314	1750.0	8.0	125.00	0.00
308	303	304	900.0	8.0	125.00	0.00
309	313	338	1600.0	12.0	100.00	0.00
310	303	338	2800.0	12.0	100.00	0.00
311	304	305	1400.0	8.0	115.00	0.00
313	304	306	2200.0	8.0	140.00	0.00
314	305	306	900.0	8.0	125.00	0.00
316	306	307	225.0	8.0	125.00	0.00
320	309	310	1500.0	12.0	110.00	0.00
322	310	337	1000.0	12.5	110.00	0.00
323	310	340	2900.0	16.3	110.00	0.00
324	340	341	800.0	16.3	110.00	0.00
325	309	313	2000.0	12.0	125.00	0.00
326	311	312	300.0	6.0	125.00	0.00

327	326	341	800.0	16.3	110.00	0.00
328	311	337	900.0	12.5	110.00	0.00
329	311	320	1000.0	12.5	110.00	0.00
330	340	341	1600.0	8.0	130.00	0.00
331	311	321	2200.0	12.5	125.00	0.00
332	312	343	1000.0	8.0	115.00	0.00
333	326	341	1200.0	8.0	130.00	0.00
334	312	314	3100.0	6.0	115.00	0.00
335	314	315	800.0	8.0	125.00	0.00
336	343	342	1000.0	8.0	130.00	0.00
337	315	316	800.0	8.0	115.00	0.00
338	315	317	700.0	8.0	125.00	0.00
339	342	314	1100.0	8.0	130.00	0.00
340	316	317	1500.0	8.0	115.00	0.00
341	317	318	900.0	8.0	125.00	0.00
343	318	319	1500.0	8.0	115.00	0.00
344	318	320	1600.0	12.5	110.00	0.00
346	318	322	400.0	8.0	125.00	0.00
347	320	321	1100.0	8.0	115.00	0.00
349	321	323	1650.0	12.5	125.00	0.00
350	322	323	600.0	8.0	125.00	0.00
352	324	323	1200.0	6.0	125.00	0.00
353	323	325	4300.0	8.0	125.00	0.00
355	325	330	1100.0	8.0	100.00	0.00
356	326	327	2500.0	16.3	110.00	0.00
358	327	328	2000.0	12.0	110.00	0.00
359	328	329	1200.0	10.0	115.00	0.00
361	328	332	1800.0	12.0	110.00	0.00
362	330	331	1300.0	8.0	125.00	0.00
364	331	332	700.0	8.0	125.00	0.00
365	332	333	900.0	8.0	125.00	0.00
367	333	334	2400.0	8.0	125.00	0.00
368	334	335	2600.0	8.0	125.00	0.00
369	338	342	180.0	12.0	130.00	0.00
370	339	305	1000.0	8.0	140.00	0.00
371	339	304	2500.0	8.0	110.00	0.00
372	342	317	1200.0	8.0	130.00	0.00
373	343	320	1000.0	8.0	130.00	0.00
400	400	401	1500.0	6.0	145.00	0.00
401	401	407	550.0	8.0	120.00	0.00
402	401	405	400.0	6.0	145.00	0.00
403	404	405	700.0	6.0	145.00	0.00
404	402	406	1600.0	8.0	120.00	0.00
405	400	407	2100.0	8.0	120.00	0.00
406	403	404	700.0	10.0	120.00	0.00
407	403	427	3075.0	10.0	120.00	0.00
408	403	406	330.0	10.0	120.00	0.00

409	408	405	550.0	8.0	120.00	0.00
410	407	408	385.0	8.0	120.00	0.00
411	407	402	150.0	8.0	120.00	0.00
412	408	406	475.0	8.0	120.00	0.00
413	427	433	450.0	10.0	120.00	0.00
414	414	428	1500.0	8.0	125.00	0.00
416	414	429	970.0	8.0	125.00	0.00
417	429	417	260.0	8.0	125.00	0.00
418	429	428	520.0	8.0	125.00	0.00
419	433	422	350.0	10.0	120.00	0.00
420	431	427	50.0	8.0	125.00	0.00
422	430	431	410.0	8.0	125.00	0.00
423	430	432	460.0	8.0	125.00	0.00
424	417	432	250.0	8.0	125.00	0.00
425	414	415	300.0	8.0	125.00	0.00
426	428	431	1700.0	8.0	125.00	0.00
427	430	433	250.0	8.0	125.00	0.00
431	415	417	1000.0	8.0	140.00	0.00
432	422	418	530.0	10.0	120.00	0.00
433	432	418	570.0	8.0	140.00	0.00
434	418	420	700.0	8.0	125.00	0.00
435	413	422	330.0	8.0	125.00	0.00
436	419	420	700.0	10.0	125.00	0.00
437	413	419	650.0	10.0	125.00	0.00
439	420	421	650.0	10.0	125.00	0.00
440	421	509	2200.0	8.0	130.00	0.00
442-RV	404	424	500.0	8.0	140.00	0.00
443-RV	419	423	500.0	10.0	115.00	0.00
445-RV	414	426	800.0	8.0	125.00	0.00
446	424	339	10.0	8.0	140.00	0.00
447	423	302	10.0	10.0	115.00	0.00
448	426	300	10.0	8.0	125.00	0.00
460	414	450	2100.0	8.0	115.00	0.00
461	450	416	2000.0	8.0	115.00	0.00
462	415	450	700.0	8.0	115.00	0.00
500	500	501	950.0	8.0	115.00	0.00
502	501	502	1700.0	8.0	115.00	0.00
503	501	509	700.0	8.0	130.00	0.00
505	502	512	750.0	8.0	115.00	0.00
511	505	506	1200.0	6.0	125.00	0.00
512	506	507	900.0	6.0	125.00	0.00
514	507	508	1850.0	8.0	125.00	0.00
518-RV	503	324	1750.0	6.0	125.00	0.00
521-RV	508	511	1600.0	8.0	125.00	0.00
522	511	330	10.0	8.0	115.00	0.00
530	512	520	700.0	8.0	115.00	0.00
531	505	520	300.0	6.0	140.00	0.00

532	504	520	1000.0	8.0	115.00	0.00
533	503	520	1000.0	6.0	140.00	0.00
601	603	604	2400.0	6.0	125.00	0.00
602	603	618	800.0	6.0	125.00	0.00
604	604	605	1300.0	6.0	125.00	0.00
605	604	606	1300.0	8.4	125.00	0.00
607	605	607	1350.0	8.0	110.00	0.00
608	605	610	1950.0	6.0	125.00	0.00
610	606	607	1300.0	8.0	110.00	0.00
611	606	612	2000.0	8.0	125.00	0.00
612	608	609	1100.0	8.0	125.00	0.00
613	607	608	1900.0	8.0	110.00	0.00
614	609	610	1800.0	6.0	115.00	0.00
617	610	611	2100.0	6.0	115.00	0.00
619	611	2914	2450.0	8.0	130.00	0.00
622	603	618	1000.0	6.0	125.00	0.00
625-RV	609	1300	900.0	8.0	115.00	0.00
626	3533	615	650.0	6.0	115.00	0.00
627-RV	618	505	70.0	6.0	125.00	0.00
628-RV	615	605	600.0	6.0	125.00	0.00
629	709	615	1300.0	1.0	115.00	0.00
700	700	701	2600.0	6.0	110.00	0.00
701	701	702	1000.0	6.0	115.00	0.00
703	701	703	1900.0	8.0	115.00	0.00
704	702	703	1300.0	6.0	115.00	0.00
715	706	708	1100.0	10.0	109.00	0.00
718	706	721	1250.0	8.4	109.00	0.00
719	707	708	1600.0	6.0	109.00	0.00
721	708	709	1350.0	10.0	109.00	0.00
722	709	720	500.0	12.0	109.00	0.00
725	709	719	1350.0	8.0	130.00	0.00
727	710	720	850.0	12.0	109.00	0.00
728	711	710	1000.0	12.0	109.00	0.00
729	710	706	3100.0	8.0	125.00	0.00
730	711	712	1350.0	12.0	125.00	0.00
731	712	713	2600.0	8.0	115.00	0.00
733	712	717	550.0	6.0	125.00	0.00
734	713	714	1850.0	8.0	115.00	0.00
736	714	715	1100.0	6.0	115.00	0.00
737	714	715	750.0	8.0	115.00	0.00
739	715	716	1500.0	8.0	115.00	0.00
742	716	717	1250.0	6.0	125.00	0.00
743	717	718	2100.0	8.0	130.00	0.00
745	718	719	750.0	8.0	130.00	0.00
746	718	720	1350.0	8.0	115.00	0.00
751	716	970	10.0	8.0	125.00	0.00
754-RV	705	723	100.0	6.0	125.00	0.00

755-RV	704	1902	1250.0	8.0	125.00	0.00
759	723	944	10.0	6.0	125.00	0.00
761	752	705	240.0	10.0	109.00	0.00
762	721	752	1800.0	8.0	115.00	0.00
763	706	752	800.0	8.0	125.00	0.00
770	753	704	1300.0	8.0	115.00	0.00
771	703	753	700.0	8.0	115.00	0.00
772	753	705	1600.0	8.0	115.00	0.00
800	800	808	400.0	10.0	115.00	0.00
805	801	806	2350.0	8.0	115.00	0.00
806	802	803	1100.0	8.0	115.00	0.00
808	802	804	600.0	8.0	115.00	0.00
809	802	805	1150.0	8.0	115.00	0.00
811	802	807	1300.0	8.0	130.00	0.00
812	802	807	1100.0	8.0	130.00	0.00
814	803	807	1200.0	8.0	130.00	0.00
815	803	1067	2000.0	8.0	125.00	0.00
817	804	805	6830.0	8.0	115.00	0.00
820	807	808	1600.0	8.0	125.00	0.00
850	2951	996	600.0	8.0	125.00	0.00
851	2951	995	600.0	8.0	125.00	0.00
852-XX	2951	2952	400.0	8.0	125.00	0.00
853	2952	2954	600.0	8.0	115.00	0.00
854	2953	2952	1500.0	8.0	115.00	0.00
855-XX	2953	806	1500.0	8.0	115.00	0.00
860	2955	2956	1500.0	8.0	125.00	0.00
861	2954	2955	300.0	8.0	125.00	0.00
862	801	2955	500.0	10.0	125.00	0.00
863	801	2956	1300.0	10.0	125.00	0.00
864	808	2954	600.0	10.0	125.00	0.00
865	802	2956	900.0	10.0	125.00	0.00
900	2935	928	1218.0	8.0	130.00	0.00
901	900	901	850.0	6.0	125.00	0.00
902	900	903	1300.0	8.0	125.00	0.00
903	928	936	650.0	8.0	130.00	0.00
905	901	902	1650.0	6.0	125.00	0.00
907	901	902	700.0	6.0	125.00	0.00
908	902	907	1600.0	6.0	125.00	0.00
910	903	904	350.0	8.0	125.00	0.00
911	903	908	1250.0	6.0	125.00	0.00
913	904	909	1250.0	8.0	125.00	0.00
914	905	906	300.0	10.0	125.00	0.00
916	905	907	500.0	8.0	125.00	0.00
917	906	911	1800.0	12.5	125.00	0.00
919	907	908	350.0	8.0	125.00	0.00
920	908	909	800.0	8.0	125.00	0.00
922	909	910	200.0	8.0	125.00	0.00

923	910	915	2400.0	8.0	125.00	0.00
925	911	912	400.0	12.5	125.00	0.00
926	911	915	1600.0	6.0	125.00	0.00
928	912	913	700.0	12.5	125.00	0.00
929	912	916	1700.0	8.0	125.00	0.00
931	913	918	2400.0	6.0	125.00	0.00
932	913	914	2300.0	16.0	115.00	0.00
933-RV	3536	933	200.0	8.0	125.00	0.00
934	914	2901	2000.0	16.7	125.00	0.00
935	914	921	1500.0	6.0	125.00	0.00
937	915	916	450.0	8.0	125.00	0.00
938	916	917	700.0	8.0	125.00	0.00
940	917	918	700.0	8.0	125.00	0.00
941	917	2906	1330.0	8.0	125.00	0.00
943	917	2904	1335.0	8.4	125.00	0.00
944	918	919	600.0	6.0	125.00	0.00
946	918	920	1150.0	6.0	125.00	0.00
947	919	920	650.0	8.0	125.00	0.00
949	919	921	700.0	6.0	125.00	0.00
950	920	930	1950.0	8.0	125.00	0.00
952	921	923	1850.0	6.0	125.00	0.00
953	922	924	1500.0	8.0	125.00	0.00
955	922	2900	845.0	8.4	125.00	0.00
956	2900	1129	1200.0	16.7	125.00	0.00
958	2900	1130	1250.0	8.4	125.00	0.00
959	2900	2901	3100.0	16.7	125.00	0.00
962	923	924	1950.0	8.0	125.00	0.00
964	924	926	1300.0	8.0	125.00	0.00
965	924	2902	1350.0	8.4	125.00	0.00
967	925	926	1700.0	8.0	125.00	0.00
968	925	1123	800.0	12.5	125.00	0.00
971	925	2902	740.0	12.5	125.00	0.00
972	968	2957	700.0	8.0	125.00	0.00
973	2902	1129	1000.0	12.5	125.00	0.00
974	926	1126	1810.0	8.0	125.00	0.00
975	965	2957	600.0	8.0	125.00	0.00
976	929	930	750.0	8.0	125.00	0.00
977	929	943	2000.0	8.0	125.00	0.00
978	964	2957	1600.0	8.0	125.00	0.00
980	930	931	500.0	8.0	125.00	0.00
981	931	2904	2000.0	8.0	130.00	0.00
982	931	2903	1200.0	6.0	125.00	0.00
983	931	2908	850.0	6.0	125.00	0.00
985	932	933	1350.0	8.0	125.00	0.00
986	932	940	450.0	8.0	125.00	0.00
988	932	2903	800.0	6.0	125.00	0.00
989	932	2905	1290.0	8.4	125.00	0.00

991	2903	2904	1300.0	8.4	125.00	0.00
992	2904	2905	700.0	8.4	125.00	0.00
995	2905	2939	600.0	8.4	125.00	0.00
997	2906	934	360.0	8.4	125.00	0.00
998	933	2907	1100.0	8.0	125.00	0.00
999	2939	2907	695.0	8.4	125.00	0.00
1000	1000	1001	1600.0	8.0	125.00	0.00
1001	1001	1002	1600.0	8.0	125.00	0.00
1002	1002	1006	1000.0	6.0	115.00	0.00
1003	1002	1003	400.0	8.0	125.00	0.00
1004	1004	1005	1500.0	6.0	125.00	0.00
1005	1003	1008	2300.0	8.0	125.00	0.00
1006	1004	1005	1400.0	6.0	125.00	0.00
1007	1004	1006	250.0	6.0	125.00	0.00
1009	1002	1006	900.0	6.0	125.00	0.00
1010	1006	1007	2300.0	6.0	125.00	0.00
1013	1008	1009	400.0	8.0	125.00	0.00
1015	1008	1029	800.0	8.0	125.00	0.00
1016	1009	1010	1000.0	8.0	125.00	0.00
1018	1010	1011	500.0	8.0	125.00	0.00
1019	1011	1012	500.0	8.0	110.00	0.00
1021	1011	1023	1100.0	8.0	110.00	0.00
1022	1012	1013	650.0	8.0	125.00	0.00
1024	1012	1014	1150.0	8.0	125.00	0.00
1025	1013	1014	300.0	8.0	125.00	0.00
1027	1013	1015	1150.0	8.0	110.00	0.00
1028	1015	1016	1550.0	8.0	125.00	0.00
1030	1016	1017	1550.0	8.0	110.00	0.00
1031	1017	1018	650.0	8.0	125.00	0.00
1034	1018	1042	1750.0	8.0	125.00	0.00
1036	1018	1019	500.0	8.0	125.00	0.00
1037	1019	1020	800.0	8.0	125.00	0.00
1039	1019	1024	1400.0	8.0	125.00	0.00
1040	1020	1021	800.0	8.0	125.00	0.00
1042	1020	1022	1100.0	8.0	125.00	0.00
1043	1021	1022	500.0	8.0	125.00	0.00
1045	1023	1024	1400.0	8.0	125.00	0.00
1046	1024	1025	800.0	8.0	125.00	0.00
1048	1022	1023	650.0	8.0	125.00	0.00
1049	1025	1026	1400.0	8.0	128.00	0.00
1051	1025	1040	1150.0	8.0	128.00	0.00
1052	1026	1027	500.0	8.0	128.00	0.00
1054	1027	1028	1150.0	8.0	128.00	0.00
1055	1027	1038	800.0	6.0	128.00	0.00
1057	1027	1044	1600.0	8.0	128.00	0.00
1058	1028	1029	800.0	8.0	125.00	0.00
1060	1028	1030	500.0	6.0	125.00	0.00

1061	1029	1030	1400.0	6.0	125.00	0.00
1063	1030	1031	300.0	6.0	125.00	0.00
1064	1030	1032	400.0	6.0	125.00	0.00
1066	1031	1037	900.0	6.0	125.00	0.00
1067	1031	1037	900.0	6.0	125.00	0.00
1069	1032	1033	900.0	6.0	125.00	0.00
1070	1032	1034	1300.0	6.0	125.00	0.00
1072	1033	1034	350.0	6.0	125.00	0.00
1073	1033	1037	200.0	6.0	125.00	0.00
1075	1034	1036	300.0	6.0	125.00	0.00
1076	1035	1036	300.0	6.0	128.00	0.00
1078	1036	1038	500.0	6.0	125.00	0.00
1079	1038	1045	1750.0	6.0	125.00	0.00
1081	1026	1039	1100.0	6.0	125.00	0.00
1082	1039	1040	1000.0	6.0	125.00	0.00
1084	1040	1041	800.0	6.0	128.00	0.00
1085	1041	1042	800.0	8.0	125.00	0.00
1087	1041	1043	300.0	8.0	125.00	0.00
1088	1042	1043	900.0	6.0	125.00	0.00
1090	1042	1070	2250.0	8.0	115.00	0.00
1091	1043	1044	1600.0	6.0	125.00	0.00
1093	1044	1045	400.0	6.0	125.00	0.00
1094	1044	1046	1100.0	8.0	128.00	0.00
1096	1045	1048	1000.0	6.0	125.00	0.00
1097	1046	1047	1300.0	8.0	125.00	0.00
1098	1095	1094	800.0	8.0	125.00	0.00
1099	1046	1049	1450.0	6.0	125.00	0.00
1100	1100	1101	1750.0	8.0	125.00	0.00
1101	1103	1128	1500.0	8.0	115.00	0.00
1102	1101	1102	950.0	12.0	125.00	0.00
1103-XX	1101	1128	760.0	12.5	125.00	0.00
1105	1102	1105	800.0	12.0	120.00	0.00
1106	1103	1121	1900.0	8.0	120.00	0.00
1108-XX	1103	1128	485.0	8.4	120.00	0.00
1109	1104	1105	1300.0	8.0	120.00	0.00
1111	1105	1106	600.0	12.0	120.00	0.00
1112	1106	1107	600.0	12.0	120.00	0.00
1114	1107	1108	1000.0	12.0	120.00	0.00
1115	1107	1121	1000.0	8.0	120.00	0.00
1117	1108	1109	800.0	8.0	120.00	0.00
1118	1108	1110	1400.0	12.0	120.00	0.00
1120	1109	1112	1600.0	8.0	120.00	0.00
1123	1110	1111	700.0	10.0	120.00	0.00
1124	1110	1122	1000.0	8.0	120.00	0.00
1126	1111	1112	1050.0	8.0	120.00	0.00
1127	1111	1114	700.0	10.0	120.00	0.00
1129	1112	1113	1200.0	8.0	120.00	0.00

1130	1113	1135	425.0	8.0	120.00	0.00
1131	1135	1114	425.0	8.0	120.00	0.00
1132	1113	1116	1350.0	8.0	120.00	0.00
1133	1114	1115	1050.0	8.0	120.00	0.00
1135	1115	1116	1200.0	8.0	120.00	0.00
1136	1115	1119	400.0	8.0	120.00	0.00
1137-RV	1131	1110	50.0	12.0	120.00	0.00
1138	1116	1117	600.0	8.0	120.00	0.00
1139	1117	1118	900.0	8.0	120.00	0.00
1141	1117	1120	1050.0	8.0	120.00	0.00
1142	1118	1119	450.0	8.0	120.00	0.00
1144	1118	1120	1050.0	8.0	120.00	0.00
1145-XX	1122	1124	1940.0	12.0	120.00	0.00
1147	1123	1125	1500.0	8.0	120.00	0.00
1148	1123	1127	900.0	12.0	120.00	0.00
1150	1124	1125	1895.0	8.0	120.00	0.00
1151	1124	1127	1000.0	12.0	120.00	0.00
1153	1125	1126	1210.0	8.0	120.00	0.00
1154	1128	1129	285.0	12.0	120.00	0.00
1156-RV	1109	1201	1450.0	8.0	115.00	0.00
1201	1201	1200	2400.0	8.0	125.00	0.00
1300	1300	1301	1550.0	8.0	135.00	0.00
1301	1301	1302	1300.0	8.0	135.00	0.00
1303	1302	1303	800.0	8.0	135.00	0.00
1304	1303	1304	2200.0	8.0	140.00	0.00
1306	1304	1305	950.0	6.0	140.00	0.00
1307	1306	1305	700.0	6.0	140.00	0.00
1309	1305	1601	1700.0	8.0	135.00	0.00
1447	1424	1081	10.0	8.0	125.00	0.00
1600	1601	1602	1300.0	8.0	115.00	0.00
1601	2929	1600	1700.0	8.0	125.00	0.00
1602-RV	997	2929	2670.0	8.0	130.00	0.00
1603	2929	1601	10.0	8.0	130.00	0.00
1604	1601	1602	1500.0	8.0	115.00	0.00
1700	1702	1701	1800.0	8.0	125.00	0.00
1701	1700	1704	1000.0	8.0	130.00	0.00
1702	1704	1705	400.0	8.0	130.00	0.00
1703	1705	1706	1500.0	8.0	130.00	0.00
1704	1705	1707	1600.0	8.0	130.00	0.00
1705	1706	1707	600.0	8.0	130.00	0.00
1707	1700	1703	1250.0	8.0	130.00	0.00
1708-RV	3002	1703	50.0	8.0	130.00	0.00
1709	1700	1701	1400.0	8.0	130.00	0.00
1900	1900	1901	1300.0	6.0	115.00	0.00
1901	1900	1901	2050.0	8.0	115.00	0.00
1903	1901	1902	1000.0	8.0	115.00	0.00
1904	1902	1903	1250.0	6.0	115.00	0.00

1906-XX	1903	1904	70.0	4.0	115.00	0.00
1907-RV	1904	603	100.0	8.0	115.00	0.00
2000	2000	2001	1900.0	8.0	125.00	0.00
2001	1002	2001	1600.0	8.0	125.00	0.00
2002	1008	2001	1700.0	8.0	125.00	0.00
2100	136	144	1400.0	6.0	125.00	0.00
2101	137	138	1000.0	8.0	125.00	0.00
2102	137	143	1000.0	6.0	125.00	0.00
2104	138	139	400.0	8.0	125.00	0.00
2105	138	142	1200.0	6.0	125.00	0.00
2107	139	140	500.0	8.0	125.00	0.00
2108	139	141	1000.0	10.0	115.00	0.00
2110	140	141	1500.0	10.0	115.00	0.00
2111	141	142	700.0	8.0	125.00	0.00
2113	142	143	1250.0	6.0	115.00	0.00
2114	147	148	300.0	8.0	125.00	0.00
2115-XX	150	151	100.0	8.0	115.00	0.00
2117-FG	AA	121	150.0	12.0	115.00	0.00
2120	104	2100	2160.0	8.0	125.00	0.00
2121	2100	111	1380.0	12.0	125.00	0.00
2122-RV	2100	2101	200.0	12.0	125.00	0.00
2900	2906	2958	1600.0	8.0	125.00	0.00
2901	927	942	900.0	6.0	125.00	0.00
2902	933	939	1300.0	8.0	125.00	0.00
2903	910	934	800.0	8.0	125.00	0.00
2904	927	943	1700.0	8.0	125.00	0.00
2905	934	935	1300.0	6.0	125.00	0.00
2906	935	2940	650.0	6.0	125.00	0.00
2907	2935	939	1550.0	6.0	128.00	0.00
2908	935	2935	650.0	6.0	128.00	0.00
2909	937	938	1000.0	8.0	125.00	0.00
2910	927	945	800.0	6.0	120.00	0.00
2911	2940	936	650.0	6.0	125.00	0.00
2912	934	2958	400.0	8.0	125.00	0.00
2913	2907	2958	470.0	8.0	125.00	0.00
2914	938	939	400.0	8.0	125.00	0.00
2915	940	941	1750.0	8.0	125.00	0.00
2917	941	944	1600.0	10.0	125.00	0.00
2918	941	2908	850.0	6.0	125.00	0.00
2921	943	947	2300.0	6.0	100.00	0.00
2923	944	945	1100.0	6.0	125.00	0.00
2924	945	946	1600.0	6.0	125.00	0.00
2925	945	948	2000.0	8.0	125.00	0.00
2926	946	947	800.0	6.0	100.00	0.00
2927	946	949	1800.0	8.0	125.00	0.00
2929	947	951	1000.0	6.0	100.00	0.00
2930	948	949	800.0	8.0	125.00	0.00

510.00

2932	949	950	1100.0	8.0	125.00	0.00
2933	949	951	1400.0	6.0	125.00	0.00
2935	950	957	1500.0	6.0	125.00	0.00
2936	2909	959	1900.0	8.0	125.00	0.00
2937	2909	950	900.0	12.0	125.00	0.00
2938	951	952	600.0	6.0	125.00	0.00
2939	952	953	500.0	6.0	125.00	0.00
2941	952	957	1200.0	8.0	125.00	0.00
2942	953	954	550.0	6.0	125.00	0.00
2944	953	956	1000.0	6.0	125.00	0.00
2945	954	955	1300.0	6.0	125.00	0.00
2947	955	956	500.0	6.0	125.00	0.00
2948	955	960	1000.0	6.0	125.00	0.00
2950	956	957	800.0	6.0	125.00	0.00
2951	957	958	500.0	8.0	125.00	0.00
2953	958	959	1000.0	8.0	125.00	0.00
2954	959	961	1800.0	8.0	125.00	0.00
2956	960	961	800.0	8.0	125.00	0.00
2957	961	962	650.0	8.0	125.00	0.00
2960	962	963	2450.0	8.0	125.00	0.00
2962	965	963	2150.0	8.0	125.00	0.00
2965	965	966	1200.0	8.0	125.00	0.00
2966	966	967	400.0	10.0	125.00	0.00
2968	966	998	200.0	10.0	125.00	0.00
2969	2910	998	1100.0	8.0	125.00	0.00
2971	2910	969	1200.0	10.0	125.00	0.00
2972	967	969	700.0	10.0	125.00	0.00
2974	967	2911	900.0	8.0	125.00	0.00
2975	2911	968	1000.0	8.0	125.00	0.00
2977	2911	2913	800.0	8.0	125.00	0.00
2978	968	985	1200.0	8.0	125.00	0.00
2980	2912	2913	600.0	8.0	125.00	0.00
2981	2912	979	1900.0	8.0	125.00	0.00
2983	2912	981	800.0	10.0	125.00	0.00
2984	2913	984	1300.0	8.0	125.00	0.00
2986	2913	985	1500.0	8.0	125.00	0.00
2987	969	2912	1000.0	10.0	125.00	0.00
2990	2914	971	1600.0	6.0	125.00	0.00
2993	970	975	1300.0	6.0	125.00	0.00
2995	971	972	300.0	8.0	125.00	0.00
2996	972	973	700.0	8.0	125.00	0.00
2998	973	974	850.0	8.0	125.00	0.00
2999	974	976	1200.0	8.0	125.00	0.00
3002	1047	1061	1050.0	8.0	125.00	0.00
3004	1047	1091	1900.0	8.0	125.00	0.00
3005	1048	1049	1100.0	6.0	125.00	0.00
3007	1048	1051	400.0	6.0	100.00	0.00

3008	1049	1050	550.0	8.0	100.00	0.00	
3010	1049	1091	1200.0	8.0	125.00	0.00	
3014	1050	1051	1250.0	8.0	100.00	0.00	
3016	1050	1055	300.0	8.0	100.00	0.00	
3017	1050	1056	750.0	10.0	125.00	0.00	
3019	1035	1051	1550.0	10.0	100.00	0.00	
3020	1051	1052	600.0	8.0	125.00	0.00	
3022	1052	1053	650.0	8.0	100.00	0.00	
3023	1052	1055	900.0	8.0	100.00	0.00	
3025	1053	1054	700.0	6.0	100.00	0.00	
3026	1054	1055	600.0	10.0	100.00	0.00	
3028	1056	1057	850.0	10.0	125.00	0.00	
3029	3511	1056	1550.0	10.0	125.00	0.00	
3030-FG	BB	3511	50.0	8.0	125.00	0.00	420.00
3032	1057	1058	300.0	10.0	125.00	0.00	
3034	1057	1059	900.0	8.0	125.00	0.00	
3035	1058	1060	1700.0	8.0	125.00	0.00	
3037	1058	1061	2000.0	10.0	125.00	0.00	
3038	1058	1091	1200.0	8.0	125.00	0.00	
3040	1061	1092	300.0	10.0	125.00	0.00	
3041	1062	1095	1430.0	8.0	125.00	0.00	
3042	1098	1096	400.0	10.0	125.00	0.00	
3043	1062	1064	1150.0	10.0	125.00	0.00	
3044	1096	1092	800.0	10.0	125.00	0.00	
3045	1062	1098	1000.0	10.0	125.00	0.00	
3046	1063	1094	800.0	8.0	125.00	0.00	
3047	1064	1065	550.0	10.0	125.00	0.00	
3048	1098	1060	2200.0	8.0	125.00	0.00	
3049	1065	1066	1500.0	8.0	125.00	0.00	
3050	1066	1067	1050.0	8.0	125.00	0.00	
3051-RV	1066	1702	1300.0	8.4	125.00	0.00	
3052	1067	1068	1250.0	8.0	125.00	0.00	
3055	1069	1071	1250.0	8.0	125.00	0.00	
3056	1070	1071	500.0	8.0	100.00	0.00	
3057	1071	1093	1500.0	8.0	125.00	0.00	
3058	1070	1072	2300.0	8.0	125.00	0.00	
3060	3004	1072	10.0	8.0	125.00	0.00	
3062	1072	1086	1200.0	8.0	125.00	0.00	
3073	1079	1080	300.0	10.0	125.00	0.00	
3074	1079	1086	1050.0	10.0	125.00	0.00	
3076	1080	1081	1100.0	10.0	125.00	0.00	
3077	1080	1082	1400.0	8.0	125.00	0.00	
3079	1081	1082	600.0	10.0	125.00	0.00	
3080	1082	1083	3300.0	8.0	125.00	0.00	
3083	1093	1094	1000.0	8.0	125.00	0.00	
3084	1095	1096	1600.0	8.0	125.00	0.00	
3087	1083	3002	1000.0	8.0	125.00	0.00	

3090	1035	3007	800.0	6.0	130.00	0.00	
3100-FG	CC	3508	5.0	16.0	125.00	0.00	590.00
3101	3508	3538	7500.0	16.0	125.00	0.00	
3102	3538	3540	4000.0	16.0	125.00	0.00	
3103	3540	1131	350.0	16.0	125.00	0.00	
3104-RV	3538	1008	600.0	8.0	125.00	0.00	
3110-FG	DD	3504	10.0	10.0	125.00	0.00	560.00
3130-FG	EE	3505	10.0	8.0	125.00	0.00	560.00
3200	976	977	850.0	8.0	125.00	0.00	
3201	977	2915	1400.0	6.0	125.00	0.00	
3204	2915	978	700.0	6.0	125.00	0.00	
3205	2915	980	2750.0	8.0	125.00	0.00	
3207	978	979	700.0	6.0	125.00	0.00	
3208	979	980	700.0	8.0	125.00	0.00	
3210	980	981	1300.0	8.0	125.00	0.00	
3211	980	2916	800.0	8.0	125.00	0.00	
3213	2916	997	600.0	8.0	125.00	0.00	
3216	2916	2917	1000.0	8.0	125.00	0.00	
3217	981	982	450.0	10.0	125.00	0.00	
3219	982	983	400.0	8.0	125.00	0.00	
3220	982	2917	1200.0	8.0	125.00	0.00	
3222	2917	2920	1000.0	8.0	125.00	0.00	
3223	983	984	750.0	8.0	125.00	0.00	
3225	983	986	250.0	10.0	125.00	0.00	
3226	984	987	1000.0	8.0	125.00	0.00	
3228	984	2918	800.0	8.0	125.00	0.00	
3229	985	991	1300.0	8.0	125.00	0.00	
3231	985	2918	800.0	8.0	125.00	0.00	
3232	2918	990	800.0	8.0	125.00	0.00	
3234	986	987	350.0	10.0	125.00	0.00	
3235	986	988	1100.0	6.0	125.00	0.00	
3237	987	988	250.0	10.0	125.00	0.00	
3238	988	989	450.0	8.0	125.00	0.00	
3240	988	992	900.0	10.0	125.00	0.00	
3241	989	990	850.0	8.0	125.00	0.00	
3243	989	993	1200.0	8.0	125.00	0.00	
3244	990	991	800.0	8.0	125.00	0.00	
3246	991	2919	1300.0	8.4	125.00	0.00	
3247	992	994	800.0	10.0	125.00	0.00	
3249	993	994	1000.0	8.0	125.00	0.00	
3250	994	995	250.0	10.0	125.00	0.00	
3252	2920	994	800.0	8.0	125.00	0.00	
3253	2920	996	1200.0	8.0	125.00	0.00	
3255	995	996	720.0	8.0	125.00	0.00	
3258	996	997	1000.0	8.0	125.00	0.00	
3259	3513	998	600.0	12.0	125.00	0.00	
3260-RV	937	2936	100.0	10.0	125.00	0.00	

3261	2936	421	800.0	10.0	100.00		0.00
3262-RV	929	1000	3700.0	8.0	125.00		0.00
3263	2938	415	70.0	8.0	125.00		0.00
3268-RV	961	2924	900.0	8.0	115.00		0.00
3271-RV	995	800	200.0	10.0	115.00		0.00
3272	937	2937	1000.0	8.0	125.00		0.00
3273-RV	2937	500	70.0	8.0	125.00		0.00
3274-RV	900	2938	600.0	8.0	125.00		0.00
3275-RV	975	978	10.0	6.0	125.00		0.00
3278	2924	1054	10.0	8.0	115.00		0.00
3279-RV	977	1306	800.0	6.0	125.00		0.00
3400-FG	FF	3400	10.0	16.0	130.00		0.00
3501-RV	3504	105	200.0	8.0	125.00		0.00
3507-RV	3505	124	200.0	8.0	115.00		0.00
3512	3536	3501	4440.0	16.0	125.00		0.00
3513	3534	3535	3775.0	16.0	125.00		0.00
3522-CV	3510	2909	1000.0	12.0	125.00		0.00
3525	3512	3500	2650.0	16.6	125.00		0.00
3527	3500	3533	685.0	8.0	125.00		0.00
3528	3500	3534	3600.0	16.6	125.00		0.00
3530	3502	3501	180.0	16.6	125.00		0.00
3531-FG	GG	3502	100.0	12.0	125.00		0.00
3535	3520	711	50.0	12.0	115.00		0.00
3536	3502	906	150.0	10.0	115.00		0.00
3537-PU	3509	3520	100.0	12.0	115.00	P1	0.00
3538-CV	3509	3520	100.0	12.0	115.00		0.00
3542-FG	HH	3509	2400.0	12.0	125.00		0.00
3543-FG	MM	3510	2400.0	12.0	125.00		0.00
3544-FG	II	3513	1200.0	12.0	125.00		0.00
3545-FG	JJ	3511	500.0	8.0	125.00		0.00
3549-FG	KK	3512	10.0	12.0	125.00		0.00
3550	3400	327	1300.0	18.0	125.00		0.00
3552	3534	1904	100.0	8.0	115.00		0.00
3553	3535	3536	2350.0	16.6	125.00		0.00
9000-XXFG	3520	LL	1000.0	0.5	125.00		0.00

P U M P D A T A

THERE IS A PUMP ID NO. 1 IN THE FOLLOWING PIPES:
3537

DESCRIBED BY THE FOLLOWING DATA:

HEAD (ft)	FLOWRATE (gpm)

137.00	0.00
134.30	1000.00
123.00	2000.00

JUNCTION NODE DATA

JUNCTION NUMBER	JUNCTION TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	CONNECTING PIPES			
100		11.00	290.00	100	101	103	
101		10.00	350.00	101	102	104	106
102		10.00	350.00	100	104	105	107 108
103		10.00	350.00	107	109	110	123
104		10.00	360.00	111	123	126	2120
105		10.00	325.00	110	112	3501	
106		10.00	295.00	113	115		
107		27.00	312.00	112	113	116	122
108		10.00	320.00	115	116	118	119 121
109		10.00	350.00	118	122	124	125
110		10.00	370.00	124	127	128	
111		10.00	300.00	130	131	2121	
112		10.00	375.00	127	128	133	134
113		7.00	350.00	119	125	136	137
114		7.00	315.00	121	136	139	
115		7.00	325.00	140	142	143	
116		7.00	375.00	145	146	148	
117		10.00	386.00	133	146	149	
118		10.00	375.00	140	151	152	
119		10.00	395.00	151	154	155	
120		10.00	400.00	148	154	157	
121		10.00	400.00	149	157	158	2117
122		7.00	362.00	131	158	160	220
123		10.00	375.00	155	160	163	
124		10.00	375.00	163	164	166	167 3507
125		10.00	375.00	164	169	170	172
126		10.00	285.00	169	173	175	
127		10.00	260.00	175	176	178	
128		10.00	350.00	170	176	179	
129		10.00	325.00	178	179	181	182
130		10.00	320.00	181	184	185	187
131		10.00	325.00	182	184	188	
132		10.00	370.00	166	190	193	241
133		10.00	355.00	167	190	240	

134	10.00	350.00	188	193	194	242
135	10.00	325.00	194	196	197	
136	10.00	310.00	196	199	2100	
137	10.00	310.00	197	199	235	2101 2102
138	10.00	325.00	185	2101	2104	2105
139	7.00	305.00	2104	2107	2108	
140	7.00	290.00	187	2107	2110	
141	7.00	275.00	2108	2110	2111	
142	7.00	265.00	2105	2111	2113	
143	10.00	260.00	235	2102	2113	
144	10.00	235.00	2100			
145	10.00	360.00	117	126		
146	10.00	385.00	117	130	134	
147	10.00	320.00	139	142	143	2114
148	10.00	350.00	137	145	2114	
149	10.00	325.00	152	172	173	
150	10.00	310.70	103	106	120	255 2115
151	0.00	240.00	250	251	252	2115
152	11.00	355.00	102	105	114	
153	11.00	355.00	108	109	111	
154	11.00	355.00	114	120	253	
175	0.00	362.00	220	221		
176	10.00	362.00	240	241	242	
200	2.00	240.00	210	251		
201	16.90	240.00	221			
202	2.00	180.00	210	211	254	
210	9.00	79.00	206	207		
211	0.00	240.00	206	211		
220	2.00	268.00	252	253	254	
221	1.20	310.00	250	255		
300	9.00	130.00	301	302	448	
301	9.00	105.00	301	304		
302	9.00	120.00	307	447		
303	9.00	80.00	304	308	310	
304	9.00	120.00	308	311	313	371
305	9.00	120.00	311	314	370	
306	9.00	140.00	313	314	316	
307	9.00	115.00	316			
309	9.00	20.00	320	325		
310	9.00	47.00	207	320	322	323
311	9.00	35.00	326	328	329	331
312	9.00	40.00	326	332	334	
313	9.00	40.00	309	325		
314	9.00	80.00	307	334	335	339
315	9.00	90.00	335	337	338	
316	9.00	130.00	337	340		
317	9.00	92.00	338	340	341	372

318	9.00	74.00	341	343	344	346
319	9.00	150.00	343			
320	9.00	50.00	329	344	347	373
321	9.00	35.00	331	347	349	
322	9.00	70.00	346	350		
323	9.00	65.00	349	350	352	353
324	9.00	125.00	352	518		
325	9.00	60.00	353	355		
326	9.00	40.00	327	333	356	
327	9.00	55.00	356	358	3550	
328	83.00	50.00	358	359	361	
329	9.00	55.00	359			
330	9.00	65.00	355	362	522	
331	9.00	60.00	362	364		
332	9.00	70.00	361	364	365	
333	2.00	75.00	365	367		
334	2.00	60.00	367	368		
335	2.00	50.00	368			
336	9.00	140.00	302			
337	9.00	35.00	322	328		
338	9.00	60.00	309	310	369	
339	9.00	140.00	370	371	446	
340	9.00	40.00	323	324	330	
341	9.00	40.00	324	327	330	333
342	10.00	60.00	336	339	369	372
343	10.00	50.00	332	336	373	
400	3.00	285.00	400	405		
401	3.00	250.00	400	401	402	
402	3.00	180.00	404	411		
403	3.00	160.00	406	407	408	
404	11.00	210.00	403	406	442	
405	3.00	230.00	402	403	409	
406	0.00	180.00	404	408	412	
407	0.00	200.00	401	405	410	411
408	0.00	200.00	409	410	412	
413	0.00	190.00	435	437		
414	0.00	180.00	414	416	425	445 460
415	23.00	200.00	425	431	462	3263
416	17.00	150.00	461			
417	8.00	200.00	417	424	431	
418	18.00	190.00	432	433	434	
419	0.00	190.00	436	437	443	
420	13.00	200.00	434	436	439	
421	8.00	235.00	439	440	3261	
422	0.00	180.00	419	432	435	
423	7.00	120.00	443	447		
424	3.00	140.00	442	446		

426	9.00	130.00	445	448		
427	0.00	190.00	407	413	420	
428	0.00	180.00	414	418	426	
429	0.00	180.00	416	417	418	
430	0.00	180.00	422	423	427	
431	0.00	200.00	420	422	426	
432	0.00	200.00	423	424	433	
433	0.00	180.00	413	419	427	
450	8.00	177.00	460	461	462	
500	8.00	330.00	500	3273		
501	7.00	240.00	500	502	503	
502	8.00	270.00	502	505		
503	0.00	260.00	518	533		
504	8.00	240.00	532			
505	7.00	270.00	511	531	627	
506	8.00	270.00	511	512		
507	8.00	275.00	512	514		
508	0.00	200.00	514	521		
509	7.00	220.00	440	503		
511	9.00	65.00	521	522		
512	8.00	290.00	505	530		
520	8.00	280.00	530	531	532	533
603	7.00	390.00	601	602	622	1907
604	7.00	450.00	601	604	605	
605	7.00	460.00	604	607	608	628
606	7.00	450.00	605	610	611	
607	6.00	400.00	607	610	613	
608	6.00	350.00	612	613		
609	0.00	370.00	612	614	625	
610	7.00	390.00	608	614	617	
611	7.00	400.00	617	619		
612	7.00	325.00	611			
615	0.00	460.00	626	628	629	
618	0.00	390.00	602	622	627	
700	4.00	480.00	700			
701	5.00	500.00	700	701	703	
702	5.00	420.00	701	704		
703	5.00	530.00	703	704	771	
704	4.00	560.00	755	770		
705	4.00	510.00	754	761	772	
706	4.00	550.00	715	718	729	763
707	4.00	520.00	719			
708	4.00	550.00	715	719	721	
709	4.00	530.00	629	721	722	725
710	4.00	560.00	727	728	729	
711	4.00	555.00	728	730	3535	
712	4.00	530.00	730	731	733	

713	4.00	525.00	731	734				
714	4.00	500.00	734	736	737			
715	4.00	505.00	736	737	739			
716	4.00	520.00	739	742	751			
717	4.00	525.00	733	742	743			
718	4.00	500.00	743	745	746			
719	4.00	475.00	725	745				
720	4.00	550.00	722	727	746			
721	4.00	560.00	718	762				
723	0.00	460.00	754	759				
752	4.00	530.00	761	762	763			
753	4.00	530.00	770	771	772			
800	4.00	330.00	800	3271				
801	4.00	290.00	805	862	863			
802	6.00	260.00	806	808	809	811	812	865
803	6.00	305.00	806	814	815			
804	4.00	250.00	808	817				
805	4.00	180.00	809	817				
806	3.00	300.00	805	855				
807	6.00	280.00	811	812	814	820		
808	4.00	325.00	800	820	864			
900	5.00	420.00	901	902	3274			
901	4.00	430.00	901	905	907			
902	4.00	430.00	905	907	908			
903	4.00	420.00	902	910	911			
904	5.00	420.00	910	913				
905	4.00	485.00	914	916				
906	4.00	470.00	914	917	3536			
907	4.00	480.00	908	916	919			
908	5.00	470.00	911	919	920			
909	4.00	450.00	913	920	922			
910	5.00	440.00	922	923	2903			
911	4.00	390.00	917	925	926			
912	4.00	390.00	925	928	929			
913	4.00	405.00	928	931	932			
914	4.00	340.00	932	934	935			
915	4.00	375.00	923	926	937			
916	5.00	375.00	929	937	938			
917	5.00	365.00	938	940	941	943		
918	4.00	370.00	931	940	944	946		
919	4.00	380.00	944	947	949			
920	4.00	365.60	946	947	950			
921	5.00	354.00	935	949	952			
922	4.00	460.00	953	955				
923	4.00	295.00	952	962				
924	5.00	400.00	953	962	964	965		
925	4.00	425.00	967	968	971			

926	5.00	425.00	964	967	974	
927	4.00	410.00	2901	2904	2910	
928	4.00	395.00	900	903		
929	0.00	318.00	976	977	3262	
930	4.00	322.00	950	976	980	
931	4.00	325.00	980	981	982	983
932	5.00	369.00	985	986	988	989
933	5.00	431.00	933	985	998	2902
934	4.00	426.00	997	2903	2905	2912
935	4.00	420.00	2905	2906	2908	
936	5.00	400.00	903	2911		
937	0.00	330.00	2909	3260	3272	
938	4.00	380.00	2909	2914		
939	4.00	395.00	2902	2907	2914	
940	5.00	335.00	986	2915		
941	4.00	355.00	2915	2917	2918	
942	4.00	380.00	2901			
943	4.00	290.00	977	2904	2921	
944	4.00	460.00	759	2917	2923	
945	4.00	440.00	2910	2923	2924	2925
946	5.00	355.00	2924	2926	2927	
947	4.00	330.00	2921	2926	2929	
948	4.00	450.00	2925	2930		
949	4.00	410.00	2927	2930	2932	2933
950	4.00	425.00	2932	2935	2937	
951	5.00	320.00	2929	2933	2938	
952	4.00	300.00	2938	2939	2941	
953	4.00	290.00	2939	2942	2944	
954	4.00	275.00	2942	2945		
955	4.00	290.00	2945	2947	2948	
956	4.00	275.00	2944	2947	2950	
957	5.00	425.00	2935	2941	2950	2951
958	4.00	445.00	2951	2953		
959	4.00	375.00	2936	2953	2954	
960	4.00	350.00	2948	2956		
961	0.00	325.00	2954	2956	2957	3268
962	5.00	350.00	2957	2960		
963	4.00	375.00	2960	2962		
964	4.00	400.00	978			
965	4.00	470.00	975	2962	2965	
966	4.00	480.00	2965	2966	2968	
967	5.00	475.00	2966	2972	2974	
968	4.00	460.00	972	2975	2978	
969	4.00	450.00	2971	2972	2987	
970	4.00	500.00	751	2993		
971	5.00	320.00	2990	2995		
972	4.00	325.00	2995	2996		

973	4.00	341.00	2996	2996
974	4.00	335.00	2998	2999
975	0.00	455.00	2993	3275
976	5.00	345.00	2999	3200
977	0.00	360.00	3200	3201
978	4.00	455.00	3204	3207
979	4.00	415.00	2981	3207
980	4.00	350.00	3205	3208
981	4.00	350.00	2983	3210
982	4.00	350.00	3217	3219
983	4.00	380.00	3219	3223
984	4.00	390.00	2984	3223
985	4.00	425.00	2978	3229
986	4.00	380.00	3225	3234
987	4.00	370.00	3226	3234
988	4.00	365.00	3235	3237
989	4.00	360.00	3238	3241
990	4.00	385.00	3232	3241
991	4.00	385.00	3229	3244
992	4.00	350.00	3240	3247
993	4.00	325.00	3243	3249
994	4.00	340.00	3247	3249
995	0.00	360.00	851	3250
996	4.00	360.00	850	3253
997	0.00	395.00	1602	3213
998	4.00	490.00	2968	2969
1000	5.00	270.00	1000	3262
1001	4.00	255.00	1000	1001
1002	4.00	265.00	1001	1002
1003	5.00	288.70	1003	1005
1004	4.00	280.00	1004	1006
1005	4.00	320.00	1004	1006
1006	5.00	250.00	1002	1007
1007	4.00	250.00	1010	1010
1008	4.00	280.00	1005	1013
1009	5.00	280.00	1013	1016
1010	4.00	300.00	1016	1018
1011	4.00	315.00	1018	1019
1012	5.00	315.00	1019	1022
1013	4.00	285.00	1022	1025
1014	4.00	260.00	1024	1025
1015	5.00	292.00	1027	1028
1016	4.00	260.00	1028	1030
1017	4.00	280.00	1030	1031
1018	5.00	225.00	1031	1034
1019	4.00	250.00	1036	1037
1020	4.00	265.00	1037	1040

1021	5.00	275.00	1040	1043	
1022	4.00	280.00	1042	1043	1048
1023	4.00	300.00	1021	1045	1048
1024	5.00	280.00	1039	1045	1046
1025	4.00	310.00	1046	1049	1051
1026	4.00	245.00	1049	1052	1081
1027	5.00	240.00	1052	1054	1055 1057
1028	4.00	250.00	1054	1058	1060
1029	4.00	260.00	1015	1058	1061
1030	5.00	245.00	1060	1061	1063 1064
1031	4.00	245.00	1063	1066	1067
1032	4.00	240.00	1064	1069	1070
1033	5.00	240.00	1069	1072	1073
1034	4.00	240.00	1070	1072	1075
1035	4.00	240.00	1076	3019	3090
1036	5.00	240.00	1075	1076	1078
1037	4.00	240.00	1066	1067	1073
1038	4.00	240.00	1055	1078	1079
1039	5.00	250.00	1081	1082	
1040	4.00	290.00	1051	1082	1084
1041	4.00	245.00	1084	1085	1087
1042	5.00	220.00	1034	1085	1088 1090
1043	4.00	245.00	1087	1088	1091
1044	4.00	240.00	1057	1091	1093 1094
1045	5.00	240.00	1079	1093	1096
1046	4.00	225.00	1094	1097	1099
1047	4.00	206.00	1097	3002	3004
1048	5.00	250.00	1096	3005	3007
1049	4.00	270.00	1099	3005	3008 3010
1050	4.00	290.00	3008	3014	3016 3017
1051	5.00	270.00	3007	3014	3019 3020
1052	4.00	295.00	3020	3022	3023
1053	5.00	300.00	3022	3025	
1054	4.00	300.00	3025	3026	3278
1055	4.00	295.00	3016	3023	3026
1056	5.00	290.00	3017	3028	3029
1057	4.00	270.00	3028	3032	3034
1058	4.00	265.00	3032	3035	3037 3038
1059	5.00	270.00	3034		
1060	4.00	295.00	3035	3048	
1061	4.00	220.00	3002	3037	3040
1062	5.00	175.00	3041	3043	3045
1063	4.00	175.00	3046		
1064	4.00	140.00	3043	3047	
1065	4.00	275.00	3047	3049	
1066	4.00	200.00	3049	3050	3051
1067	4.00	300.00	815	3050	3052

1068	5.00	175.00	3052		
1069	4.00	200.00	3055		
1070	4.00	200.00	1090	3056	3058
1071	5.00	200.00	3055	3056	3057
1072	4.00	225.00	3058	3060	3062
1079	4.00	225.00	3073	3074	
1080	5.00	260.00	3073	3076	3077
1081	4.00	320.00	1447	3076	3079
1082	4.00	260.00	3077	3079	3080
1083	5.00	145.00	3080	3087	
1086	4.00	194.20	3062	3074	
1091	5.00	260.00	3004	3010	3038
1092	4.00	212.00	3040	3044	
1093	5.00	185.00	3057	3083	
1094	4.00	180.00	1098	3046	3083
1095	4.00	178.00	1098	3041	3084
1096	5.00	195.00	3042	3044	3084
1098	5.00	185.00	3042	3045	3048
1100	4.00	415.00	1100		
1101	5.00	420.00	1100	1102	1103
1102	5.00	450.00	1102	1105	
1103	5.00	345.00	1101	1106	1108
1104	4.00	400.00	1109		
1105	5.00	450.00	1105	1109	1111
1106	5.00	450.00	1111	1112	
1107	4.00	450.00	1112	1114	1115
1108	5.00	470.00	1114	1117	1118
1109	0.00	440.00	1117	1120	1156
1110	5.00	500.00	1118	1123	1124 1137
1111	4.00	500.00	1123	1126	1127
1112	5.00	480.00	1120	1126	1129
1113	5.00	460.00	1129	1130	1132
1114	5.00	465.00	1127	1131	1133
1115	10.00	430.00	1133	1135	1136
1116	10.00	420.00	1132	1135	1138
1117	10.00	390.00	1138	1139	1141
1118	10.00	365.00	1139	1142	1144
1119	10.00	380.00	1136	1142	
1120	10.00	320.00	1141	1144	
1121	5.00	360.00	1106	1115	
1122	5.00	380.00	1124	1145	
1123	4.00	370.00	968	1147	1148
1124	4.00	375.00	1145	1150	1151
1125	4.00	305.00	1147	1150	1153
1126	4.00	300.00	974	1153	
1127	4.00	300.00	1148	1151	
1128	4.00	350.00	1101	1103	1108 1154

1129	4.00	350.00	956	973	1154
1130	4.00	450.00	958		
1131	0.00	500.00	1137	3103	
1135	0.00	500.00	1130	1131	
1200	1.40	320.00	1201		
1201	1.40	280.00	1156	1201	
1300	4.00	275.00	625	1300	
1301	4.00	250.00	1300	1301	
1302	4.00	325.00	1301	1303	
1303	4.00	260.00	1303	1304	
1304	4.00	325.00	1304	1306	
1305	4.00	320.00	1306	1307	1309
1306	4.00	310.00	1307	3279	
1424	0.00	320.00	1447		
1600	4.00	300.00	1601		
1601	11.00	275.00	1309	1600	1603 1604
1602	11.00	200.00	1600	1604	
1700	10.00	120.00	1701	1707	1709
1701	10.00	125.00	1700	1709	
1702	10.00	125.00	1700	3051	
1703	10.00	160.00	1707	1708	
1704	10.00	160.00	1701	1702	
1705	10.00	170.00	1702	1703	1704
1706	10.00	225.00	1703	1705	
1707	9.00	250.00	1704	1705	
1900	5.80	420.00	1900	1901	
1901	2.00	490.00	1900	1901	1903
1902	2.00	470.00	755	1903	1904
1903	2.00	390.00	1904	1906	
1904	0.00	390.00	1906	1907	3552
2000	5.00	273.00	2000		
2001	4.00	272.00	2000	2001	2002
2100	0.00	260.00	2120	2121	2122
2101	5.60	260.00	2122		
2900	4.00	375.00	955	956	958 959
2901	4.00	350.00	934	959	
2902	4.00	425.00	965	971	973
2903	4.00	350.00	982	988	991
2904	4.00	360.00	943	981	991 992
2905	4.00	400.00	989	992	995
2906	4.00	400.00	941	997	2900
2907	4.00	370.00	998	999	2913
2908	4.00	370.00	983	2918	
2909	4.00	425.00	2936	2937	3522
2910	4.00	480.00	2969	2971	
2911	4.00	470.00	2974	2975	2977
2912	4.00	435.00	2980	2981	2983 2987

2913	4.00	445.00	2977	2980	2984	2986
2914	4.00	450.00	619	2990		
2915	4.00	435.00	3201	3204	3205	
2916	4.00	375.00	3211	3213	3216	
2917	4.00	365.00	3216	3220	3222	
2918	4.00	400.00	3228	3231	3232	
2919	4.00	390.00	3246			
2920	4.00	375.00	3222	3252	3253	
2924	4.00	303.00	3268	3278		
2929	4.00	275.00	1601	1602	1603	
2935	4.00	430.00	900	2907	2908	
2936	8.00	235.00	3260	3261		
2937	4.00	330.00	3272	3273		
2938	4.00	200.00	3263	3274		
2939	4.00	420.00	995	999		
2940	3.00	460.00	2906	2911		
2951	4.00	316.00	850	851	852	
2952	4.00	316.00	852	853	854	
2953	3.00	316.00	854	855		
2954	4.00	316.00	853	861	864	
2955	4.00	316.00	860	861	862	
2956	4.00	316.00	860	863	865	
2957	4.00	443.00	972	975	978	
2958	4.00	399.00	2900	2912	2913	
3002	0.00	150.00	1708	3087		
3004	0.00	225.00	3060			
3007	4.00	240.00	3090			
3400	0.00	216.00	3400	3550		
3500	0.00	455.00	3525	3527	3528	
3501	0.00	488.00	3512	3530		
3502	0.00	492.00	3530	3531	3536	
3504	0.00	318.30	3110	3501		
3505	0.00	380.00	3130	3507		
3508	0.00	233.00	3100	3101		
3509	0.00	535.00	3537	3538	3542	
3510	0.00	535.00	3522	3543		
3511	0.00	402.00	3029	3030	3545	
3512	0.00	355.00	3525	3549		
3513	0.00	525.00	3259	3544		
3520	0.00	555.00	3535	3537	3538	9000
3533	0.00	474.30	626	3527		
3534	0.00	379.70	3513	3528	3552	
3535	0.00	503.20	3513	3553		
3536	0.00	438.50	933	3512	3553	
3538	0.00	280.00	3101	3102	3104	
3540	0.00	453.00	3102	3103		

O U T P U T O P T I O N D A T A

OUTPUT SELECTION: THE FOLLOWING RESULTS ARE INCLUDED IN THE TABULATED OUTPUT

ALL CLOSED PIPES ARE NOTED

ALL PIPES WITH PUMPS

FOLLOWING PIPES

210	404	405	406	407	408	409	410	411	412	413	414	416
431	432	433	1201	3263	3274							

ALL JUNCTION NODES

MAXIMUM AND MINIMUM PRESSURES = 20

MAXIMUM AND MINIMUM VELOCITIES = 20

S Y S T E M C O N F I G U R A T I O N

NUMBER OF PIPES	(p)	=	706
NUMBER OF JUNCTION NODES	(j)	=	503
NUMBER OF PRIMARY LOOPS	(l)	=	192
NUMBER OF FIXED GRADE NODES	(f)	=	12
NUMBER OF SUPPLY ZONES	(z)	=	1

East Side of District - Existing Conditions Data Summary

***** K Y P I P E 3 *****
* University of Kentucky Hydraulic Analysis Program *
* Distribution of Pressure and Flows in Piping Networks *
* 1000 PIPE VERSION - 1.00 (04/15/97) *

DATE: 11/03/99
TIME: 09:07:55.32

INPUT DATA FILENAME ----- C:\KYTMP\DATA\EAST98.DAT
TABULATED OUTPUT FILENAME ----- C:\KYTMP\DATA\EAST98.OUT
POSTPROCESSOR RESULTS FILENAME --- C:\KYTMP\DATA\EAST98.RES

SUMMARY OF ORIGINAL DATA

U N I T S S P E C I F I E D

FLOWRATE = gallons/minute
HEAD (HGL) = feet
PRESSURE = psig

R E G U L A T I N G V A L V E D A T A

RV LABEL	VALVE TYPE	POSITION JUNCTION	CONTROLLED PIPE	VALVE SETTING (ft or gpm)
R1	PRV-2	1556	1529	575.00
R2	PRV-1	3005	1451	485.00
R3	PRV-2	1515	1527	575.00
R4	PRV-1	1807	1806	575.00
R5	PRV-1	1507	2201	540.00

P I P E L I N E D A T A

STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PU -PUMP LINE
 CV -CHECK VALVE RV -REGULATING VALVE

PIPE NUMBER	NODE NOS. #1	NODE NOS. #2	LENGTH (ft)	DIAMETER (in)	ROUGHNESS COEFF.	PUMP LABEL	MINOR LOSS COEFF.	FGN-HGL (ft)
1400	1400	1401	2900.0	12.0	142.00		0.00	
1405	1401	1402	900.0	12.0	142.00		0.00	
1406	1404	1402	1300.0	8.0	142.00		0.00	
1408	1405	1403	1300.0	8.0	125.00		0.00	
1409	1421	1403	1500.0	8.0	125.00		0.00	
1411	1404	1405	1600.0	8.0	125.00		0.00	
1412	1406	1404	1700.0	8.0	125.00		0.00	
1415	1407	1406	600.0	8.0	125.00		0.00	
1417	1408	1407	1000.0	8.0	125.00		0.00	
1418	1409	1407	2400.0	8.0	125.00		0.00	
1420	1409	1408	900.0	12.0	125.00		0.00	
1421	1408	1410	700.0	12.0	125.00		0.00	
1423	1416	1409	2200.0	12.0	125.00		0.00	
1424	1410	1414	700.0	12.0	125.00		0.00	
1427	1413	1411	1000.0	8.0	125.00		0.00	
1429	1411	1421	1900.0	8.0	125.00		0.00	
1430	1412	1413	750.0	8.0	125.00		0.00	
1432	1415	1412	1300.0	12.0	125.00		0.00	
1433	1413	1421	3400.0	8.0	125.00		0.00	
1435	1414	1415	1150.0	12.0	125.00		0.00	
1437	1414	1427	2000.0	8.0	130.00		0.00	
1438	1422	1415	1300.0	8.0	130.00		0.00	
1439	1425	1422	650.0	8.0	130.00		0.00	
1440	1426	1422	1000.0	8.0	130.00		0.00	
1441	1426	1425	300.0	8.0	130.00		0.00	
1442	1427	1426	300.0	8.0	130.00		0.00	
1444	1557	1400	310.0	12.0	140.00		0.00	
1445	1557	3005	1100.0	12.0	125.00		0.00	
1446	1421	1424	600.0	8.0	125.00		0.00	
1451-RV	3005	1075	10.0	6.0	140.00		0.00	
1500	1500	1558	1500.0	12.0	125.00		0.00	
1501	1507	1530	2000.0	8.0	125.00		0.00	
1502	1530	1533	300.0	8.0	125.00		0.00	
1503	1533	1500	125.0	8.0	125.00		0.00	
1504	1530	1535	1084.0	8.0	125.00		0.00	
1505	1502	1501	3000.0	8.0	125.00		0.00	
1506	1533	1534	1380.0	8.0	125.00		0.00	
1507	1535	1536	334.0	8.0	125.00		0.00	
1508	1501	1507	1800.0	8.0	125.00		0.00	
1509	1534	1535	516.0	8.0	125.00		0.00	

1510	1506	1502	1400.0	10.0	130.00	0.00
1511	1502	1503	1950.0	8.0	140.00	0.00
1512	1536	1801	2294.0	12.0	130.00	0.00
1523	1503	1511	900.0	8.0	140.00	0.00
1525	1511	1556	800.0	8.0	140.00	0.00
1526	1402	1519	1300.0	8.0	140.00	0.00
1527-RV	1515	1521	100.0	12.5	125.00	0.00
1528	1521	1416	10.0	12.5	125.00	0.00
1529-RV	1556	1519	500.0	8.0	140.00	0.00
1533	1548	1549	490.0	8.0	130.00	0.00
1540	1511	1540	1942.0	8.0	130.00	0.00
1541	1541	1540	745.0	8.0	130.00	0.00
1542	1540	1544	762.0	8.0	130.00	0.00
1544	1541	1542	672.0	8.0	130.00	0.00
1545	1544	1545	1092.0	8.0	130.00	0.00
1546	1544	1545	1567.0	8.0	130.00	0.00
1548	1545	1546	507.0	8.0	130.00	0.00
1549	1501	1542	1458.0	8.0	130.00	0.00
1550	1542	1546	1745.0	12.0	130.00	0.00
1551	1550	1558	1600.0	12.0	130.00	0.00
1552	1546	1548	157.0	12.0	130.00	0.00
1554	1548	1550	1202.0	12.0	130.00	0.00
1556	1549	1550	1156.0	8.0	130.00	0.00
1557	3545	1551	2000.0	12.0	130.00	0.00
1558	1551	1552	1816.0	12.0	130.00	0.00
1559	1561	1557	2850.0	12.0	130.00	0.00
1560	1552	1561	2518.0	12.0	130.00	0.00
1561-XX	1546	1551	100.0	8.0	130.00	0.00
1562	1560	1559	1100.0	12.0	130.00	0.00
1563	1559	1562	1055.0	12.0	130.00	0.00
1564	1562	1813	487.0	12.0	130.00	0.00
1569	1556	1555	1632.0	8.0	130.00	0.00
1571	1544	1554	500.0	8.0	130.00	0.00
1572	1554	1553	500.0	8.0	130.00	0.00
1574	1503	1541	1900.0	12.0	130.00	0.00
1576	1555	1554	600.0	8.0	130.00	0.00
1580	1535	1580	672.0	8.0	125.00	0.00
1800	1801	1805	1463.0	12.0	130.00	0.00
1801	1805	1806	1703.0	12.0	130.00	0.00
1802	1806	1813	703.0	12.0	130.00	0.00
1803	1813	1814	1347.0	8.0	130.00	0.00
1804	1806	1807	207.0	12.0	130.00	0.00
1805-XX	1808	1814	1073.0	8.0	130.00	0.00
1806-RV	1807	1808	296.0	12.0	130.00	0.00
1807	1809	1808	2133.0	12.0	130.00	0.00
1808	1809	1810	305.0	12.0	130.00	0.00
1809	1816	1810	560.0	8.0	130.00	0.00

1810	1826	1816	490.0	8.0	130.00	0.00	
1811	1812	1826	426.0	12.0	130.00	0.00	
1812	1812	1809	1000.0	12.0	130.00	0.00	
1813	1558	1801	2400.0	12.0	130.00	0.00	
1820	1813	1822	487.0	12.0	130.00	0.00	
1821	1822	1823	643.0	12.0	130.00	0.00	
1822	1823	1824	740.0	8.0	130.00	0.00	
1823	1822	1825	430.0	8.0	130.00	0.00	
1824	1814	1821	601.0	8.0	130.00	0.00	
1825	1808	1820	1040.0	8.0	130.00	0.00	
1826	1812	1827	352.0	12.0	130.00	0.00	
1827	1827	1828	465.0	12.0	130.00	0.00	
1828	1828	1829	498.0	12.0	130.00	0.00	
1829	1829	1830	395.0	12.0	130.00	0.00	
1830	1827	1831	369.0	8.0	130.00	0.00	
1831	1829	1832	594.0	8.0	130.00	0.00	
1832	1820	1833	1115.0	8.0	130.00	0.00	
2003-PU	1510	2001	1200.0	8.0	125.00	0.00	P1
2201-RV	1507	2200	1200.0	8.0	125.00	0.00	
2202	2200	2201	1100.0	8.0	125.00	0.00	
2203	2200	2202	800.0	8.0	125.00	0.00	
3001	1075	3006	2100.0	8.0	125.00	0.00	
3003	1561	3008	1000.0	8.0	125.00	0.00	
3018	1510	3529	1200.0	10.0	130.00	0.00	
3054	3000	3001	1600.0	8.0	135.00	0.00	
3059	1076	3000	625.0	8.0	130.00	0.00	
3061	1078	3004	830.0	8.0	125.00	0.00	
3064	3000	1073	625.0	8.0	125.00	0.00	
3065	1073	1078	1800.0	8.0	125.00	0.00	
3066	1074	1099	650.0	8.0	140.00	0.00	
3067	1075	1074	700.0	6.0	140.00	0.00	
3068	1074	1099	700.0	6.0	140.00	0.00	
3069	1075	1099	1500.0	8.0	140.00	0.00	
3070	1076	1077	1550.0	8.0	140.00	0.00	
3071	1077	1078	1200.0	8.0	140.00	0.00	
3085	3001	1076	750.0	8.0	130.00	0.00	
3086	1099	3001	750.0	8.0	140.00	0.00	
3507-FG	AA	1560	20.0	12.0	130.00	0.00	670.00
3515	1510	1506	2200.0	10.0	130.00	0.00	
3516	3506	3529	800.0	12.0	125.00	0.00	
3517	3506	1515	2500.0	12.0	125.00	0.00	
3538-FG	BB	3506	20.0	10.0	130.00	0.00	670.00
3545-FG	CC	3545	20.0	12.0	130.00	0.00	575.00
3575	3529	1503	5000.0	12.0	130.00	0.00	

P U M P D A T A

THERE IS A PUMP ID NO. 1 IN THE FOLLOWING PIPES:
 2003

DESCRIBED BY THE FOLLOWING DATA:

HEAD (ft)	FLOWRATE (gpm)
170.00	0.00
168.00	60.00
148.00	106.00

J U N C T I O N N O D E D A T A

JUNCTION NUMBER	JUNCTION TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	CONNECTING PIPES
1073		2.00	270.00	3064 3065
1074		2.00	320.00	3066 3067 3068
1075		2.00	350.00	1451 3001 3067 3069
1076		2.00	325.00	3059 3070 3085
1077		2.00	325.00	3070 3071
1078		2.00	300.00	3061 3065 3071
1099		2.00	322.00	3066 3068 3069 3086
1400		5.00	392.00	1400 1444
1401		5.00	435.00	1400 1405
1402		5.00	420.00	1405 1406 1526
1403		9.00	250.00	1408 1409
1404		5.00	430.00	1406 1411 1412
1405		6.00	390.00	1408 1411
1406		5.00	415.00	1412 1415
1407		5.00	415.00	1415 1417 1418
1408		5.00	415.00	1417 1420 1421
1409		6.00	430.00	1418 1420 1423
1410		5.00	415.00	1421 1424
1411		9.00	390.00	1427 1429
1412		9.00	395.00	1430 1432
1413		9.00	410.00	1427 1430 1433
1414		5.00	465.00	1424 1435 1437
1415		6.00	445.00	1432 1435 1438
1416		5.00	425.00	1423 1528
1421		9.00	380.00	1409 1429 1433 1446

1422	5.00	435.00	1438	1439	1440
1424	0.00	320.00	1446		
1425	5.00	430.00	1439	1441	
1426	5.00	420.00	1440	1441	1442
1427	6.00	400.00	1437	1442	
1500	3.00	575.00	1500	1503	
1501	3.00	530.00	1505	1508	1549
1502	3.00	560.00	1505	1510	1511
1503	3.00	545.00	1511	1523	1574 3575
1506	3.00	570.00	1510	3515	
1507	0.00	535.00	1501	1508	2201
1510	0.00	600.00	2003	3018	3515
1511	0.00	500.00	1523	1525	1540
1515	0.00	450.00	1527	3517	
1519	5.00	444.70	1526	1529	
1521	5.00	425.00	1527	1528	
1530	3.00	510.00	1501	1502	1504
1533	3.00	560.00	1502	1503	1506
1534	3.00	490.00	1506	1509	
1535	3.00	460.00	1504	1507	1509 1580
1536	3.00	430.00	1507	1512	
1540	3.00	480.00	1540	1541	1542
1541	3.00	490.00	1541	1544	1574
1542	3.00	505.00	1544	1549	1550
1544	4.00	470.00	1542	1545	1546 1571
1545	3.00	480.00	1545	1546	1548
1546	4.00	500.00	1548	1550	1552 1561
1548	3.00	520.00	1533	1552	1554
1549	3.00	555.00	1533	1556	
1550	3.00	525.00	1551	1554	1556
1551	5.00	420.00	1557	1558	1561
1552	5.00	330.00	1558	1560	
1553	3.00	470.00	1572		
1554	3.00	470.00	1571	1572	1576
1555	4.00	470.00	1569	1576	
1556	0.00	500.00	1525	1529	1569
1557	5.00	375.00	1444	1445	1559
1558	3.00	425.00	1500	1551	1813
1559	3.00	510.00	1562	1563	
1560	4.00	545.00	1562	3507	
1561	5.00	265.00	1559	1560	3003
1562	3.00	470.00	1563	1564	
1580	3.00	460.00	1580		
1801	3.00	450.00	1512	1800	1813
1805	3.00	440.00	1800	1801	
1806	3.00	440.00	1801	1802	1804
1807	0.00	450.00	1804	1806	

1808	4.00	450.00	1805	1806	1807	1825
1809	3.00	450.00	1807	1808	1812	
1810	4.00	480.00	1808	1809		
1812	3.00	470.00	1811	1812	1826	
1813	3.00	450.00	1564	1802	1803	1820
1814	3.00	460.00	1803	1805	1824	
1816	3.00	480.00	1809	1810		
1820	4.00	445.00	1825	1832		
1821	3.00	460.00	1824			
1822	4.00	450.00	1820	1821	1823	
1823	3.00	450.00	1821	1822		
1824	4.00	450.00	1822			
1825	3.00	450.00	1823			
1826	4.00	475.00	1810	1811		
1827	3.00	470.00	1826	1827	1830	
1828	3.00	470.00	1827	1828		
1829	3.00	470.00	1828	1829	1831	
1830	3.00	470.00	1829			
1831	4.00	470.00	1830			
1832	4.00	470.00	1831			
1833	3.00	435.00	1832			
2001	3.20	600.00	2003			
2200	0.00	475.00	2201	2202	2203	
2201	3.50	390.00	2202			
2202	3.50	375.00	2203			
3000	2.00	300.00	3054	3059	3064	
3001	2.00	324.00	3054	3085	3086	
3004	0.00	225.00	3061			
3005	0.00	350.00	1445	1451		
3006	2.00	265.00	3001			
3008	5.00	310.00	3003			
3506	0.00	500.00	3516	3517	3538	
3529	0.00	500.00	3018	3516	3575	
3545	0.00	555.00	1557	3545		

OUTPUT OPTION DATA

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT

SYSTEM CONFIGURATION

NUMBER OF PIPES(p) = 131
 NUMBER OF JUNCTION NODES(j) = 106

NUMBER OF PRIMARY LOOPS(l) = 21
NUMBER OF FIXED GRADE NODES(f) = 5
NUMBER OF SUPPLY ZONES(z) = 1

*West Side; Kingsgate; PHD
Equalizing Storage Depleted
2020. Existing infrastructure*

CHANGES FOR NEXT SIMULATION

DEMAND CHANGES

DEMAND TYPE = 1 - GDF = 5.100

PIPE PARAMETER CHANGES

STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PU -PUMP LINE
CV -CHECK VALVE RV -REGULATING VALVE

PIPE NUMBER	NODE #1	NODE #2	LENGTH (ft)	DIAMETER (in)	ROUGHNESS COEFF.	MINOR LOSS COEFF.	FGN-HGL (ft)
2990	2914	971	1600.0	10.0	125.00	0.00	0.00
617	610	611	2100.0	10.0	125.00	0.00	0.00
614	609	610	1800.0	10.0	125.00	0.00	0.00
608	605	610	1950.0	10.0	125.00	0.00	0.00
604	604	605	1300.0	10.0	125.00	0.00	0.00
2990	2914	971	1600.0	10.0	125.00	0.00	0.00
3201	977	2915	1400.0	10.0	125.00	0.00	0.00
3204	2915	978	700.0	10.0	125.00	0.00	0.00
3207	978	979	700.0	10.0	125.00	0.00	0.00
619	611	2914	2450.0	10.0	130.00	0.00	0.00

SIMULATION RESULTS

THE RESULTS ARE OBTAINED AFTER 16 TRIALS WITH AN ACCURACY = 0.00080
THE REGULATING VALVES REQUIRED 3 ADJUSTMENTS

SIMULATION DESCRIPTION (LABEL)

Simulation of PHD for Zone 1; Kingsgate Reservoir equalizing storage depleted.

PIPELINE RESULTS

STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PU -PUMP LINE
 CV -CHECK VALVE RV -REGULATING VALVE TK -STORAGE TANK

PIPE NUMBER	NODE NOS. #1 #2	FLOWRATE (gpm)	HEAD LOSS (ft)	PUMP HEAD (ft)	PUMP LABEL	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL/ 1000 (ft/ft)
3537-PU	3509 3520	833.56	0.23	135.25	P1	0.00	2.36	2.27

FOLLOWING ADDITIONAL PIPES ARE CLOSED :
 253 754 852 855 1103 1108 1145 1708 1906 2115 3501 3538

MAXIMUM AND MINIMUM VALUES

PRESURES

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
3508	154.70	3511	7.62
1083	147.16	3510	12.46
3002	144.99	3509	17.48
3538	128.29	3513	18.78
1086	125.94	3400	19.06
1700	125.01	2940	25.91
702	122.97	3535	27.01
956	121.36	1135	30.83
954	121.30	907	30.90
202	117.37	1111	31.07
1064	115.89	1110	31.51
953	114.86	1131	31.58
955	114.74	998	31.64
943	113.31	120	32.60
923	113.29	3502	32.82
1072	112.84	905	32.95
3004	112.84	121	33.32
1079	112.54	2910	33.92
1127	111.44	908	34.10

1126 111.42 3501 34.51

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
3130	16.87	604	0.00
3507	16.87	332	0.01
933	12.00	986	0.01
2914	11.06	701	0.01
2909	10.93	1057	0.01
2902	9.10	1075	0.01
3531	8.89	2944	0.01
627	8.77	1705	0.01
3536	8.62	974	0.02
3274	7.21	991	0.03
3263	7.05	2110	0.03
916	6.35	817	0.03
3549	6.22	400	0.04
1907	6.08	347	0.04
3552	6.08	3238	0.04
2968	5.83	1306	0.04
439	5.45	2002	0.05
511	5.40	956	0.05
2905	5.38	725	0.06
3259	5.37	127	0.06

R E G U L A T I N G V A L V E R E P O R T

RV LABEL	VALVE TYPE	POSITION NODE	CONTROLLED PIPE	VALVE SETTING (ft or gpm)	VALVE STATUS	UPSTREAM GRADE (ft)	DOWNSTREAM GRADE (ft)	THROUGH FLOW (gpm)
R1	PRV-1	3504	3501	510.00	THROTTLED	559.97	472.08	0.00
R2	PRV-1	211	206	260.00	THROTTLED	449.04	257.46	350.45
R3	PRV-1	503	518	260.00	THROTTLED	413.00	255.37	159.05
R4	PRV-1	705	754	540.00	CLOSED	706.71	551.05	0.00
R5	PRV-1	704	755	585.00	THROTTLED	703.53	584.65	100.98
R6	PRV-1	618	627	420.00	THROTTLED	545.68	416.53	773.01
R7	PRV-1	3002	1708	340.00	CLOSED	484.60	408.40	0.00
R8	PRV-1	975	3275	550.00	THROTTLED	701.27	549.96	190.92
R9	PRV-1	929	3262	425.00	THROTTLED	550.38	418.57	269.85
RA	PRV-1	937	3260	425.00	THROTTLED	427.68	423.99	1255.06

RB	PRV-1	419	443	265.00	THROTTLED	402.43	263.50	599.52
RC	PRV-1	961	3268	415.00	THROTTLED	554.01	412.37	328.52
RD	PRV-1	3505	3507	510.00	THROTTLED	558.81	482.27	2642.56
RE	PRV-1	508	521	260.00	THROTTLED	369.86	255.05	368.69
RF	PRV-1	404	442	260.00	THROTTLED	383.74	257.40	546.30
RG	PRV-1	1109	1156	420.00	THROTTLED	571.24	419.92	37.74
RH	PRV-1	609	625	420.00	THROTTLED	551.49	419.68	105.81
RI	PRV-1	995	3271	420.00	THROTTLED	545.17	418.80	870.55
RJ	PRV-1	2937	3273	420.00	THROTTLED	423.08	419.68	456.82
RK	PRV-1	175	221	420.00	THROTTLED	472.26	418.93	301.41
RL	PRV-1	615	628	575.00	WIDE OPEN	561.08	552.63	391.93
RM	PRV-1	1904	1907	560.00	THROTTLED	565.35	557.91	952.50
RN	PRV-1	414	445	260.00	THROTTLED	402.18	256.67	432.34
RO	PRV-1	977	3279	420.00	THROTTLED	549.76	419.42	79.19
RP	PRV-1	3538	3104	420.00	THROTTLED	576.06	414.15	685.17
RQ	PRV-1	997	1602	420.00	THROTTLED	546.27	419.10	115.90
RR	PRV-1	1066	3051	340.00	THROTTLED	406.16	336.37	402.90
RS	PRV-1	3536	933	570.00	WIDE OPEN	564.53	551.89	1879.81
RT	PRV-1	2100	2122	340.00	THROTTLED	472.05	339.99	127.50
RU	PRV-1	900	3274	420.00	THROTTLED	519.03	405.23	1129.60
RV	PRV-1	1131	1137	575.00	WIDE OPEN	572.88	572.72	1046.77
RW	FCV-1	3504	3501	600.00	THROTTLED	559.97	472.08	600.00

SUMMARY OF INFLOWS AND OUTFLOWS

- (+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES
 (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

NODE LABEL	PIPE NUMBER	FLOWRATE (gpm)	NODE TITLE
AA	2117	1573.97	
BB	3030	635.82	
CC	3100	1731.95	
DD	3110	600.00	
EE	3130	2642.56	
FF	3400	1654.24	
GG	3531	3132.36	
HH	3542	833.56	
MM	3543	975.37	
II	3544	1892.49	
JJ	3545	183.38	
KK	3549	2192.93	
LL	9000	-1.25	

NET SYSTEM INFLOW = 18048.63
NET SYSTEM OUTFLOW = -1.25
NET SYSTEM DEMAND = 18047.43

*Fireflow Node 402
ES & FS depleted (except Kingsgate)*

CHANGES FOR NEXT SIMULATION

DEMAND CHANGES

DEMAND TYPE = 1 - GDF = 3.000

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND (gpm)
402	1400.00

SIMULATION RESULTS

THE RESULTS ARE OBTAINED AFTER 21 TRIALS WITH AN ACCURACY = 0.00039
THE REGULATING VALVES REQUIRED 3 ADJUSTMENTS

PIPELINE RESULTS

STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PU -PUMP LINE
CV -CHECK VALVE RV -REGULATING VALVE TK -STORAGE TANK

PIPE NUMBER	NODE NOS. #1	NODE NOS. #2	FLOWRATE (gpm)	HEAD LOSS (ft)	PUMP HEAD (ft)	PUMP LABEL	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL/1000 (ft/ft)
210	200	202	55.67	0.05	0.00		0.00	0.36	0.11
404	402	406	-508.80	9.70	0.00		0.00	3.25	6.06
405	400	407	53.74	0.20	0.00		0.00	0.34	0.09
406	403	404	506.85	1.42	0.00		0.00	2.07	2.03
407	403	427	-1619.30	53.66	0.00		0.00	6.61	17.45
408	403	406	1103.46	2.83	0.00		0.00	4.51	8.58
409	408	405	-17.59	0.01	0.00		0.00	0.11	0.01
410	407	408	-612.24	3.29	0.00		0.00	3.91	8.54
411	407	402	891.20	2.57	0.00		0.00	5.69	17.12
412	408	406	-594.66	3.84	0.00		0.00	3.80	8.09

413	427	433	-840.61	2.33	0.00	0.00	3.43	5.18	
414	414	428	193.30	1.40	0.00	0.00	1.23	0.94	
416	414	429	214.30	1.10	0.00	0.00	1.37	1.13	
431	415	417	358.87	2.39	0.00	0.00	2.29	2.39	
432	422	418	-399.08	0.69	0.00	0.00	1.63	1.30	
433	432	418	-74.89	0.07	0.00	0.00	0.48	0.13	
1201	1201	1200	4.20	0.00	0.00	0.00	0.03	0.00	
3263	2938	415	1033.92	1.46	0.00	0.00	6.60	20.90	
3274-RV	900	2938	1045.92	12.81	0.00	0.00	6.68	21.35	
3537-PU	3509	3520	354.59	0.05	136.77	P1	0.00	1.01	0.47

FOLLOWING ADDITIONAL PIPES ARE CLOSED :

253 754 852 855 1103 1108 1145 1708 1906 2115 3275 3538 9000

MAXIMUM AND MINIMUM VALUES

PRESSURES

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
3508	154.70	3511	7.16
1083	150.80	3510	10.44
3002	148.63	3513	18.48
202	141.17	3400	19.07
3538	131.22	3509	19.08
1086	129.52	400	21.41
1700	128.13	3535	26.65
702	127.39	3502	30.51
956	122.71	907	31.49
954	122.66	905	32.00
1064	118.82	1135	32.13
144	118.24	3501	32.24
1072	116.26	1111	32.25
3004	116.26	1110	32.46
955	116.22	2940	32.48
953	116.15	998	32.70
1079	116.15	2101	34.67
151	115.24	1131	35.11
200	115.19	908	35.17
211	115.10	2910	36.22

VELOCITIES

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
933	9.32	148	0.00
2914	9.26	701	0.00
2909	9.19	139	0.01
3030	7.98	160	0.01
2902	7.42	355	0.01
3274	6.68	1705	0.01
407	6.61	2996	0.01
3263	6.60	2111	0.01
3536	5.85	1094	0.01
411	5.69	817	0.01
3549	5.66	3022	0.01
439	5.49	310	0.01
916	4.97	811	0.02
420	4.97	2107	0.02
902	4.84	361	0.02
3260	4.69	1306	0.02
3545	4.67	812	0.02
3261	4.60	350	0.02
408	4.51	309	0.02
3531	4.35	974	0.02

REGULATING VALVE REPORT

RV LABEL	VALVE TYPE	POSITION NODE	CONTROLLED VALVE PIPE	VALVE SETTING (ft or gpm)	VALVE STATUS	UPSTREAM GRADE (ft)	DOWNSTREAM GRADE (ft)	THROUGH FLOW (gpm)
R1	PRV-1	3504	3501	510.00	THROTTLED	559.98	509.09	454.00
R2	PRV-1	211	206	260.00	THROTTLED	505.61	259.76	97.65
R3	PRV-1	503	518	260.00	THROTTLED	418.22	259.55	44.94
R4	PRV-1	705	754	540.00	CLOSED	714.79	554.34	0.00
R5	PRV-1	704	755	585.00	THROTTLED	714.00	584.95	35.40
R6	PRV-1	618	627	420.00	THROTTLED	556.75	419.16	358.99
R7	PRV-1	3002	1708	340.00	CLOSED	493.00	415.66	0.00
R8	PRV-1	975	3275	550.00	CLOSED	715.42	559.72	0.00
R9	PRV-1	929	3262	425.00	THROTTLED	553.82	420.71	216.84
RA	PRV-1	937	3260	425.00	THROTTLED	466.42	424.14	1149.20
RB	PRV-1	419	443	265.00	THROTTLED	403.83	264.38	373.27
RC	PRV-1	961	3268	415.00	THROTTLED	558.76	415.00	4.22
RD	PRV-1	3505	3507	510.00	THROTTLED	559.95	508.82	479.70

RE	PRV-1	508	521	260.00	THROTTLED	413.01	259.39	119.17
RF	PRV-1	404	442	260.00	THROTTLED	342.76	259.76	150.30
RG	PRV-1	1109	1156	420.00	THROTTLED	574.01	420.00	8.40
RH	PRV-1	609	625	420.00	THROTTLED	559.79	419.88	61.48
RI	PRV-1	995	3271	420.00	THROTTLED	559.07	419.70	409.19
RJ	PRV-1	2937	3273	420.00	THROTTLED	464.43	419.87	278.02
RK	PRV-1	175	221	420.00	THROTTLED	508.72	419.96	50.70
RL	PRV-1	615	628	575.00	WIDE OPEN	566.64	561.20	309.37
RM	PRV-1	1904	1907	560.00	THROTTLED	568.88	559.70	334.25
RN	PRV-1	414	445	260.00	THROTTLED	404.47	259.67	123.44
RO	PRV-1	977	3279	420.00	THROTTLED	558.45	419.79	45.83
RP	PRV-1	3538	3104	420.00	THROTTLED	582.82	417.41	441.51
RQ	PRV-1	997	1602	420.00	THROTTLED	559.26	419.68	66.69
RR	PRV-1	1066	3051	340.00	THROTTLED	414.07	338.64	237.00
RS	PRV-1	3536	933	570.00	WIDE OPEN	562.36	554.43	1460.76
RT	PRV-1	2100	2122	340.00	THROTTLED	508.43	340.00	16.80
RU	PRV-1	900	3274	420.00	THROTTLED	526.57	407.19	1045.92
RV	PRV-1	1131	1137	575.00	THROTTLED	581.02	574.91	768.92
RW	FCV-1	3504	3501	600.00	WIDE OPEN	559.98	509.09	454.00

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

- (+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES
- (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

NODE LABEL	PIPE NUMBER	FLOWRATE (gpm)	NODE TITLE
AA	2117	885.05	
BB	3030	1250.42	
CC	3100	1210.43	
DD	3110	454.00	
EE	3130	479.70	
FF	3400	528.23	
GG	3531	1531.96	
HH	3542	354.59	
MM	3543	343.02	
II	3544	1167.97	
JJ	3545	-732.18	
KK	3549	1994.72	

NET SYSTEM INFLOW = 10200.08
 NET SYSTEM OUTFLOW = -732.18
 NET SYSTEM DEMAND = 9467.90

*Fireflow
Node 700-
Full Reservoirs*

C H A N G E S F O R N E X T S I M U L A T I O N

D E M A N D C H A N G E S

DEMAND TYPE = 1 - GDF = 3.000

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND (gpm)
700	800.00

S I M U L A T I O N R E S U L T S

THE RESULTS ARE OBTAINED AFTER 19 TRIALS WITH AN ACCURACY = 0.00187
THE REGULATING VALVES REQUIRED 3 ADJUSTMENTS

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PU -PUMP LINE
 CV -CHECK VALVE RV -REGULATING VALVE TK -STORAGE TANK

PIPE NUMBER	NODE NOS. #1 #2	FLOWRATE (gpm)	HEAD LOSS (ft)	PUMP HEAD (ft)	PUMP LABEL	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL/ 1000 (ft/ft)
210	200 202	55.67	0.05	0.00		0.00	0.36	0.11
404	402 406	-24.32	0.03	0.00		0.00	0.16	0.02
405	400 407	-9.73	0.01	0.00		0.00	0.06	0.00
406	403 404	149.53	0.15	0.00		0.00	0.61	0.21
407	403 427	-228.30	1.43	0.00		0.00	0.93	0.46
408	403 406	69.77	0.02	0.00		0.00	0.28	0.05
409	408 405	30.78	0.02	0.00		0.00	0.20	0.03
410	407 408	-14.67	0.00	0.00		0.00	0.09	0.01
411	407 402	-15.32	0.00	0.00		0.00	0.10	0.01
412	408 406	-45.45	0.03	0.00		0.00	0.29	0.07

413	427	433	-120.44	0.06	0.00	0.00	0.49	0.14	
414	414	428	16.07	0.01	0.00	0.00	0.10	0.01	
416	414	429	1.36	0.00	0.00	0.00	0.01	0.00	
431	415	417	78.11	0.14	0.00	0.00	0.50	0.14	
432	422	418	-103.98	0.06	0.00	0.00	0.42	0.11	
433	432	418	-45.34	0.03	0.00	0.00	0.29	0.05	
1201	1201	1200	4.20	0.00	0.00	0.00	0.03	0.00	
3263	2938	415	362.98	0.21	0.00	0.00	2.32	3.01	
3274-RV	900	2938	374.98	1.92	0.00	0.00	2.39	3.19	
3537-PU	3509	3520	1145.56	0.41	133.27	P1	0.00	3.25	4.09

FOLLOWING ADDITIONAL PIPES ARE CLOSED :

253 754 852 855 1103 1108 1145 1708 1906 2115 3275 3538 9000

MAXIMUM AND MINIMUM VALUES

PRESSURES

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
3508	154.70	700	-12.26
1083	150.80	3511	7.16
3002	148.63	3510	14.53
719	146.76	3509	15.85
202	141.17	3513	19.04
718	136.04	3400	19.07
3538	131.83	3535	29.46
1086	129.52	1135	32.21
1700	128.13	1111	32.30
956	126.33	1110	32.47
954	126.32	998	33.54
707	125.06	3502	33.71
709	122.75	2101	34.67
953	119.83	3501	35.45
955	119.82	1131	35.95
943	119.39	905	36.14
1064	118.82	2910	37.22
144	118.24	907	37.47
923	117.98	966	37.56
1072	116.26	800	38.87

VELOCITIES

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
700	9.08	148	0.00
3030	7.98	139	0.01
933	6.01	160	0.01
772	5.77	355	0.01
771	5.39	1705	0.01
629	5.38	2111	0.01
2914	5.36	400	0.01
2909	5.28	416	0.01
3545	4.67	1094	0.01
2902	4.38	817	0.01
3549	4.32	2980	0.01
763	4.07	3022	0.01
3536	3.75	2995	0.01
761	3.74	310	0.01
703	3.69	811	0.02
628	3.65	964	0.02
626	3.50	2107	0.02
3535	3.25	361	0.02
3537	3.25	974	0.02
3542	3.25	1306	0.02

REGULATING VALVE REPORT

RV LABEL	VALVE TYPE	POSITION NODE	CONTROLLED PIPE	VALVE SETTING (ft or gpm)	VALVE STATUS	UPSTREAM GRADE (ft)	DOWNSTREAM GRADE (ft)	THROUGH FLOW (gpm)
R1	PRV-1	3504	3501	510.00	THROTTLED	559.98	509.09	454.00
R2	PRV-1	211	206	260.00	THROTTLED	505.61	259.76	97.65
R3	PRV-1	503	518	260.00	THROTTLED	419.25	259.55	44.94
R4	PRV-1	705	754	540.00	CLOSED	683.49	565.86	0.00
R5	PRV-1	704	755	585.00	THROTTLED	652.93	584.95	35.40
R6	PRV-1	618	627	420.00	THROTTLED	558.37	419.57	250.62
R7	PRV-1	3002	1708	340.00	CLOSED	493.00	415.66	0.00
R8	PRV-1	975	3275	550.00	CLOSED	702.61	562.29	0.00
R9	PRV-1	929	3262	425.00	THROTTLED	565.21	420.71	216.84
RA	PRV-1	937	3260	425.00	THROTTLED	534.08	424.62	742.98
RB	PRV-1	419	443	265.00	THROTTLED	417.70	264.38	373.27
RC	PRV-1	961	3268	415.00	THROTTLED	566.47	415.00	4.22
RD	PRV-1	3505	3507	510.00	THROTTLED	559.95	508.82	479.70

RE	PRV-1	508	521	260.00	THROTTLED	413.42	259.39	119.17
RF	PRV-1	404	442	260.00	THROTTLED	416.02	259.76	150.30
RG	PRV-1	1109	1156	420.00	THROTTLED	574.35	420.00	8.40
RH	PRV-1	609	625	420.00	THROTTLED	561.12	419.88	61.48
RI	PRV-1	995	3271	420.00	THROTTLED	561.74	419.70	409.18
RJ	PRV-1	2937	3273	420.00	THROTTLED	533.88	419.99	72.54
RK	PRV-1	175	221	420.00	THROTTLED	508.72	419.96	50.70
RL	PRV-1	615	628	575.00	WIDE OPEN	568.32	562.45	321.86
RM	PRV-1	1904	1907	560.00	THROTTLED	573.69	559.89	198.02
RN	PRV-1	414	445	260.00	THROTTLED	417.73	259.67	123.44
RO	PRV-1	977	3279	420.00	THROTTLED	560.57	419.79	45.83
RP	PRV-1	3538	3104	420.00	THROTTLED	584.23	417.41	441.50
RQ	PRV-1	997	1602	420.00	THROTTLED	561.92	419.68	66.69
RR	PRV-1	1066	3051	340.00	THROTTLED	414.07	338.64	237.00
RS	PRV-1	3536	933	570.00	WIDE OPEN	569.83	566.32	941.10
RT	PRV-1	2100	2122	340.00	THROTTLED	508.43	340.00	16.80
RU	PRV-1	900	3274	420.00	THROTTLED	561.68	418.08	374.98
RV	PRV-1	1131	1137	575.00	THROTTLED	582.97	574.94	634.19
RW	FCV-1	3504	3501	600.00	WIDE OPEN	559.98	509.09	454.00

SUMMARY OF INFLOWS AND OUTFLOWS

- (+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES
 (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

NODE LABEL	PIPE NUMBER	FLOWRATE (gpm)	NODE TITLE
AA	2117	885.05	
BB	3030	1250.44	
CC	3100	1075.69	
DD	3110	454.00	
EE	3130	479.70	
FF	3400	528.23	
GG	3531	843.16	
HH	3542	1145.56	
MM	3543	445.79	
II	3544	966.35	
JJ	3545	-732.19	
KK	3549	1523.11	

NET SYSTEM INFLOW = 9597.07
 NET SYSTEM OUTFLOW = -732.19
 NET SYSTEM DEMAND = 8864.90

*Fire flow Node 700-
ES & FS Depleted Reservoirs*

CHANGES FOR NEXT SIMULATION

DEMAND CHANGES

DEMAND TYPE = 1 - GDF = 3.000

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND (gpm)
700	800.00

SIMULATION RESULTS

THE RESULTS ARE OBTAINED AFTER 17 TRIALS WITH AN ACCURACY = 0.00492
THE REGULATING VALVES REQUIRED 2 ADJUSTMENTS

PIPELINE RESULTS

STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PU -PUMP LINE
CV -CHECK VALVE RV -REGULATING VALVE TK -STORAGE TANK

PIPE NUMBER	NODE NOS. #1 #2	FLOWRATE (gpm)	HEAD LOSS (ft)	PUMP HEAD (ft)	PUMP LABEL	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL/ 1000 (ft/ft)
210	200 202	55.67	0.05	0.00		0.00	0.36	0.11
404	402 406	-24.32	0.03	0.00		0.00	0.16	0.02
405	400 407	-9.73	0.01	0.00		0.00	0.06	0.00
406	403 404	149.53	0.15	0.00		0.00	0.61	0.21
407	403 427	-228.30	1.43	0.00		0.00	0.93	0.46
408	403 406	69.77	0.02	0.00		0.00	0.28	0.05
409	408 405	30.78	0.02	0.00		0.00	0.20	0.03
410	407 408	-14.67	0.00	0.00		0.00	0.09	0.01
411	407 402	-15.32	0.00	0.00		0.00	0.10	0.01
412	408 406	-45.45	0.03	0.00		0.00	0.29	0.07

413	427	433	-120.44	0.06	0.00	0.00	0.49	0.14	
414	414	428	16.07	0.01	0.00	0.00	0.10	0.01	
416	414	429	1.36	0.00	0.00	0.00	0.01	0.00	
431	415	417	78.11	0.14	0.00	0.00	0.50	0.14	
432	422	418	-103.98	0.06	0.00	0.00	0.42	0.11	
433	432	418	-45.34	0.03	0.00	0.00	0.29	0.05	
1201	1201	1200	4.20	0.00	0.00	0.00	0.03	0.00	
3263	2938	415	362.98	0.21	0.00	0.00	2.32	3.01	
3274-RV	900	2938	374.98	1.92	0.00	0.00	2.39	3.19	
3537-PU	3509	3520	1111.80	0.39	133.53	P1	0.00	3.15	3.87

FOLLOWING ADDITIONAL PIPES ARE CLOSED :

253 754 852 855 1103 1108 1145 1708 1906 2115 3275 3538 9000

MAXIMUM AND MINIMUM VALUES

PRESSURES

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
3508	154.70	708	-238.46
1083	150.80	720	-236.23
3002	148.63	709	-227.78
202	141.17	707	-225.48
3538	131.40	718	-214.52
1086	129.52	719	-203.79
1700	128.13	700	-11.84
956	123.23	3511	7.16
954	123.21	3510	10.71
1064	118.82	3509	16.05
144	118.24	3513	18.52
955	116.74	3400	19.07
953	116.71	3535	27.11
943	116.35	3502	30.74
1072	116.26	1135	32.15
3004	116.26	1111	32.26
1079	116.15	1110	32.46
416	115.93	3501	32.48
151	115.24	998	32.76
923	115.21	905	33.22

VELOCITIES

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
700	9.08	148	0.00
629	8.41	139	0.01
3030	7.98	160	0.01
933	6.21	974	0.01
772	5.77	355	0.01
3549	5.41	1705	0.01
771	5.39	2111	0.01
2914	5.36	400	0.01
2909	5.28	416	0.01
3545	4.67	1094	0.01
2902	4.38	817	0.01
763	4.07	2996	0.01
761	3.74	3022	0.01
703	3.69	310	0.01
626	3.62	811	0.02
2968	3.58	2107	0.02
3536	3.48	361	0.02
628	3.38	1306	0.02
3259	3.27	812	0.02
3544	3.27	350	0.02

REGULATING VALVE REPORT

RV LABEL	VALVE TYPE	POSITION NODE	CONTROLLED PIPE	VALVE SETTING (ft or gpm)	VALVE STATUS	UPSTREAM GRADE (ft)	DOWNSTREAM GRADE (ft)	THROUGH FLOW (gpm)
R1	PRV-1	3504	3501	510.00	THROTTLED	559.98	509.09	454.00
R2	PRV-1	211	206	260.00	THROTTLED	505.61	259.76	97.65
R3	PRV-1	503	518	260.00	THROTTLED	419.25	259.55	44.94
R4	PRV-1	705	754	540.00	CLOSED	684.47	558.95	0.00
R5	PRV-1	704	755	585.00	THROTTLED	653.92	584.95	35.40
R6	PRV-1	618	627	420.00	THROTTLED	558.33	419.57	250.63
R7	PRV-1	3002	1708	340.00	CLOSED	493.00	415.66	0.00
R8	PRV-1	975	3275	550.00	CLOSED	703.44	559.91	0.00
R9	PRV-1	929	3262	425.00	THROTTLED	558.32	420.71	216.84
RA	PRV-1	937	3260	425.00	THROTTLED	527.46	424.62	742.98
RB	PRV-1	419	443	265.00	THROTTLED	417.70	264.38	373.27
RC	PRV-1	961	3268	415.00	THROTTLED	559.73	415.00	4.22
RD	PRV-1	3505	3507	510.00	THROTTLED	559.95	508.82	479.70

RE	PRV-1	508	521	260.00	THROTTLED	413.42	259.39	119.17
RF	PRV-1	404	442	260.00	THROTTLED	416.02	259.76	150.30
RG	PRV-1	1109	1156	420.00	THROTTLED	574.11	420.00	8.40
RH	PRV-1	609	625	420.00	THROTTLED	559.70	419.88	61.48
RI	PRV-1	995	3271	420.00	THROTTLED	559.27	419.70	409.19
RJ	PRV-1	2937	3273	420.00	THROTTLED	527.25	419.99	72.54
RK	PRV-1	175	221	420.00	THROTTLED	508.72	419.96	50.70
RL	PRV-1	615	628	575.00	WIDE OPEN	566.12	561.03	298.03
RM	PRV-1	1904	1907	560.00	THROTTLED	570.06	559.84	233.94
RN	PRV-1	414	445	260.00	THROTTLED	417.73	259.67	123.44
RO	PRV-1	977	3279	420.00	THROTTLED	558.55	419.79	45.83
RP	PRV-1	3538	3104	420.00	THROTTLED	583.23	417.41	441.50
RQ	PRV-1	997	1602	420.00	THROTTLED	559.46	419.68	66.69
RR	PRV-1	1066	3051	340.00	THROTTLED	414.07	338.64	237.00
RS	PRV-1	3536	933	570.00	WIDE OPEN	563.45	559.71	973.74
RT	PRV-1	2100	2122	340.00	THROTTLED	508.43	340.00	16.80
RU	PRV-1	900	3274	420.00	THROTTLED	554.99	418.08	374.98
RV	PRV-1	1131	1137	575.00	THROTTLED	581.59	574.92	731.09
RW	FCV-1	3504	3501	600.00	WIDE OPEN	559.98	509.09	454.00

SUMMARY OF INFLOWS AND OUTFLOWS

- (+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES
 (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

NODE LABEL	PIPE NUMBER	FLOWRATE (gpm)	NODE TITLE
AA	2117	885.05	
BB	3030	1250.43	
CC	3100	1172.59	
DD	3110	454.00	
EE	3130	479.70	
FF	3400	528.23	
GG	3531	470.04	
HH	3542	1111.80	
MM	3543	184.09	
II	3544	1153.28	
JJ	3545	-732.18	
KK	3549	1907.88	

NET SYSTEM INFLOW = 9597.08
 NET SYSTEM OUTFLOW = -732.18
 NET SYSTEM DEMAND = 8864.90

*Node 508
Depleted ES &
FS*

CHANGES FOR NEXT SIMULATION

DEMAND CHANGES

DEMAND TYPE = 1 - GDF = 3.000

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND (gpm)
508	550.00

SIMULATION RESULTS

THE RESULTS ARE OBTAINED AFTER 21 TRIALS WITH AN ACCURACY = 0.00069
THE REGULATING VALVES REQUIRED 3 ADJUSTMENTS

PIPELINE RESULTS

STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PU -PUMP LINE
CV -CHECK VALVE RV -REGULATING VALVE TK -STORAGE TANK

PIPE NUMBER	NODE NOS. #1 #2	FLOWRATE (gpm)	HEAD LOSS (ft)	PUMP HEAD (ft)	PUMP LABEL	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL/ 1000 (ft/ft)
210	200 202	55.67	0.05	0.00		0.00	0.36	0.11
404	402 406	-24.32	0.03	0.00		0.00	0.16	0.02
405	400 407	-9.73	0.01	0.00		0.00	0.06	0.00
406	403 404	149.53	0.15	0.00		0.00	0.61	0.21
407	403 427	-228.30	1.43	0.00		0.00	0.93	0.46
408	403 406	69.77	0.02	0.00		0.00	0.28	0.05
409	408 405	30.78	0.02	0.00		0.00	0.20	0.03
410	407 408	-14.67	0.00	0.00		0.00	0.09	0.01
411	407 402	-15.32	0.00	0.00		0.00	0.10	0.01
412	408 406	-45.45	0.03	0.00		0.00	0.29	0.07

413	427	433	-119.47	0.06	0.00	0.00	0.49	0.14	
414	414	428	17.04	0.02	0.00	0.00	0.11	0.01	
416	414	429	5.44	0.00	0.00	0.00	0.03	0.00	
431	415	417	80.93	0.15	0.00	0.00	0.52	0.15	
432	422	418	-105.28	0.06	0.00	0.00	0.43	0.11	
433	432	418	-40.92	0.02	0.00	0.00	0.26	0.04	
1201	1201	1200	4.20	0.00	0.00	0.00	0.03	0.00	
3263	2938	415	370.86	0.22	0.00	0.00	2.37	3.13	
3274-RV	900	2938	382.86	1.99	0.00	0.00	2.44	3.32	
3537-PU	3509	3520	354.48	0.05	136.77	P1	0.00	1.01	0.47

FOLLOWING ADDITIONAL PIPES ARE CLOSED :

253 754 852 855 1103 1108 1145 1708 1906 2115 3275 3538 9000

MAXIMUM AND MINIMUM VALUES

PRESSURES

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
3508	154.70	3511	7.16
1083	150.80	3510	10.68
3002	148.63	3513	18.50
202	141.17	3400	19.07
3538	131.38	3509	19.08
1086	129.52	507	23.39
1700	128.13	3535	26.61
702	127.39	3502	30.70
956	123.16	1135	32.15
954	123.14	1111	32.26
1064	118.82	3501	32.43
144	118.24	1110	32.46
955	116.67	998	32.74
953	116.63	905	33.13
1072	116.26	907	34.41
3004	116.26	2101	34.67
943	116.18	1131	35.33
1079	116.15	2910	36.27
416	115.90	966	36.62
151	115.24	967	38.36

VELOCITIES

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
511	8.14	974	0.00
627	8.00	148	0.00
3030	7.98	701	0.00
512	7.87	139	0.01
933	6.37	160	0.01
3549	5.99	355	0.01
2914	5.92	1705	0.01
2909	5.84	2111	0.01
2902	4.81	400	0.01
3545	4.67	1094	0.01
1907	4.30	817	0.01
3552	4.30	437	0.01
514	4.27	2917	0.01
602	4.24	3022	0.01
629	4.12	310	0.01
622	3.76	811	0.02
3536	3.65	2107	0.02
2968	3.60	361	0.02
628	3.51	1306	0.02
626	3.39	435	0.02

REGULATING VALVE REPORT

RV LABEL	VALVE TYPE	POSITION NODE	CONTROLLED PIPE	VALVE SETTING (ft or gpm)	VALVE STATUS	UPSTREAM GRADE (ft)	DOWNSTREAM GRADE (ft)	THROUGH FLOW (gpm)
R1	PRV-1	3504	3501	510.00	THROTTLED	559.98	509.09	454.00
R2	PRV-1	211	206	260.00	THROTTLED	505.61	259.76	97.65
R3	PRV-1	503	518	260.00	THROTTLED	416.91	259.55	44.94
R4	PRV-1	705	754	540.00	CLOSED	714.79	558.51	0.00
R5	PRV-1	704	755	585.00	THROTTLED	714.00	584.95	35.40
R6	PRV-1	618	627	420.00	THROTTLED	548.60	417.08	704.82
R7	PRV-1	3002	1708	340.00	CLOSED	493.00	415.66	0.00
R8	PRV-1	975	3275	550.00	CLOSED	715.42	559.79	0.00
R9	PRV-1	929	3262	425.00	THROTTLED	557.88	420.71	216.84
RA	PRV-1	937	3260	425.00	THROTTLED	520.40	424.60	756.32
RB	PRV-1	419	443	265.00	THROTTLED	417.60	264.38	373.27
RC	PRV-1	961	3268	415.00	THROTTLED	559.60	415.00	4.22
RD	PRV-1	3505	3507	510.00	THROTTLED	559.95	508.82	479.69

RE	PRV-1	508	521	260.00	THROTTLED	311.70	259.39	119.17
RF	PRV-1	404	442	260.00	THROTTLED	415.92	259.76	150.30
RG	PRV-1	1109	1156	420.00	THROTTLED	574.10	420.00	8.40
RH	PRV-1	609	625	420.00	THROTTLED	559.26	419.88	61.48
RI	PRV-1	995	3271	420.00	THROTTLED	559.17	419.70	409.19
RJ	PRV-1	2937	3273	420.00	THROTTLED	519.75	419.96	147.13
RK	PRV-1	175	221	420.00	THROTTLED	508.72	419.96	50.70
RL	PRV-1	615	628	575.00	WIDE OPEN	566.04	560.61	309.00
RM	PRV-1	1904	1907	560.00	THROTTLED	566.75	558.90	673.21
RN	PRV-1	414	445	260.00	THROTTLED	417.63	259.67	123.44
RO	PRV-1	977	3279	420.00	THROTTLED	558.31	419.79	45.83
RP	PRV-1	3538	3104	420.00	THROTTLED	583.19	417.41	441.51
RQ	PRV-1	997	1602	420.00	THROTTLED	559.36	419.68	66.69
RR	PRV-1	1066	3051	340.00	THROTTLED	414.07	338.64	237.00
RS	PRV-1	3536	933	570.00	WIDE OPEN	562.93	559.02	997.36
RT	PRV-1	2100	2122	340.00	THROTTLED	508.43	340.00	16.80
RU	PRV-1	900	3274	420.00	THROTTLED	554.39	418.01	382.86
RV	PRV-1	1131	1137	575.00	THROTTLED	581.54	574.92	734.61
RW	FCV-1	3504	3501	600.00	WIDE OPEN	559.98	509.09	454.00

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

- (+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES
- (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

NODE LABEL	PIPE NUMBER	FLOWRATE (gpm)	NODE TITLE
AA	2117	885.05	
BB	3030	1250.42	
CC	3100	1176.12	
DD	3110	454.00	
EE	3130	479.69	
FF	3400	528.23	
GG	3531	748.89	
HH	3542	354.48	
MM	3543	210.32	
II	3544	1158.57	
JJ	3545	-732.17	
KK	3549	2113.30	

NET SYSTEM INFLOW = 9359.08
 NET SYSTEM OUTFLOW = -732.17
 NET SYSTEM DEMAND = 8626.90

CHANGES FOR NEXT SIMULATION

DEMAND CHANGES

DEMAND TYPE = 1 - GDF = 3.000

*Depleted FS&ES
Node 450
Fireflow*

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND (gpm)
450	2800.00

SIMULATION RESULTS

THE RESULTS ARE OBTAINED AFTER 18 TRIALS WITH AN ACCURACY = 0.00080
THE REGULATING VALVES REQUIRED 3 ADJUSTMENTS

PIPELINE RESULTS

STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PU -PUMP LINE
CV -CHECK VALVE RV -REGULATING VALVE TK -STORAGE TANK

PIPE NUMBER	NODE NOS. #1	NODE NOS. #2	FLOWRATE (gpm)	HEAD LOSS (ft)	PUMP HEAD (ft)	PUMP LABEL	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL/1000 (ft/ft)
210	200	202	55.67	0.05	0.00		0.00	0.36	0.11
404	402	406	-24.32	0.03	0.00		0.00	0.16	0.02
405	400	407	-9.73	0.01	0.00		0.00	0.06	0.00
406	403	404	149.53	0.15	0.00		0.00	0.61	0.21
407	403	427	-228.30	1.43	0.00		0.00	0.93	0.46
408	403	406	69.77	0.02	0.00		0.00	0.28	0.05
409	408	405	30.78	0.02	0.00		0.00	0.20	0.03
410	407	408	-14.67	0.00	0.00		0.00	0.09	0.01
411	407	402	-15.32	0.00	0.00		0.00	0.10	0.01
412	408	406	-45.45	0.03	0.00		0.00	0.29	0.07

413	427	433	-446.05	0.72	0.00	0.00	1.82	1.60
414	414	428	-303.92	3.25	0.00	0.00	1.94	2.16
416	414	429	-383.96	3.24	0.00	0.00	2.45	3.34
431	415	417	-384.75	2.72	0.00	0.00	2.46	2.72
432	422	418	-175.39	0.15	0.00	0.00	0.72	0.28
433	432	418	-544.60	2.95	0.00	0.00	3.48	5.17
1201	1201	1200	4.20	0.00	0.00	0.00	0.03	0.00
3263	2938	415	1970.82	4.83	0.00	0.00	12.58	69.01
3274-RV	900	2938	1982.82	41.88	0.00	0.00	12.66	69.79
3537-PU	3509	3520	354.66	0.05	136.77	P1	0.00	0.47

FOLLOWING ADDITIONAL PIPES ARE CLOSED :

253 754 852 855 1103 1108 1145 1708 1906 2115 3275 3538 9000

MAXIMUM AND MINIMUM VALUES

PRESSURES

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
3508	154.70	3511	7.16
1083	150.80	3510	10.14
3002	148.63	900	16.39
202	141.17	3513	18.42
3538	130.97	3400	19.07
1086	129.52	3509	19.08
1700	128.13	901	22.44
702	127.39	907	25.47
956	122.13	2940	25.51
954	122.06	3535	25.91
1064	118.82	902	26.04
144	118.24	908	28.46
1072	116.26	905	29.80
3004	116.26	3502	30.08
1079	116.15	3501	31.80
955	115.65	1135	32.10
953	115.54	1111	32.23
151	115.24	1110	32.46
200	115.19	998	32.61
211	115.10	2101	34.67

VELOCITIES

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
3274	12.66	148	0.00
3263	12.58	2996	0.00
933	11.93	701	0.00
462	11.78	139	0.01
2914	11.36	160	0.01
2909	11.28	355	0.01
2902	9.12	1705	0.01
902	9.11	2111	0.01
3536	8.56	400	0.01
916	8.02	1094	0.01
3030	7.98	817	0.01
3531	7.33	3022	0.01
439	7.32	310	0.01
908	6.74	811	0.02
901	6.47	2107	0.02
460	6.42	361	0.02
3549	6.05	1306	0.02
913	6.04	812	0.02
910	5.94	350	0.02
3260	5.81	309	0.02

REGULATING VALVE REPORT

RV LABEL	VALVE TYPE	POSITION NODE	CONTROLLED PIPE	VALVE SETTING (ft or gpm)	VALVE STATUS	UPSTREAM GRADE (ft)	DOWNSTREAM GRADE (ft)	THROUGH FLOW (gpm)
R1	PRV-1	3504	3501	510.00	THROTTLED	559.98	509.09	454.00
R2	PRV-1	211	206	260.00	THROTTLED	505.61	259.76	97.65
R3	PRV-1	503	518	260.00	THROTTLED	416.39	259.55	44.94
R4	PRV-1	705	754	540.00	CLOSED	714.79	548.33	0.00
R5	PRV-1	704	755	585.00	THROTTLED	714.00	584.95	35.40
R6	PRV-1	618	627	420.00	THROTTLED	554.42	418.57	479.10
R7	PRV-1	3002	1708	340.00	CLOSED	493.00	415.66	0.00
R8	PRV-1	975	3275	550.00	CLOSED	715.41	559.44	0.00
R9	PRV-1	929	3262	425.00	THROTTLED	547.51	420.71	216.85
RA	PRV-1	937	3260	425.00	WIDE OPEN	419.38	418.11	1421.54
RB	PRV-1	419	443	265.00	THROTTLED	386.08	264.38	373.27
RC	PRV-1	961	3268	415.00	THROTTLED	557.67	415.00	4.24
RD	PRV-1	3505	3507	510.00	THROTTLED	559.95	508.82	479.70

RE	PRV-1	508	521	260.00	THROTTLED	412.42	259.39	119.17
RF	PRV-1	404	442	260.00	THROTTLED	377.95	259.76	150.30
RG	PRV-1	1109	1156	420.00	THROTTLED	573.87	420.00	8.40
RH	PRV-1	609	625	420.00	THROTTLED	559.45	419.88	61.48
RI	PRV-1	995	3271	420.00	THROTTLED	558.78	419.70	409.16
RJ	PRV-1	2937	3273	420.00	WIDE OPEN	416.63	416.45	333.68
RK	PRV-1	175	221	420.00	THROTTLED	508.72	419.96	50.70
RL	PRV-1	615	628	575.00	WIDE OPEN	566.14	560.83	305.03
RM	PRV-1	1904	1907	560.00	THROTTLED	567.06	559.46	458.05
RN	PRV-1	414	445	260.00	THROTTLED	372.00	259.67	123.44
RO	PRV-1	977	3279	420.00	THROTTLED	558.15	419.79	45.83
RP	PRV-1	3538	3104	420.00	THROTTLED	582.25	417.41	441.51
RQ	PRV-1	997	1602	420.00	THROTTLED	558.98	419.68	66.69
RR	PRV-1	1066	3051	340.00	THROTTLED	414.07	338.64	237.00
RS	PRV-1	3536	933	570.00	WIDE OPEN	560.60	548.08	1869.28
RT	PRV-1	2100	2122	340.00	THROTTLED	508.43	340.00	16.80
RU	PRV-1	900	3274	420.00	THROTTLED	457.82	378.12	1982.82
RV	PRV-1	1131	1137	575.00	THROTTLED	580.22	574.90	820.05
RW	FCV-1	3504	3501	600.00	WIDE OPEN	559.98	509.09	454.00

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

- (+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES
- (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

NODE LABEL	PIPE NUMBER	FLOWRATE (gpm)	NODE TITLE
AA	2117	885.05	
BB	3030	1250.43	
CC	3100	1261.55	
DD	3110	454.00	
EE	3130	479.70	
FF	3400	528.23	
GG	3531	2584.77	
HH	3542	354.66	
MM	3543	467.45	
II	3544	1186.26	
JJ	3545	-732.18	
KK	3549	2132.82	

NET SYSTEM INFLOW = 11584.93
 NET SYSTEM OUTFLOW = -732.18
 NET SYSTEM DEMAND = 10852.90

C H A N G E S F O R N E X T S I M U L A T I O N

D E M A N D C H A N G E S

DEMAND TYPE = 1 - GDF = 3.000

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND (gpm)
402	1100.00

S I M U L A T I O N R E S U L T S

THE RESULTS ARE OBTAINED AFTER 20 TRIALS WITH AN ACCURACY = 0.00262
THE REGULATING VALVES REQUIRED 2 ADJUSTMENTS

S I M U L A T I O N D E S C R I P T I O N (L A B E L)

ES and FS depleted (except Kingsgate); *Fireflow 2020*

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PU -PUMP LINE
 CV -CHECK VALVE RV -REGULATING VALVE TK -STORAGE TANK

PIPE NUMBER	NODE NOS. #1 #2	FLOWRATE (gpm)	HEAD LOSS (ft)	PUMP HEAD (ft)	PUMP LABEL	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL/ 1000 (ft/ft)
3537-PU	3509 3520	395.28	0.06	136.70	P1	0.00	1.12	0.57

FOLLOWING ADDITIONAL PIPES ARE CLOSED :

253 754 852 855 1103 1108 1145 1708 1906 2115 3268 3275 3501 3538

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
719	271.31	3511	7.70
714	270.93	3510	10.04
718	260.49	3513	16.84
713	260.14	3509	18.99
717	260.11	3400	19.06
712	258.06	400	23.35
707	251.66	3535	25.33
709	247.47	2940	28.34
3520	247.27	3502	29.15
711	247.26	907	29.36
710	244.96	905	30.39
720	238.82	3501	30.88
708	238.68	998	30.89
3508	154.70	1135	32.10
1083	150.93	1111	32.22
3002	148.76	1110	32.46
202	138.32	908	32.93
3538	131.03	2910	34.24
1086	129.65	2101	34.66
1700	128.13	966	34.69

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
2914	10.22	2111	0.00
2909	10.14	340	0.00
933	10.12	932	0.00
2902	8.24	3200	0.00
629	8.20	701	0.00
3274	7.39	332	0.00

3263	7.30	1705	0.01
407	6.33	2107	0.01
3549	6.32	3238	0.02
3536	6.31	817	0.02
9000	6.23	974	0.02
439	5.86	3022	0.02
627	5.76	142	0.02
916	5.47	1306	0.03
902	5.35	610	0.03
3260	5.07	143	0.03
3261	4.94	1094	0.03
3531	4.86	353	0.04
3130	4.86	3216	0.05
3507	4.86	3079	0.06

REGULATING VALVE REPORT

RV LABEL	VALVE TYPE	POSITION NODE	CONTROLLED PIPE	VALVE SETTING (ft or gpm)	VALVE STATUS	UPSTREAM GRADE (ft)	DOWNSTREAM GRADE (ft)	THROUGH FLOW (gpm)
R1	PRV-1	3504	3501	510.00	THROTTLED	559.97	507.25	0.00
R2	PRV-1	211	206	260.00	THROTTLED	498.60	259.15	194.07
R3	PRV-1	503	518	260.00	THROTTLED	416.67	258.44	88.21
R4	PRV-1	705	754	540.00	CLOSED	714.23	550.15	0.00
R5	PRV-1	704	755	585.00	THROTTLED	713.04	584.87	59.40
R6	PRV-1	618	627	420.00	THROTTLED	553.71	418.41	507.54
R7	PRV-1	3002	1708	340.00	CLOSED	493.30	415.66	0.00
R8	PRV-1	975	3275	550.00	CLOSED	715.07	554.38	0.00
R9	PRV-1	929	3262	425.00	THROTTLED	549.65	420.80	214.37
RA	PRV-1	937	3260	425.00	THROTTLED	443.86	424.01	1241.64
RB	PRV-1	419	443	265.00	THROTTLED	400.92	264.13	447.33
RC	PRV-1	961	3268	415.00	CLOSED	556.67	415.46	0.00
RD	PRV-1	3505	3507	510.00	THROTTLED	559.88	507.24	760.72
RE	PRV-1	508	521	260.00	THROTTLED	402.02	258.29	207.91
RF	PRV-1	404	442	260.00	THROTTLED	344.16	259.12	304.54
RG	PRV-1	1109	1156	420.00	THROTTLED	573.83	419.97	22.20
RH	PRV-1	609	625	420.00	THROTTLED	558.26	419.88	62.24
RI	PRV-1	995	3271	420.00	THROTTLED	552.96	419.52	531.18
RJ	PRV-1	2937	3273	420.00	THROTTLED	441.09	419.81	346.93
RK	PRV-1	175	221	420.00	THROTTLED	505.90	419.60	177.30
RL	PRV-1	615	628	575.00	WIDE OPEN	565.65	560.04	314.47
RM	PRV-1	1904	1907	560.00	THROTTLED	565.79	559.32	518.79
RN	PRV-1	414	445	260.00	THROTTLED	401.16	258.85	243.29
RO	PRV-1	977	3279	420.00	THROTTLED	553.90	419.78	46.59

RP	PRV-1	3538	3104	420.00	THROTTLED	582.38	417.58	425
RQ	PRV-1	997	1602	420.00	THROTTLED	553.36	419.66	68.17
RR	PRV-1	1066	3051	340.00	THROTTLED	414.06	338.64	237.00
RS	PRV-1	3536	933	570.00	WIDE OPEN	559.14	549.93	1584.85
RT	PRV-1	2100	2122	340.00	THROTTLED	506.10	340.00	75.00
RU	PRV-1	900	3274	420.00	THROTTLED	516.40	404.52	1158.56
RV	PRV-1	1131	1137	575.00	THROTTLED	580.34	574.90	824.06
RW	FCV-1	3504	3501	600.00	THROTTLED	559.97	507.25	600.00

SUMMARY OF INFLOWS AND OUTFLOWS

- (+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES
 (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

NODE LABEL	PIPE NUMBER	FLOWRATE (gpm)	NODE TITLE
AA	2117	1460.45	
BB	3030	448.57	
CC	3100	1249.48	
DD	3110	600.00	
EE	3130	760.72	
FF	3400	932.66	
GG	3531	1714.56	
HH	3542	395.28	
MM	3543	501.33	
II	3544	1275.81	
JJ	3545	129.45	
KK	3549	2227.59	
LL	9000	-3.81	

NET SYSTEM INFLOW = 11695.90
 NET SYSTEM OUTFLOW = -3.81
 NET SYSTEM DEMAND = 11692.10

C H A N G E S F O R N E X T S I M U L A T I O N

D E M A N D C H A N G E S

DEMAND TYPE = 1 - GDF = 3.000

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND (gpm)
508	500.00

S I M U L A T I O N R E S U L T S

THE RESULTS ARE OBTAINED AFTER 17 TRIALS WITH AN ACCURACY = 0.00265
THE REGULATING VALVES REQUIRED 2 ADJUSTMENTS

S I M U L A T I O N D E S C R I P T I O N (L A B E L)

ES and FS depleted (except Kingsgate) *Fireflow 2020*

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PU -PUMP LINE
CV -CHECK VALVE RV -REGULATING VALVE TK -STORAGE TANK

PIPE NUMBER	NODE NOS. #1 #2	FLOWRATE (gpm)	HEAD LOSS (ft)	PUMP HEAD (ft)	PUMP LABEL	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL/ 1000 (ft/ft)
3537-PU	3509 3520	392.92	0.06	136.71	P1	0.00	1.11	0.56

FOLLOWING ADDITIONAL PIPES ARE CLOSED :

253 754 852 855 1103 1108 1145 1708 1906 2115 3268 3275 3501 3538

MAXIMUM AND MINIMUM VALUES

PRESSURES

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
719	231.19	3511	7.70
714	230.40	3510	10.24
718	220.37	3513	16.88
713	219.60	3509	19.00
717	219.58	3400	19.06
712	217.52	507	19.53
707	211.55	3535	25.29
709	207.35	3502	29.32
3520	206.73	998	30.95
711	206.72	3501	31.05
710	204.43	905	31.40
720	198.71	907	31.99
708	198.57	1135	32.11
3508	154.70	1111	32.23
1083	150.93	1110	32.46
3002	148.76	2940	34.12
202	138.32	2910	34.31
3538	131.16	2101	34.66
1086	129.65	966	34.76
1700	128.13	1131	35.00

VELOCITIES

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
627	9.24	2111	0.00
511	8.51	340	0.00
512	8.27	701	0.00
933	7.80	332	0.00
2914	7.67	974	0.00
2909	7.59	1705	0.01

629	7.41	991	0.01
3549	6.61	3530	0.01
2902	6.24	3512	0.01
9000	5.53	932	0.01
1907	5.22	2107	0.01
3552	5.22	817	0.02
602	4.90	3022	0.02
3130	4.86	3238	0.02
3507	4.86	142	0.02
3536	4.58	1306	0.03
514	4.52	400	0.03
622	4.34	143	0.03
3274	4.17	1094	0.03
2117	4.14	353	0.04

REGULATING VALVE REPORT

RV LABEL	VALVE TYPE	POSITION NODE	CONTROLLED PIPE	VALVE SETTING (ft or gpm)	VALVE STATUS	UPSTREAM GRADE (ft)	DOWNSTREAM GRADE (ft)	THROUGH FLOW (gpm)
R1	PRV-1	3504	3501	510.00	THROTTLED	559.97	507.25	0.00
R2	PRV-1	211	206	260.00	THROTTLED	498.60	259.15	194.07
R3	PRV-1	503	518	260.00	THROTTLED	415.43	258.44	88.21
R4	PRV-1	705	754	540.00	CLOSED	714.26	553.83	0.00
R5	PRV-1	704	755	585.00	THROTTLED	713.06	584.87	59.40
R6	PRV-1	618	627	420.00	THROTTLED	544.95	416.18	814.54
R7	PRV-1	3002	1708	340.00	CLOSED	493.30	415.66	0.00
R8	PRV-1	975	3275	550.00	CLOSED	715.09	554.50	0.00
R9	PRV-1	929	3262	425.00	THROTTLED	553.40	420.80	214.37
RA	PRV-1	937	3260	425.00	THROTTLED	491.31	424.44	909.06
RB	PRV-1	419	443	265.00	THROTTLED	413.50	264.13	447.33
RC	PRV-1	961	3268	415.00	CLOSED	557.39	415.46	0.00
RD	PRV-1	3505	3507	510.00	THROTTLED	559.88	507.24	760.71
RE	PRV-1	508	521	260.00	THROTTLED	300.90	258.29	207.91
RF	PRV-1	404	442	260.00	THROTTLED	407.05	259.12	304.54
RG	PRV-1	1109	1156	420.00	THROTTLED	573.91	419.97	22.20
RH	PRV-1	609	625	420.00	THROTTLED	557.56	419.88	62.24
RI	PRV-1	995	3271	420.00	THROTTLED	553.12	419.52	531.15
RJ	PRV-1	2937	3273	420.00	THROTTLED	489.45	419.87	280.23
RK	PRV-1	175	221	420.00	THROTTLED	505.90	419.60	177.30
RL	PRV-1	615	628	575.00	WIDE OPEN	564.92	559.28	315.40
RM	PRV-1	1904	1907	560.00	THROTTLED	563.62	558.42	817.50
RN	PRV-1	414	445	260.00	THROTTLED	413.53	258.85	243.29
RO	PRV-1	977	3279	420.00	THROTTLED	553.88	419.78	46.58

RP	PRV-1	3538	3104	420.00	THROTTLED	582.69	417.58	425.45
RQ	PRV-1	997	1602	420.00	THROTTLED	553.51	419.66	68.17
RR	PRV-1	1066	3051	340.00	THROTTLED	414.06	338.64	237.00
RS	PRV-1	3536	933	570.00	WIDE OPEN	559.66	553.96	1222.76
RT	PRV-1	2100	2122	340.00	THROTTLED	506.10	340.00	75.00
RU	PRV-1	900	3274	420.00	THROTTLED	542.04	414.63	653.84
RV	PRV-1	1131	1137	575.00	THROTTLED	580.77	574.90	797.12
RW	FCV-1	3504	3501	600.00	THROTTLED	559.97	507.25	600.00

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

(+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES
 (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

NODE LABEL	PIPE NUMBER	FLOWRATE (gpm)	NODE TITLE
AA	2117	1460.45	
BB	3030	448.62	
CC	3100	1222.57	
DD	3110	600.00	
EE	3130	760.71	
FF	3400	932.66	
GG	3531	1127.80	
HH	3542	392.92	
MM	3543	428.72	
II	3544	1263.14	
JJ	3545	129.42	
KK	3549	2331.46	
LL	9000	-3.39	

NET SYSTEM INFLOW = 11098.48
 NET SYSTEM OUTFLOW = -3.39
 NET SYSTEM DEMAND = 11095.10

**** KYPIPE SIMULATION COMPLETED ****

DATE: 11/03/99
 TIME: 15:45:59.40

CHANGES FOR NEXT SIMULATION

DEMAND CHANGES

DEMAND TYPE = 1 - GDF = 3.000

Kingsgate FS & ES depleted - under MDO no fireflow

SIMULATION RESULTS

THE RESULTS ARE OBTAINED AFTER 18 TRIALS WITH AN ACCURACY = 0.00054
THE REGULATING VALVES REQUIRED 3 ADJUSTMENTS

PIPELINE RESULTS

STATUS CODE: XX -CLOSED PIPE FG -FIXED GRADE NODE PU -PUMP LINE
CV -CHECK VALVE RV -REGULATING VALVE TK -STORAGE TANK

PIPE NUMBER	NODE #1	NODE #2	FLOWRATE (gpm)	HEAD LOSS (ft)	PUMP HEAD (ft)	PUMP LABEL	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL/1000 (ft/ft)
3537-PU	3509	3520	383.03	0.05	136.72	P1	0.00	1.09	0.54

FOLLOWING ADDITIONAL PIPES ARE CLOSED :

253 754 852 855 1103 1108 1145 1708 1906 2115 3268 3275 3501 3538

MAXIMUM AND MINIMUM VALUES

PRESSURES

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)
3508	154.70	121	4.99

1083	150.93	120	5.98
3002	148.76	3511	7.70
3538	131.18	119	8.96
1086	129.65	3510	10.28
1700	128.13	117	11.43
702	127.07	146	12.14
956	122.31	112	16.35
954	122.28	116	16.41
1064	118.90	3513	16.90
1072	116.39	118	17.68
3004	116.39	110	18.54
1079	116.28	3509	19.02
955	115.81	3400	19.06
953	115.77	123	20.36
943	114.63	104	22.41
416	114.21	145	22.45
923	113.47	154	23.37
975	112.74	152	23.44
1127	111.45	175	23.49

VELOCITIES

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
3130	26.06	991	0.00
3507	26.06	340	0.00
933	7.57	974	0.00
163	7.18	701	0.00
2914	7.17	332	0.00
2909	7.10	1705	0.01
3549	6.12	3200	0.01
2902	5.87	932	0.01
2117	5.28	610	0.02
627	4.81	817	0.02
160	4.70	3238	0.02
152	4.62	3022	0.02
3536	4.44	1306	0.03
164	4.34	400	0.03
629	4.17	1094	0.03
154	4.15	353	0.04
3274	4.10	986	0.04
3263	4.01	3216	0.05
2968	3.87	3079	0.06
158	3.66	1150	0.06

REGULATING VALVE REPORT

RV LABEL	VALVE TYPE	POSITION NODE	CONTROLLED PIPE	VALVE SETTING (ft or gpm)	VALVE STATUS	UPSTREAM GRADE (ft)	DOWNSTREAM GRADE (ft)	THROUGH FLOW (gpm)
R1	PRV-1	3504	3501	510.00	THROTTLED	559.97	413.39	0.00
R2	PRV-1	211	206	260.00	THROTTLED	405.86	259.15	194.07
R3	PRV-1	503	518	260.00	THROTTLED	417.76	258.44	88.21
R4	PRV-1	705	754	540.00	CLOSED	714.34	554.34	0.00
R5	PRV-1	704	755	585.00	THROTTLED	713.15	584.87	59.40
R6	PRV-1	618	627	420.00	THROTTLED	555.49	418.86	423.89
R7	PRV-1	3002	1708	340.00	CLOSED	493.30	415.66	0.00
R8	PRV-1	975	3275	550.00	CLOSED	715.17	554.68	0.00
R9	PRV-1	929	3262	425.00	THROTTLED	553.89	420.81	214.36
RA	PRV-1	937	3260	425.00	THROTTLED	499.08	424.47	884.17
RB	PRV-1	419	443	265.00	THROTTLED	413.74	264.13	447.33
RC	PRV-1	961	3268	415.00	CLOSED	557.53	415.46	0.00
RD	PRV-1	3505	3507	510.00	THROTTLED	557.34	447.91	4083.85
RE	PRV-1	508	521	260.00	THROTTLED	402.47	258.29	207.91
RF	PRV-1	404	442	260.00	THROTTLED	407.27	259.12	304.54
RG	PRV-1	1109	1156	420.00	THROTTLED	573.92	419.97	22.20
RH	PRV-1	609	625	420.00	THROTTLED	558.47	419.88	62.23
RI	PRV-1	995	3271	420.00	THROTTLED	553.27	419.52	531.15
RJ	PRV-1	2937	3273	420.00	THROTTLED	497.81	419.91	227.77
RK	PRV-1	175	221	420.00	WIDE OPEN	416.20	415.81	177.30
RL	PRV-1	615	628	575.00	WIDE OPEN	565.72	560.22	310.96
RM	PRV-1	1904	1907	560.00	THROTTLED	566.86	559.50	437.75
RN	PRV-1	414	445	260.00	THROTTLED	413.73	258.85	243.29
RO	PRV-1	977	3279	420.00	THROTTLED	554.19	419.78	46.57
RP	PRV-1	3538	3104	420.00	THROTTLED	582.73	417.58	425.45
RQ	PRV-1	997	1602	420.00	THROTTLED	553.67	419.66	68.21
RR	PRV-1	1066	3051	340.00	THROTTLED	414.06	338.64	237.00
RS	PRV-1	3536	933	570.00	WIDE OPEN	560.00	554.61	1186.62
RT	PRV-1	2100	2122	340.00	THROTTLED	415.38	340.00	75.00
RU	PRV-1	900	3274	420.00	THROTTLED	542.87	414.80	642.85
RV	PRV-1	1131	1137	575.00	THROTTLED	580.82	574.90	793.50
RW	FCV-1	3504	3501	600.00	THROTTLED	559.97	413.39	600.00

SUMMARY OF INFLOWS AND OUTFLOWS

- (+) INFLOWS INTO THE SYSTEM FROM FIXED GRADE NODES
 (-) OUTFLOWS FROM THE SYSTEM INTO FIXED GRADE NODES

NODE LABEL	PIPE NUMBER	FLOWRATE (gpm)	NODE TITLE
AA	2117	-1862.69	
BB	3030	448.61	
CC	3100	1218.95	
DD	3110	600.00	
EE	3130	4083.85	
FF	3400	932.66	
GG	3531	855.83	
HH	3542	383.03	
MM	3543	415.77	
II	3544	1255.96	
JJ	3545	129.43	
KK	3549	2156.27	
LL	9000	-1.41	

NET SYSTEM INFLOW = 12480.37
NET SYSTEM OUTFLOW = -1864.10
NET SYSTEM DEMAND = 10616.10

**** KYPIPE SIMULATION COMPLETED ****

DATE: 11/03/99
TIME: 15:48:25.66

Appendix I
Storage Calculations

Required Storage for 1998 Demand

Zone	ADD (gpm)	MDD (gpm)	PHD (gpm)	Q _s (gpm)	Q _L (gpm)	Available Storage (mg)	Equalizing (mg)	Method 1 Standby (mg)	Method 2 Standby (mg)	Maximum Required Standby (mg)	Fire (mg)	Maximum of Standby or Fire (mg)	Required Equalizing and Standby/Fire (mg)	Additional Required Storage (mg)	Excess Storage (mg)
1 (510), 2 (420) and 21 (340)	574	1,723	2,896	1,950	1,350	0.44	0.14	0.79	0.64	0.79	0.96	0.96	1.10	0.66	-
3 (280), 4 (340), 5 (340), 6 (420)	115	344	689	1,800	1,200	2.33	-	0.33	0.13	0.33	0.12	0.33	0.33	-	2.00
7 (650), 19 (585)	134	403	783	3,375	2,100	0.41	-	0.39	0.15	0.39	0.12	0.39	0.39	0.39	-
11 (570) and 12 (420)	123	370	730	2,053	1,323	0.41	-	0.36	0.14	0.36	0.12	0.36	0.36	-	0.05
15 (670) and 22 (570)	268	1,397	2,374	5,092	3,08	3.08	-	1.34	0.52	1.34	1.20	1.34	1.34	-	1.74

Required Storage for 2010 Demand

Zone	ADD (gpm)	MDD (gpm)	PHD (gpm)	Q _s (gpm)	Q _L (gpm)	Available Storage (mg)	Equalizing (mg)	Method 1 Standby (mg)	Method 2 Standby (mg)	Maximum Required Standby (mg)	Fire (mg)	Maximum of Standby or Fire (mg)	Required Equalizing and Standby/Fire (mg)	Additional Required Storage (mg)	Excess Storage (mg)
1 (510), 2 (420) and 21 (340)	751	2,253	3,743	1,950	1,350	0.44	0.27	1.30	0.84	1.30	1.20	1.30	1.57	1.12	-
3 (280), 4 (340), 5 (340), 6 (420)	119	357	709	1,800	1,200	2.33	-	0.34	0.13	0.34	0.12	0.34	0.34	-	1.99
7 (650), 19 (585)	137	410	795	3,375	2,100	0.41	-	0.39	0.15	0.39	0.12	0.39	0.39	0.39	-
11 (570) and 12 (420)	149	446	852	2,037	1,323	0.41	-	0.43	0.17	0.43	0.12	0.43	0.43	0.02	-
15 (670) and 22 (570)	466	1,397	2,374	5,080	2,91	2.91	-	1.34	0.52	1.34	1.20	1.34	1.34	-	1.57

Required Storage for 2020 Demand

Zone	ADD (gpm)	MDD (gpm)	PHD (gpm)	Q _s (gpm)	Q _L (gpm)	Available Storage (mg)	Equalizing (mg)	Method 1 Standby (mg)	Method 2 Standby (mg)	Maximum Required Standby (mg)	Fire (mg)	Maximum of Standby or Fire (mg)	Required Equalizing and Standby/Fire (mg)	Additional Required Storage (mg)	Excess Storage (mg)
1 (510), 2 (420) and 21 (340)	876	2,628	4,343	1,950	1,350	0.44	0.36	1.66	0.98	1.66	1.20	1.66	2.02	1.57	-
3 (280), 4 (340), 5 (340), 6 (420)	123	368	727	1,800	1,200	2.33	-	0.35	0.14	0.35	0.12	0.35	0.35	-	1.88
7 (650), 19 (585)	139	417	806	3,375	2,100	0.41	-	0.40	0.16	0.40	0.12	0.40	0.40	0.40	-
11 (570) and 12 (420)	169	505	947	2,024	1,323	0.41	-	0.49	0.19	0.49	0.12	0.49	0.49	0.09	-
15 (670) and 22 (570)	466	1,397	2,374	5,089	2,89	2.89	-	1.34	0.52	1.34	1.20	1.34	1.34	-	1.55

Appendix J
1999 Water Quality Report

This report describes your drinking water sources and quality, and how this quality compares to stringent federal water quality standards. This publication conforms to the new federal regulation requiring water utilities to provide water quality information annually. We support the passage of this regulation and believe the information provides a valuable service to our customers.

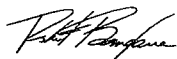
This report is technical in nature and we have attempted to provide it in a user-friendly format. Our goal is to help you understand what is in your water - and what isn't. Your drinking water is highly regulated by the Environmental Protection Agency (EPA) and tested frequently by our supplier, Seattle Public Utilities, to ensure the water delivered to your home is of very high quality. New technologies continue to increase the ability to find contaminants in water. Keeping pace with more stringent federal standards is a challenge, but one Woodinville Water District strongly supports.

We are committed to keeping you informed about water issues. We encourage you to read this report and save it. Each year we will refine and update this report in response to new federal requirements. If you have questions or comments on this report or suggestions for future reports, please call our Public Information Office at (425) 483-9104, ext. 302. For more information regarding water quality, please call our Water Quality Office at (425) 483-9104, ext. 325.

Sincerely,



Maureen Jewitt
President, Board of Commissioners



Bob Bandarra
General Manager
Woodinville Water District



1999 Water Quality Report

Woodinville Water District

The Cascade Mountains Supply Your Drinking Water

The primary source of water for Woodinville Water District customers is the pristine South Fork Tolt River Watershed (13,390 acres). Occasionally, this is supplemented by water from the 90,495 acre Cedar River Watershed. Both watersheds begin in remote, uninhabited areas of the Cascade Mountains. After treatment, the water flows through a 60-inch diameter pipeline to Woodinville and other Eastside cities on its way to Seattle. An essential part of this water supply is mountain snowmelt, which is captured in the Tolt Reservoir, thereby assuring an adequate supply of drinking water throughout the year.

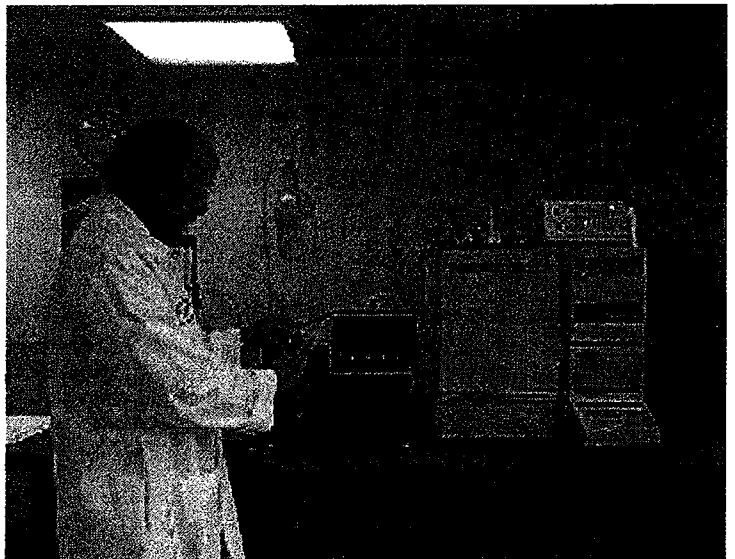
Water Quality Protection - Current and Future

Seattle Public Utilities' (SPU) aggressive watershed protection plan for the Cedar and Tolt River watersheds protects water quality. Agricultural, industrial and recreational activities are not allowed. Access to these watersheds is restricted to appropriate staff and educational programs conducted by SPU staff. Seattle owns most of the land (99 percent of the Cedar River Watershed and 77 percent of the South Fork Tolt River Watershed) and has a strong working relationship with the other major landowner in the South Fork Tolt River Watershed, the United States Forest Service.

The Washington State Department of Health (WDOH) must conduct source water assessments on all water supplies in the state by the year 2003 to determine their vulnerability to organic and inorganic contamination. WDOH has not yet conducted the assessments for Seattle's sources, but has completed vulnerability assessments. Because of SPU's extensive efforts to protect its source water, there is little opportunity for organic and inorganic contaminants to enter the water. Accordingly, WDOH has designated Seattle's surface water sources as having "low vulnerability" to organic and inorganic contamination. Potential sources of contamination in this surface water supply are limited to naturally occurring sources: erosion of soil or natural soil deposits, or animal activity.

Who Monitors Your Water?

The United States Environmental Protection Agency (EPA), in order to ensure that tap water is safe to drink, limits the amount of certain contaminants in water provided by public water systems. Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water. All drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (1-800-426-4791).



Laboratory Technician testing water sample.

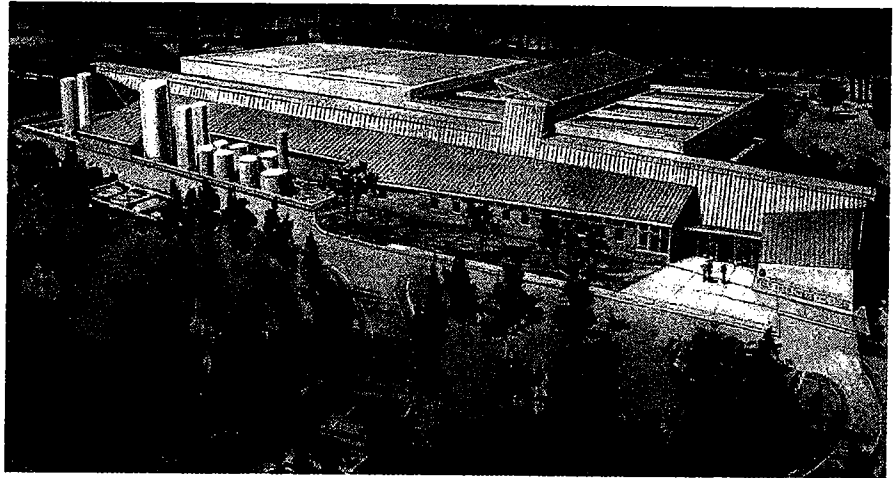
Seattle Public Utilities protects, collects and treats our region's water supply. Various compounds are monitored at specific frequencies (continuously, daily, monthly, quarterly or annually) and at various locations (prior to treatment, entering the distribution system, and throughout the distribution system) in accordance with federal and state regulations.

Woodinville Water District designs, operates and maintains your local water storage and distribution system.

Because of our pristine source water, we can provide high quality drinking water with very little additional treatment. Currently our water is not filtered, but is disinfected with chlorine to destroy *Giardia*, bacteria, and viruses that may be present in the source water. Seattle Public Utilities adds minerals (calcium oxide and sodium carbonate) to our naturally soft water to inhibit corrosion in building plumbing systems. In accordance with a Seattle public vote held in November 1968, SPU also adds fluoride to the drinking water to prevent tooth decay.

Can We Improve Your Water Quality?

As new research tells us more about the health effects of various drinking water contaminants, Woodinville Water District stays in step to improve and protect the product we deliver. New technologies continue to increase the ability to find contaminants, and keeping pace with more stringent federal standards is a challenge, but one that the District strongly supports. SPU is currently constructing a Tolt Filtration Plant to enable us to meet new disinfection by-product regulations, increase system reliability, and address aesthetic concerns of our customers. The Tolt filtration and ozonation facility is expected to be operational in late 2000.



Rendering of New Filtration Treatment Plant

We are not on the Cedar water supply often, but a Cedar River Treatment Project is underway and will include an ozonation facility by 2004. More information about this project can be found on Seattle's website at www.ci.seattle.wa.us/

1998 Water Quality Monitoring

SPU conducts numerous tests on your drinking water 365 days a year. The Water Quality Monitoring Results table lists contaminants detected in 1998, their concentrations and possible sources. Our 1998 water quality monitoring showed no contaminants at or above allowable levels of concern for the general public. SPU monitors for about 140 compounds but the table lists only the few compounds that were found. For a list of the compounds that were monitored for but not found, please call our Water Quality Office at (425) 483-9104, ext. 325. Turbidity, a measure of water clarity and an overall indicator of water quality, is also monitored. Both the Cedar River and the South Fork Tolt River generally have low turbidity levels. The section following the table describes the significance of the contaminants.

What Are Potential Contaminants?

In your drinking water supply, the potential contaminants and their sources include:

- * Microbial contaminants, such as viruses and bacteria, from wildlife;
- * Inorganic contaminants, such as salts and metals, which are naturally occurring;
- * Organic contaminants, which are by-products of disinfection processes; and
- * Radioactive contaminants, which can be naturally occurring.

Your Comments Welcome

We welcome customer input on decisions involving your drinking water. Your questions, concerns and observations are an important part of our quality assurance program. Reading this report and staying current with local water issues will help you stay involved. We also invite you to attend our Board of Commissioner meetings on the first and third Tuesday of each month at 7:00 p.m. at the district office.

District Storage is 14.87 Million Gallons

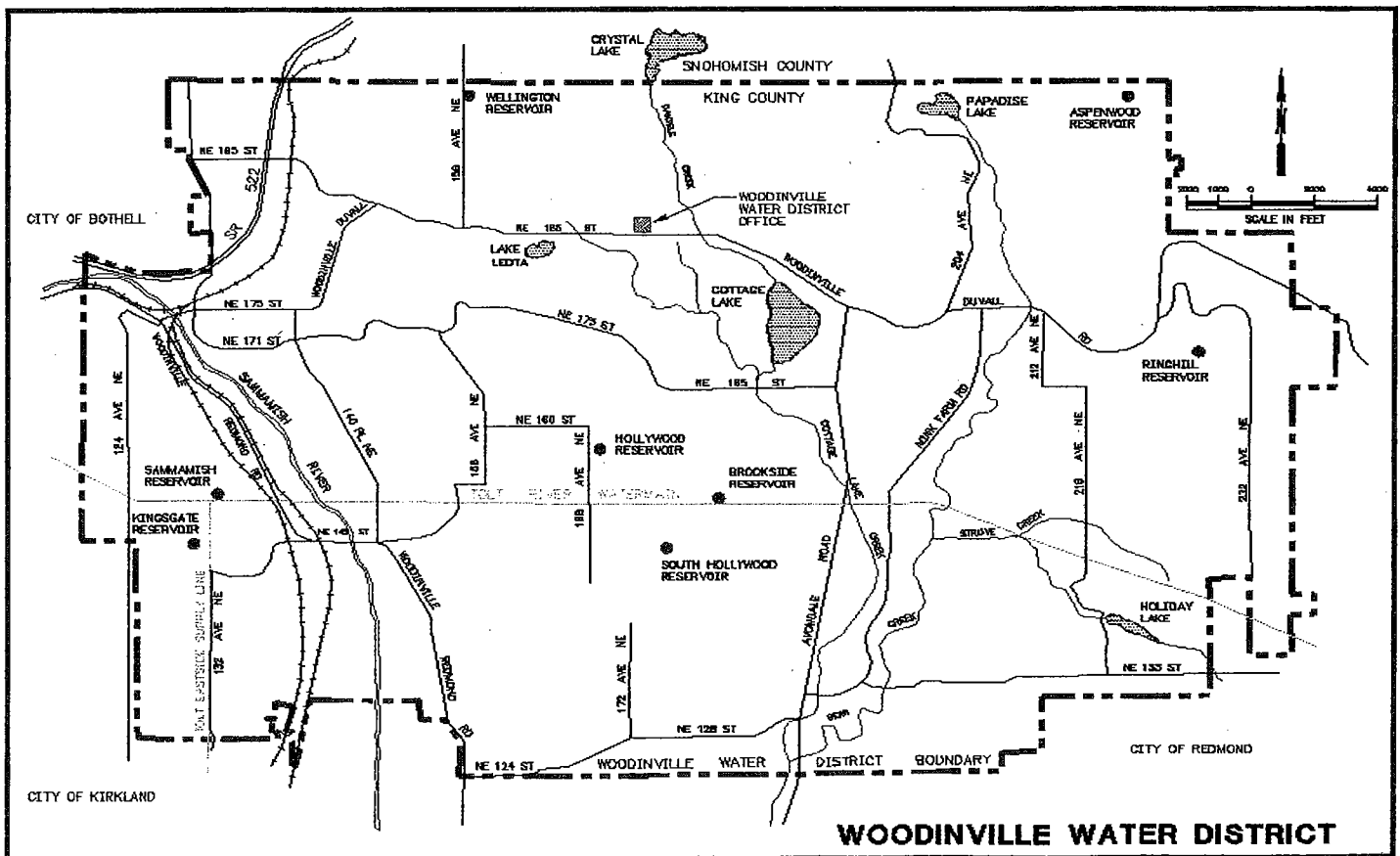
Eight reservoirs, with a total holding capacity of 14.87 million gallons, are located throughout the District. A computer model of the distribution system helps control water movement and anticipate water demands. District staff monitor these levels at all times and adjust input to equal output to ensure the reservoirs remain at the appropriate level.

Managing the Distribution System

Another key to maintaining good water quality is effectively managing the water distribution system. Eight reservoirs/tanks store enough water to last Woodinville Water District's customers four days if water is used only indoors. It is important for the water to remain fresh and retain sufficient chlorine for disinfection. Our cross-connection control program is designed to keep contaminants from homes and businesses from entering the potable water system.

District Service Area

Woodinville Water District's Service Area extends from the King/Snohomish County Line to just south of English Hill and from Ringhill to Kingsgate.



1998 Water Quality Monitoring Results

Water quality tests were conducted and compiled in December 1998, and distributed in January to water agencies for their 1999 reports. In the table below, the first column lists each compound and the units of measure. The second is the highest level allowed by the U.S. Environmental Protection Agency. (Please refer to the definition of MCLG and MCL below the table). The third column lists the levels found in the Cedar supply, including an average and a range. The fourth shows the levels found in the Tolt supply. Woodinville Water District customers receive most of their water from the Tolt. The fifth column shows that your water meets all requirements. The last column is the source of the compounds. Some tests are not required every year. For these, the concentrations listed are the results of the most recent listing.

Detected Compounds	Units	EPA's Allowable Limits		Levels in Cedar Water		Levels in Tolt Water		Is Your Water Safe?	Typical Sources
		MCLG ^①	MCL ^②	Average	Range	Average	Range	Compliance	
CLARITY (Measured Before Treatment)									
Turbidity	NTU	NA	(5)TT ^③	0.5	0.2 to 3.5	0.4	0.1 to 1.7	YES	Soil runoff
INORGANIC AND ORGANIC PARAMETERS (Measured After Treatment)									
Fluoride	ppm	4	4	1	0.9 to 1.1	1	0.8 to 1.2	YES	Water additive which promotes strong teeth. (Our target is 1 ppm)
Nitrate (one sample)	ppm	10	10		0.1		0.1	YES	Erosion from natural deposits
Chloroform (one sample) ▽	ppb	No EPA limit set yet			6		11	YES	By-product of drinking water chlorination
Bromodichloromethane (one sample) ▽	ppb	No EPA limit set yet			1		1	YES	By-product of drinking water chlorination
Hexachlorocyclopentadiene (HCCPD) _Ω	ppb	50	50		ND		ND to 0.3	YES	A Synthetic Organic Chemical (SOC) believed to be a byproduct of chlorination
MICROBIAL PARAMETERS (Measured in the Distribution System)									
Total Coliform, % positive samples - Combined distribution system		0	5%	Highest month = 0.0% (none found) Annual Average = 0.0% (none found)				YES	Naturally present in the environment
DISINFECTION BY PRODUCTS (Measured in the Distribution System)									
Total Trihalomethanes*	ppb	NA	100			71.5	63.3 - 75.6	YES	By-product of drinking water chlorination

* (Includes chloroform and bromodichloromethane, which are listed above in table)

Ω Test results 11/25/97; Not required again until 1999-2001 monitoring period.

▽ Test results 02/17/97; Not required again until 1999-2001 monitoring period.

Definitions

- ① MCLG = Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLG's allow for a margin of safety.
- ② MCL = Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. MCL's are set as close to the MCLG's as feasible using the best available treatment technology.
- ③ TT = Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water. The turbidity MCL that applies to the Cedar and Tolt supplies is (5) NTU.

NA = Not Applicable

ND = Not Detected

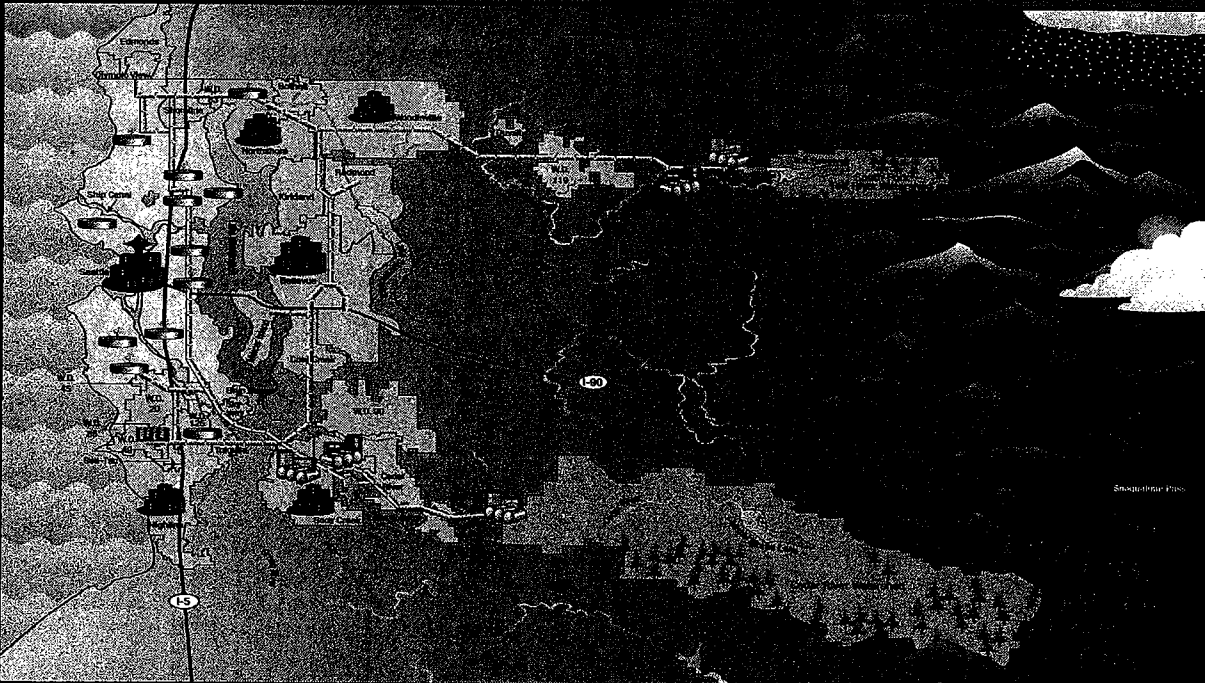
For water samples: 1 part per million (ppm) = 1 mg/L.

1 part per billion (ppb) = 1 µg/L

1 ppm = 1000 ppb

One part per million could be compared to one second every 12 days.

One part per billion could be compared to one second every 32 years.



Area served by Seattle Public Utilities (SPU)



Area served by SPU's Purveyors



UNIBus Serving > 40,000



Existing Treatment Plants



Proposed Treatment Plants



Supply/Major Transmission Lines



Seattle's Uncovered Distribution Reservoirs > 2 MG



Seattle's Covered Distribution Reservoirs > 2 MG



Highline Water Field

What Other Things Is My Water Tested For?

SPU monitors several parameters in the interest of our customers. The following table lists the water quality information most frequently requested.

PARAMETER & UNITS	GEDAP	TOLT
Alkalinity, Total (as CaCO ₃), ppm	16 - 21	12 - 14
Aluminum, ppb	16 - 48	42 - 67
Calcium, (as CaCO ₃), ppm	21.4	10.4
Hardness, (as CaCO ₃), ppm	26.1	11.7
Hardness, (as CaCO ₃), grains/gal.	1.5	0.7
Iron, ppm	0.01 - 0.04	0.03 - 0.20
Manganese, ppb	<3 - 4	<3 - 24
pH	7.6 - 8.5	7.3 - 8.6
Potassium, ppm	0.3	0.1
Sodium, ppm	2.9	5.5
Sulfate, ppm	1.9	1.8
Temperature, annual range, °C	4 - 20	4 - 20

What Can I Do About Chlorine Taste and Odor?

Chlorine kills organisms that may cause disease. If you remove the chlorine with a filter, refrigerate the water to limit bacterial re-growth. You can also:

- Fill a pitcher and let it stand in the refrigerator overnight. (This is the best way).
- Fill a glass or jar with water and let it stand in sunlight for 30 minutes
- Heat the water to about 100 degrees Fahrenheit.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons, such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers.

Cryptosporidium parvum:

Cryptosporidium parvum is a disease-causing organism commonly found in the natural environment and in most rivers and streams across the country. *Cryptosporidium* sources include deer, elk and voles in the watersheds. No disease outbreaks have been associated with Seattle's drinking water. Chlorination is ineffective against *Cryptosporidium*, but ozonation effectively destroys it and other microbial bugs. Seattle plans to use ozonation on Tolt water (by the end of 2000) when the Filtration Treatment Plant is operational and Cedar water (approximately 2004).

Seattle Public Utilities monitored monthly for *Cryptosporidium* in the source waters for 18 months during 1997 and 1998, in accordance with the Federal Information Collection Rule. No *Cryptosporidium* was detected in the 18 untreated water samples of the Tolt system. It was detected in 2 of the 18 untreated water samples on the Cedar system, which is not our primary source of supply. Of the Cedar samples that did detect *Cryptosporidium*, the maximum number found was 8 oocysts per 100 liters, relatively low compared to typical surface water sources throughout the country. Furthermore, the method used for detecting *Cryptosporidium* cannot determine if the organisms are alive, and possibly harmful, or dead and presumably harmless. There is no current standard, but of course, the goal is zero.

Ingestion of *Cryptosporidium* may cause cryptosporidiosis, an abdominal infection that may cause nausea, diarrhea and abdominal cramps. Although most healthy individuals overcome the disease within a few weeks, immuno-compromised people are at greater risk of developing life-threatening illnesses and should consult their doctor about preventing infections. *Cryptosporidium* must be ingested to cause problems and may be spread through means other than water.

EPA guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791), and on EPA's web site at www.epa.gov/safewater.

Lead and Copper and Your Drinking Water - Are You at Risk?

Our source waters do not contain lead or copper. However, lead and copper can leach into residential water from building plumbing systems containing copper plumbing, lead-based solder, brass fixtures or some types of zinc coatings used on galvanized pipes and fittings. Homes built or plumbed with copper pipe prior to the 1985 King County lead solder bans would likely have used lead-based solder, and are considered "high risk" by EPA's criteria. Brass fixtures, regardless of age, generally also contain some lead. Metals leach into building plumbing systems when water has not been used and sits stagnant in the pipes for six hours or longer.

As part of regional monitoring conducted in 1992 and 1997, the drinking water in "high-risk" homes was tested for lead and copper. Samples were collected from these homes after water stood in the pipes overnight. (We are required to report the "90th percentile" result of the testing, meaning that 90 percent of the high-risk homes have concentrations less than the reported value, and 10 percent have concentrations higher than

Health Issues continued:

the reported value.) Homes in Woodinville Water District were tested at the same time as homes in Seattle's direct service area and in other cities and districts that purchase water from SPU. Compliance is determined on a regional basis and the results are listed in the table below.

If your home or building is "high risk," you may want to flush water that has been standing for six hours or longer, prior to using it for cooking or drinking. Many people flush until they notice the temperature change - usually less than 30 seconds. However, be "water smart" and use the flushed water for watering plants or washing dishes. You should never use hot tap water for cooking, drinking, or making baby formula because hot water dissolves metals faster.

Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.

Customers wanting to have their water tested (for a fee) may call the District Water Quality office at (425) 483-9104, ext. 325 to obtain a list of independent testing laboratories in the area.

LEAD AND COPPER					
			Combined Regional Monitoring Lead and Copper		WWD's Customers Tolt Water
Parameter & Units	MCLG	Action Level	90th percentile	# Homes exceeding action level	# Homes exceeding action level
Lead, parts per billion	0	15	19.3	53 of 390	1 of 15 tests done
Copper, parts per million	1.3	1.3	0.59	0 of 390	0 of 15 tests done
Sources of Contamination: Corrosion of household plumbing systems.					

How Can I Get More Water Quality Information?

Woodinville Water District 17238 Woodinville-Duvall Road PO Box 1390 Woodinville, WA 98072	Phone: (425) 483-9104 Website: www.woodinvillewater.com
Tim Cantwell, WWD Water Quality Dept.	tcantwell@woodinvillewater.com Phone: (425) 483-9104, ext. 325
Washington Dept. Of Health (WDOH) web site	www.doh.wa.gov/ehp/dw
Environmental Protection Agency (EPA) web site	www.epa.gov/safewater
EPA Safe Drinking Water Hotline	1-800-426-4791
EPA Safe Drinking Water Hotline e-mail	EPA Safe Drinking Water Hotline e-mail



Woodinville Water District
17238 Woodinville-Duvall Road
PO Box 1390
Woodinville, WA 98072

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Appendix K
1999 Water System Sanitary Survey



STATE OF WASHINGTON
DEPARTMENT OF HEALTH
1511 Third Ave., Suite 719 • Seattle, Washington 98101-1632

RECEIVED

JUL 14 1999

Woodinville Water District

July 13, 1999

WOODINVILLE WATER DISTRICT
C/O MR BOB BANDARRA
PO BOX 1390
WOODINVILLE WA 98072

Subject: Woodinville Water System (ID#41600Y) King County
Water System Sanitary Survey

Dear Mr. Bandarra:

This letter is written in follow up to my sanitary survey of the Woodinville water system on June 24, 1999. Thank you to Tim Cantwell for meeting with me and showing me around the system. The purpose of a routine survey is to identify any immediate health concerns and to assess the operation, maintenance and management of the water system.

My survey revealed no immediate health concerns; the system appears to be well operated, maintained and managed. Enclosed is a copy of my notes summarizing the issues Tim and I discussed along with my recommendations. Please consider these issues and work with me in their implementation. I would appreciate a progress report indicating your thoughts and intentions within the next month or so.

I can be reached in Seattle at (206) 464-5401 if you have any questions or concerns about this survey. Bob James is also available at (206) 464-7671 to discuss any other issues that may be of concern to the district.

Sincerely,

Derek M. Pell, PE
Regional Engineer
NW Drinking Water Operations

Enclosure

cc: King County Health Department
Bob James, PE - DOH





STATE OF WASHINGTON
DEPARTMENT OF HEALTH
1511 Third Ave., Suite 719 • Seattle, Washington 98101-1632

SYSTEM INSPECTION / MEETING SUMMARY

Date: 06/24/99

WOODINVILLE WATER DISTRICT King County (ID#41600Y)

Persons Attending:

Tim Cantwell - WQ and Cross-Connection Control Specialist

Derek Pell - DOH

Purpose:

Routine Sanitary Survey

System Summary / Findings

Last surveyed: unknown

Approval status:	Existing Connects	=	12,358 residential
	Eng Capacity	=	not specified
	Total Lots	=	unknown

WATER QUALITY HISTORY:

Good coliform bacteria history. Exceeded Action Level for lead - Seattle's Tolt filter plant which is under construction is expected to address the corrosion problem.

WATER QUALITY MONITORING

Source purchase entirely from Seattle Public Utilities. Regional monitoring.

** See DOH Coliform Monitoring File for system layout map **

SOURCES:

Seattle's Tolt River Pipeline (TRP) provides the backbone of the Woodinville system (8 metered connections with flow control valves). There is 1 metered connection off of the Seattle Tolt Eastside Supply Line.

STORAGE:

Typical Reservoir: welded steel construction with common inlet/outlet, internal overflow, drain to daylight, sample tap adjacent to flow control valves. Reservoirs use impressed current corrosion protection. Cla-valve and altitude valve on inlet/outlet tied to SCADA system to control reservoir level. Meter tied to SCADA. Reservoirs were last cleaned in 1997 and painted in 1993.

Sammamish Reservoir - 2.6MG H=30' (o/f=300')

Located on the border between Zones 1 and 3 adjacent to a TRP tap serving downtown Woodinville. Did not climb to inspect access hatch seal, or screened vents.



Brookside Reservoir - 2.5MG H=18' (o/f=420')

Located at the end of a cul de sac on 180th Place adjacent to a TRP tap in Zone 9. Did not climb to inspect access hatch seal, or screened vents.

Kingsgate Reservoir - 1.1MG H=100' (o/f=510')

Located in Zone 1. Did not climb to inspect access hatch seal, or screened vents.

Hollywood Reservoir - 2.5MG H=27' (o/f=570').

Located on NE 158th St / 168th NE in Zone 7. No seal on access hatch. Vent screen installed, but susceptible to small critter access (insects, bats). Internal overflow needs smaller mesh and better fitting screen. Water inside reservoir appeared clean and clear.

S. Hollywood Reservoir - 1.7MG H=88' (o/f=570').

Located on NE 144th / 174th NE in Zone 9S. Did not climb to inspect access hatch seal, or screened vents.

Wellington #1 Reservoir - 1.4MG H=78' (o/f=570').

Located on NE 203rd / 156th NE in Zone 9. Flow control valves located in vault ~3 miles from reservoir (Wellington transmission main from TRP). Did not climb to inspect access hatch seal, or screened vents.

** 2 drilled well casings are located adjacent to the reservoir **

Ringhill Reservoir 1.8MG H=18' (o/f=570').

Located on NE 169th / 227th NE in Zone 15. No seal on access hatch. Vent screen ok. Internal overflow should be screened to prohibit small critter access. Water inside reservoir appeared clean and clear.

Aspenwood Reservoir 1.1MG H=123' (o/f=670').

Located on NE 200th / 223rd NE in Zone 15. Inlet discharges to top of tank, check valve on outlet. Vent has ~1/2" screen mesh. Water inside reservoir appeared clean and clear.

DISTRIBUTION:

Service area consists of undulating terrain; and is consequently served by ~20 pressure zones. A majority of the service area is served directly from the TRL via pressure reducing stations. Reservoir levels throughout the service area are remotely controlled by the SCADA system via altitude and Cla-Valves. In addition, there are 3 pump stations.

Hollywood Pump Station (HGL=650').

Located adjacent to Hollywood reservoir; pumps from TRL or Hollywood Reservoir to Zone 7. 2- 50hp + 15hp pumps activated by SCADA, flow <500gpm, or <50psi. Back-up power is on-site and is on auto switch.

Ringhill Pump Station (HGL=670').

Located on 227th Ave NE adjacent to TRL; pumps from TRL to Zones 15 and 20. 3- 40hp pups activated by level control from Aspenwood Reservoir or flow control via SCADA. Back-up power is on-site and is on auto switch.

Lake of the Woods (Ringhill) East Pump Station (HGL=670').

Serves a 17 lot subdivision at NE 140th / 232rd NE.

2- 5hp pumps + 1- 20hp with 2- 220gal pressure tanks; 72/90psi. Back-up power is on-site and is on auto switch.

MANAGEMENT & OPERATIONS:

Water System Plan	approved 4/27/94
Overall Design Approval	yes
Certified Operator	yes
O&M Manual	in wsp + operators keep notebooks
Flushing Program	as needed - not budgeted in past. future budgeted item.
Conservation Program	Active PR- demonstration garden project.
Individual Customer Meters	yes
Unaccounted for Water	unknown
WQ Table / Coliform Monitoring Plan	part of Seattle's regional monitoring program
Cross Connect Program	Active budgeted item - 1 FTE
Emergency Response Plan	See wsp - Boxed water emergency prep program.
Financial Viability Program	See wsp
Complaints	none on DOH file. Purveyor reports some leakage and taste/odor complaints that are dealt with immediately.

FINDINGS / RECOMMENDATIONS

- 1) The water system appears to be well operated and maintained. Noted below are some minor recommendations that the district should consider.
- 2) Reservoir appurtenances need to be maintained with appropriate seals or screens to keep out birds, bats, insects, and rainwater runoff. Access hatches should be fitted with gasketed seals. Vents and overflow pipes should be fitted screens of appropriate mesh size.
- 3) Since most of the District's reservoirs have common inlet/out piping, keeping water fresh is an important challenge. While the SCADA system can show reservoir level variation, it may not account for short circuiting (high turnover of water near the inlet/outlet, but little turnover in upper parts of the tank). When cleaning reservoirs in the future, the district may want to consider placing a tee on the existing common pipe with a riser to the top of the tank on the inlet and a check valve on the outlet. HPC (Heterotrophic Plate Count) profiling at the tank outlet during various flow conditions may also help quantify reservoir water quality over time.
- 4) The District's 1992 Comprehensive Water Plan models distribution system hydraulics under several flow conditions. However, there is no discussion of what the actual maximum field flow conditions are at individual hydrants. The District should consider evaluating the field flow capacity of a hydrant vs. the rate at which the hydrant was hydraulically modeled. If the actual field flow is greater than the modeled rate, unsuspected pressure losses in portions of the system may pose a back suction contamination risk.

Appendix L
SEPA Checklist

**WOODINVILLE WATER DISTRICT
COMPREHENSIVE WATER PLAN**

**DETERMINATION OF
NONSIGNIFICANCE (DNS)**

Description of Proposal:

This Comprehensive Water Plan (Plan) for the Woodinville Water District (District) presents an evaluation of existing facilities, system operation, water quality, projected water demands, and existing and future requirements. Based on the evaluation, the Plan updates the long-range planning strategies, the Capital Improvement Plan (CIP), and financial plan. This Plan has been prepared in accordance with the requirements of Washington Administrative Code (WAC) 246-290-100 and the April 1997 Washington Department of Health (DOH) Water System Planning Handbook. A site-specific SEPA review will be completed for each specific project, as appropriate.

Proponent:

Woodinville Water District
17238 Woodinville-Duvall Road
P.O. Box 1390
Woodinville, WA 98072-1390

Contact: Bob Bandarra, General Manager
(425) 483-9104, ext. 303

Location of Proposal, including street address, if any:

The area covered by Plan includes approximately 18,660 acres in northeast King County. The District serves the City of Woodinville and portions of unincorporated King County. The Plan contains several maps showing the geographical extent of the area covered by the Plan.

Lead Agency:

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

There is no comment period for this DNS.

- This DNS is issued after using the optional DNS process in WAC 197-11-355. There is no further comment period on the DNS.
- This DNS is issued under 197-11-340(2); the lead agency will not act on this proposal for 14 days from the date below. Comments must be submitted by _____.

Responsible Official:

Bob Bandarra, General Manager
Woodinville Water District
17238 Woodinville-Duvall Road
P.O. Box 1390
Woodinville, WA 98072-1390

Date: _____ Signature: _____

- You may appeal this determination in the form of a written statement to Bob Bandarra, Woodinville Water District no later than _____. The written statement must: 1) request an appeal to the Determination of Non-Significance; 2) state the name and address of the person aggrieved; 3) present a clear and concise statement of the grounds for the appeal; and 4) be accompanied by a processing fee.
- There is no agency appeal.

ENVIRONMENTAL CHECKLIST

A. BACKGROUND

1. Name of proposed project, if applicable:

Woodinville Water District Comprehensive Water Plan (Plan)

2. Name of applicant:

Woodinville Water District

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

Bob Bandarra, General Manager
Woodinville Water District
17238 Woodinville-Duvall Rd.
P.O. Box 1390
Woodinville, WA 98072-1390
(425) 483-9104 ext. 303

4. Date checklist prepared:

February 2000

5. Agency requesting checklist:

Washington Department of Health (DOH)

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

The Plan identifies capital improvement projects through 2020.
The Comprehensive Water Plan is required to be updated every six years.

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

Implementation of the Plan will lead to the installation of water mains, reservoirs, pump stations and other components of the water system as described in the Plan. The Plan may be amended at any time.

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

Environmental checklists will be prepared for specific projects recommended in the Plan if they are determined to not be categorically exempt under SEPA.

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

None are known.

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

The Plan must be approved by the DOH.

11. **Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)**

The Woodinville Water District Comprehensive Water Plan presents an evaluation of existing facilities, system operation, water quality, projected water demands, and existing and future requirements. The Plan updates the long-range planning strategies, the Capital Improvement Plan, and financial plan.

Specific sections of the Plan examine the characteristics of the service area, including such topics as geography, adjacent purveyors, land use, and growth.

The source of water supply is discussed in detail. The District's current water supply contract with Seattle Public Utilities (SPU) will expire on January 1, 2012, and SPU will likely not renew the contract under the current terms. To secure its future water supply, the District has been exploring future water supply alternatives. The various sources of supply alternatives were examined in the Plan.

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

The area covered by this Plan includes approximately 18,660 acres in northeast King County. The District serves the City of Woodinville and portions of unincorporated King County. The Plan contains several maps showing the geographical extent of the area covered by the Plan.

B. ENVIRONMENTAL ELEMENTS

1. Earth

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

Topography within the District ranges from flat terrain to undulating hills, with elevations varying from 25 feet to over 600 feet. Elevations at the western District boundary are over 400 feet. Moving east, elevations drop to 25 feet in the Sammamish Valley, then rise to 500 feet at the east ridge of the Sammamish Valley. The elevations drop to below 200 feet across the Cottage Lake Creek and Bear Creek drainage areas. Elevations then rise to over 600 feet at the east boundary of the District (the westerly ridge of the Snoqualmie Valley).

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

Some areas of the District's service area have slopes exceeding 15 percent; the majority are less than 15 percent.

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

The Soil Survey of King County Area, Washington (USDA SCS, 1973), indicates that the following soil types are typically found in the District's service area: Alderwood association (moderately well drained, undulating to hilly soils that have dense, very slowly permeable glacial till at a depth of 20 to 40 inches); Buckley-Alderwood association (poorly drained and moderately well drained, nearly level to rolling soils that have dense, slowly permeable and very slowly permeable glacial till at a depth of 20 to 40 inches); and Everett association (somewhat excessively drained, gravelly, gently undulating soils underlain by sand and gravel; on terraces).

In the past, areas in the Sammamish Valley were considered agricultural; however, in recent years, portions of these area has been converted to other uses (business parks, industrial uses and recreational playfields).

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

Areas within the District's service area have been classified as having severe landslide hazards. Construction of water system improvements is not planned for these areas.

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

Construction of proposed improvements may require grading or filling (i.e., backfilling of water lines will be done with native excavated materials).

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

Temporary erosion could occur from construction including land-clearing activities. Appropriate erosion control measures will be incorporated into project design to minimize erosion.

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

Does not apply.

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

Erosion and sediment control for projects will rely on structural measures (silt fences, straw bale barriers, sediment ponds and check dams) and non-structural measures (common sense planning, good design, routine inspection and maintenance, employment and enforcement of Best Management Practices).

2. Air

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

Air quality issues will be limited primarily to fugitive dust emissions caused by construction of recommended improvements. There may be short-term localized increases in exhaust emissions from heavy equipment and support vehicle operation during construction. There will be no emissions from the completed improvements.

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

No.

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

Appropriate Best Management Practices will be implemented during construction to minimize fugitive dust. Vehicular emissions are anticipated to be short-term in nature.

3. Water

a. Surface:

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

Sammamish River, Cottage Lake, Cottage Lake Creek, Bear Creek, Struve Creek, Colin Creek Daniels Creek, Welcome Lake, Paradise Lake and Lake Leota all lie within the District's service area.

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

Future water supply alternatives under consideration may require work within or adjacent to described waters. These activities will be addressed under separate SEPA documents as required.

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

Does not apply.

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

The District is exploring future supply alternatives that may require surface water withdrawals or diversions. These activities are currently being, or will be, addressed under separate SEPA documents as required.

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

Some of the proposed improvements may lie within the 100-year floodplain.

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

No. If any of the proposed improvements require construction near or across a creek or other surface water, erosion control measures will be incorporated to control erosion to the surface water.

b. Ground:

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

The District currently owns and maintains an emergency standby well (and site) located in close proximity to the District's Woodinville office properties. The purposes of the well is to provide an alternate source of water in the event a natural disaster or other unforeseen event disrupts the District's ability to receive a safe and reliable water supply from SPU. This well has a reliable, sustained pumping capacity of 1,000 gpm. As an emergency standby source, this well will be used only when necessary to address public health and safety emergencies.

Some of the alternatives in the Plan consider other sources of water from groundwater (i.e., Cross Valley Water District Groundwater and the Snoqualmie Aquifer and Snoqualmie River). These activities are currently being, or will be, addressed under separate SEPA documents as required.

- 2) **Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals; agricultural; etc.). Describe the general size of**

the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

Does not apply.

c. Water Runoff (including storm water):

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

Intermittent flushing of water lines and reservoirs may result in the discharge of turbid water to the storm drainage system.

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

Suspended solids and/or chlorine may be discharged from the flushing and disinfection of newly constructed pipelines.

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

It is anticipated that the limited amount of suspended solids discharged will have an insignificant short-term effect and no indirect or long-term impacts. Chlorinated water for sterilization of facilities can be neutralized at the time of discharge.

4. Plants

a. Check or circle types of vegetation found on the site:

- deciduous tree: alder, maple, aspen, other
- evergreen tree: firm cedar, pine, other
- shrubs
- grass
- pasture
- crop or grain
- wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
- water plants: water lily, eelgrass, milfoil, other
- Other types of vegetation

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

Minor amounts of vegetation will be disturbed/removed as a result of normal construction activities.

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

None are known.

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

Hydroseeding will occur in areas that are excavated or disturbed for construction activities.

5. Animals

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

Birds: hawk, heron, eagle, songbirds, other: All

Mammals: deer, bear, elk, beaver, other: All

Fish: bass, salmon, trout, herring, shellfish, other: _____

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

The listed Puget Sound chinook utilize the Sammamish River.

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

The District's service area is not a critical migratory corridor or migratory-use area for birds or mammals. The Sammamish River is a migratory corridor for chinook, coho and sockeye salmon; kokanee; and steelhead and cutthroat trout.

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

No impacts to wildlife are expected as a result of approval of the Plan, therefore, no wildlife enhancement measures are proposed.

6. Energy and Natural Resources

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

Electricity is used to operate equipment associated with the water supply system (i.e., booster pumps).

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

No.

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

Where appropriate, energy efficient equipment will be specified for proposed water system improvements.

7. Environmental Health

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

None are known.

- 1) Describe special emergency services that might be required.**

The Plan describes emergency operational procedures that might be required in the event of an equipment failure and contamination of water supply. Approval of the Plan is not expected to result in the need for any other emergency services.

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

None are required.

b. Noise

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

Does not apply.

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

Short-term noise would be created during construction activities associated with the improvements proposed in the Plan. There are no long-term noises anticipated with approval of the Plan, nor associated improvements.

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

Construction activities will comply with appropriate noise regulations.

8. Land and Shoreline Use

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

A wide range of urban and rural uses exist within the District's service area, including residential, commercial, industrial, agricultural and open space.

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

The Sammamish Valley contains agricultural lands. System improvements are not expected to impact these lands.

c. Describe any structures on the site.

Numerous residential, commercial, industrial, agricultural and public use structures exist within the District's service area.

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

No structures will be demolished as a result of approval or adoption of the Plan.

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

The zoning designations in the District's service area vary and are shown on Figure 1-4 of the Plan. Approximately 70 percent of the District's current service area is designated either RA-2.5 or RA-5.

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

The service area is covered under the City of Woodinville and King County comprehensive plans. They each contain

classifications for specific uses including residential, commercial, industrial and other.

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

Not applicable.

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

Portions of the District’s service area have been classified as environmentally sensitive areas. These include floodways, wetlands, slopes over 40 percent, and landslide hazard areas. Proposed system improvements are not planned for these areas.

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

None.

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

None.

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

None are required.

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

Land use policies identify where growth will occur. The District provides service consistent with the adopted land use policies of King County and the City of Woodinville.

9. Housing

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

None.

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

None.

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

None are required.

10. Aesthetics

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

The Plan recommends construction of two storage facilities, with potential heights up to approximately 100 feet.

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

None.

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

If necessary, water storage and pumping facilities will be located to minimize aesthetic impacts (i.e., screened from view).

11. Light and Glare

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

Some of the proposed system improvements may require outside lighting for safety and security. Lighting levels would be similar to levels in residential areas.

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

No.

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

None.

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

None are required.

12. Recreation

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

Numerous recreational opportunities and facilities are located in and around the District's service area.

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

No.

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

None are required.

13. Historic and Cultural Preservation

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

None are known.

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

Does not apply.

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

If objects or structures of potential historical or cultural importance are discovered during excavation, work will be halted and the Washington State Office of Archaeology and Historic Preservation will be consulted immediately.

14. Transportation

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

The District's service area includes many streets, roads and highways.

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

Portions of the District's service area are served by public transit.

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

Does not apply.

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

Construction of some of the proposed system improvements may occur within street right-of-ways, requiring repair of affected streets or roads.

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

Does not apply.

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

Project improvements may require periodic maintenance inspections, but would not generate a significant number of trips to impact traffic.

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

During construction of the proposed improvements, work will be conducted so as to minimize transportation impacts. This may include roadway crossings where at least one-half of the roadway remains open to traffic at all times.

15. Public Services

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

Growth during the time period covered by the Plan will require an increased need for all types of public services in the District's service area. Approval and adoption of Plan will not add or subtract from the need for those services.

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

None are required.

16. Utilities

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

All of the above.

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

Electricity and telephone service may be required at some of the proposed system improvements.

C. SIGNATURE

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

Signature: _____

Date Submitted: _____

D. SUPPLEMENTAL QUESTIONS FOR NONPROJECT ACTIONS

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

Approval or adoption of the Plan will not lead to any discharge to water, emissions to air, noise production, or production, storage or releases of hazardous substances. Actual implementation of the Plan may cause minor temporary impacts to the environment as a result of construction activities. Examples of the types of impacts that may occur include the temporary increase in fugitive dust or increased noises associated with construction.

Proposed measures to avoid or reduce such increases are:

During construction provisions will be made to minimize water, mud, silt or other runoff from excavations or other activities. Contractors will comply with regulatory requirements and implement appropriate dust and noise control measures.

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

No impacts to plants, animals, fish or marine life are expected as a result of approval or adoption of the Plan. Vegetation removal for facility construction may be required. Any improvements will be accomplished in accordance with state law so as to not impact fish life.

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

Appropriate designs will be incorporated to minimize the effects on plants, animals and fish.

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

Does not apply.

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

None are required.

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

None of the area types listed above are expected to be affected by approval, adoption or implementation of the Plan. Proposed improvements would not affect environmentally sensitive areas in the District's service area.

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

None are required.

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

Proposed improvements will not impact land and shoreline uses. The Plan is compatible with the King County and the City of Woodinville comprehensive plans.

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

Improvements made to the water system will follow state law and the guidance provided by comprehensive plans, zoning ordinances and shoreline development standards of the City of Woodinville and King County, the local governments with jurisdiction.

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

No increased demands are expected other than those that will occur as a result of normal growth in the service area.

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

None are required.

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

No conflict is known or anticipated.

Appendix M
Resolution 3320 – Cross Connection Control

**WOODINVILLE WATER DISTRICT
KING COUNTY, WASHINGTON
RESOLUTION NO. 3320**

A RESOLUTION of the Board of Commissioners establishing a cross connection control program; repealing Resolution No. 3312 and Chapter 4.40 of the Woodinville Water District Codes; and codifying the District's cross connection control program in a new Chapter 4.40 of the Woodinville Water District Codes.

Whereas, the Woodinville Water District (the "District") provides water supply to residents and property located within its boundaries; and

Whereas, the District must comply with state and federal law and regulations, including regulations governing cross connections with the District's public water supply; and

Whereas, the State of Washington recently adopted revised regulations governing cross connection control; now, therefore,

BE IT RESOLVED by the Board of Commissioners of the Woodinville Water District:

1. Cross Connection Control Policy. The District is required to protect the public water supply with premise isolation cross connection control protection and by installation of approved air gaps or approved backflow prevention assemblies at the property line provided in this resolution or by entering into an agreement with the property owner to have the devices tested at a minimum, annually in premise at the owners expense.

2. Cross Control Specialist. The District shall employ a Cross Connection Control Specialist who shall be certified as a CCS in compliance with State regulations and who shall be responsible for administering the District's cross connection control policy under the direction of the District Manager and in compliance with Department of Health regulation.

i. The CCS shall eliminate cross connections by appropriate enforcement action as provided herein; but

ii. Whenever a cross connection cannot be eliminated, the CCS shall require, at the expense of the user, in-premises cross connection control, or premise isolation all at the expense of the consumer.

3. Cross Connection Control Policy. The CCS shall oversee installation of cross connection control devices and the maintenance and testing thereof as follows:

a. New Commercial Services and Fire Systems. After the effective date of this Resolution, all new commercial services shall be isolated from the public system at the meter and at the property line for fire systems by an approved backflow device and tested, at minimum, annually at the owner's expense. The owner will provide the CCS reports required by the District's cross connection control program.

b. Existing High Hazard. Those premises and services identified by WAC 246-290-490 (4) (b) as high hazards shall be converted to premises isolation at the meter under the direction of the CCS or the property owner shall enter into an agreement with the District to guarantee no connections between the meter and first backflow device. In addition the agreement will allow the CCS access to the property and the owner of the property shall have the devices tested at a minimum, annually at the owner's expense. The owner will provide the annual CCS reports required by the District's cross connection control program.

c. Existing Commercial. Commercial premises shall be required to convert to premise isolation at the meter under the direction of the CCS or the property owner shall enter into an agreement with the District to allow the CCS access to the property and the owner of the property shall have the devices tested at a minimum, annually at the owners expense. The owner will provide the annual CCS report required by the District's cross connection control program.

d. Existing and New Residential Connections

Connections with a known backflow hazard will be required to install cross connection protective devices appropriate to the risk and the property owner shall have the devices tested at a minimum, annually at their expense in accordance with the District's cross connection control program. The owner will provide the annual CCS reports required by the District's cross connection control program.

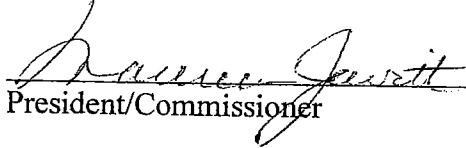
3. Cross Connection Control Enforcement. The CCS is responsible for cross control enforcement.

a. Failure to Comply. The CCS shall take appropriate enforcement action against consumers who fail to control cross connections as required by the District, or who fail to install, maintain, repair or test backflow devices as required by the District.

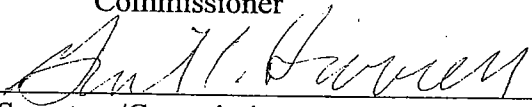
b. Enforcement Action. The CCS may discontinue service until compliance is achieved, with appropriate notice to the local administrative agency, or cause an appropriate backflow device to be installed at the expense of the consumer.

- c. CCS -- Duties. The District's CCS shall administer the District's cross connection control program and, in addition to duties heretofore set forth, the CCS shall be responsible for:
- d. Program. The CCS shall develop the District's cross connection control program incorporating good engineering and public health practices and policies stressing practical economics and finances, including the use of private contractors. The CCS may refer to the current *Manual of Cross Connection Control* (USC Manual) or the current *Cross-Connection Control Manual, Accepted Procedure and Practice* (PNWS-AWWA Manual), or such other current reference approved by the Department of Health when developing the cross connection control program.
- e. Records. The CCS shall develop and maintain the records required by WAC 246-290-490 (3) (j) & (8).
- f. Testing and Inspection. The CCS shall develop and include in the Program procedures for initial evaluations of new and existing services, a schedule for re-evaluations of services, procedures for notification to the consumer and the local administrative agency.
- g. Coordination and Reports. The CCS shall coordinate with the local administrative agency by providing notice of (1) all premises that have been isolated from the public system in accordance with this Resolution, (2) any internal cross connections about which the CCS learns, (3) Shut-off for failure to comply with requirements of this Resolution or the WAC, and (4) the CCS shall report to the ratepayers through the District's newsletter about the cross connection control program, its purpose and rationale.
- h. Approved Backflow Devices. The CCS shall develop and include in the Manual practices and procedures for installing and testing backflow devices in accordance with WAC 246-290-490 (5) (6) & (7).
5. Repealer: Resolution 3312 and Chapter 4.40 of the Woodinville Water District Codes are repealed. This Resolution shall be codified as a new Chapter 4.40 when the existing code is revised.


ADOPTED by the Board of Commissioners of the Woodinville Water District, King County, Washington, at a regular meeting thereof this 5th day of October 1999.



President/Commissioner


Commissioner


Secretary/Commissioner

Vice President/Commissioner


Commissioner

Approved to form by General Counsel



Appendix N
SRRWA Water Rights Transfer Project Technical Memorandum

**SNOHOMISH RIVER REGIONAL WATER AUTHORITY
WATER RIGHTS TRANSFER PROJECT
TECHNICAL MEMORANDUM**

Prepared For:

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June 1999

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EXECUTIVE SUMMARY

This report presents an evaluation of the Woodinville Water District's (WWD) participation in the Snohomish River Regional Water Authority's (RWA) Weyerhaeuser (Weyco) Snohomish River surface water right transfer project. This is a planning level report, and as such, does not evaluate details or subalternatives that would be explored in a predesign or engineering report. There are two primary alternatives being considered in this Technical Memorandum for the water right transfer. The alternatives are denoted as Alternative 1 – Flow Swap and Alternative 2 – Direct Transfer. The two alternatives are as summarized below.

Alternative 1 – Flow Swap

- The proposed alternative involves a water swap with the City of Everett. The RWA would provide the City of Everett with up to 36 mgd instantaneous flow and an annual average flow of 28.7 mgd of treated industrial grade process water (non-potable water) delivered to the vicinity of the existing Weyco site in Everett. The City of Everett would, in turn, provide the same volumes of potable water to the RWA. Since Everett will use 41.7 percent of the RWA, not all of the “swapped” water would need to be conveyed through new facilities. The WWD would be eligible for 11 mgd peak instantaneous and 8.8 mgd average annual flow from 30.6 percent of the RWA water right.
- The existing Weyco Ebey Slough Intake Facility would be upgraded with a new trash rack, fish screens, pumps, mechanical piping and valves, new electrical power equipment and controls, and a new building.
- It was assumed that only minor mortar lining repairs would be made to approximately 3.5 miles of the existing 40-inch-diameter Weyco transmission main which would then be used to convey water from the Ebey Slough Intake to new pipe connecting to the proposed industrial water treatment plant (industrial WTP).
- Approximately 1,700 feet of new 40-inch diameter steel pipe would connect the existing Weyco pipe to the headworks of the proposed treatment plant.
- A new 36 mgd industrial water treatment plant (industrial WTP) would be constructed on a representative site adjacent to the Snohomish River in the City of Everett. The treatment process would consist of coagulation, flocculation, sedimentation, and filtration (treating to a turbidity level of 0.3 NTU).
- Approximately 1,700 feet of new 40-inch diameter steel pipe would convey water back from the treatment plant clearwell to the existing Weyco pipeline.
- The remaining two-mile-long section of the existing Weyco pipeline would then be used to convey treated water from the treatment plant to the redeveloped Weyco site. Since this pipeline is under higher pressure than the raw water pipeline, it is assumed that this section of existing 40-inch diameter steel pipeline would be slip lined with 36-inch diameter HDPE pipe.

- The following facilities would convey City of Everett potable water flows to the WWD:
 - WWD portion of the 7.9-mile-long Clearview Project Pipeline including the Snohomish River crossing and Clearview Project pump station.
 - A new 9.5-mile-long, 40-inch-diameter pipeline from the Clearview Reservoir site to the WWD, referred to as the Clearview/WWD pipeline.
 - A new 1.5 mile long, 24-inch diameter pipeline to convey water within the WWD service area boundary.

Figure 1 shows the locations of these project facilities. The estimated costs of these project elements are listed in Table ES-1.

With the exception of the water treatment plant cost estimates, the opinion of probable costs were developed with a 40 percent construction contingency and include a 20 percent contingency for engineering and administration. The WTP costs were developed to a higher level of detail and therefore, a 20 percent construction contingency was used.

**Table ES-1
Snohomish River RWA Project Capital and O&M Cost Summary Alt. 1 – Flow Swap
(1999 Dollars)**

Component	Total Capital Costs	Total O&M Costs	WWD Share (%)	WWD Shared Cost	
				Capital Cost	O&M Cost
RWA Project					
Ebey Slough Intake Upgrades	\$2,747,000	\$280,000	30.6	\$841,000	\$86,000
Existing Weyco Pipeline Rehabilitation	\$1,804,000	-	30.6	\$553,000	-
New Raw Water Line	\$935,000		30.6	\$287,000	
Industrial WTP ⁽¹⁾	\$52,956,000	\$4,650,000	30.6	\$16,205,000	\$1,423,000
WTP Finished Water Line	\$1,030,000	-	30.6	\$316,000	-
Clearview/WWD Pipeline	\$29,280,000	-	100 ⁽²⁾	\$29,280,000 ⁽²⁾	-
Clearview Project					
Pump Station	\$6,720,000	\$676,000	- ⁽³⁾	\$222,000	\$102,000
River Crossing	\$10,320,000	-	15	\$1,548,000	-
Pipeline	\$19,200,000	-	12.9	\$2,483,000	-
Total	\$124,992,000	\$5,606,000		\$51,735,000	\$1,611,000

Notes:

(1) Includes finished water pump station.

(2) If NUD participated in the Clearview/WWD Pipeline construction, the WWD share of the Clearview/WWD Pipeline capital cost would be reduced to approximately \$17,568,000 (i.e., 60% of \$29,280,000), and the WWD share of the total capital cost of Alternative 1 would be reduced to approximately \$40,023,000.

(3) WWD/CVWD Agreement does not specify WWD's shared capital cost as a percentage of the total cost. Instead, the Agreement specifies the shared capital cost shown above. Assumed O&M shared cost for WWD was 15% of the total O&M cost.

There are several pending issues that affect the implementation of the Flow Swap Alternative. They include:

- Ecology must approve the RWA water right change application in order for the RWA project to proceed.

- Based on existing FEMA floodplain maps, portions of the proposed industrial water treatment plant site are located in a 100-year flood area with average depths of less than one foot. The remainder of the site is not located in the 100-year floodplain but is within the 500-year floodplain. This site is not located in the floodway. The WTP cost estimate includes a flood control line item to account for the cost to raise the site by one foot to mitigate the potential impacts from the 100-year flood areas. FEMA has indicated that they are updating the flood plain map for the Lower Snohomish River via a contract with the Corps of Engineers. Whether or not the proposed site is located within any flood plain may change based upon this analysis.
- Snohomish County PUD could charge King County recipients of Sultan River water a cost of water surcharge, as a requirement of this project. These surcharges would include a monthly rate to WWD customers who receive Sultan River water (i.e., from the Everett filtration plant). Also, it is possible that Snohomish County PUD would charge a one-time connection charge per ERU. The amount of these potential charges has yet to be determined/negotiated. The cost impacts to WWD will depend on how many WWD ERUs are served by the Sultan River supply.
- Construction of the Ebey Slough Intake upgrades will require an approval from the National Marine Fisheries Service to meet Endangered Species Act requirements.
- The alignment of the proposed Clearview/WWD Pipeline will need to be finalized.
- This study does not address NUD's transmission needs to convey their share of the RWA water right south to NUD's distribution system. However, the potential cost savings to WWD if NUD were to share in the cost of the Clearview/WWD Pipeline is discussed.
- The planning level capital costs for the industrial WTP could be significantly reduced (by \$16 to \$20 million) if the water quality criteria for the industrial end users are less stringent than the criteria used in this study. The WTP costs represent approximately 42 percent of the total project capital costs.

Alternative 2 – Direct Transfer

- Alternative 2 does not involve a water swap with the City of Everett Sultan River supply. Instead, the Weyco water right beneficial use will be municipal water supply. The Snohomish River water will be treated to potable water standards and directly transferred to the RWA. The transfer would include up to 36 mgd instantaneous flow and an annual average flow of 28.7 mgd. The WWD would be eligible for 30.6 percent of this water right, which would provide 11 mgd peak instantaneous, and 8.8 mgd average annual demand.
- The existing Weyco Ebey Slough Intake Facility would be upgraded with a new trash rack, fish screens, pumps, mechanical piping and valves, new electrical power equipment and controls, and a new building.
- Raw Water Transmission: A new raw water transmission line would be required from the intake to a new potable water treatment plant (potable WTP). The proposed pipeline would be a 36-inch diameter buried pipeline with a total length of approximately 7,200 feet. The pipeline is sized to convey 36 mgd (55.7 cfs).

- Treatment: The RWA would construct a 36 mgd potable WTP to treat water from the Snohomish River to drinking water standards. The finished water would be conveyed from the potable WTP to the WWD distribution system. The Snohomish River potable WTP would have an ultimate capacity of 36 mgd. A potential water quality concern is the high Total Dissolved Solids (TDS) (i.e. salinity) in the raw water. Options to address the TDS may include temporary shutdown of the treatment facility, dilution, and treatment. The high salinity levels are tidally influenced. High concentrations of TDS in the raw water (above 80 mg/L) are anticipated during the months of August and September for a one week time period. During that one-week time period, the high raw water concentrations would persist for a few hours, depending on the tides.
- The following facilities would convey the potable water to the WWD:
 - A new finished water high-head pump station would be required to pump flows to the WWD.
 - A 17.3 mile long, 36-inch diameter pipeline from the potable WTP to the WWD service area boundary, referred to as the WWD Finished Water Pipeline.
 - A new 1.5 mile long, 24-inch diameter pipeline to convey water within the WWD service area boundary.

Figure 9 shows the locations of these project facilities. The estimated costs of these project elements are listed in Table ES-2.

Table ES-2
Snohomish River RWA Project Capital and O&M Cost Summary Alt. 2 Direct Transfer
(1999 Dollars)

Component	Total Capital Costs	Total O&M Costs	WWD Share (%)	WWD Shared Cost	
				Capital Cost	O&M Cost
RWA Project					
Ebey Slough Intake Upgrades	\$2,981,000	\$435,000	30.60	\$913,000	\$134,000
New Raw Water Line	\$4,371,000		30.60	\$1,338,000	
Potable WTP	\$47,500,000	\$4,680,000	30.60	\$14,535,000	\$1,433,000
Finished Water Pump Station	\$1,862,000	\$450,000	100 ⁽¹⁾	\$1,862,000	\$450,000
WWD Finished Water Pipeline	\$45,932,000	-	100 ⁽¹⁾	\$45,932,000	-
Total	\$102,646,000	\$5,565,000		\$64,580,000	\$2,017,000
⁽¹⁾ If NUD participated in the WWD Finished Water Pipeline and Finished Water Pump Station, the WWD share of the pipeline and pump station capital cost would be reduced to approximately \$28,678,000, (i.e., 60% of \$45,932,000 and \$1,862,000) and the WWD share of the total capital cost of Alternative 2 would be reduced to approximately \$45,464,000.					

There are several pending issues that affect the implementation of the Direct Transfer Alternative. They include:

- Ecology must approve the RWA water right change application in order for the RWA project to proceed.
- Construction of the Ebey Slough Intake upgrades will require an approval from the National Marine Fisheries Service to meet Endangered Species Act requirements.
- This study does not address NUD's transmission needs to convey their share of the RWA water right south to NUD's distribution system. However, the potential cost savings to WWD if NUD were to share in the cost of the Finished Water Pipeline and Pump Station is discussed.
- The impact of the salinity in the raw water needs to be further investigated. If treatment is required to reduce salinity levels, a process such as reverse osmosis would be required, which may increase capital costs by approximately \$20 million.

Cost Comparison

WWD's share of the project costs for each alternative were inflated to the year 2012, at which time the project will need to be implemented to meet WWD's water supply needs after the Seattle Public Utilities contract expires. A comparison of the WWD's share of both 1999 and 2012 costs is presented in Table ES-3.

Conclusion

Although there are several open items that need to be resolved, once the water right change is approved by Ecology, it appears that Alternative 1 – Flow Swap is a favorable option for Woodinville Water District's future water supply needs, compared to Alternative 2 – Direct Transfer. The cost comparison (Table ES-3) indicates that the Flow Swap would be more cost effective than the direct transfer. Most of the cost savings associated with the Flow Swap are for the finished water transmission component whereby WWD can take advantage of the purchased capacity in the Clearview Pipeline. In addition to cost considerations, the water quality and blending issues associated with using the Snohomish River as a potable water source make the Flow Swap a more favorable option than the Direct Transfer. The salinity levels in the river will have less impact, if any, with respect to the level of treatment required, for industrial water supply than for municipal water supply. Furthermore, the water quality of the Sultan River supply is better than the Snohomish River. Finally, use of the Sultan River supply for potable water eliminates the Snohomish River/Sultan River blending issue for the RWA so WWD can utilize the Clearview Pipeline for potable water transmission.

**Table ES-3
Comparison of WWD Share of Costs for Two Alternatives**

Alternative 1 - Flow Swap		Alternative 2 - Direct Transfer	
1999 ITEMIZED CAPITAL COSTS			
Raw Water Intake and Transmission		Raw Water Intake and Transmission	
Ebey Slough Intake Upgrades	\$841,000	Ebey Slough Intake Upgrades	\$913,000
Lower Weyco Pipeline Rehab.	\$23,000	New Raw Water Line	<u>\$1,338,000</u>
New Raw Water Line	<u>\$287,000</u>		
Subtotal	\$1,151,000	Subtotal	\$2,251,000
Treatment		Treatment	
Industrial WTP	\$16,205,000	Potable WTP	\$14,535,000
(WTP includes finished water pump station)		Finished Water Pump Station	<u>\$1,862,000</u>
		Subtotal	\$16,397,000
Finished Water Transmission		Finished Water Transmission	
Upper Weyco Pipeline Rehab.	\$529,074	Potable WTP Finished Water Line	\$45,932,000
Industrial WTP Finished Water Line	\$316,000		
Clearview/WWD Pipeline	\$29,280,000		
Clearview Project	<u>\$4,253,000</u>		
Subtotal	\$34,378,074		
Total WWD Share of Capital Costs	\$51,734,074	Total WWD Share of Capital Costs	\$64,580,000
1999 OPERATION AND MAINTENANCE COSTS			
Total WWD Share of O&M Costs	\$1,611,000	Total WWD Share of O&M Costs	\$2,017,000
2012 TOTAL CAPITAL AND OPERATION AND MAINTENANCE COSTS			
Total Capital Cost	\$75,973,000	Total Capital Cost	\$94,836,000
O&M	\$2,366,000	O&M	\$2,962,000
Annualized Capital	\$5,516,000	Annualized Capital	\$6,886,000
Total Annualized Cost	\$7,882,000	Total Annualized Cost	\$9,848,000
(Capital and O&M)		(Capital and O&M)	
Cost CCF treated	\$1.84	Cost CCF treated	\$2.29
Cost Per ERU Per Month	\$31.13	Cost Per ERU Per Month	\$38.89

I. INTRODUCTION

This memorandum provides a conceptual plan for implementing the Snohomish River Regional Water Authority (RWA) Water Rights Transfer Project. The memorandum has been prepared for the Woodinville Water District (WWD) as part of the ongoing District's Water System Comprehensive Plan Update. It will be included as an appendix to the Water System Plan for reference as a source of supply option for the District's long-term water supply needs.

Seattle Public Utilities has not committed to renewing their purveyor contract with WWD, which expires on December 31, 2011. Therefore, the District is evaluating alternative long-term source of supply options. The RWA Water Rights Transfer Project is one option under consideration. This memorandum presents two alternatives for implementing the water rights transfer project to meet WWD's water supply needs. Each alternative includes an opinion of probable cost and implementation schedule for the District's use in their upcoming source of supply strategy decision. Design considerations, conceptual drawings of the major project features, and environmental/permitting issues are also presented. With the exception of the water treatment plant cost estimates, the opinion of probable costs were developed with a 40 percent construction contingency and include a 20 percent contingency for engineering and administration. The WTP costs were developed to a higher level of detail and therefore, a 20 percent construction contingency was used.

Background

History

The Snohomish River Regional Water Authority (RWA) is comprised of three municipal purpose public water utilities: the City of Everett (Everett), Woodinville Water District (WWD) and Northshore Utility District (NUD). RWA executed an agreement in December 1996 to acquire Weyerhaeuser Timber Company (Weyco) Surface Water Right S1-10617C. Weyco made continuous and beneficial use of its water right in its North Everett Weyco Mill operations from 1952 to 1992, after which full manufacturing activity ceased. The RWA submitted a change in water right application to the Department of Ecology (Ecology) on December 23, 1996. Both the purpose of use (from industrial to municipal) and place of use (from the former North Everett Weyco Mill site to the RWA Service Area) would change as a result of the application.

Subsequent to the change application, the RWA prepared several studies and planning documents to support the water right change application. Two of these documents, listed below, were referenced in the development of this technical memorandum:

- Snohomish River Regional Water Authority, *Revised and Amended Plan of Use for Weyerhaeuser Timber Company Water Right No. S1-10617C, Volume I and II*, January 30, 1998. (*Plan of Use* document)
- Snohomish River Regional Water Authority, *SEPA Expanded Checklist for Proposed Water Right Change and Plan of Use Adoption for Water Right No. S1-10617C*, January 30, 1998.

The water right withdrawal limits are based on Weyco's historical water use of 36 million gallons per day (mgd) instantaneous and 28.7 mgd annual. The RWA intends to use the same withdrawal limits for a regional Snohomish River water supply. The *Plan of Use* document indicates that the 36 mgd instantaneous withdrawal amount will be distributed as shown in Table 1.

Table 1
Weyco Water Right Withdrawal Limits Distribution

Purveyor	Percent of Water Right	Q instantaneous (mgd)	Q annual average (mgd)
Everett	41.7	15	12.0
WWD	30.6	11	8.8
NUD	27.7	10	7.9
Total	100	36	28.7

The distributed amount for the instantaneous demand as specified in the *Plan of Use* document was used for this analysis. The percentages of water rights for the instantaneous withdrawal limit were also applied to the annual withdrawal limit (see Table 1). The 15-mgd Everett allotment for instantaneous withdrawal was originally based on redevelopment of the Weyco site for new industries. Due to a pulp and paper industry market decline, recent estimates for new industry demands may be as low as three mgd. The actual water demand Everett will need for industrial use at the redeveloped Weyco site is unknown.

Everett Long-Term Water Supply Needs

Everett's existing potable water supply is provided by the Everett Filtration Plant which treats water from the Sultan River. Everett has three large transmission pipelines that convey water from the Everett Filtration Plant west to Everett. A fourth pipeline, Transmission Line No. 4, is dedicated to convey unfiltered Sultan River water for industrial supply uses. One of Everett's options under consideration to alleviate future potable water supply needs is to convert Transmission Line No. 4 to a potable water line. If Transmission Line No. 4 is converted to potable water use, a new source of industrial supply would be needed. The Snohomish River water supply is one option to replace this industrial source of supply. A 36-mgd industrial water treatment plant (industrial WTP) would be constructed to treat the Snohomish River source. The plant would be located within the Everett City limits in an area zoned for industrial use.

Clearview Project

WWD has entered into an agreement with Cross Valley Water District (CVWD) to purchase additional capacity in the Clearview Pipeline. This pipeline will convey water from Everett's Transmission Line No. 5 (from the Everett Water Filtration Plant) approximately eight miles south to the new Clearview Reservoir site. The agreement stipulates that "Woodinville may use its capacity only for water supplied by the City of Everett."

The Clearview Group is a consortium of the six water purveyors located in southwest Snohomish County: Alderwood Water District, Cross Valley Water District, City of Everett, City of Lynnwood, Mukilteo Water District and the Silver Lake Water District. The Group provides joint planning and implementation of the Clearview Water Supply Project. The Project includes a new pump station, pipeline, a Snohomish River crossing, terminal reservoir and system connections to the water purveyor distribution systems. The selected location for the new pump station and selected route for the Clearview Pipeline, per the approved *Final Environmental Impact Statement for Alderwood/Clearview Water Pipeline Project*, (Alderwood Water District, April 15, 1998), are shown on Figure 1.

Woodinville Water District Sources of Supply Issues

Seattle Public Utilities (SPU) presently supplies all of WWD's water in accordance with an existing purveyor agreement that expires on December 31, 2011. SPU has notified WWD that the contract would

not be extended. Therefore, if WWD pursues the Snohomish River RWA project as an alternate source of supply, the project should be implemented by 2012.

The *Woodinville Water District Comprehensive Water Plan Planning Data Memorandum*, April, 1999, contains water demand and connection projections for the District's water service area. Water demand projections for the year 2012 are listed below and compared with the WWD's share of the Weyco water right.

- 2012 projected average day demand is 5.4 mgd
- Weyco water right maximum annual withdrawal is 8.8 mgd
- 2012 projected maximum day demand is 16.2 mgd
- Weyco water right maximum instantaneous withdrawal is 11.0 mgd

Based on these projections, it appears that the Snohomish River water supply can meet WWD's 2012 average day demand needs. However, an additional source of supply would be required to meet the 2012 maximum day demand.

Water Rights Status

The water right change application submitted to Ecology in 1996 has not been approved. The timing for approval is contingent upon Ecology's staffing resources. The Ecology has indicated to the RWA that, with respect to pending change applications, RWA's will be the first to be considered for approval. In order to assist Ecology in their approval process, the RWA has prepared a draft Report of Examination for their water right change application. Ecology may require additional studies on the information already provided to them (i.e., the *Plan of Use* document and *Expanded SEPA Checklist*). The RWA is awaiting comments from Ecology regarding these additional studies. It is anticipated that Ecology's decision regarding the water right change application will occur in the next few years.

Summary Of Project Alternatives

There are two alternatives under consideration for the RWA Water Rights Transfer Project.

Alternative 1 – Flow Swap

- A new 36 mgd industrial WTP would be constructed to treat water from the Snohomish River. The treated water would supply Everett's industrial users.
- Water from the Everett filtration plant (Sultan River supply) would be conveyed to the WWD through the Clearview Project.

Alternative 2 – Direct Transfer

- A new 36 mgd potable WTP would be constructed to treat water from the Snohomish River. The treated water would be conveyed directly to the WWD.

II. ALTERNATIVE 1 – FLOW SWAP

Alternative 1 – Flow Swap is based on the WWD utilizing the additional capacity in the Clearview Pipeline to convey their share of the Weyco water right south from Everett's Transmission Line No. 5 to the Clearview Reservoir site. Direct transmission of the Snohomish River water supply to WWD is not an option due to the stipulation in the *WWD/CVWD Agreement*. Therefore, the alternative involves a water supply swap of Snohomish River water to Everett for Clearview water from Everett.

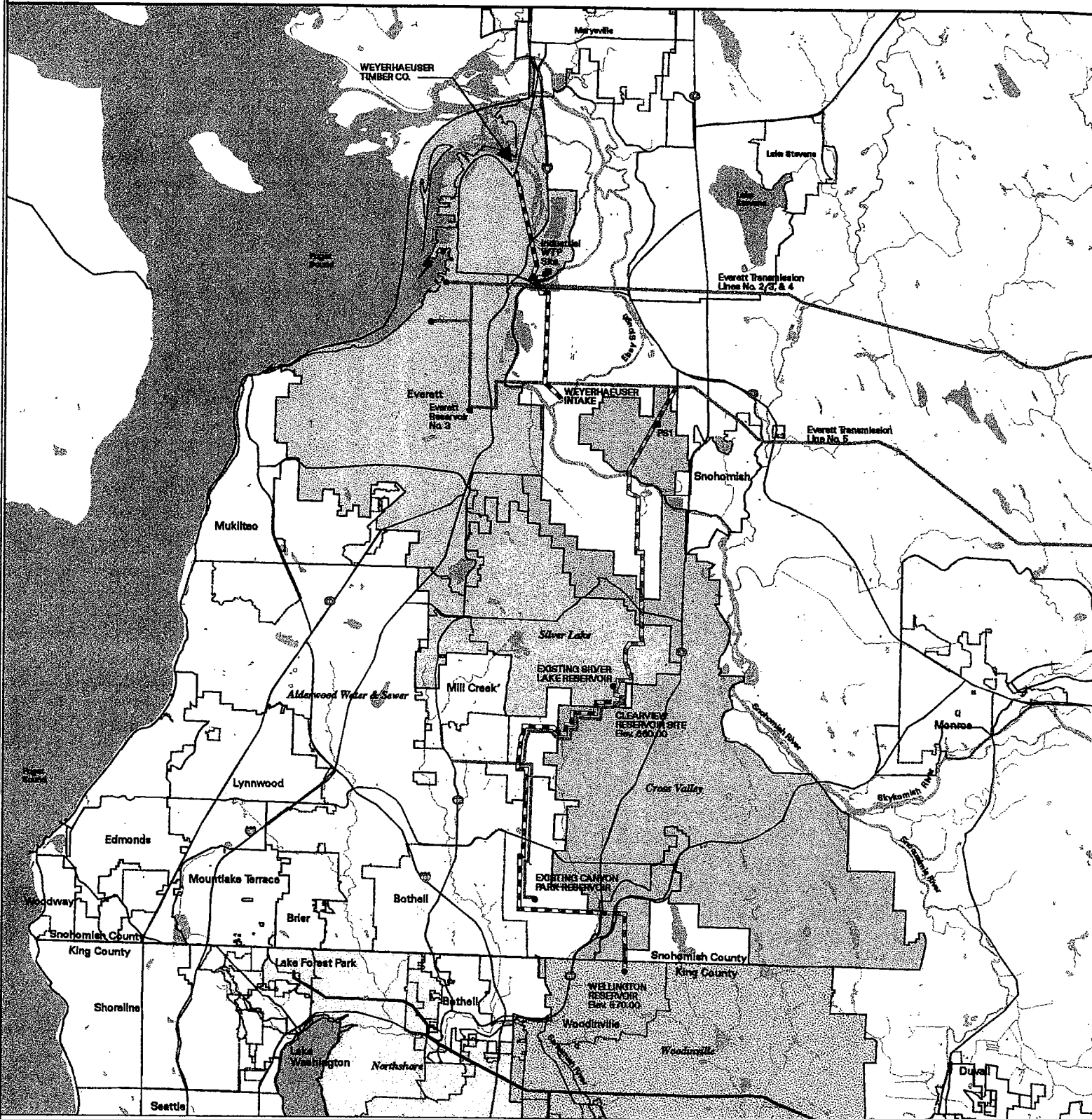
The Snohomish River industrial WTP will produce an annual average of 28.7 mgd (36 mgd instantaneous) of industrial water for Everett industrial customers. The WTP will be located in the Everett industrial area north of the Snohomish River and east of the existing Weyco transmission line. The plant capacity will be 36 mgd with no plans for expansion. In turn, Everett will transfer WWD's 8.8 mgd (11 mgd instantaneous) share of the Weyco water right from the Sultan River supply via the Transmission Line No. 5 and Clearview Pipeline intertie.

Alternative 1 – Flow Swap project components, RWA jurisdictions, adjacent water utilities and existing water transmission lines are shown on Figure 1. Key assumptions for Alternative 1 - Flow Swap are listed below:

- Raw Water Transmission: The existing Ebey Slough Intake and south half of the existing Weyco pipeline will be used for raw water transmission facilities. A short reach of new raw water transmission line between the Weyco line and new industrial WTP will be required.
- Everett Finished Water Transmission: Finished water transmission for Everett will include a new pipeline parallel to the new raw water line to convey the finished water from the WTP back into the Weyco pipeline. The north half of the Weyco pipeline will be used to convey the treated water to the Weyco site.
- WWD Finished Water Transmission. The Clearview Pipeline will be used to convey WWD's water from the Transmission Line No. 5 and Clearview Pipeline Intertie south to the Clearview Reservoir site. A new transmission line will be required between the Clearview Reservoir site and WWD's distribution system.
- NUD Finished Water Transmission. It is our understanding that NUD has not pursued arrangements to obtain additional capacity in the Clearview Pipeline to convey their share of the Weyco water right south to the NUD distribution system. For this analysis, it was assumed that NUD would participate in the swap alternative and have Everett supply NUD's share from the Sultan River supply. NUD would have to construct a separate transmission line between Transmission Line No. 5 and the NUD Distribution system. WWD would not need to use the NUD transmission line and therefore, it is not included in Alternative 1.
- Blending issues (within the WWD system) will not be addressed in this planning-level analysis.

The components of the Alternative 1 - Flow Swap are discussed in more detail below.

Snohomish River Regional Water Authority



Legend

Alderwood Water District	Woodinville Water District	Tilt Pipeline	Clearview Pipelines	Water District Boundary
Cross Valley Water District	Clearview Reservoir Site	Everett Transmission Line	42" Clearview / WWD Pipeline	Divided Highway
Everett Water District	Water Body	Existing Weyerhaeuser Pipelines	Alderwood / Clearview Pipelines	
Northshore Water District	Stream	Industrial WTP RW & FW Pipelines	Municipality Boundary	
Silver Lake Water District				

Figure 1

Project Components Alternative 1 - Flow Swap

June

Note: Project components are shown as dashed lines.



Project Components

Ebey Slough Intake Upgrades

The existing Ebey Slough Intake is sited on the left bank of the Ebey Slough approximately 1,500 feet downstream of the confluence of Ebey Slough and the main channel of the Snohomish River. The intake was constructed in 1953 by the Weyerhaeuser Company to provide water for operating a lumber mill in Everett. The intake is within a fenced site that is approximately 70 feet by 100 feet in size.

The intake is a reinforced concrete structure approximately 35 feet by 47 feet. The structure extends approximately 20 feet into the active channel. The intake was designed to handle 36 mgd and is equipped with two 300 HP vertical turbine pumps, one 400 HP vertical turbine pump, mechanical piping and valves, compressed air system, travelling screens and supporting electrical systems. There is space for a fourth pump, which could be used for additional capacity or a standby pump. The structure is secured with a 6-foot chain link fence mounted to the structure.

Although it is difficult to tell by inspection, most of the mechanical equipment appears to be original. The electrical switchgear appears to be in newer condition and was probably replaced since original construction. In general, the mechanical and electrical equipment appear to be in poor condition largely due to its age and exposure to the weather. There have been numerous changes and additions to piping, conduits and equipment over the years. The concrete structure appears to be in sound condition.

It was assumed that the RWA desires to use the existing structure as much as practical. Other criteria are as follows:

- The flow capacity is 36 mgd peak and 28.7 mgd annual average.
- A trash rack and cleaner will be required. Due to the Ebey Slough slack water conditions, it is expected that large floating debris and bed load movement will not be prevalent.
- Fish screens and cleaning provisions will be designed per Washington State Department of Fisheries criteria that include a maximum approach velocity of 0.4 feet per second and a sweeping velocity of 2 feet-per-second. The sweeping velocity may be unattainable since the hydraulics are tidally influenced with changing direction of flow and low channel velocities.
- Pump sizing is based on delivery head of 40 feet above mean low low water (MLLW) at the treatment plant and head losses through 3.5 miles of pipe to the WTP. Total dynamic head is approximately 90 feet.
- Existing structure will be reused as much as practical.
- Existing underground header and manifold piping will be reused.
- The facility will be unmanned and will have automatic controls or will be operated by telemetry from the proposed industrial WTP.
- The pump system will have to be designed to a high degree of reliability. There is already a second power feed to the site and so an emergency generator is not required.

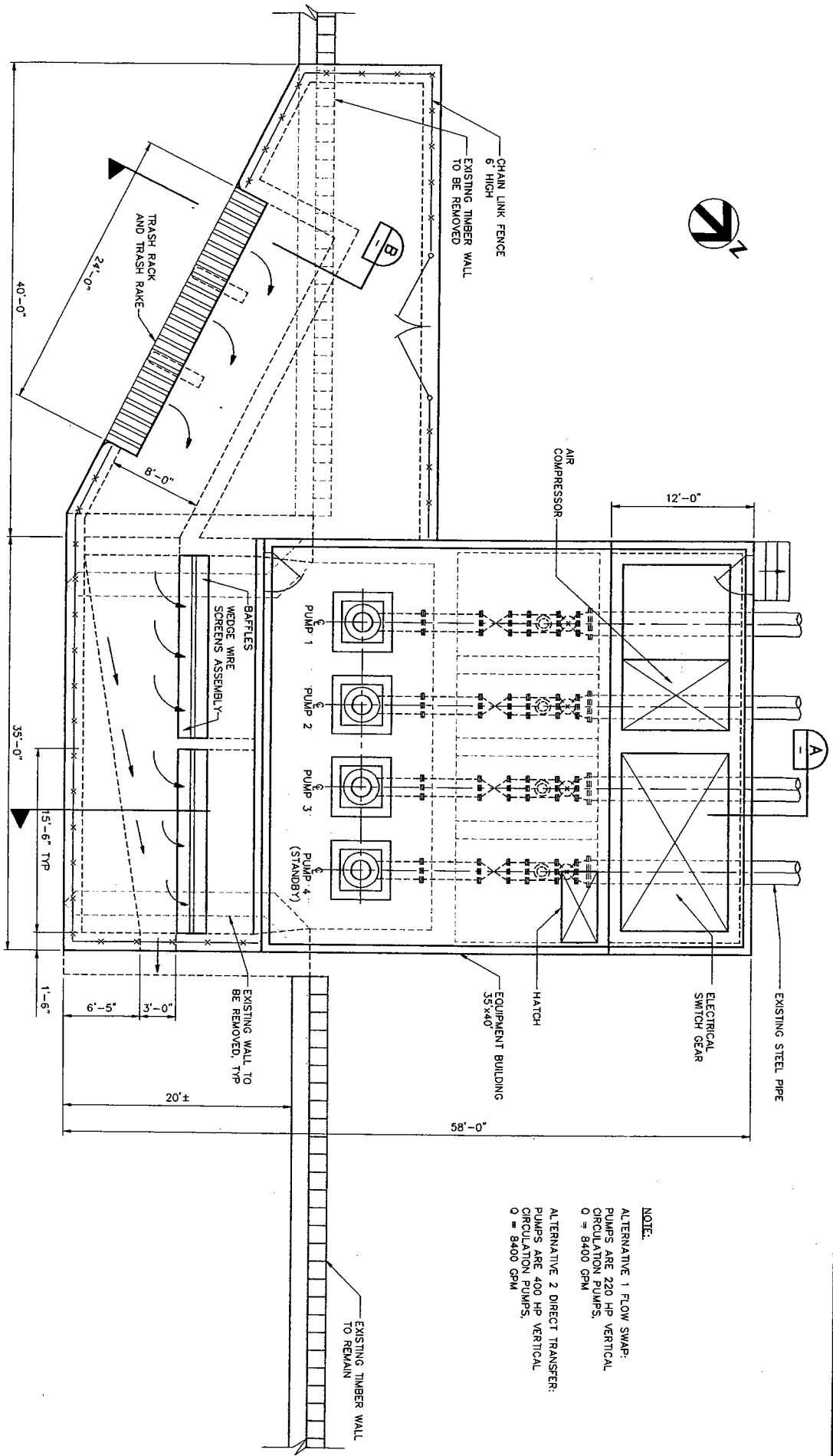
In order to meet the fisheries criteria, the riverside of the intake will be modified to improve hydraulic approach conditions. The proposed modifications are shown on Figures 2, 3 and 4. The proposed changes are:

- The intake structure will be extended upstream approximately 40 feet. Existing riverside walls and deck will be demolished and entrance to pump chamber widened to allow room for new fish screens. The bottom of the intake will be preserved.
- Fish screens and regulating baffles will be incorporated into the structure.
- Replace pumps with four 220 HP, 8400 GPM pumps. Three pumps will handle the required flows; one pump is for standby.
- New mechanical piping and valves.
- New electrical power equipment and controls.
- New building to protect pump and electrical equipment.

The water will enter through the trash rack set at an angle to the river. The water will then travel through an opening in the upstream wall parallel to the screens to create a sweeping flow. Water will then be extracted by the pumps through the screens. Remaining flows and fish will exit through an opening in the downstream sidewall of the structure.

Construction of the intake modifications will require work within the waterway. We anticipate that a sheet pile cofferdam will be constructed to enable construction of the structure. Early consultation with the fisheries agencies will ensure their approval of cofferdam design. Construction is expected to take 6 to 12 months.

Costs: The estimated capital cost of the intake modifications is \$2,747,000. The estimated annual operations and maintenance cost is \$280,000. A detailed cost estimate is provided in Appendix A.

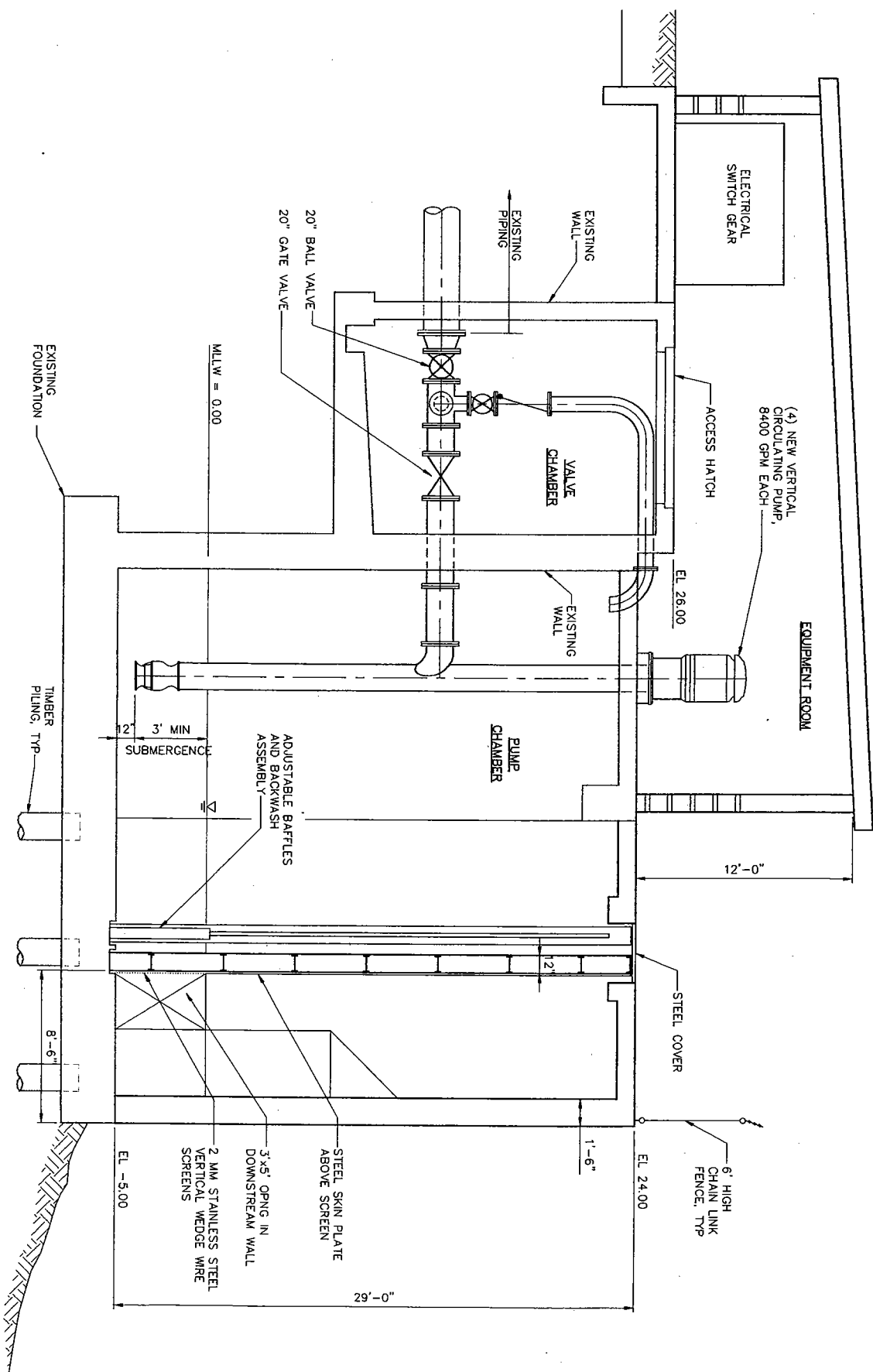


PLAN
SCALE: 1/8" = 1'-0"

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Project Title	NOHOMISH RIVER REGIONAL WATER AUTHORITY	Date	JUNE 1999
Sheet Title	WATER RIGHTS TRANSFER PROJECT	Figure No.	2
	EBEY SLOUGH INTAKE		
	UPGRADE - PLAN VIEW		

NOTE:
ALTERNATIVE 1 FLOW SWAP:
PUMPS ARE 220 HP VERTICAL
CIRCULATION PUMPS.
Q = 8400 GPM
ALTERNATIVE 2 DIRECT TRANSFER:
PUMPS ARE 400 HP VERTICAL
CIRCULATION PUMPS.
Q = 8400 GPM



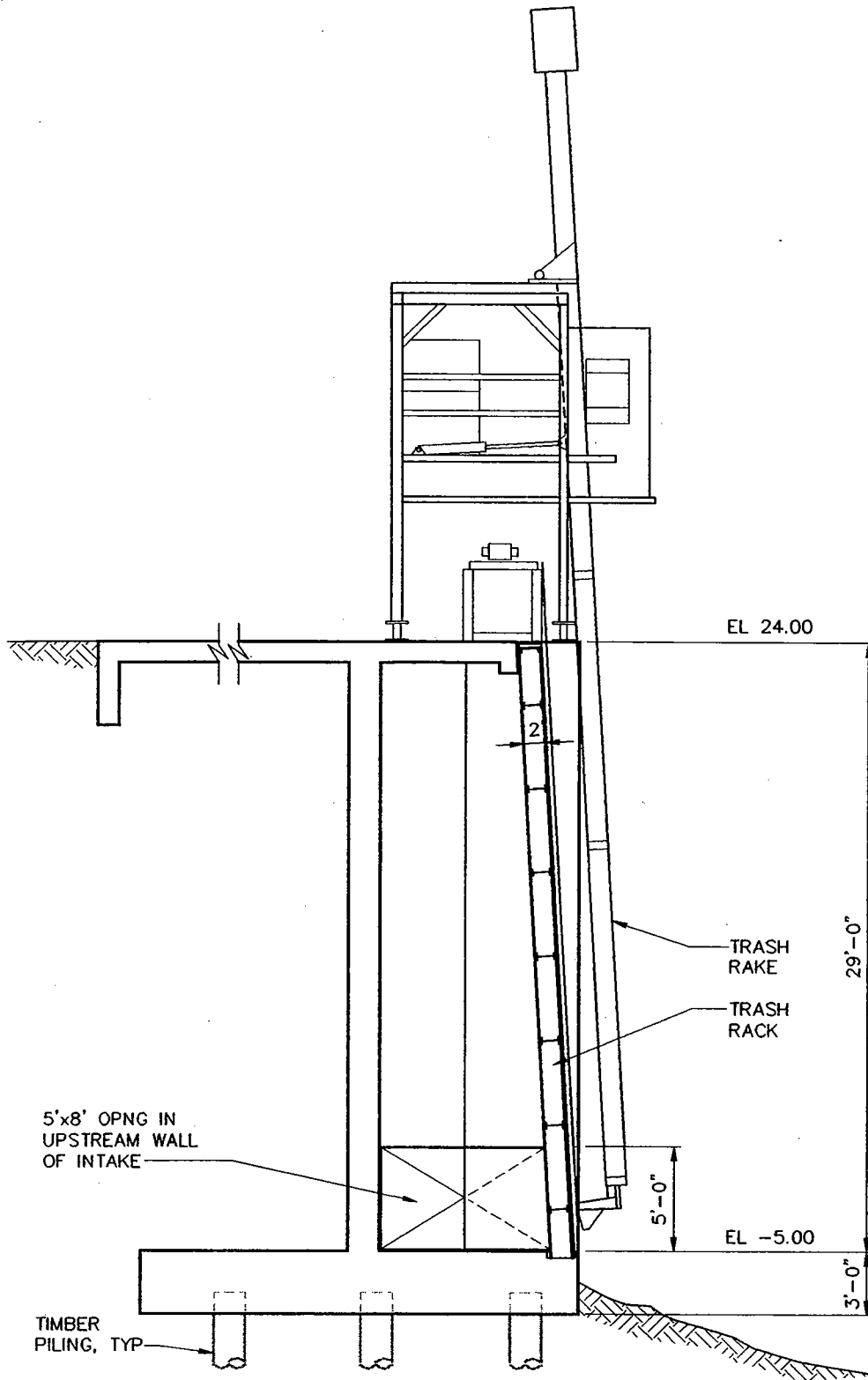
SECTION A
 SCALE: 3/16" = 1'-0"



Project Title	SNOHOMISH RIVER REGIONAL WATER AUTHORITY WATER RIGHTS TRANSFER PROJECT	Date	JUNE 1999
Sheet Title	EBEY SLOUGH INTAKE UPGRADE - SECTION A	Figure No.	3

DATE: 6/14/99

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SECTION B

SCALE: 1/8" = 1'-0"



Project Title	SNOHOMISH RIVER REGIONAL WATER AUTHORITY WATER RIGHTS TRANSFER PROJECT
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Date	JUNE 1999
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Sheet Title	EBEY SLOUGH INTAKE UPGRADE - SECTION B
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Figure No.	4
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Raw Water Transmission

Existing Weyco Line

HDR was not able to secure design documents for the Weyco pipeline. What is contained herein is a compilation of information obtained by others that is reported in reference documents listed at the end of this report. Inspection and detailed assessment of the condition of the existing pipeline is beyond the scope of this study.

The existing raw water line was constructed in 1953 at the same time as the intake. In the *SEPA checklist*, it is reported that the pipeline is 40-inch concrete cylinder pipe manufactured by American Pipe and Construction Company (Ameron) in 1952. Weyco staff have reported that the pipeline construction consists of "10 gauge steel cylinder with rod wrap that is lined and coated with cement mortar". The above ground portions also manufactured by Ameron is coated steel. We were able to confirm that the pipe leaving the intake structure, shown on the intake drawings, is concrete cylinder pipe. The pipeline is approximately 5.5 miles long beginning at the Ebey Slough Intake and terminating at the Weyco site in North Everett.

The pipeline is approximately 45 years old and nearing the end of its economic life. Early generation concrete cylinder pipe was used on this project. There have been problems noted with other concrete cylinder pipe around the country, most notably Seattle Public Utilities Tolt Pipeline No. 1, which failed twice in the late 1980's after approximately 35 years of service. Without confirmation of the pipeline condition and knowing the specific pressure classification of the pipeline, it is very difficult to draw any conclusions regarding suitability for the proposed use and expected life.

The lower section of line is approximately 3.5 miles long and will be exposed to approximately 100 feet of static head. For the purposes of this study we have assumed that due to the relatively low pressure, the raw water supply portion of the line will be adequate for service. We have assumed that the line will only require inspection and repairs of the mortar lining. The capital cost of repair is estimated to be \$75,000. A detailed cost estimate is provided in Appendix A.

New Raw Water Line

Raw water will be conveyed through the existing 40-inch diameter pipeline approximately 3.5 miles from the intake to a point where a new line will be constructed from the existing transmission main to the new treatment plant. The proposed interconnection point is just north of the Snohomish River on Railroad Avenue. The proposed pipeline would be a 40-inch diameter buried pipeline with a total length of approximately 1,650 feet. The pipeline is sized to convey 36 mgd (55.7 cfs). At the interconnection, the existing concrete cylinder pipe would be cut and a bend installed to divert raw water to the new industrial WTP.

The alignment for the proposed pipeline begins at the existing transmission pipeline and runs to the east along the northern half of Railroad Avenue within the paved right-of-way. The pipeline terminates within the industrial WTP adjacent the Snohomish River. Figure 6 (presented in the Industrial Water Treatment Plant section) shows the proposed alignment.

Pipeline construction is anticipated to be conventional and open cut trench for the entire alignment with a minimum cover of 5 feet to avoid other utilities. It is assumed that the pipeline would be installed in a combination trench with the 40-inch finished water pipeline. The typical trench for the two pipelines would be 9.5 feet deep by 12 feet wide. The surface condition to be restored is assumed to be either asphalt paving or crushed rock.

The capital cost of this pipeline is estimated to be \$935,000 including pipeline installation, restoration, right-of-way, state sales tax, engineering, administration and contingencies. Operation and maintenance

costs for the new pipeline are expected to be minimal. Cathodic protection is not included in the estimate. A detailed cost estimate is provided in Appendix A.

Industrial Water Treatment Plant

This section presents a conceptual design for treatment of the Snohomish River water from the Ebey Slough Intake. The treatment plant will produce water for a number of current and future industrial users. The plant capacity of 36 mgd is the maximum instantaneous withdrawal rate specified in the water right.

Raw and Treated Water Quality

Raw water quality parameters are presented in Table 2. The raw water is typical of lower river systems in western Washington. The alkalinity is low, color and total organic carbon (TOC) are low to moderate, and turbidity is low to moderately high. The higher turbidities are generally associated with higher river flows.

Treated water quality requirements are dependent upon the final use of the water; however, no water quality criteria are available from the present industrial users. The water currently received by the users is untreated water from the City of Everett's Sultan River supply. The quality of this water is very high, with extremely low turbidity and color levels, and is assumed to be better than what is needed. For the purposes of this analysis, the treated water quality criteria listed in Table 3 have been assumed adequate for the current and expected industrial users. These are the same criteria used in the *Plan of Use* document. In order to meet these criteria with the Snohomish River water, turbidity and color removal, as well as pH adjustment, will be required.

Water at the Ebey Slough Intake is tidally influenced. Periods of elevated salinity levels not reflected by the data in Table 2 have been reported (*Plan of Use* document). High levels of salinity, and chloride ion in particular, can cause excessive rates of corrosion. However, it does not appear that high salinity levels would appear at the intake more than one to four days per year (*Plan of Use* document), nor does it appear that these salinity levels will pose a problem for the industrial users. Further review of existing data and possibly additional monitoring should be conducted to confirm these potential impacts. A possible option to safeguard against high salinity would be to monitor conductivity at the intake and shutdown the plant at a predetermined level. More discussion of the salinity at the Ebey Slough Intake is presented with Alternative 2 – Direct Transfer.

Table 2
Snohomish River Water Quality

Snohomish River Water Quality¹Parameter	Water Quality Value
Turbidity (NTU)	1.5 – 94
Color (CU)	8.3 – 76
Total organic carbon, TOC (mg/L)	<0.8 – 3.7
Alkalinity (mg/L as CaCO ₃)	11 – 13
Hardness (mg/L as CaCO ₃)	Not available
pH	6.4 – 6.9
Conductivity (µmhos/cm)	43 - 49
Iron (mg/L)	Not detectable
Manganese (mg/L)	Not detectable
Silica (mg/L)	7.2
Aluminum (mg/L)	Not detectable
Nitrate (mg/L)	1.4 – 1.5
Nitrite (mg/L as NO ₂)	<0.2
Temperature (°C)	2.7 – 21
Fecal Coliform (CFU/100 mL)	8 – 1250
Total Coliform (CFU/100 mL)	20 – 4970
¹ Source: Weyerhaeuser Water Right, June 1994, CH2M HILL	

Table 3
Proposed Treated Water Quality Criteria

Parameter	Water Quality Value
Turbidity (NTU)	0.3
Color (CU)	15
pH	6.5 – 8.5
Iron (mg/L)	0.3
Manganese (mg/L)	0.05

Treatment Processes and Facilities

The treatment process consists of coagulation, flocculation, sedimentation, and filtration. This process generally provides a consistent, high level of treatment for the two main objectives: turbidity and color removal. To reduce construction costs and land requirements, the flocculation, sedimentation, and filtration processes are designed for higher flow rates than typical conventional potable water treatment. A schematic of the overall treatment and residuals handling processes is shown in Figure 5.

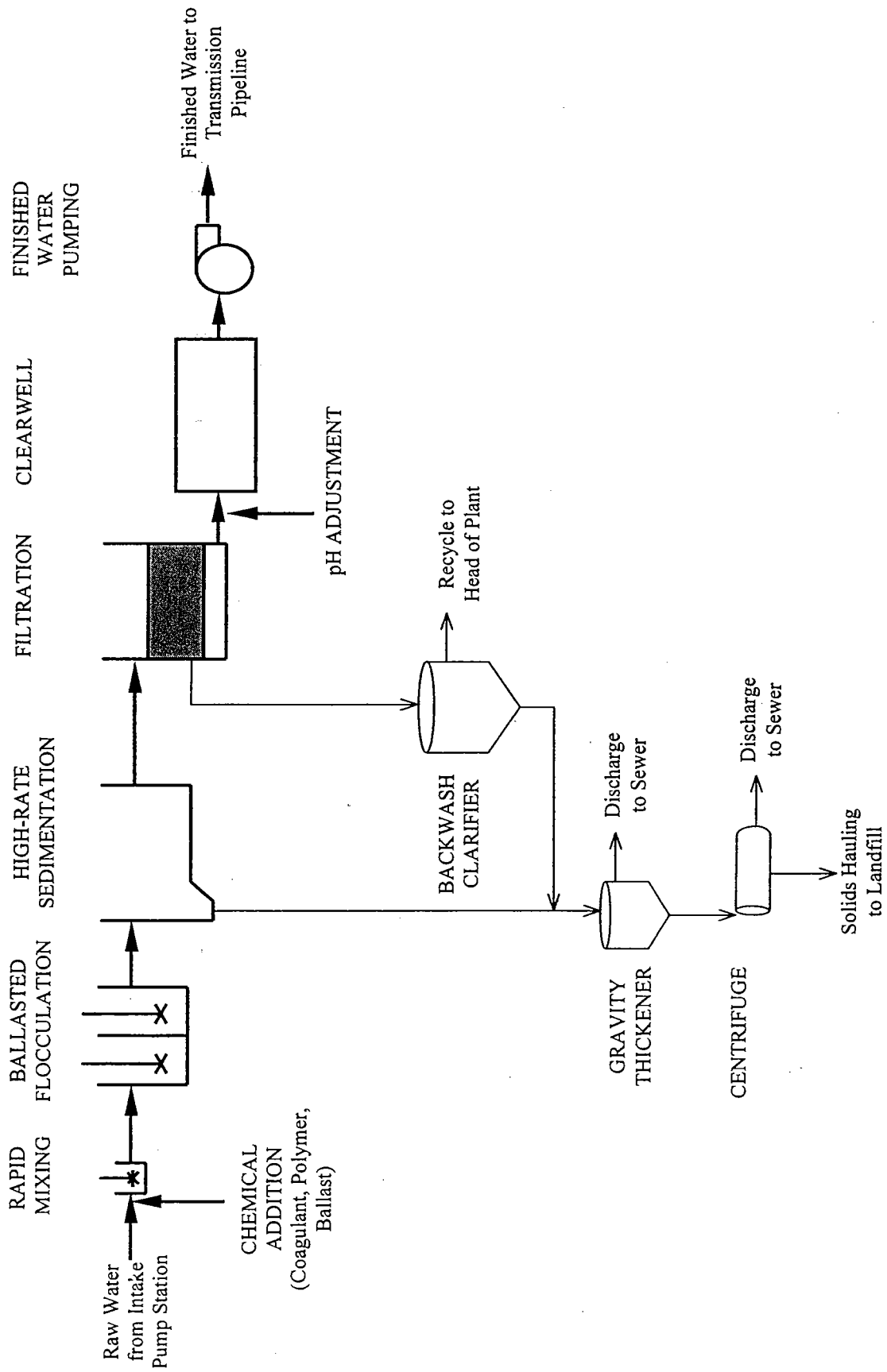


Figure 5. Process Schematic for 36 mgd Industrial Water Treatment Plant

The raw water first passes through a rapid mix basin where coagulant chemicals are added and dispersed into the flow. Rapid mixing is followed by ballasted flocculation and high-rate sedimentation. Ballasted flocculation is similar to conventional flocculation, except that a ballast, such as sand, is added to improve agglomeration of contaminants and to increase settling rates. The settled water passes to the filters for final particle removal. High-rate filtration through a deep bed of granular media uses a smaller filter area than conventional filtration. Following filtration, flow enters the clearwell from where it is pumped into the finished water transmission main. Water for backwashing the filters will also be pumped from the clearwell.

Waste streams are generated from two of the main treatment processes. Spent filter backwash water is generated from cleaning the filters and settled residuals are collected from the sedimentation tank. A few options can be used for disposal of treatment plant residuals, such as landfilling, land application, and discharge to the sewer. For the purposes of this study, it is assumed that the residual solids will be disposed of in a landfill. Residuals handling processes are designed with this objective.

Spent filter backwash water accounts for the majority of the waste stream from the plant and is first treated in backwash clarifiers. Treated backwash water is recycled to the head of the plant. The residuals from backwash treatment are combined with the sedimentation basin residuals in the gravity thickeners. The thickened residuals are sent to the centrifuges for dewatering and then hauled to a landfill. It is assumed that the liquid streams from residuals thickening and dewatering would be sent to the sewer. If discharge to the sewer is not feasible, other options include recycling within the plant and discharge to the river.

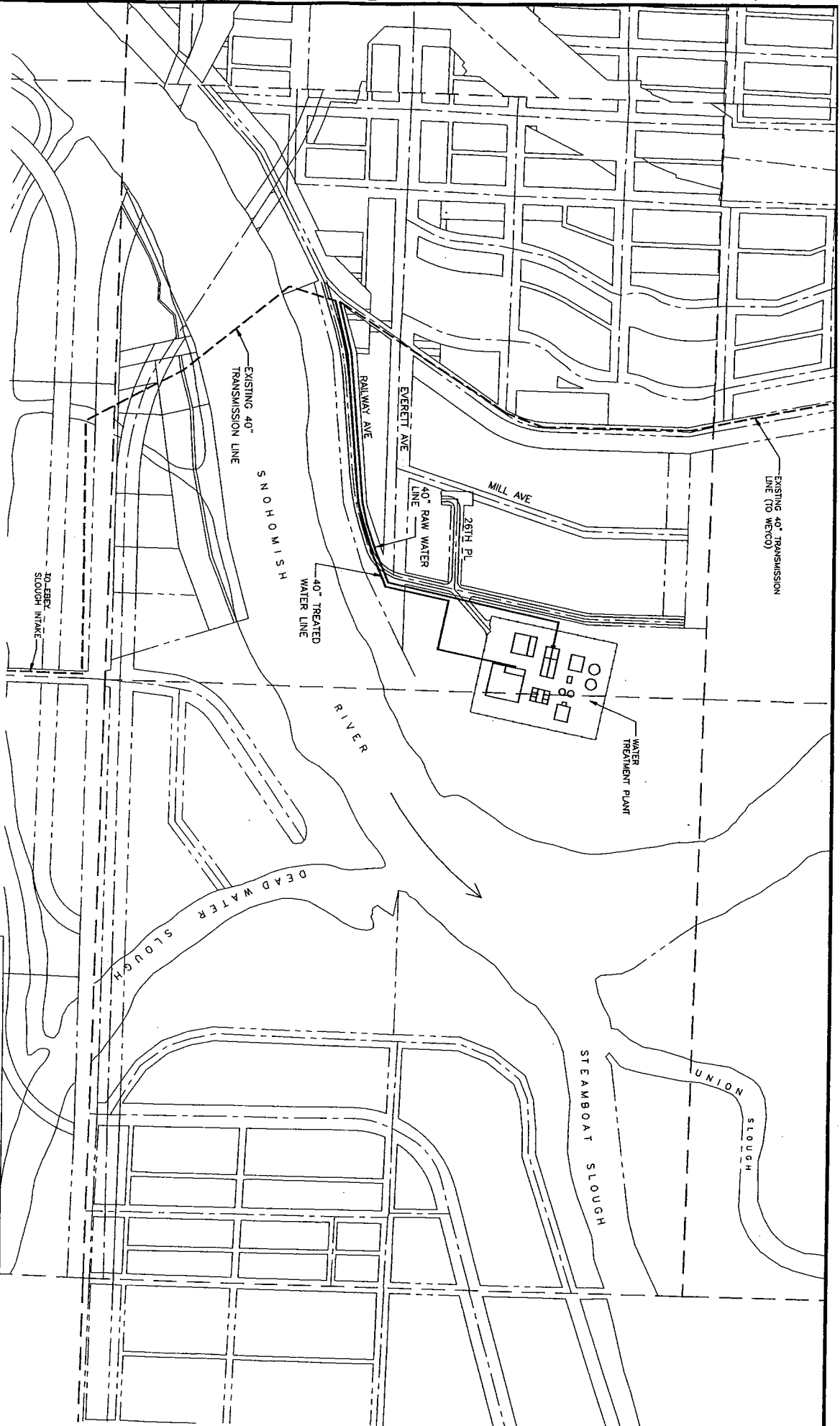
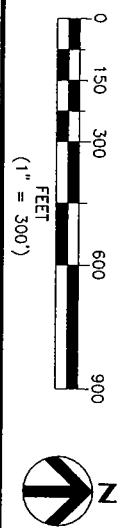
Alternative Treatment Processes

The finished water quality criteria for the treatment plant are only approximate, as noted in the water quality discussion. A refinement of these criteria, in particular the turbidity limit of 0.3 NTU, may allow for a less complicated and costly treatment plant. For example, under most raw water quality conditions a low level finished water turbidity could be obtained without filtration. The ballasted flocculation/sedimentation process alone (i.e., no filtration) is capable of producing a water with less than 0.5 NTU turbidity under most of the raw water quality conditions for the Snohomish River. Under all but the most extreme raw water conditions, the process is capable of a treated water turbidity less than 1.0 NTU. If these finished water quality criteria were acceptable to the end users, a cost savings of 30 to 40 percent would be possible. Pilot testing would be required to confirm raw water treatability.

Treatment Plant Layout and Siting

The preliminary site selected for the industrial WTP is along the Snohomish River, just west of downtown Everett, as shown in Figure 6. Based on existing FEMA floodplain maps, portions of the proposed industrial water treatment plant site are located in a 100-year flood area with average depths of less than one foot. The remainder of the site is not located in the 100-year floodplain but is within the 500-year floodplain. The site is not located in the floodway. The WTP cost estimate includes a flood control line item to account for the cost to raise the site by one foot to mitigate the potential impacts from the 100-year food areas. FEMA has indicated that they are updating the flood plain map for the Lower Snohomish River via a contract with the Corps of Engineers. Whether or not the proposed site is located within any flood plain may change based upon this analysis.

Based on the proximity of the site to the river and the design of the nearby facilities, it is assumed that the soils at the site are relatively poor for structural support and the area may be considered a liquefaction zone. For these reasons, it has been assumed that piling will be necessary to support the treatment plant facilities.



Project Title	Date
SNOHOMISH RIVER REGIONAL WATER AUTHORITY	JUNE 1999
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INDUSTRIAL WATER TREATMENT PLANT SITE (ALT 1 FLOW SWAP)	6

A conceptual layout of the industrial WTP is shown in Figure 7. The sizes of the structures are based on the plant design criteria, which are tabulated in Appendix A. The treatment processes were selected in part to keep a small plant layout. Smaller structures also reduce the amount and cost of pile supports. Space between structures has been provided for yard piping and vehicle access. No space for plant expansion has been provided for this analysis. It was assumed that the ultimate capacity if the plant would be 36 mgd.

The total area of the layout shown in Figure 7 is approximately eight acres. For planning purposes, it is recommended that a 25 percent contingency be applied on land requirements. The contingency allows for additional or alternative processes and facilities. With the contingency, a total area of 10 acres would be used. This acreage should be reviewed and refined as the project evolves.

Cost Estimate

The planning-level capital and annual operation and maintenance cost estimates are presented in Appendix A. The capital cost is estimated to be \$52,956,000 with an annual operation and maintenance cost of \$4,650,000. The basic treatment process costs were generated using the cost program W/W Costs (CWC Engineering Software, 1994). The program costs are based on equipment cost data supplied by manufacturers, cost data from actual plant construction, unit takeoffs from actual and conceptual designs, and published data. Other costs were included based on a percentage of construction costs and based on costs for similar facilities. For the industrial WTP, a construction cost contingency of 20 percent was used because the cost estimate was developed at a higher level of detail.

It has been assumed that secondary power to the plant will be provided only for emergency equipment. The plant would shut down upon power failure.

The cost of land for the site is based on a unit cost of \$4.00 per square foot. The unit cost takes into consideration that portions of the site are within the 100-year flood plain.

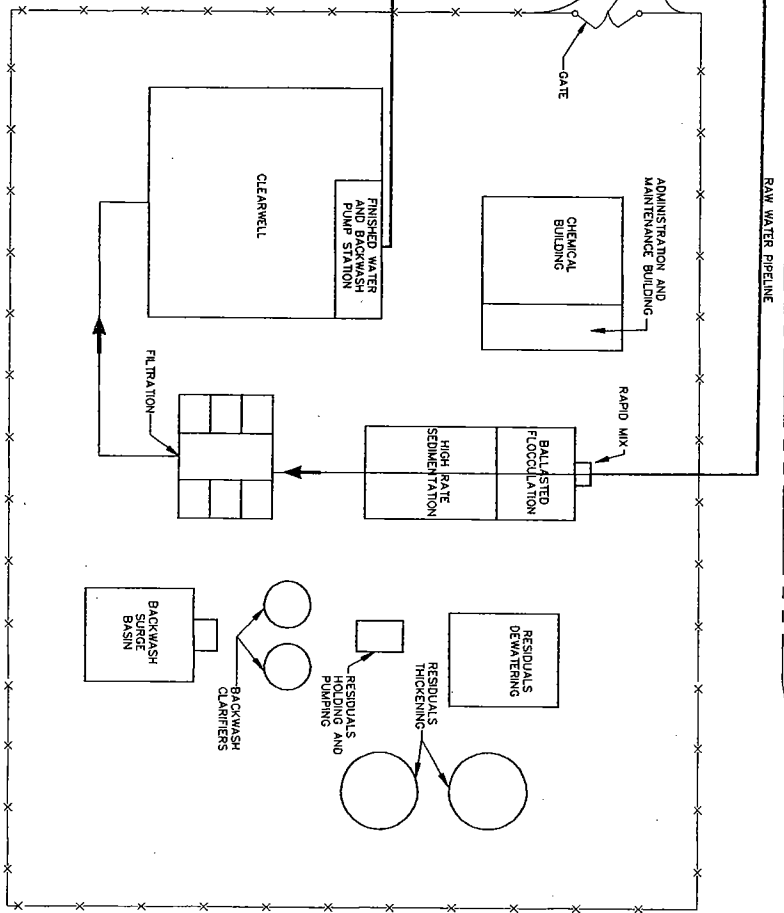
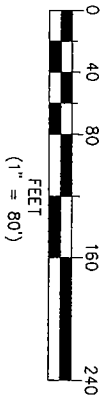
The operation and maintenance costs are based on an average treated flow of 28.7 mgd. The costs include operation and maintenance for the main treatment processes, residuals handling, and residuals disposal. A 20 percent contingency factor has been applied to annual operation and maintenance costs.

Industrial Finished Water Transmission

Existing Weyco Line

How the treated water from the 36-mgd industrial WTP is conveyed to Everett's existing (i.e., Kimberly Clark) and future industrial users, located at the redeveloped Weyco site, have not been determined. There are several different pipeline routes and combinations of existing and new pipelines that could be used. For this analysis, it was assumed that all of the new industrial treatment plant water would be pumped into the north half of the existing Weyco pipeline to supply the redeveloped Weyco site.

The treated water segment of the line is approximately two miles long and will be exposed to 250 feet of static head. This line may require substantial upgrade or replacement to reliably convey flows over the long term. For the purposes of this study, we have assumed that the pipeline will be slip lined with 36-inch diameter HDPE pipe. The capital cost of this repair is estimated to be \$1,729,000. A detailed cost estimate is provided in Appendix A.



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Project Title
SYNOHOMISH RIVER REGIONAL WATER AUTHORITY
WATER RIGHTS TRANSFER PROJECT

Sheet Title
INDUSTRIAL WATER TREATMENT
PLANT LAYOUT (ALT 1 FLOW SWAP)

Date
JUNE 1999

Figure No.
7

New Finished Water Pipeline

Treated water will be conveyed from the proposed treatment plant to the existing 40-inch diameter pipeline through a new pipeline to the existing transmission main. The proposed pipeline will parallel the proposed raw water line along Railroad Avenue. The interconnection with the existing 40-inch transmission main will be adjacent the raw water interconnection with a bend connecting to the existing Weyco pipeline conveying treated water north to the Weyco site. The proposed pipeline would be a 40-inch diameter buried pipeline with a total length of approximately 1,650 feet. The pipeline is sized to convey 36 mgd (55.7 cfs). At the interconnection the existing concrete cylinder pipe would be cut and a bend installed such that treated water would be directed to the Weyco site. Refer to Figure 6, which shows the proposed alignment.

Pipeline construction is anticipated to be conventional trench and open cut for the entire alignment with a minimum cover of 5 feet to avoid other utilities. It is assumed that the pipeline would be installed in a combination trench with the 40-inch raw water pipeline. The typical trench for the two pipelines would be 9.5 feet deep by 12 feet wide. The surface condition to be restored is assumed to be either asphalt paving or crushed rock.

The capital cost of this pipeline is estimated to be \$1,030,000 including pipeline installation, restoration, right-of-way, state sales tax, engineering, administration and contingencies. Operation and maintenance costs for the new pipeline are expected to be minimal. Cathodic protection is not included in the estimate. The finished water pipeline cost estimate is included in Appendix A. The finished water pipeline cost is slightly higher than the raw water pipeline cost because the pipe material must handle a higher pressure (i.e., a thicker pipe wall).

WWD Potable Water Transmission

Potable water transmission for WWD will include two separate pipeline projects. The Clearview Pipeline, which is expected to be constructed in the year 2001 will convey WWD's share of the water right from the existing Everett Transmission Line No. 5 south to the Clearview Reservoir site. The total length of the Clearview pipeline is about 7.9 miles. The remaining 9.5 miles of pipeline between the Clearview Reservoir site and the WWD distribution system will be constructed as part of the RWA project. It is referred to as the Clearview/WWD pipeline.

Clearview Pipeline

WWD purchased additional capacity (12 mgd) in the Clearview Pipeline that requires the pipeline diameter to be increased from 36- to 42-inches. Per the *WWD/CVWD Agreement*, WWD will share in the cost to construct the Snohomish River crossing and the new pump station. Refer to the *WWD/CVWD Agreement* included in Appendix C for additional information regarding the capacity shares of the Clearview Project facilities for the Clearview Group and WWD.

The Agreement stipulates that WWD will only share in the "Phase II" project costs (i.e., excludes the costs associated with preliminary engineering, permitting and the environmental impact statement). The estimated project costs for the Clearview Project facilities (Personal communication with Alderwood Water District, May 5, 1999) based on 90 percent design engineering estimate and a 20 percent contingency for engineering and administration, are listed below.

- Pump Station: \$6.7 million
- Pipeline: \$19.2 million
- River Crossing: \$10.3 million

The WWD share of these Clearview Project estimated costs are discussed later (presented in Table 4 of the Alternative 1 Cost Summary section).

Clearview/WWD Pipeline

Potable water will be conveyed by gravity to Woodinville via a pipeline running from Alderwood Water District's Clearview Reservoir site to WWD distribution system. The proposed pipeline is 42-inch diameter buried steel pipeline with a total length of 9.5 miles. The pipeline is sized large for 11 mgd (17 cfs) due to the relatively low elevation difference of 90 feet between the Clearview Reservoir (Elev. 660) and the Wellington Reservoir (Elev. 570). Alternatives to reduce the 42-inch diameter pipeline (e.g., by constructing a booster pump station near the Clearview Reservoir site) should be considered during the predesign phase. The pipeline route follows the route of the proposed Alderwood Clearview Pipeline to Canyon Park along an existing power transmission line right-of-way (see Figure 1). The reason for selecting this alignment is that it follows existing dedicated power transmission right-of-way and the EIS for the majority of this route has been completed for the Alderwood pipeline. The impacts to roadways, traffic, property owners and the environment should be less than other alignments. For example, a different route along existing roadways will have greater impacts to traffic and an increased cost for roadway restoration.

From the Clearview Reservoir site, the pipe would follow rural and residential roadways in a southwesterly direction for approximately two miles to the Snohomish PUD Transmission right-of-way. The pipeline would follow the edge of the right-of-way due south for approximately three miles passing by Alderwood's Canyon Park Reservoir, to the intersection of 228th Street SE. The alignment would then follow the 228th St. SE right-of-way in an easterly direction crossing under Bear creek and Highway 9. The pipeline would then continue in an easterly direction on an easement through industrial and undeveloped properties to 75th Avenue SE. This section ascends sloping topography and crosses under the Burlington Northern Railroad and SR 522 right-of-ways. Once on 75th Ave SE, the pipeline would run south within the road right-of-way, crossing the Snohomish County/King County line, to the WWD Wellington Reservoir located at 156th Ave. N.E. and N.E. 203rd Pl. in Woodinville. Figure 1 shows the proposed Clearview/WWD Pipeline alignment.

Pipeline construction is anticipated to be conventional trench and open cut for the majority of the alignment with a minimum cover of four feet. The typical trench would be approximately 8.5 feet deep by 8 feet wide. At some locations trenchless crossings are assumed to reduce or eliminate environmental and traffic impacts. It is anticipated that the crossings of Maltby Road, Bear Creek, State Highway 9, Burlington Northern Railroad and State Route 522 will be by boring and jacking or microtunnelling depending on subsurface conditions. At these special crossings the pipeline could be in the range of 10 to 25 feet deep. Cathodic protection, especially for the portion of the alignment along the Snohomish PUD transmission right-of-way, should be addressed during the predesign phase.

A 24-inch diameter, 1.5 mile long ductile iron pipeline is included in the alternative to convey water within the WWD distribution system. The 24-inch pipeline would run south, approximately parallel to the Wellington Transmission Main. The exact alignment and tie-in to the system is not included in this analysis.

The capital cost of the Clearview/WWD Pipeline (including the 24-inch pipeline) is estimated to be \$29,280,000 including pipeline installation, restoration, right-of-way, state sales tax, engineering, administration and contingencies. Operation and maintenance costs are expected to be minimal. The detailed cost estimate for the Clearview/WWD Pipeline is included in Appendix A.

Environmental/Permitting

Environmental and permitting requirements for Alternative 1 – Flow Swap are discussed below. The SEPA/NEPA process, anticipated permitting requirements, and anticipated ESA requirements are presented

SEPA Process

The State Environmental Policy Act (SEPA) Chapter 43.21C Revised Code of Washington (RCW) requires all governmental agencies to consider the impacts of a development proposal on the environment before making a decision on the proposal. Permits may not be issued until the SEPA process is complete.

Development proposals that significantly affect the environment require an environmental impact statement (EIS). The EIS process would require that a determination of significance and scoping notice be issued for public review and comment. A draft EIS would then be prepared and issued for review. Once comments have been received, changes would be made as appropriate and a final EIS issued. It can take approximately 12 to 15 months to complete this process.

If Alternative 1 – Flow Swap is not considered to have significant impacts, an environmental checklist may be prepared whereby the lead agency issues a determination of nonsignificance (DNS) or mitigated determination of nonsignificance. The environmental review/studies are the same as for the environmental impact statement, however, the issuance of the DNS with an appeal period can be significantly shorter (3-5 months).

When an agency initiates a proposal, it is the lead agency for the proposal. For purposes of this project, the WWD/RWA would be the lead agency for the SEPA process.

After a preliminary assessment of the project, the WWD/Snohomish River RWA may want to consider pursuing an expanded environmental checklist for the following reasons:

- During project design, the project team will continue to provide ways to lessen impacts by avoidance, reduction, restoration and/or mitigation.
- Portions of the project have already been analyzed in the following SEPA documents: *SEPA Expanded checklist for Proposed Water Right Change and Plan of Use Adoption for Water Right No. S1-10617C* (Ebey Slough Intake) and *Draft/Final Environmental Impact Statement – Alderwood/Clearview Water Pipeline Project* (portion of the Clearview/WWD Pipeline from the Clearview Reservoir site to the Canyon Park Reservoir).
- Except for construction of the industrial WTP and modifications to the intake structure, project impacts will be temporary in nature and can be restored to the pre-project condition.
- Early consultation with the cities of Everett and Woodinville and Snohomish County would confirm their agreement to this approach.

NEPA Process

The Corps of Engineers will need to conduct their own environmental review of the project and will most likely prepare an environmental assessment using information supplied by the applicant, such as the SEPA document, cultural resource report, wetlands report, biological assessments (if required), etc.

Permitting

For the purposes of assessing permit/approval requirements, Alternative 1 was divided into three major components: (1) Ebey Slough Intake Upgrades, (2) Industrial Water Treatment Plant/Industrial Finished Water Transmission and (3) Clearview/WWD Pipeline. It should be noted, however, that several of the permits could be combined into one application (i.e., the Corps of Engineers Section 10 and Section 404

permit, Water Quality Certification/CZMA). Additionally, a Washington State Department of Health Public Water Supply Approval would be required for the entire project.

Ebey Slough Intake Upgrades

Anticipated permits and approvals for the Ebey Slough Intake Upgrades are:

- Corps of Engineers Section 10 Individual or Nationwide
- USFWS/NMFS Consultation – Biological Assessment for Chinook (listed), Coho (candidate) and bald eagles (listed)
- Tribal Consultation
- Washington State Historic Preservation Office Cultural Resource Consultation
- Washington Department of Fish and Wildlife
 - Hydraulic Project Approval
 - Priority Habitats and Species Consultation
- Washington Department of Ecology
 - Water Quality Certification
 - Coastal Zone Consistency Determination
- Washington Department of Natural Resources Aquatic Use Authorization
- Snohomish County
 - Shoreline Substantial Development Permit
 - Conditional Use Permit
 - Building Permit
 - Flood Hazard Permit
 - Mechanical/Electrical Permit

The following assumptions were used to identify the anticipated permits and approvals for this facility:

- Portions of the existing concrete structure and the buried discharge piping will be reused.
- Equipment, pumps, transformers, switchgear, motor starters and controls removed and replaced.
- New fish screens, designed to meet WDFW/National Marine Fisheries Service (NMFS) salmonid fry protection criteria, will be installed.
- In-water work will be required (installation of cofferdam) and will be done outside of designated fisheries windows.

Industrial Water Treatment Plant

Anticipated permits and approvals for the industrial WTP are listed below. Permitting needs for the new raw water line from the existing Weyco pipeline to the WTP and the new finished water line from the WTP to the existing Weyco line are included.

- Washington Department of Ecology Stormwater Construction Permit (NPDES)
- Railroad Easement

- City of Everett
 - Shoreline Substantial Development Permit
 - Flood Hazard Permit
 - Critical Areas Review/Permit
 - Building Permit
 - Grading Permit
 - Road Right-of-Way Permit
 - Mechanical/Electrical

The following assumptions were used to identify the anticipated permits and approvals for this facility:

- Facility will most likely be located within 200 feet of the Snohomish River; no in-water work is required.
- There will be no discharge to the Snohomish River.
- There are no wetland impacts for construction of the treatment plant or interconnection with the water supply pipeline.
- Interconnection with Weyco pipeline will consist of a buried pipeline and will occur along existing roadways.

Clearview/WWD Pipeline

Anticipated permits and approvals for the Clearview/WWD Pipeline are:

- Corps of Engineers Section 404 Permit (Wetlands)
- U.S. Fish and Wildlife Service (USFWS)/NMFS Consultation
- Washington State Historic Preservation Office Cultural Resource Consultation
- Washington Department of Fish and Wildlife
 - Hydraulic Project Approval
 - Priority Habitats and Species Consultation
- Washington Department of Ecology
 - Water Quality Certification
 - Coastal Zone Consistency Determination
 - Stormwater Construction Permit
- Washington Department of Transportation
 - Utility Permit/Franchise -- SR 9/SR 522
- Bonneville Power Administration/Seattle City Light Right-of Way Use
- Burlington Northern Railroad Easment

- Snohomish County
 - Shoreline Substantial Development Permit
 - Conditional Use Permit
 - Critical Areas Approval
 - Flood Hazard Permit
 - Grading Permit
 - Road Right-of-Way Use Permit
 - Haul Route Permit
 - Road/Lane Closure Permit
- City of Woodinville
 - Site Development Permit
 - Right-of-Way Permit

The following assumptions were used to identify the anticipated permits and approvals for the pipeline:

- From the Clearview Reservoir site to the Canyon Park Reservoir, will utilize same corridor as the Alderwood/Clearview Pipeline (see Figure 1); from the Canyon Park Reservoir, the route will turn east on 228th, cross SR 9, BNRD railroad tracks, SR 522 to 75th Ave. SE, then turn south on 75th Ave. SE to Bear Creek, the Snohomish County/King County line. In King County (city of Woodinville), 75th Ave. SE becomes 156th Ave. NE, where the pipeline continues South in the road right-of-way to the WWD Wellington Reservoir (intersection of 156th Ave. NE and NE 203rd Pl).
- There will be temporary wetland impacts.
- Several drainages/streams will be crossed; crossings will comply with designated fisheries windows as appropriate.
- Bore and jack or microtunnel major road crossing of SR522.

Endangered Species Act (ESA)

A Federal permit requires Section 7 consultation with federal agencies on threatened or endangered species. In this case, the Corps Permit triggers the ESA consultation requirement for Alternative 1. Preview consultations have been conducted for the intake facility and portions of the Clearview/WWD Pipeline alignment, as noted below.

In support of the *SEPA Expanded Checklist* prepared for the change of water right at the intake structure, R2 Resources and Beak Consultants consulted with federal and state agencies on threatened or endangered plant, animal and anadromous fish species known to be in the project area. The following species were identified: chinook (listed-threatened), coho (candidate-threatened) and bald eagles (listed-threatened). Formal consultation will need to be initiated for the proposed industrial WTP site (this site is in the general vicinity of the intake, but a distance to the north) and the portion of the Clearview/WWD Pipeline between the Canyon Park Reservoir and the WWD Wellington Reservoir.

Section 7 consultation requires preparation of a biological assessment (BA) evaluation of the proposed project impacts on any listed or proposed Endangered Species Act species or critical habitat within the project area. If it is determined that the project will not have any effect on listed species or critical habitat, a "No Effects" letter BA would be prepared. If it were concluded that the project would have an

effect on any listed species, a full BA report would be required. The BA Letter or BA Report would be forwarded to the USFWS and the NMFS for their concurrence.

For the intake structure upgrades, the fish, shellfish and waterfowl prey base used by bald eagles would not be negatively affected since there would be no alterations of physical habitat or water quality impacts associated with the completed project. Distance of any bald eagle nests from the intake structure would need to be determined as there may be noise restrictions during nesting or breeding season.

Although it is anticipated that there will be in-water work required for installation of the traveling fish screens, the work will be completed behind cofferdams that will be constructed outside of the fisheries windows, thereby minimizing impacts to the fisheries resource, including listed species, that use the Lower Snohomish Estuary. Additionally, refurbishment of the intake structure to include modern fish screen protection would have a positive effect on salmonid fry by providing increased protection from screen impingement.

Cost Summary

The total project costs for Alternative 1 – Flow Swap, both capital and annual operation and maintenance, in 1999 dollars, are summarized in Table 4. WWD's share in the various annual cost components are also listed in Table 4. The portion of the total project cost incurred by WWD for the Ebey Slough Intake upgrades, transmission lines to and from the WTP, and industrial WTP are based on WWD's share of the Weyco water right (30.6 percent). WWD's shared cost in the Clearview Project facilities are based on the *WWD/CVWD Agreement*. WWD will incur 100 percent of the cost for the Clearview/WWD Pipeline. Table 4 notes the estimated reduction in WWD's share of the Clearview/WWD Pipeline if NUD were to share in the cost of the pipeline. The pipeline size would have to be increased to convey a peak flow of 21 mgd. Also the alignment could move west to provide a location between the two districts. These considerations will be addressed as the project evolves and NUD's involvement is further defined with respect to finished water transmission. For the analysis, NUD's share of a larger pipeline was estimated to be 40 percent of the cost of the 42-inch pipeline (i.e., the pipeline sized only for WWD transmission needs, 11 mgd).

Table 4
Snohomish River RWA Project Capital and O&M Cost Summary Alt. 1 – Flow Swap
(1999 Dollars)

Component	Total Capital Costs	Total O&M Costs	WWD Share (%)	WWD Shared Cost	
				Capital Cost	O&M Cost
RWA Project					
Ebey Slough Intake Upgrades	\$2,747,000	\$280,000	30.6	\$841,000	\$86,000
Existing Weyco Pipeline Rehabilitation	\$1,804,000	-	30.6	\$553,000	-
New Raw Water Line	\$935,000		30.6	\$287,000	
Industrial WTP ⁽¹⁾	\$52,956,000	\$4,650,000	30.6	\$16,205,000	\$1,423,000
WTP Finished Water Line	\$1,030,000	-	30.6	\$316,000	-
Clearview/WWD Pipeline ⁽²⁾	\$29,280,000	-	100 ⁽³⁾	\$29,280,000 ⁽³⁾	-
Clearview Project					
Pump Station	\$6,720,000	\$676,000	- ⁽⁴⁾	\$222,000	\$102,000
River Crossing	\$10,320,000	-	15	\$1,548,000	-
Pipeline	\$19,200,000	-	12.9	\$2,483,000	-
Total	\$124,992,000	\$5,606,000		\$51,735,000	\$1,611,000

Notes:

(1) Includes finished water pump station.

(2) Includes 24-inch diameter pipeline within WWD.

(3) If NUD participated in the Clearview/WWD Pipeline construction, the WWD share of the Clearview/WWD Pipeline capital cost would be reduced to approximately \$17,568,000 (i.e., 60% of \$29,280,000), and the WWD share of the total capital cost of Alternative 1 would be reduced to approximately \$40,023,000.

(4) WWD/CVWD Agreement does not specify WWD's shared capital cost as a percentage of the total cost. Instead, the Agreement specifies the shared capital cost shown above. Assumed O&M shared cost for WWD was 15% of the total O&M cost.

Annual and Monthly Cost – Year 2012

The Snohomish River RWA project would have to be implemented on or before the year 2012 to meet WWD's water supply needs after the SPU contract expires. The intent of this cost analysis is to provide

WWD with an estimate of the cost per million gallons to utilize this source of supply as well as the potential cost impacts to customers. The cost analysis focuses on cost impacts in the year 2012.

The capital and operation and maintenance costs (1999 Dollars) were then adjusted to 2012 dollars by applying an annual inflation rate of three percent. The capital costs were converted to an annual cost in the year 2012 using an expected life of 30 years (2012 to 2041) and an annual bond rate of six percent. Year 2012 total capital and annual capital costs, and annual operation and maintenance costs incurred by WWD are estimated to be:

- 2012 total capital costs: \$75,973,000
- 2012 annualized capital costs: \$5,516,000
- 2012 operation and maintenance costs: \$2,366,000

The total annualized 2012 capital and operation and maintenance costs would be \$7,882,000. This cost was converted to a monthly cost per customer using projected equivalent residential units (ERUs) (*Planning Data Memorandum, April 1999*). The projected number of equivalent residential units for the WWD water service area in 2012 is approximately 21,100. Also, the annual cost was converted to cost per million gallons based on WWD's 8.8-mgd annual average share of the Weyco water right. These costs are listed below:

- 2012 monthly cost per customer: \$31.13 per ERU/month
- Average annualized cost per average mgd of supply: \$896,000
- 2012 annual cost per volume: \$2,454 per MG
- 2012 annual cost per volume: \$1.84 per CCF

Another consideration is the potential cost impacts from the Snohomish County PUD. The PUD has a vested interest in the Sultan River water supply, which is also used for the PUD's Jackson Hydroelectric Project. Presently, the rate base for the Jackson Hydroelectric Project and the Sultan River water supply customers are the same (i.e., both located in Snohomish County). However, future King County water customers will be outside the PUD service area.

Snohomish County PUD could charge King County recipients of Sultan River water a cost of water surcharge, as a requirement of this project. These surcharges would include a monthly rate to WWD customers who receive Sultan River water (i.e., from the Everett filtration plant). Also, it is possible that Snohomish County PUD would charge a one-time connection charge per ERU. The amount of these potential charges has yet to be determined/negotiated. The cost impacts to WWD will depend on how many WWD ERUs are served by the Sultan River supply.

Schedule

The anticipated schedule to implement the proposed project, including estimated durations for the regulatory and permitting processes is illustrated in Figure 8. This Gant Chart shows that the anticipated completion of the project will be in the year 2007. This assumes that Ecology will approve the water right change application by January, 2002.

III. ALTERNATIVE 2 – DIRECT TRANSFER

Alternative 2 – Direct Transfer does not involve a water swap with the City of Everett Sultan River supply. Instead, the Weyco water right beneficial use will be municipal potable water supply. The Snohomish River water will be treated to potable water standards and directly transferred to the RWA. The transfer would include up to 36 mgd instantaneous flow and an annual average flow of 28.7 mgd. The WWD

would be eligible for 30.6 percent of this water right, which would provide 11 mgd peak instantaneous, and 8.8 mgd average annual demand.

The RWA would construct a potable water treatment plant (potable WTP) to treat water from the Snohomish River to drinking water standards. The finished water would be conveyed from the potable WTP to the WWD distribution system. The Snohomish River potable WTP would have an ultimate capacity of 36 mgd.

Alternative 2 – Direct Transfer project components, RWA jurisdictions, adjacent water utilities and existing water transmission lines are shown on Figure 9. Key assumptions for the alternative are listed below:

- Raw Water Transmission: The existing Ebey Slough Intake will be used in conjunction with new raw water transmission line from the intake to the new potable WTP.
- The preliminary site selected for the treatment plant is identified in the *Plan of Use* document (Site 2) as being east of the existing intake structure across Ebey Slough on the west slope of Fobes Hill, which is not in the 100-year floodplain.
- A new finished water high-head pump station would be required to pump flows to the WWD. The pump station would also likely have to house pumps for Everett and NUD. This analysis focuses on a pump station conceptual design and cost estimate to pump WWD's share of the Weyco water right.
- WWD Finished Water Transmission: A new transmission main, the WWD Finished Water Pipeline, would be built to convey WWD's water from the potable WTP to the WWD distribution system.
- This study does not address NUD's transmission needs to convey their share of the RWA water right south to NUD's distribution system. However, the potential cost savings to WWD if NUD were to share in the cost of the Finished Water Pipeline is discussed.
- Blending issues (within the WWD system) will not be addressed in this planning-level analysis.

The components of the Alternative 2 – Direct Transfer are discussed in more detail below.

Snohomish River Regional Water Authority

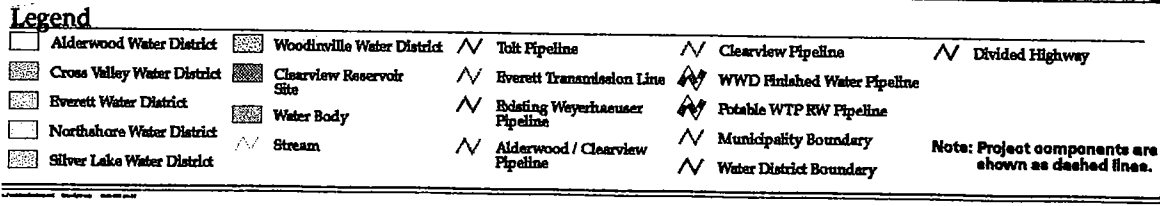
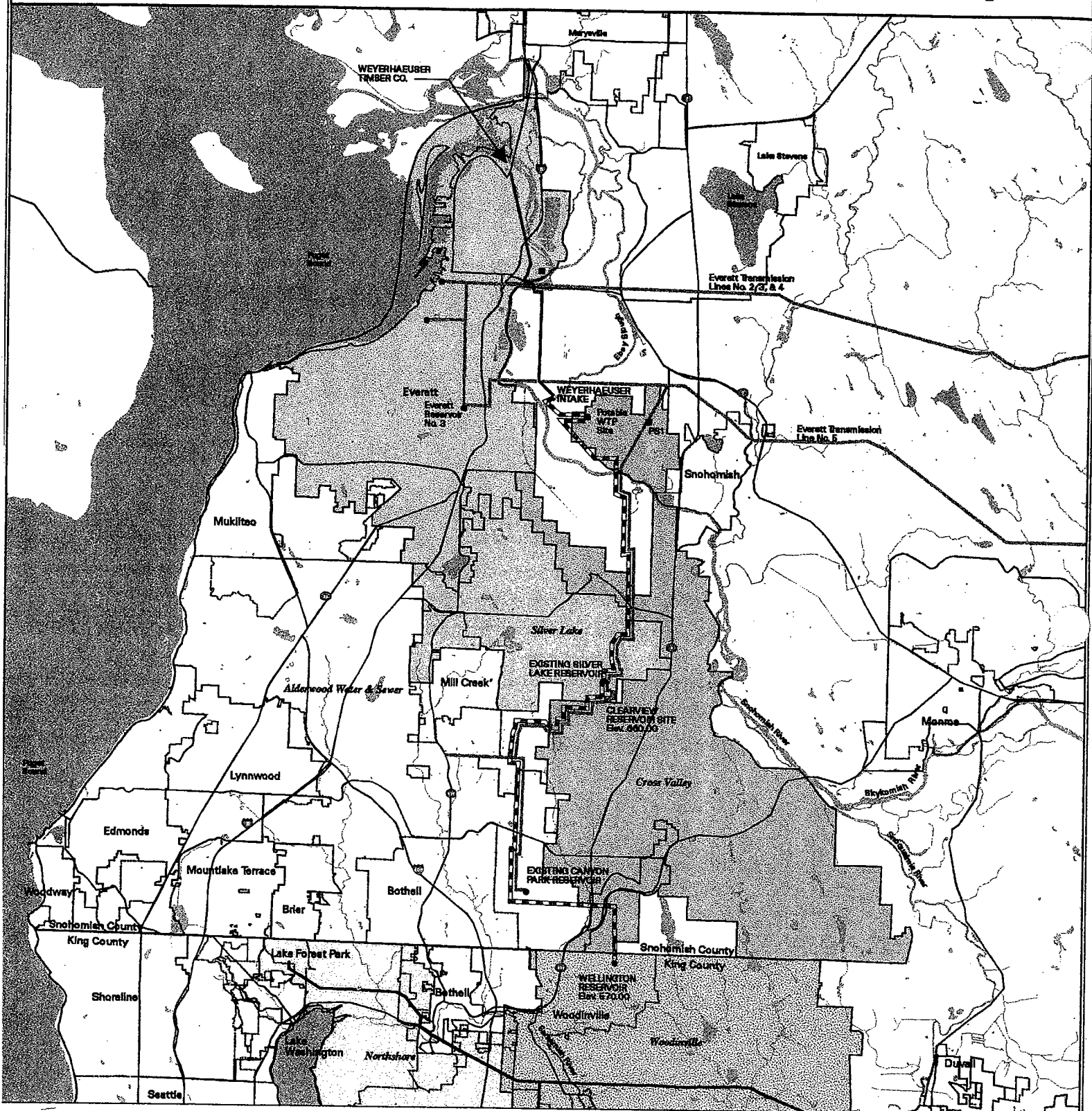


Figure 8
Project Components
Alternative 2 - Direct Transfer

Project Components

Ebey Slough Intake Upgrades

This alternative will use the existing intake located on Ebey Slough similar to Alternative 1. For a description of the existing intake and proposed improvements refer to the Alternative 1 Flow Swap project components discussions. With the exception of the pump sizing, the proposed modifications to the Ebey Slough intake for Alternative 2 are expected to be the same as Alternative 1. The proposed potable WTP site is closer to the intake but at a higher elevation, approximately 80 feet above MLLW. This condition results in a requirement for 4 - 400 HP pumps with a capacity of 8,400 GPM. Three pumps are required to provide 36 mgd to the treatment plant; one pump would be for standby. Pump sizing is based on delivery head of 30 feet above the mean site elevation at the treatment plant and head losses through 1.5 miles of pipe to the WTP. Total dynamic head is approximately 146 feet.

Costs: The estimated capital cost of the intake modifications is \$2,981,000. The estimated annual operations and maintenance cost is \$435,000. A detailed cost estimate is provided in Appendix B.

Raw Water Transmission

Raw water will be conveyed through a new pipeline from the intake to the potable WTP. The proposed pipeline would be a 36-inch diameter buried pipeline with a total length of approximately 7,200 feet. The pipeline is sized to convey 36 mgd (55.7 cfs).

The alignment for the proposed pipeline begins at the intake and runs southwest parallel to Ebey Slough until it intersects an existing Snohomish PUD electrical transmission line. The transmission line is a single circuit line supported by H-frame poles located on old railroad right-of-way. The transmission tower alignment runs in a southwesterly direction from the intake across the slough. The pipeline turns south along the transmission line crossing under the slough. This crossing would be achieved using a 300-foot long, 48-inch diameter micro-tunnel. After crossing Ebey Slough the pipeline would continue in a southwesterly direction to 64th Street SE. The pipeline would then continue east along 64th Street SE to the potable WTP. See Figure 9.

Pipeline construction is anticipated to be conventional and open cut trench for the entire alignment with a minimum cover of four feet. The typical trench would be eight feet deep by seven feet wide. The surface condition to be restored is predominantly grass.

The capital cost of this pipeline is estimated to be \$4,371,000 including pipeline installation, restoration, right-of-way, state sales tax, engineering, administration and contingencies. Operation and maintenance costs for the new pipeline are expected to be minimal. A detailed cost estimate is provided in Appendix B.

Potable Water Treatment Plant

This section presents a conceptual design for treatment of the Snohomish River water from the Ebey Slough Intake to drinking water standards. A single treatment facility is planned, with separate finished water pumping and transmission facilities for the WWD, Northshore Utility District, and the City of Everett. The plant capacity of 36 mgd is the maximum instantaneous withdrawal rate specified in the water right. The average annual plant production will be 28.7 mgd as required by the water right.

Raw and Treated Water Quality

Raw Water Quality. Raw water quality parameters are presented in Table 2 (See Alternative 1 – Flow Swap). The raw water is typical of lower river systems in western Washington. The alkalinity is low, color and total organic carbon (TOC) are low to moderate, and turbidity is low to moderately high. The higher turbidities are generally associated with higher river flows.

Salinity Issues. Water at the Ebey Slough Intake is tidally influenced. During periods of low river flow and high tides, elevated levels of salinity (as measured by total dissolved solids, TDS) can occur. In the absence of marine water influences, the TDS concentrations in the Snohomish River Water are approximately 30 to 40 mg/L (*Plan of Use* document, Appendix I). Due to marine influences, the TDS concentration at the Ebey Slough Intake can increase above 500 mg/L, and on some occasions above 1000 mg/L. The potable water standard for TDS is 500 mg/L; however, fluctuations in TDS concentration can be problematic with drinking water even if the levels do not exceed 500 mg/L. Changes in TDS can trigger consumer complaints about water quality due to changes in the taste, odor, and feel of the water. As a rule of thumb, TDS concentrations become a concern if they increase more than 100 percent above the typical concentration. For water from the Ebey Slough Intake, this would mean that TDS concentrations above 80 mg/L could be a problem.

High levels of TDS can also cause high rates of corrosion. Utilities without alternative sources of water operate with TDS concentrations up to 500 mg/L. However, these TDS levels, especially when associated with high chloride ion levels, can result in excessive corrosion of equipment and pipelines as well as concerns about corrosion in regard to water quality and health impacts.

TDS (i.e., salinity) is mentioned as a possible water quality issue in the *Plan of Use* document, though the severity of its impact on water use is not clear. Based on preliminary modeling results presented in the *Plan of Use* document, a TDS concentration of 80 mg/L has an exceedence probability between 20 and 25 percent in the months of August and September, the months of lowest river flow. These elevated TDS concentrations would be expected to persist for at least a few hours and recur for approximately one week (*Plan of Use* document). Further review of existing data and possibly additional monitoring or modeling would be required to fully evaluate the extent of high TDS levels.

Options to address the issue of TDS may include temporary shutdown of the intake and treatment facility, dilution (blending), and treatment. The feasibility of temporary plant shutdown depends on the frequency, duration, and timing of the high TDS levels as well as the acceptability of shutdown for operation of the RWA member water systems. Dilution of water during high TDS events requires a source of dilution water, which may be feasible for small increases in TDS concentration but would not likely be feasible at higher TDS concentrations. Treatment of water to remove TDS would require additional processes not typically required for potable treatment of a river water. Possible treatment techniques include membrane process, such as reverse osmosis or electro dialysis reversal, or ion exchange; however, these processes are relatively expensive (add approximately \$20 million to conventional treatment costs) compared to typical processes for surface water treatment.

Suitability of Raw Water for Potable Use. In this report, use of Snohomish River water as a source for potable water is an alternative to using the Sultan River supply. The two sources have different water quality characteristics and so a comparison of the general suitability of the two sources for potable treatment and use is presented below.

The Sultan River supply has an extremely high quality for potable use and is easy to treat. The turbidity, color, and total organic carbon (TOC) concentration are all very low and the watershed is relatively well protected.

The Snohomish River water quality is good for a potable water source (assuming that the salinity issue is not a problem), but it is not nearly as good as the Sultan River water quality. The Snohomish supply

should be treatable to current drinking water standards without unusual difficulty; however, the Snohomish supply would require more attention to the treatment and also result in a lower finished water quality than would the Sultan supply. There is some risk that finished water quality would be a concern with the Snohomish supply if drinking water regulations were to become more strict; if this were the case, additional treatment may be required.

The issues with the Snohomish River as a source are turbidity, color, TOC, and watershed protection. The turbidity of the Snohomish source is relatively low, but not nearly as low as the turbidity of the Sultan supply. The Snohomish River water turbidity also fluctuates to moderate and sometimes high levels. Color and TOC are a concern with the Snohomish source and will require treatment for removal. Compared to the Sultan supply, the Snohomish River is less well protected from contamination from upstream discharges and runoff, particularly runoff from nearby pasturelands.

Treated Water Quality

Proposed treated water quality criteria are presented in Table 5. This list is not meant to be comprehensive in terms of all water quality parameters regulated under the Safe Drinking Water Act. Rather, the list presents those criteria for which treatment is necessary given the raw water quality presented in Table 2. The criteria in Table 5 reflect the current regulatory limits and are subject to change due to new regulations. The limits on disinfection by-products may become more stringent in the next several years; however, this is not a certainty. Changes in the other criteria are not currently foreseen.

**Table 5
Proposed Treated Water Quality Criteria***

Parameter	Water Quality Value
Turbidity (NTU)	0.3
Color (CU)	15
pH	6.5 – 8.5
TDS (mg/L)	See discussion
Disinfection by-products	
Trihalomethanes (µg/L)	80 ⁺
Haloacetic Acids (µg/L)	60 ⁺
Total Organic Carbon	Treatment technique
Pathogens	
Giardia, Enteric Viruses, Legionella, Cryptosporidium	Treatment technique

* Only primary contaminants of concern are presented.
⁺ May be lowered with Stage 2 Disinfectant/Disinfection By-product Rule.

Treatment Processes and Facilities

The treatment process consists of coagulation, flocculation, sedimentation, filtration, and disinfection. This treatment train is similar to that used for the industrial treatment train, except the addition of disinfection. To reduce construction costs and land requirements, the flocculation, sedimentation, and filtration processes are designed for higher flow rates than are typical with conventional potable water treatment; however, a more conservative filter loading rate has been used with the potable plant than with the industrial plant. A schematic of the overall treatment and residuals handling processes is shown in Figure 10.

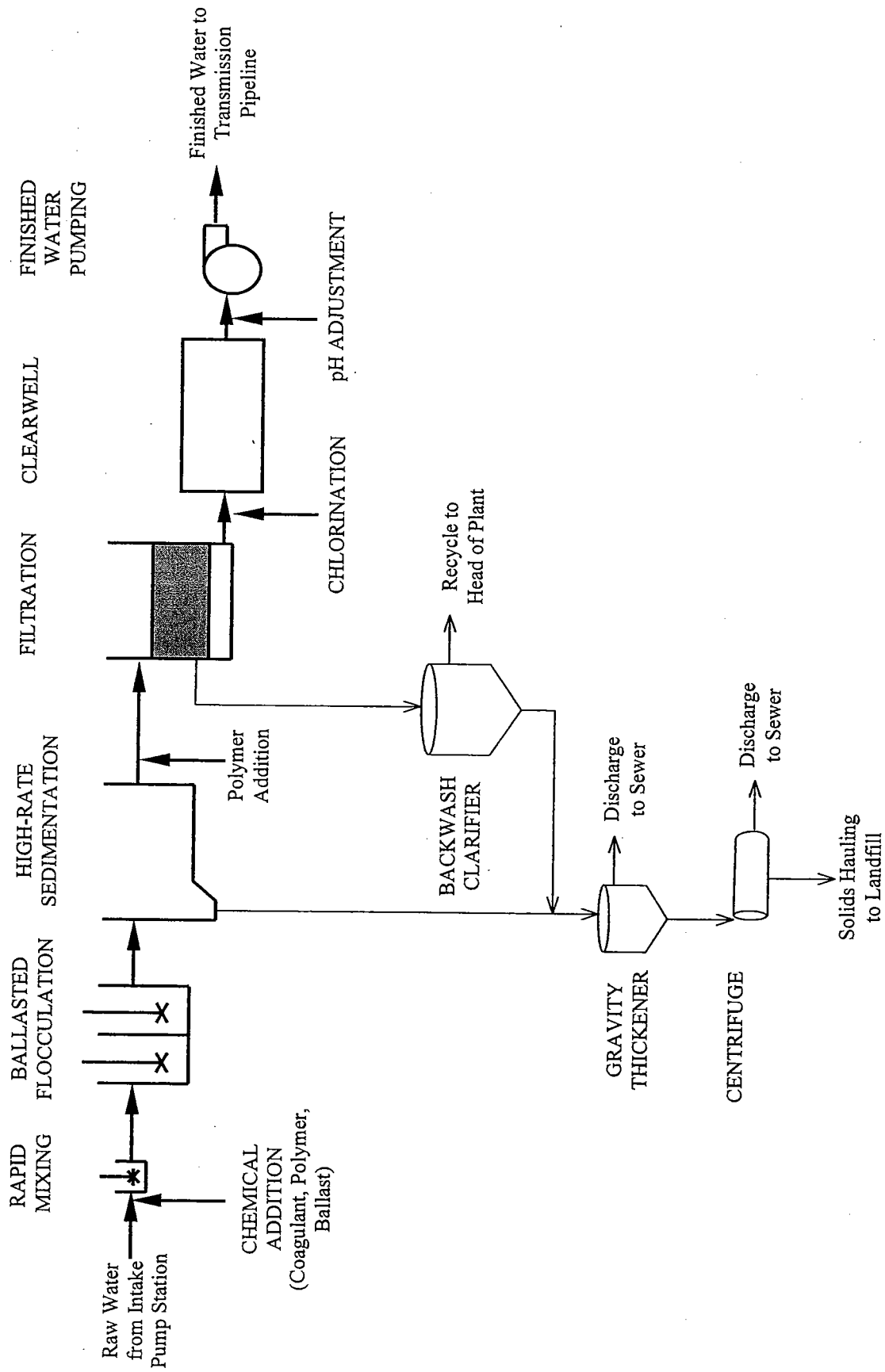


Figure 10. Process Schematic for 36 mgd Potable Water Treatment Plant

The raw water first passes through a rapid mix basin where coagulant chemicals are added and dispersed into the flow. Rapid mixing is followed by ballasted flocculation and high-rate sedimentation. Ballasted flocculation is similar to conventional flocculation, except that a ballast, such as sand, is added to improve agglomeration of contaminants and to increase settling rates. The settled water passes to the filters for final particle removal. High-rate filtration through a deep bed of granular media uses a smaller filter area than conventional filtration. Following filtration, chlorine is added and flow enters the clearwell. The clearwell provides contact time for chlorination in order to meet disinfection requirements. Water is then pumped from the clearwell into the finished water transmission main where pH is adjusted for corrosion control. Water for backwashing the filters will also be pumped from the clearwell.

Waste streams are generated from two of the main treatment processes. Spent filter backwash water is generated from cleaning the filters and settled residuals are collected from the sedimentation tank. A number of options can be used for disposal of treatment plant residuals, such as landfilling, land application, and discharge to the sewer. For the purposes of this study, it is assumed that the residual solids will be disposed of in a landfill. Residuals handling processes are designed with this objective.

Spent filter backwash water accounts for the majority of the waste stream from the plant and is first treated in backwash clarifiers. Treated backwash water is recycled to the head of the plant. The residuals from backwash treatment are combined with the sedimentation basin residuals in the gravity thickeners. The thickened residuals are sent to the centrifuges for dewatering and then hauled to a landfill. It is assumed that the liquid streams from residuals thickening and dewatering would be sent to the sewer. If discharge to the sewer is not feasible, additional treatment of the liquid wastes and discharge to the river may be required.

Alternative Treatment Processes

The treatment scheme recommended above is conservative in that it is a proven method on nearly all types of water and its costs are relatively high. Alternative treatment processes for the potable water plant may be suitable for the Snohomish River supply to save costs or possibly improve treatment. Further evaluation during pre-design and piloting should be used to determine feasibility. Possible alternatives include direct filtration and membrane filtration. Direct filtration is similar to the process described above, but without a sedimentation process. Membrane filtration, either microfiltration or ultrafiltration, may also be feasible. The cost of membrane systems has decreased substantially in the past few years and has become very attractive for a potable water treatment. With the Snohomish River supply, a membrane system would need to be augmented with a process to remove color and TOC, such as powdered activated carbon (PAC), granular activated carbon (GAC), or heated iron oxide particles (HIOPS).

Treatment Plant Layout and Siting

The preliminary site selected for the treatment plant is east of the existing intake structure across Ebey Slough on the west slope of Fobes Hill. This site is one of two that were considered in the *Plan of Use* document (Site 2). The other site considered in the *Plan of Use* document (Site 1) is adjacent to the intake structure. The intake site has several disadvantages: it is within the 100-year flood plain; it is within the Density Fringe, an area in which development is limited to two percent of the site; and the development of the site would be very costly due to geotechnical issues.

The site selected for this report is out of the 100-year flood plain, out of the Density Fringe, and appears to have much better soil conditions for construction (*Plan of Use* document). As recommended in the *Plan of Use* document, piling for the foundation is not considered necessary. Additionally, the site has a natural slope that may be amenable to gravity flow through the plant. The disadvantage of the selected

site is that additional pipe will be required to transmit raw water to the site and treated water away from it.

A conceptual layout of the WTP is shown in Figure 11. The sizes of the structures are based on the plant design criteria, which are tabulated in Appendix B. The treatment processes were selected in part to keep a small plant layout. Space between structures has been provided for yard piping and vehicle access. No space for plant expansion has been provided in this analysis. It was assumed that the ultimate capacity of the plant would be 36 mgd.

The total area of the layout shown is approximately eight acres. For planning purposes, it is recommended that a 25 percent contingency be applied on land requirements. The contingency allows for additional or alternative processes and facilities. With the contingency, a total area of 10 acres would be used. This acreage should be reviewed and refined as the project evolves.

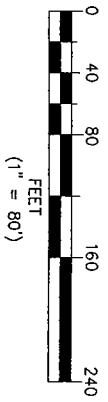
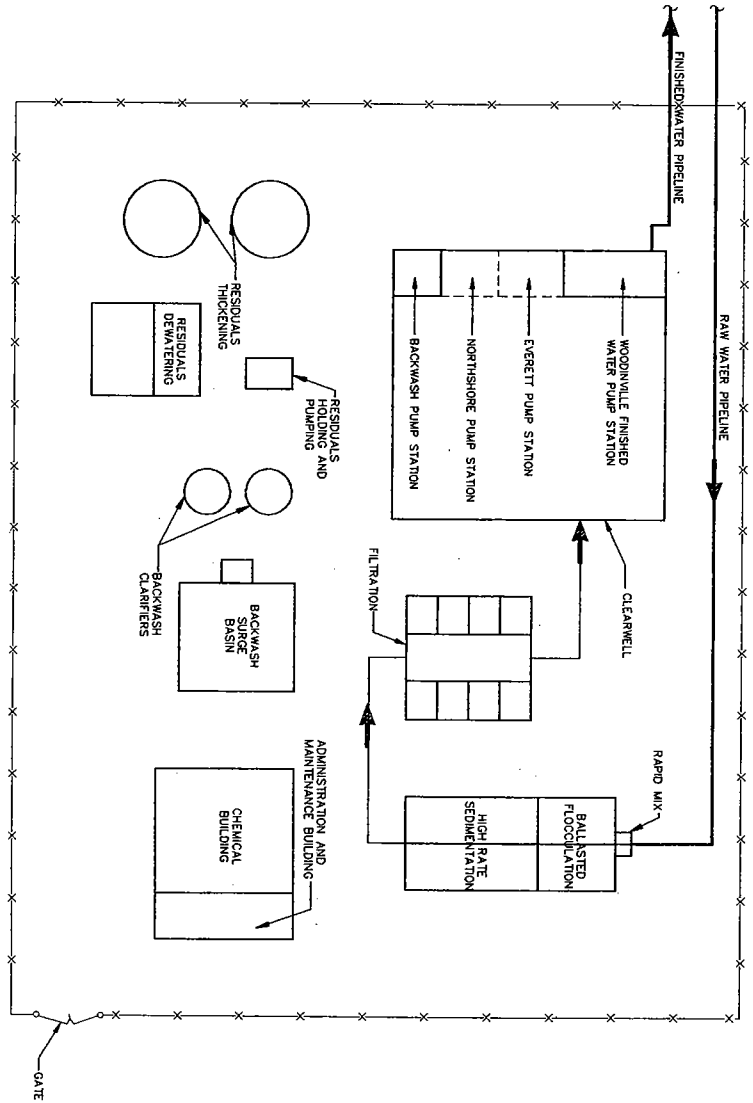
Cost Estimate

The planning-level capital and annual operation and maintenance cost estimates are presented in Appendix B. The capital cost is estimated to be \$47,500,000, and the annual operation and maintenance cost is \$4,650,000. The basic treatment process costs were generated using the cost program W/W Costs (CWC Engineering Software, 1994). The program costs are based on equipment cost data supplied by manufacturers, cost data from actual plant construction, unit takeoffs from actual and conceptual designs, and published data. Other costs were included based on a percentage of construction costs and based on costs for similar facilities. As with the cost for the industrial treatment plant, a contingency of 20 percent has been applied to the construction cost. Additional cost factors include 20 percent for engineering and administration and 8.6 percent sales tax.

Also, an allowance has been included for backup power. Either an emergency generator or secondary power feed could be used. An evaluation of the appropriate method should be made if this potable treatment plant alternative is accepted.

The cost for land at the site is estimated based on a unit cost of \$46,000 per acre. This is equivalent to the cost used in the *Plan of Use* document, but inflated to 1999 at a rate of five percent. A 25 percent contingency has been added to the cost of land.

The operation and maintenance costs are based on an average treated flow of 28.7 mgd. The costs include operation and maintenance for the main treatment processes, residuals handling, and residuals disposal. A 20 percent contingency factor has been applied to operation and maintenance costs.



HDR
Engineering, Inc.

Project Title	SNOHOMISH RIVER REGIONAL WATER AUTHORITY WATER RIGHTS TRANSFER PROJECT	Date	JUNE 1999
Sheet Title	POTABLE WATER TREATMENT PLANT LAYOUT (ALT 2 DIRECT TRANSFER)	Figure No.	11

Potable Finished Water Transmission

Potable water will be pumped through a pipeline from the potable WTP to WWD distribution system. The proposed pipeline is 36-inch diameter, 17.3 mile long buried pipeline is sized for 11 mgd (17 cfs) flow. The pipeline begins at the potable WTP at an elevation of 80 feet above MLLW to an elevation of 570 feet at the Wellington Reservoir. The high point in the line would occur near Alderwood Water District Clearview Reservoir site at Elev. 600. Figure 9 shows the proposed alignment. A 24-inch diameter, 1.5 mile long ductile iron pipeline is included in the alternative to convey water within the WWD distribution system. The exact alignment and tie-in to the system is not included in this analysis.

The majority of the pipeline would run in a north to south direction along existing electrical transmission line corridors. The reason for selecting this alignment is that it follows existing dedicated power transmission right-of-way and the EIS for the majority of this route has been completed for the Alderwood Water Districts proposed Clearview Pipeline Project. The impacts to roadways, traffic, property owners and the environment should be less than other alignments.

Beginning at the potable WTP located at the intersection of 60th Street SE and 61st Avenue SE, the pipeline would run west for approximately one-half mile, parallel to the raw water line, until it intersects with an electrical transmission corridor. The pipeline would continue in a southeasterly direction toward the town of Snohomish for approximately 1.5 miles until it intersects another major transmission corridor which, is also the same alignment as the Clearview Pipeline. The pipeline would then run due south parallel to the Clearview Pipeline approximately 5.5 miles to a point near the Clearview Reservoir site.

From the Clearview Reservoir site, the pipe would follow rural and residential roadways in a southwesterly direction for approximately two miles to the Snohomish PUD Transmission right-of-way. The pipeline would follow the edge of the right-of-way due south for approximately three miles passing by Alderwood's Canyon Park Reservoir, to the intersection of Canyon Park Road. The alignment would then follow the 228th St. SE right-of-way in an easterly direction crossing under Bear creek and Highway 9 and then continue in an easterly direction on an easement through industrial and undeveloped properties to 75th Avenue SE. This section ascends sloping topography and crosses under the Burlington Northern Railroad and SR 522 right-of-ways. Once on 75th Ave SE, the pipeline would run south within the road right-of-way, crossing the Snohomish County/King County line, to the Wellington Reservoir located at 156th Ave. N.E. and N.E. 203rd Pl. in Woodinville. Within the WWD service area, the 24-inch pipeline would run south, approximately parallel to the Wellington Transmission Main. Figure 1 shows the proposed WWD Finished Water Pipeline alignment.

Pipeline construction is anticipated to be conventional trench and open cut for the majority of the alignment with a minimum cover of four feet. The typical trench would be approximately eight feet deep by seven feet wide. At some locations trenchless crossings are assumed to reduce or eliminate environmental and traffic impacts. It is anticipated that the crossings of the Ebey Slough, Burlington Northern Railroad (2 locations), Snohomish River, Maltby Road, Bear Creek, State Highway 9, and State Route 522 will be by boring and jacking or microtunnelling depending on subsurface conditions. At these special crossings the pipeline could be in the range of 10 to 60 feet deep.

The capital cost of this pipeline is estimated to be \$45,932,000 including pipeline installation, restoration, right-of-way, state sales tax, engineering, administration and contingencies. Operation and maintenance costs are expected to be minimal. Cathodic protection is not included in the estimate. The finished water pipeline cost estimate is included in Appendix B.

Environmental/Permitting

Environmental and permitting requirements for Alternative 2 – Direct Transfer are discussed below. The SEPA/NEPA process, anticipated permitting requirements, and anticipated ESA requirements are presented.

SEPA Process

The State Environmental Policy Act (SEPA) Chapter 43.21C Revised Code of Washington (RCW) requires all governmental agencies to consider the impacts of a development proposal on the environment before making a decision on the proposal. Permits may not be issued until the SEPA process is complete.

Development proposals that significantly affect the environment require an environmental impact statement (EIS). The EIS process would require that a determination of significance and scoping notice be issued for public review and comment. A draft EIS would then be prepared and issued for review. Once comments have been received, changes would be made as appropriate and a final EIS issued. It can take approximately 12 to 15 months to complete this process.

If Alternative 2 – Direct Transfer is not considered to have significant impacts, an environmental checklist may be prepared whereby the lead agency issues a determination of nonsignificance (DNS) or mitigated determination of nonsignificance. The environmental review/studies are the same as for the environmental impact statement, however, the issuance of the DNS with an appeal period can be significantly shorter (3-5 months).

When an agency initiates a proposal, it is the lead agency for the proposal. For purposes of this project, the WWD/RWA would be the lead agency for the SEPA process.

After a preliminary assessment of the project, the WWD/Snohomish River RWA may want to consider pursuing an expanded environmental checklist for the following reasons:

- During project design, the project team will continue to provide ways to lessen impacts by avoidance, reduction, restoration and/or mitigation.
- Portions of the project have already been analyzed in the following SEPA documents: *SEPA Expanded checklist for Proposed Water Right Change and Plan of Use Adoption for Water Right No. S1-10617C* (Ebey Slough Intake), *Draft/Final Environmental Impact Statement – Clearview Water Supply Project* (portion of the WWD Finished Water Pipeline from Everett's Pipeline No. 5 to the Clearview Reservoir site), and *Draft/Final Environmental Impact Statement – Alderwood/Clearview Water Pipeline Project* (portion of the WWD Finished Water Pipeline from the Clearview Reservoir site to the Canyon Park Reservoir).
- Except for construction of the potable WTP and modifications to the intake structure, project impacts will be temporary in nature and can be restored to the pre-project condition.
- Early consultation with Snohomish County and the City of Woodinville would confirm their agreement to this approach.

NEPA Process

The Corps of Engineers will need to conduct their own environmental review of the project and will most likely prepare an environmental assessment using information supplied by the applicant, such as the SEPA document, cultural resource report, wetlands report, biological assessments (if required), etc.

Permitting

For the purposes of assessing permit/approval requirements, the project was divided into four major components: (1) Ebey Slough Intake Upgrades, (2) Raw Water Line, (3) Potable WTP (including the

Finished Water Pump Station) and (4) WWD Finished Water Pipeline. It should be noted, however, that several of the permits could be combined into one application (i.e., the Corps of Engineers Section 10 and Section 404 permit, Water Quality Certification/CZMA, Snohomish County Shoreline Substantial Development Permit). Additionally, a Washington State Department of Health Public Water Supply Approval would be required for the entire project.

Ebey Slough Intake Upgrades

Anticipated permits and approvals for the Ebey Slough Intake Upgrades are:

- Corps of Engineers Section 10 Individual or Nationwide
- USFWS/NMFS Consultation – Biological Assessment for Chinook (listed), Coho (candidate) and bald eagles (listed)
- Tribal Consultation
- Washington State Historic Preservation Office Cultural Resource Consultation
- Washington Department of Fish and Wildlife
 - Hydraulic Project Approval
 - Priority Habitats and Species Consultation
- Washington Department of Ecology
 - Water Quality Certification
 - Coastal Zone Consistency Determination
- Washington Department of Natural Resources Aquatic Use Authorization
- Snohomish County
 - Shoreline Substantial Development Permit
 - Conditional Use Permit
 - Building Permit
 - Flood Hazard Permit
 - Mechanical/Electrical Permit

The following assumptions were used to identify the anticipated permits and approvals for this facility:

- Portions of the existing concrete intake structure and the buried discharge piping will be reused.
- Intake equipment, pumps, transformers, switchgear, motor starters and controls removed and replaced.
- New fish screens, designed to meet WDFW/National Marine Fisheries Service (NMFS) salmonid fry protection criteria, will be installed at the intake.
- In-water work at the intake will be required (installation of cofferdam) and will be done outside of designated fisheries windows.

Raw Water Line

Anticipated permits and approvals for the raw water line are listed below. These approvals will be combined with those required for the intake.

- Corps of Engineers Section 10/404 Individual or Nationwide
- USFWS/NMFS Consultation – Biological Assessment for Chinook (listed), Coho (candidate) and bald eagles (listed)
- Tribal Consultation
- Washington State Historic Preservation Office Cultural Resource Consultation
- Washington Department of Fish and Wildlife
 - Hydraulic Project Approval
 - Priority Habitats and Species Consultation
- Washington Department of Ecology
 - Water Quality Certification
 - Coastal Zone Consistency Determination
 - Stormwater Construction Permit (NPDES)
- Washington Department of Natural Resources Aquatic Use Authorization
- Snohomish County
 - Shoreline Substantial Development Permit
 - Grading Permit
 - Conditional Use Permit
 - Flood Hazard Permit
 - Critical Areas Approval
 - Road Right-of-Way Use Permit
 - Haul Route Permit
- Snohomish County PUD Right-of-Way or Easement

The following assumptions were used to identify the anticipated permits and approvals for this project component:

- The raw water line crossing of Ebey Slough will be done via a microtunnel.
- The raw water line will follow an existing powerline corridor or roadways eastward to the potable WTP site.
- Potential temporary wetland impacts may occur.

Potable Water Treatment Plant

Anticipated permits and approvals for the potable WTP are listed below.

- Washington Department of Ecology Stormwater Construction Permit (NPDES)

- Snohomish County
 - Conditional Use Permit
 - Critical Areas Approval
 - Building Permit
 - Grading Permit
 - Drainage Review
 - Road Right-of-Way Permit
 - Haul Route Permit
 - Mechanical/Electrical Permit

The following assumptions were used to identify the anticipated permits and approvals for this facility:

- The treatment plant is located east of the intake structure/Ebey Slough outside of the floodplain.
- There are no wetland impacts for construction of the treatment plant.

WWD Finished Water Pipeline

Anticipated permits and approvals for the WWD Finished Water Pipeline are:

- Corps of Engineers Section 10/404 Permit
- USFWS/NMFS Consultation – Biological Assessment for Chinook (listed), Coho (candidate) and bald eagles (listed)
- Washington State Historic Preservation Office Cultural Resource Consultation
- Washington Department of Fish and Wildlife
 - Hydraulic Project Approval
 - Priority Habitats and Species Consultation
- Washington Department of Ecology
 - Water Quality Certification
 - Coastal Zone Consistency Determination
 - Stormwater Construction Permit (NPDES)
- Washington Department of Natural Resources Aquatic Use Authorization
- Washington Department of Transportation
 - Utility Permit/Franchise – SR 9/SR 522
- Burlington Northern Railroad Easement
- Bonneville Power Administration/Seattle City Light/Snohomish County PUD Right-of-Way Use

- Snohomish County
 - Shoreline Substantial Development Permit
 - Conditional Use Permit
 - Critical Areas Approval
 - Flood Hazard Permit
 - Grading Permit
 - Road Right-of-Way Use Permit
 - Haul Route Permit
 - Road/Lane Closure Permit
- City of Woodinville
 - Site Development Permit
 - Right-of-Way Permit

The following assumptions were used to identify the anticipated permits and approvals for the pipeline:

- The pipeline will generally follow the westerly corridor proposed for the Clearview Pipeline that is within the Seattle City Light/Bonneville Power Administration corridor to the Clearview Reservoir site.
- From the Clearview Reservoir site to the Canyon Park Reservoir, will utilize same corridor as the Alderwood/Clearview Pipeline (see Figure 1); from the Canyon Park Reservoir, the route will turn east on 228th, cross SR 9, BNRR railroad tracks, SR 522 to 75th Ave. SE, then turn south on 75th Ave. SE to Bear Creek, the Snohomish County/King County line. In King County (city of Woodinville), 75th Ave. SE becomes 156th Ave. NE, where the pipeline continues South in the road right-of-way to the WWD Wellington Reservoir (intersection of 156th Ave. NE and NE 203rd Pl).
- There will be temporary wetland impacts.
- Microtunnel crossing of the Snohomish River.
- Several drainages/streams will be crossed; open cut crossings will comply with designated fisheries windows as appropriate.
- Bore and jack or microtunnel crossing of SR522.

Endangered Species Act (ESA)

A Federal permit requires Section 7 consultation with federal agencies on threatened or endangered species. In this case, the Corps Permit triggers the ESA consultation requirement. A section 7 consultation should be conducted for Alternative 2, if it is the selected project. Previous consultations have been conducted for portions of the pipeline alignments and intake facility as noted below.

In support of the *SEPA Expanded Checklist* prepared for the change of water right at the intake structure, R2 Resources and Beak Consultants consulted with federal and state agencies on threatened or endangered plant, animal and anadromous fish species known to be in the project area. The following species were identified: chinook (listed-threatened), coho (candidate-threatened) and bald eagles (listed-threatened).

In the Environmental Impact Statement prepared for the Clearview Water Supply Project (the northern portion of the proposed WWD Finished Water Pipeline corridor), no threatened, endangered, or sensitive plant or animal species were documented. However, the Washington Department of Fish and Wildlife priority habitat and species database identified a bald eagle nest and a great blue heron herony within approximately 1,000 feet of the proposed alignment. In the EIS prepared for the Alderwood/Clearview Pipeline (portion of the WWD Finished Water Pipeline alignment between the Clearview Reservoir site and the Canyon Park Reservoir) it is noted that bald eagles may over-winter in the project area.

If it is our understanding that formal consultation will need to be initiated for the portion of the WWD Finished Water Pipeline alignment from the Canyon Park Reservoir to the interconnection to WWD, as well as the raw water line alignment, to determine if there are any species of concern.

Section 7 consultation requires preparation of a biological assessment (BA) evaluation of the proposed project impacts on any listed or proposed Endangered Species Act species or critical habitat within the project area. If it is determined that the project will not have any effect on listed species or critical habitat, a "No Effects" letter BA would be prepared. If it were concluded that the project would have an effect on any listed species, a full BA report would be required. The BA Letter or BA Report would be forwarded to the USFWS and the NMFS for their concurrence.

For the intake structure upgrades, the fish, shellfish and waterfowl prey base used by bald eagles would not be negatively affected since there would be no alterations of physical habitat or water quality impacts associated with the completed project. Distance of any bald eagle nests from the intake structure would need to be determined as there may be noise restrictions during breeding season.

Although it is anticipated that there will be in-water work required for installation of the traveling fish screens, the work will be completed behind cofferdams that will be constructed outside of the fisheries windows, thereby minimizing impacts to the fisheries resource, including listed species, that use the Lower Snohomish Estuary. Additionally, refurbishment of the intake structure to include modern fish screen protection would have a positive effect on salmonid fry by providing increased protection from screen impingement.

The raw water line crossing of Ebey Slough and the transmission line crossing of the Snohomish River will be accomplished by a microtunnel method. No in-water work will occur for these crossings, thereby avoiding disturbance in the waterways.

For the northern portion of the transmission pipeline, construction probably would not impact nesting bald eagles or blue heron as these nests are near roads and railroads and experience farm vehicle traffic and train traffic year-round.

Cost Summary

The total project capital and operation and maintenance costs for Alternative 2 – Direct Transfer are summarized in Table 6 in 1999 dollars. WWD's share in the various cost components are also listed in Table 6. The portion of the total project cost incurred by WWD for the Ebey Slough Intake upgrades, transmission lines to and from the WTP, and potable WTP are based on WWD's share of the Weyco water right (30.6 percent). WWD will incur 100 percent of the cost for the WWD Finished Water Pipeline. Similar to Alternative 1, the estimated cost reduction in WWD's share of the Finished Water Pipeline is noted at the bottom of Table 6.

The capital cost for the potable treatment plant shown in Table 6 is approximately \$5.5 million less than the capital cost for the industrial plant (shown in Table 4). This may be surprising given that the potable plant includes more processes and a slightly more conservative design. However, the difference in cost is mainly due to the different sites selected for the plants. The industrial water treatment plant site, adjacent to the river, has a higher land acquisition cost and requires substantially more cost for

geotechnical and flooding considerations. Also, the capital cost for the industrial plant includes a 36 mgd finished water pump station to deliver water to the Everett industrial users. With the potable plant, the finished water pump station is presented separately from the treatment plant and is sized to deliver Woodinville's portion of the flow (11 mgd) to the Woodinville distribution system. The result of these differences is a substantially higher capital cost for the industrial plant compared to the potable plant.

**Table 6
Snohomish River RWA Project Capital and O&M Cost Summary Alt. 2 Direct Transfer
(1999 Dollars)**

Component	Total Capital Costs	Total O&M Costs	WWD Share (%)	WWD Shared Cost	
				Capital Cost	O&M Cost
RWA Project					
Ebey Slough Intake Upgrades	\$2,981,000	\$435,000	30.60	\$913,000	\$134,000
New Raw Water Line	\$4,371,000		30.60	\$1,338,000	
Potable WTP	\$47,500,000	\$4,680,000	30.60	\$14,535,000	\$1,433,000
Finished Water Pump Station	\$1,862,000	\$450,000	100 ⁽¹⁾	\$1,862,000	\$450,000 ⁽¹⁾
Potable Finished Water Pipeline WTP to WWD	\$45,932,000	-	100 ⁽¹⁾	\$45,932,000	- ⁽¹⁾
Total	\$102,646,000	\$5,565,000		\$64,580,000	\$2,017,000
⁽¹⁾ If NUD participated in the Potable Water Pipeline and Finished Water Pump Station, the WWD share of the pipeline and pump station capital cost would be reduced to approximately \$28,678,000, and the WWD share of the total capital cost of Alternative 2 would be reduced to approximately \$45,464,000.					

Annual and Monthly Cost – Year 2012

The Snohomish River RWA project would have to be implemented on or before the year 2012 to meet WWD's water supply needs after the SPU contract expires. The intent of this cost analysis is to provide WWD with an estimate of the cost per million gallons to utilize this source of supply as well as the potential cost impacts to customers. The cost analysis focuses on cost impacts in the year 2012.

The capital and annual operation and maintenance costs (1999 Dollars) were then adjusted to 2012 dollars by applying an annual inflation rate of three percent. The capital costs were converted to an annual cost in the year 2012 using an expected life of 30 years (2012 to 2041) and an annual bond rate of six percent. Year 2012 total capital and annual capital costs, and annual operation and maintenance costs incurred by WWD are estimated to be:

- 2012 total capital costs: \$94,836,000
- 2012 annualized capital costs: \$6,886,000
- 2012 operation and maintenance costs: \$2,962,000

The total annualized 2012 capital and operation and maintenance costs would be \$9,848,000. This cost was converted to a monthly cost per customer using projected equivalent residential units (ERUs)

geotechnical and flooding considerations. Also, the capital cost for the industrial plant includes a 36 mgd finished water pump station to deliver water to the Everett industrial users. With the potable plant, the finished water pump station is presented separately from the treatment plant and is sized to deliver Woodinville's portion of the flow (11 mgd) to the Woodinville distribution system. The result of these differences is a substantially higher capital cost for the industrial plant compared to the potable plant.

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Finished Water Pump Station	\$1,862,000	\$450,000	100 ⁽¹⁾	\$1,862,000	\$450,000 ⁽¹⁾
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Total	\$102,646,000	\$5,565,000		\$64,580,000	\$2,017,000
⁽¹⁾ If NUD participated in the Potable Water Pipeline and Finished Water Pump Station, the WWD share of the pipeline and pump station capital cost would be reduced to approximately \$28,678,000, and the WWD share of the total capital cost of Alternative 2 would be reduced to approximately \$45,464,000.					

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The capital and annual operation and maintenance costs (1999 Dollars) were then adjusted to 2012 dollars by applying an annual inflation rate of three percent. The capital costs were converted to an annual cost in the year 2012 using an expected life of 30 years (2012 to 2041) and an annual bond rate of six percent. Year 2012 total capital and annual capital costs, and annual operation and maintenance costs incurred by WWD are estimated to be:

- 2012 total capital costs: \$94,836,000
- 2012 annualized capital costs: \$6,886,000
- 2012 operation and maintenance costs: \$2,962,000

The total annualized 2012 capital and operation and maintenance costs would be \$9,848,000. This cost was converted to a monthly cost per customer using projected equivalent residential units (ERUs)

(*Planning Data Memorandum, April 1999*). The projected number of equivalent residential units for the WWD water service area in 2012 is approximately 21,100. Also, the annual cost was converted to cost per million gallons based on WWD's 8.8-mgd annual average share of the Weyco water right. These costs are listed below:

- 2012 monthly cost per customer: \$38.89 per ERU/month
- Average annualized cost per average mgd of supply: \$1,120,000
- 2012 annual cost per volume: \$3,066 per MG
- 2012 annual cost per volume: \$2.29 per CCF

Since Alternative 2 does not utilize the Sultan River supply, Snohomish County PUD charges are not applicable.

Schedule

The anticipated schedule to implement the proposed project, including estimated duration for the regulatory and permitting processes is illustrated in Figure 12. This Gant Chart shows that the anticipated completion of the project will be in the year 2007. This assumes that Ecology will approve the water right change application by January, 2002.

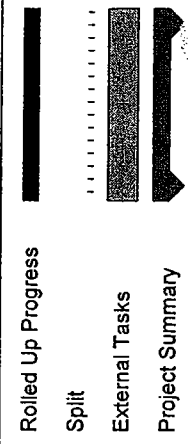
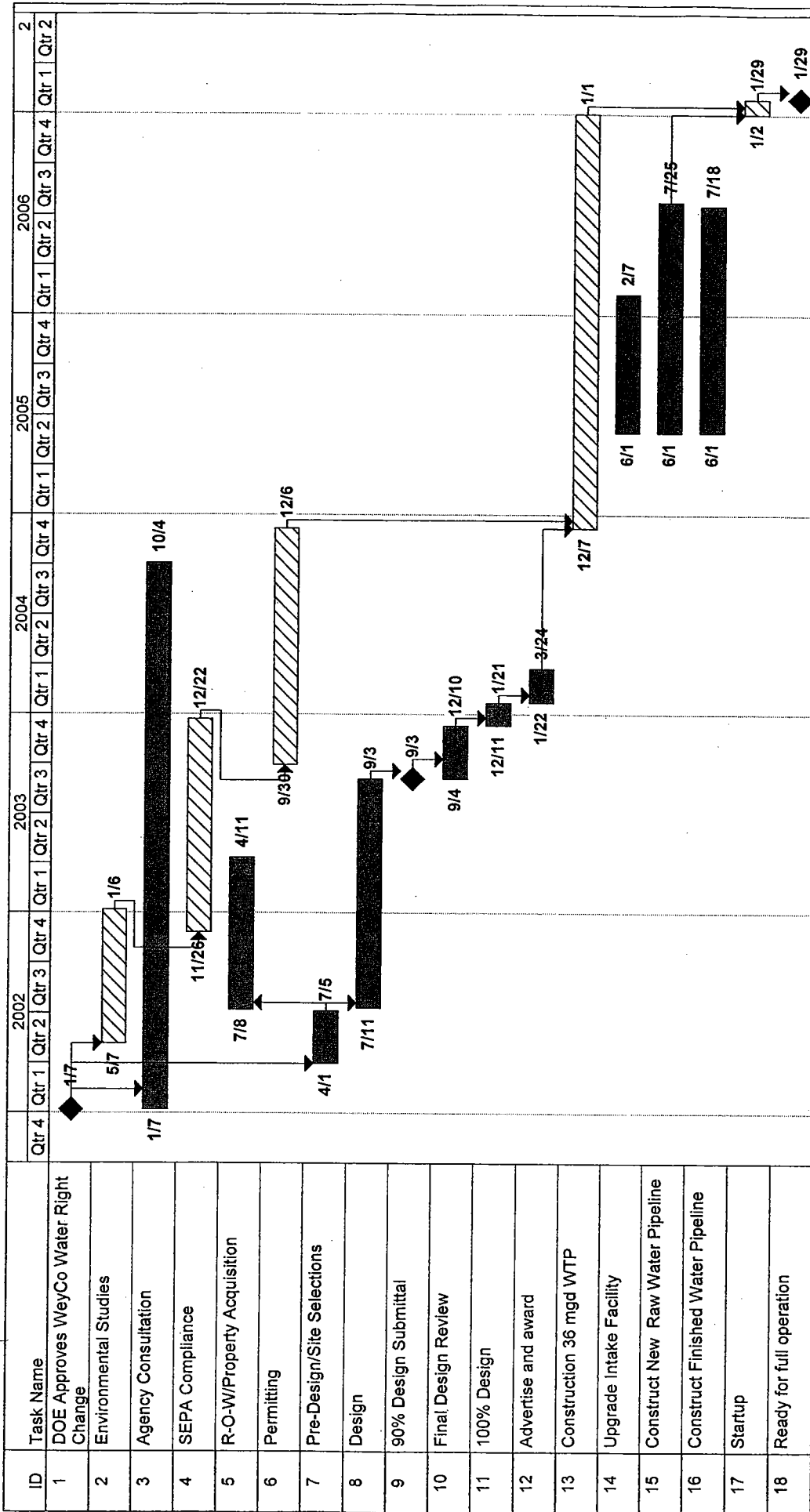


Figure 12
Alt. 2 Direct Trans. Schedule

IV. COST COMPARISON OF TWO ALTERNATIVES

A comparison of the WWD 1999 and 2012 costs for the two alternatives is presented in Table 7.

**Table 7
Comparison of WWD Share of Costs for Two Alternatives**

Alternative 1 - Flow Swap		Alternative 2 - Direct Transfer	
1999 ITEMIZED CAPITAL COSTS			
Raw Water Intake and Transmission		Raw Water Intake and Transmission	
Ebey Slough Intake Upgrades	\$841,000	Ebey Slough Intake Upgrades	\$913,000
Lower Weyco Pipeline Rehab.	\$23,000	New Raw Water Line	\$1,338,000
New Raw Water Line	\$287,000		
Subtotal	\$1,151,000	Subtotal	\$2,251,000
Treatment		Treatment	
Industrial WTP	\$16,205,000	Potable WTP	\$14,535,000
(WTP includes finished water pump station)		Finished Water Pump Station	\$1,862,000
		Subtotal	\$16,397,000
Finished Water Transmission		Finished Water Transmission	
Upper Weyco Pipeline Rehab.	\$529,000	Potable WTP Finished Water Line	\$45,932,000
Industrial WTP Finished Water	\$316,000		
Line			
Clearview/WWD Pipeline	\$29,280,000		
Clearview Project	\$4,253,000		
Subtotal	\$34,378,000		
Total WWD Share of Capital Costs	\$51,734,000	Total WWD Share of Capital Costs	\$64,580,000
1999 OPERATION AND MAINTENANCE COSTS			
Total WWD Share of O&M Costs	\$1,611,000	Total WWD Share of O&M Costs	\$2,017,000
2012 TOTAL CAPITAL AND OPERATION AND MAINTENANCE COSTS			
Total Capital Cost	\$75,973,000	Total Capital Cost	\$94,836,000
O&M	\$2,366,000	O&M	\$2,962,000
Annualized Capital	\$5,516,000	Annualized Capital	\$6,886,000
Total Annualized Cost	\$7,882,000	Total Annualized Cost	\$9,848,000
(Capital and O&M)		(Capital and O&M)	
Cost CCF treated	\$1.84	Cost CCF treated	\$2.29
Cost Per ERU Per Month	\$31.13	Cost Per ERU Per Month	\$38.89

REFERENCES

Snohomish River Regional Water Authority, *Revised and Amended Plan of Use for Weyerhaeuser Timber Company Water Right No. S1-10617C, Volume I and II*, January 30, 1998.

Snohomish River Regional Water Authority, *SEPA Expanded Checklist for Proposed Water Right Change and Plan of Use Adoption for Water Right No. S1-10617C*, January 30, 1998.

Clearview Group, Alderwood Water District – Lead Agency, *Final Environmental Impact Statement for Clearview Water Supply Project*, April 15, 1998.

Alderwood Water District, *Final Environmental Impact Statement for Alderwood/Clearview Water Pipeline Project*, April, 1999.

Woodinville Water District/Cross Valley Water District Agreement, Clearview Project Capacity, September 30, 1998.

Woodinville Water District Comprehensive Water Plan, Planning Data Memorandum, April, 1999.

APPENDIX A
ALTERNATIVE 1 – FLOW SWAP

SNOHOMISH RIVER REGIONAL WATER AUTHORITY

ALTERNATIVE 1 FLOW SWAP - FEASIBILITY COST ESTIMATE

Ebey Slough Intake Upgrade Capitla Cost (1999 Dollars)					
Item	Description	Unit	Quantity	Unit Price	Estimated Cost
1	Mobilization	LS	1	\$ 50,000	\$ 50,000
2	Cofferdam, sheetpile	SF	5,500	\$ 30	\$ 165,000
3	Dewatering	LS	1	\$ 75,000	\$ 75,000
4	Equipment demolition	LS	1	\$ 50,000	\$ 50,000
5	Concrete demolition	CY	190	\$ 150	\$ 28,500
6	Excavation	CY	300	\$ 20	\$ 6,000
7	Concrete, intake footings	CY	22	\$ 250	\$ 5,500
8	Concrete, intake walls	CY	140	\$ 450	\$ 63,000
9	Concrete, intake slabs	CY	15	\$ 250	\$ 3,750
10	Chain link fence	LF	186	\$ 30	\$ 5,580
11	US & DS sheetpile training walls	SF	5,000	\$ 25	\$ 125,000
12	Micellaneous metals	LBS	25,000	\$ 2.50	\$ 62,500
13	Trash rake	EA	1	\$ 50,000	\$ 50,000
14	Fish Screens (Wedgewire)	SF	155	\$ 120	\$ 18,600
15	Screen Cleaner	LS	1	\$ 100,000	\$ 100,000
16	Pumps	EA	4	\$ 20,000	\$ 80,000
17	Mechanical Piping and Valves	LS	1	\$ 200,000	\$ 200,000
18	Compressed Air System	LS	1	\$ 25,000	\$ 25,000
19	Electrical Power & Control	LS	1	\$ 267,000	\$ 267,000
20	Telemetry	LS	1	\$ 25,000	\$ 25,000
21	Building and overhead hoist	LS	1	\$ 100,000	\$ 100,000
	Subtotal				\$ 1,505,430
	Contingencies (40%)				\$ 602,172
	Subtotal				\$ 2,107,602
	Sales tax (8.6 percent)				181,254
	Subtotal				2,288,856
	Engineering & Admin (20%)				\$ 457,771
	Total Estimated Cost				\$ 2,747,000
<p>Assumptions:</p> <ol style="list-style-type: none"> 1. Basic location and structure is to be maintained, all operating equipment to be replaced. 2. Fish screen approach velocity not to exceed 0.4 fps. 3. Existing Header piping to remain to edge of the existing structure. 4. Second permanent power feed exists, no need for emergency generator. 5. Full capacity of 36 mgd is handled by 3 pumps, 1 pump is spare. 6. Construction to occur during low flow period, construction duration is approx. 6 months. 					

SNOHOMISH RIVER REGIONAL WATER AUTHORITY

ALTERNATIVE 1 FLOW SWAP - FEASIBILITY COST ESTIMATE

Upper Weyco Pipeline Rehabilitation Capital Cost (1999 Dollars)					
Item	Description	Unit	Quantity	Unit Price	Estimated Cost
1	Mobilization	LS	1	\$ 10,000.0	\$ 10,000
2	Drain Pipeline	LS	1	\$ 2,000.0	\$ 2,000
3	Excavate, shore, backfill & restore access pits.	EA	10	\$ 10,000	\$ 100,000
4	Cut and remove existing pipe	EA	10	\$ 1,000	\$ 10,000
5	HDPE Pipe material	LF	10,500	\$ 40	\$ 420,000
6	Pipe installation	LF	10,500	\$ 35	\$ 367,500
7	Special fitting 24 x 36 Tee	EA	4	\$ 8,000	\$ 32,000
8	Special fitting stub end	EA	2	\$ 3,000	\$ 6,000
	Subtotal				\$ 947,500
	Contingencies (40%)				\$ 379,000
	Subtotal				\$ 1,326,500
	Sales tax (8.6 percent)				114,079
	Subtotal				1,440,579
	Engineering & Admin (20%)				\$ 288,116
	Total Estimated Cost				\$ 1,729,000
Assumptions: 1. Approximate length of pipeline is 2.0 miles 2. Pipe is to be sliplined with 36-inch diameter HDPE SDR-32 3. Pipe to be sliplined in 1000 foot segments					

SNOHOMISH RIVER REGIONAL WATER AUTHORITY

ALTERNATIVE 1 FLOW SWAP - FEASIBILITY COST ESTIMATE

Raw Water Pipeline to Water Treatment Plant Capital Cost (1999 Dollars)					
Item	Description	Unit	Quantity	Unit Price	Estimated Cost
1	Mobilization	EA	1	\$ 10,000	\$ 10,000
2	Excavation (trench 9.5 feet deep)	CY	6270	\$ 6	\$ 37,620
3	Dewatering	LS	1	\$ 50,000	\$ 50,000
4	Furnishing and installing 40-in dia pipe x 3/16 in wall steel	LF	1650	\$ 190	\$ 313,500
5	Pipe Bedding	EA	420	\$ 15	\$ 6,300
6	Backfill, pipe zone	CY	1650	\$ 15	\$ 24,750
7	Backfill, above pipe	CY	4125	\$ 10	\$ 41,250
8	Drain & Cut into Existing Pipe	LS	1	\$ 10,000	\$ 10,000
10	ESC Measures	LS	1	\$ 10,000	\$ 10,000
11	Surface restoration Asphalt 2" Cl. B	SY	750	\$ 12	\$ 9,000
	Subtotal				\$ 512,420
	Contingencies (40%)				\$ 204,968
	Subtotal				\$ 717,388
	Sales tax (8.6 percent)				61,695
	Subtotal				779,083
	Engineering & Admin (20%)				\$ 155,817
	Total Estimated Cost				\$ 935,000
Assumptions: 1. Well Points required for dewatering of trench 2. Raw water pipe to water treatment plant placed in common trench with finish water pipe. 3. Pipe is 40-inch dia x 3/16 wall steel, mortar lined and poly wrapped. 4. Construction during dry season of approximately 2 month duration.					

SNOHOMISH REGIONAL WATER AUTHORITY

Design Criteria for Industrial Water Treatment Plant - Alternative 1			
Process	Parameter	Unit	Value
Plant capacity		mgd	36
Rapid Mix			
	Number of units	-	2
	Type	-	mechanical, complete-mix
	Mixing intensity (G)	sec-1	900
Flocculation			
	Type	-	ballasted flocculation
	Number of units	-	2
	Flocculation time	min	10
Sedimentation			
	Type	-	high rate with tubes or plates
	Overflow rate	gpm/sf	12
Filtration			
	Type	-	high-rate, granular-bed
	Filter loading rate	gpm/sf	10
	Media - type	-	mono-media
	Media depth	inches	72
	Number of filters	-	6
Filter Backwash			
	Type	-	air-water
	Backwash supply water loading rate (max)	gpm/sf	22
	Backwash supply water pumping capacity	gpm	11,000
	Spent backwash water holding basin - volume	gal	400,000
	Backwash water clarifier - loading rate	gpm/sf	0.75
	Backwash water clarifier - capacity	gpm	1,000
Finished Water Clearwell			
	Capacity	MG	3
Finished Water Pump Station			
	Capacity	mgd	36
	Number of pumps	-	6
	Capacity per pump	gpm	5,000
	Total Dynamic Head	ft	250
	Pump horsepower - each	hp	450
Chemical Feed Systems			
	Coagulant - type	-	alum
	System capacity	lb/hr	625
	Coagulant aid - type	-	polymer
	System capacity	lb/day	300
	Filter aid - type	-	polymer
	System capacity	lb/day	300
	pH adjustment - type	-	lime
	System capacity	lb/hr	225
Residuals Handling			
	Thickening - type	-	gravity thickener
	Number of units	-	2
	Unit capacity	gpm	330
	Dewatering - type	-	centrifuge
	Number of units	-	2
	Unit capacity	gpm	60

SNOHOMISH RIVER REGIONAL WATER AUTHORITY

ALTERNATIVE 1 FLOW SWAP - FEASIBILITY COST ESTIMATE

Industrial Water Treatment Plant					
Capital Cost (1999 Dollars)					
Item	Description	Unit	Quantity	Unit Price	Estimated Cost
	Treatment Processes				
1	Rapid mix	LS	1	\$ 147,000	\$ 147,000
2	High rate flocculation and sedimentation	LS	1	3,176,000	\$ 3,176,000
3	Filtration	LS	1	5,005,000	\$ 5,005,000
4	Finished water clearwell and pumping	LS	1	3,528,000	\$ 3,528,000
	Ancillary Facilities				
5	Chemical facilities	LS	1	1,420,000	\$ 1,420,000
6	Filter backwash supply and handling	LS	1	2,360,000	\$ 2,360,000
7	Residuals handling	LS	1	4,616,000	\$ 4,616,000
8	Admin, lab, maintenance facilities	LS	1	500,000	\$ 500,000
	Associated Construction Costs				
9	Sitework and interface piping	LS	1	3,740,000	\$ 3,740,000
10	Subsurface conditions	LS	1	3,000,000	\$ 3,000,000
11	Flood control	LS	1	250,000	\$ 250,000
12	Electrical transformer/service/emergency	LS	1	2,080,000	\$ 2,080,000
13	Contractor overhead & profit	LS	1	2,640,000	\$ 2,640,000
	Subtotal				\$ 32,462,000
	Contingencies (20%)				\$ 6,493,000
	Subtotal				\$ 38,955,000
	Sales tax (8.6percent)				\$ 3,351,000
	Subtotal				\$ 42,306,000
	Engineering and admin (20%)				\$ 8,462,000
	Subtotal				\$ 50,768,000
	Land Acquisition				
	Land cost				\$ 1,750,000
	Land contingency (25%)				\$ 438,000
	Land Subtotal				\$ 2,188,000
	Total Project Cost				\$ 52,956,000
Operation and Maintenance Cost (1999 Dollars)					
	Annual O&M Costs				\$ 3,870,000
	Contingency (20%)				\$ 774,000
	Total Annual O&M Costs				\$ 4,650,000

SNOHOMISH RIVER REGIONAL WATER AUTHORITY

ALTERNATIVE 1 FLOW SWAP - FEASIBILITY COST ESTIMATE

Finish Water Pipeline from Water Treatment Plant Capital Cost (1999 Dollars)					
Item	Description	Unit	Quantity	Unit Price	Estimated Cost
1	Mobilization	EA	1	\$ 10,000	\$ 10,000
2	Excavation (trench 9.5 feet deep)	CY	6270	\$ 6	\$ 37,620
3	Dewatering	LS	1	\$ 50,000	\$ 50,000
4	Furnishing and installing 40-in dia pipe x 5/16 in wall steel	LF	1650	\$ 210	\$ 346,500
5	Pipe Bedding	EA	420	\$ 15	\$ 6,300
6	Backfill, pipe zone	CY	1650	\$ 15	\$ 24,750
7	Backfill, above pipe	CY	4125	\$ 10	\$ 41,250
8	Drain & Cut into Existing Pipe	LS	1	\$ 10,000	\$ 10,000
9	Disinfection		1	\$ 10,000	\$ 10,000
10	ESC Measures	LS	1	\$ 10,000	\$ 10,000
11	Surface restoration Asphalt 2" Cl. B	SY	1500	\$ 12	\$ 18,000
	Subtotal				\$ 564,420
	Contingencies (40%)				\$ 225,768
	Subtotal				\$ 790,188
	Sales tax (8.6 percent)				67,956
	Subtotal				858,144
	Engineering & Admin (20%)				\$ 171,629
	Total Estimated Cost				\$ 1,030,000
<p>Assumptions:</p> <ol style="list-style-type: none"> 1. Well Points required for dewatering of trench 2. Raw water pipe to water treatment plant placed in common trench with finish water pipe. 3. Pipe is 40-inch dia x 0.5/16 wall steel, mortar lined and poly wrapped. 4. Construction during dry season of approximately 2 month duration. 					

SNOHOMISH RIVER REGIONAL WATER AUTHORITY

ALTERNATIVE 1 FLOW SWAP - FEASIBILITY COST ESTIMATE

Upper Weyco Pipeline Rehabilitation Capital Cost (1999 Dollars)					
Item	Description	Unit	Quantity	Unit Price	Estimated Cost
1	Mobilization	LS	1	\$ 10,000	\$ 10,000
2	Drain Pipeline	LS	1	\$ 2,000	\$ 2,000
3	Excavate, shore, backfill & restore access pits.	EA	10	\$ 10,000	\$ 100,000
4	Cut and remove existing pipe	EA	10	\$ 1,000	\$ 10,000
5	HDPE Pipe material	LF	10,500	\$ 40	\$ 420,000
6	Pipe installation	LF	10,500	\$ 35	\$ 367,500
7	Special fitting 24 x 36 Tee	EA	4	\$ 8,000	\$ 32,000
8	Special fitting stub end	EA	2	\$ 3,000	\$ 6,000
	Subtotal				\$ 947,500
	Contingencies (40%)				\$ 379,000
	Subtotal				\$ 1,326,500
	Sales tax (8.6 percent)				114,079
	Subtotal				1,440,579
	Engineering & Admin (20%)				\$ 288,116
	Total Estimated Cost				\$ 1,729,000
Assumptions: 1. Aproximate length of pipeline is 2.0 miles 2. Pipe is to be sliplined with 36-inch diameter HDPE SDR-32 3. Pipe to be sliplined in 1000 foot segments					

SNOHOMISH RIVER REGIONAL WATER AUTHORITY

ALTERNATIVE 1 FLOW SWAP - FEASIBILITY COST ESTIMATE

Clearview/WWD Pipeline Capital Cost (1999 Dollars)					
Item	Description	Unit	Quantity	Unit Price	Estimated Cost
1	Mobilization	LS	1	\$ 100,000.0	\$ 100,000
2	Clear and grub	AC	2	\$ 10,000.0	\$ 20,000
3	Grading for pipe line	AC	36	\$ 2,000	\$ 72,000
4	Pipe Material and installation	LF	50,000	\$ 225	\$ 11,250,000
5	42-inch valves & reservoir tie-in	EA	2	\$ 250,000	\$ 500,000
6	Trenching (8.5 deep)	CY	246,500	\$ 4	\$ 862,750
7	Bedding	CY	13,300	\$ 15	\$ 199,500
8	Pipe Zone Backfill	CY	7,000	\$ 15	\$ 105,000
9	Backfill Above Pipe Zone	CY	100,000	\$ 5	\$ 500,000
10	Bore & Jack Pits w/shoring	EA	10	\$ 40,000	\$ 400,000
11	Bore and Jack, w/Casing & grout	LF	710	\$ 650	\$ 461,500
12	Surface Restoration, Seeding	AC	40	\$ 1,500	\$ 60,000
13	Surface Restoration, asphalt 3" Class B	SY	12,500	\$ 15	\$ 187,500
14	24-inch pipe within WWD	LF	8,000	\$ 160	\$ 1,280,000
15	Telemetry	LS	1	\$ 50,000	\$ 50,000
	Subtotal				\$ 16,048,250
	Contingencies (40%)				\$ 6,419,300
	Subtotal				\$ 22,467,550
	Sales tax (8.6 percent)				1,932,209
	Subtotal				24,399,759
	Engineering & Admin (20%)				\$ 4,879,952
	Total Estimated Cost				\$ 29,280,000
<p>Asumptions:</p> <ol style="list-style-type: none"> 1. Pipe is 42-inch dia x 0.25 wall steel, mortar lined and poly wrapped. 2. Bore and jack 54-inch casing at Bear Creek is 50 feet. 3. Bore and jack 54-inch casing at Highway 9 is 100 feet. 4. Bore and jack 54-inch casing at SR522 is 300 feet to cross split highway and is inclined. 5. Bore and jack 54-inch casing at BN Railroad is 100 feet and is inclined. 6. Bore and jack 54-inch casing at Maltby road 60 feet. 7. Duration of construction: 8 months. 8. 24-inch pipeline assumes ductile iron pipe installed w/ trenching and restoration included. 					

APPENDIX B
ALTERNATIVE 2 – DIRECT TRANSFER

SNOHOMISH RIVER REGIONAL WATER AUTHORITY

ALTERNATIVE 2 DIRECT TRANSFER - FEASIBILITY COST ESTIMATE

Ebey Slough Intake Upgrade Capital Cost (1999 Dollars)					
Item	Description	Unit	Quantity	Unit Price	Estimated Cost
1	Mobilization	LS	1	\$ 50,000	\$ 50,000
2	Cofferdam, sheetpile	SF	5,500	\$ 30	\$ 165,000
3	Dewatering	LS	1	\$ 75,000	\$ 75,000
4	Equipment demolition	LS	1	\$ 50,000	\$ 50,000
5	Concrete demolition	CY	190	\$ 150	\$ 28,500
6	Excavation	CY	300	\$ 20	\$ 6,000
7	Concrete, intake footings	CY	22	\$ 250	\$ 5,500
8	Concrete, intake walls	CY	140	\$ 450	\$ 63,000
9	Concrete, intake slabs	CY	15	\$ 250	\$ 3,750
10	Chain link fence	LF	186	\$ 30	\$ 5,580
11	US & DS sheetpile training walls	SF	5,000	\$ 25	\$ 125,000
12	Micellaneous metals	LBS	25,000	\$ 2.50	\$ 62,500
13	Trash rake	EA	1	\$ 50,000	\$ 50,000
14	Fish Screens (Wedgewire)	SF	155	\$ 120	\$ 18,600
15	Screen Cleaner	LS	1	\$ 100,000	\$ 100,000
16	Pumps	EA	4	\$ 50,000	\$ 200,000
17	Mechanical Piping and Valves	LS	1	\$ 200,000	\$ 200,000
18	Compressed Air System	LS	1	\$ 25,000	\$ 25,000
19	Electrical Power & Control	LS	1	\$ 275,000	\$ 275,000
20	Telemetry	LS	1	\$ 25,000	\$ 25,000
21	Building and overhead hoist	LS	1	\$ 100,000	\$ 100,000
	Subtotal				\$ 1,633,430
	Contingencies (40%)				\$ 653,372
	Subtotal				\$ 2,286,802
	Sales tax (8.6 percent)				196,665
	Subtotal				2,483,467
	Engineering & Admin (20%)				\$ 496,693
	Total Estimated Cost				\$ 2,981,000
<p>Assumptions: 1. Basic location and structure is to be maintained, all operating equipment to be replaced. 2. Fish screen approach velocity not to exceed 0.4 fps. 3. Existing Header piping to remain to edge of the existing structure. 4. Second permanent power feed exists, no need for emergency generator. 5. Full capacity of 36 mgd is handled by 3 pumps, 1 pump is spare. 6. Pump required is 400 HP @ 8,400 gpm, TDH = 146 feet. 7. Construction to occur during low flow period, construction duration is approx. 6 months.</p>					

SNOHOMISH RIVER REGIONAL WATER AUTHORITY

ALTERNATIVE 2 DIRECT TRANSFER - FEASIBILITY COST ESTIMATE

Raw Water Pipeline Capital Cost (1999 Dollars)					
Item	Description	Unit	Quantity	Unit Price	Estimated Cost
1	Mobilization	LS	1	\$ 30,000.0	\$ 30,000
2	Clear and grub	AC	1	\$ 5,000.0	\$ 5,000
3	Grading for pipe line	AC	11	\$ 2,000	\$ 22,000
4	Pipe Material and installation	LF	7,200	\$ 175	\$ 1,260,000
5	36-inch valve at WTP	EA	1	\$ 150,000	\$ 150,000
6	Trenching (8 deep)	CY	16,600	\$ 4	\$ 58,100
7	Bedding	CY	1,900	\$ 15	\$ 28,500
8	Pipe Zone Backfill	CY	5,800	\$ 15	\$ 87,000
9	Backfill Above Pipe Zone	CY	8,700	\$ 5	\$ 43,500
10	Microtunnel shafts w/shoring	EA	2	\$ 100,000	\$ 200,000
11	MicroTunnel w/Casing & grout	LF	350	\$ 800	\$ 280,000
12	Dewatering of Shafts	EA	2	\$ 75,000	\$ 150,000
13	Surface Restoration, Seeding	AC	11	\$ 1,500	\$ 16,500
14	Surface Restoration, asphalt 3" Class B	SY	1,000	\$ 15	\$ 15,000
15	Telemetry	LS	1	\$ 50,000	\$ 50,000
	Subtotal				\$ 2,395,600
	Contingencies (40%)				\$ 958,240
	Subtotal				\$ 3,353,840
	Sales tax (8.6 percent)				288,430
	Subtotal				3,642,270
	Engineering & Admin (20%)				\$ 728,454
	Total Estimated Cost				\$ 4,371,000
<p>Assumptions: 1. Pipe is 36-inch dia x 0.25 wall steel, mortar lined and poly wrapped. 2. Microtunnel 48-inch casing at Ebey Slough is 350 feet long with 60-foot deep shafts. 3. Duration of construction: 15 months.</p>					

SNOHOMISH REGIONAL WATER AUTHORITY

Design Criteria for Potable Water Treatment Plant - Alternative 2			
Process	Parameter	Unit	Value
Plant capacity		mgd	36
Rapid Mix			
	Number of units	-	2
	Type	-	mechanical, complete-mix
	Mixing intensity (G)	sec-1	900
Flocculation			
	Type	-	ballasted flocculation
	Number of units	-	2
	Flocculation time	min	10
Sedimentation			
	Type	-	high rate with tubes or plates
	Overflow rate	gpm/sf	12
Filtration			
	Type	-	high-rate, granular-bed
	Filter loading rate	gpm/sf	7.5
	Media - type	-	mono-media
	Media depth	inches	72
	Number of filters	-	8
Filter Backwash			
	Type	-	air-water
	Backwash supply water loading rate (max)	gpm/sf	22
	Backwash supply water pumping capacity	gpm	11,000
	Spent backwash water holding basin - volume	gal	500,000
	Backwash water clarifier - loading rate	gpm/sf	0.75
	Backwash water clarifier - capacity	gpm	1,250
Finished Water Clearwell			
	Capacity	MG	4
Finished Water Pump Station			
	Capacity	mgd	11
	Number of pumps	-	5
	Capacity per pump	gpm	1,910
	Total Dynamic Head	ft	556
	Pump horsepower - each	hp	400
Chemical Feed Systems			
	Coagulant - type	-	alum
	System capacity	lb/hr	625
	Coagulant aid - type	-	polymer
	System capacity	lb/day	300
	Filter aid - type	-	polymer
	System capacity	lb/day	300
	pH adjustment - type	-	lime
	System capacity	lb/hr	225
Residuals Handling			
	Thickening - type	-	gravity thickener
	Number of units	-	2
	Unit capacity	gpm	330
	Dewatering - type	-	centrifuge
	Number of units	-	2
	Unit capacity	gpm	60
Disinfection			
	Type	-	chlorination
	Capacity	ppd	1,200

SNOHOMISH RIVER REGIONAL WATER AUTHORITY

ALTERNATIVE 2 DIRECT TRANSFER - FEASIBILITY COST ESTIMATE

Potable Water Treatment Plant					
Capital Cost (1999 Dollars)					
Item	Description	Unit	Quantity	Unit Price	Estimated Cost
Water Treatment Plant					
Treatment Processes					
1	Rapid mix	LS	1	\$ 147,000	\$ 147,000
2	High rate flocculation and sedimentation	LS	1	3,176,000	\$ 3,176,000
3	Filtration	LS	1	6,218,000	\$ 6,218,000
4	Finished water clearwell	LS	1	2,119,000	\$ 2,119,000
Ancillary Facilities					
5	Chemical facilities	LS	1	1,833,000	\$ 1,833,000
6	Filter backwash supply and handling	LS	1	2,605,000	\$ 2,605,000
7	Residuals handling	LS	1	4,616,000	\$ 4,616,000
8	Admin, lab, maintenance facilities	LS	1	600,000	\$ 600,000
9	Backup power sytem (allowance)	LS	1	400,000	\$ 400,000
Associated Construction Costs					
10	Sitework and interface piping	LS	1	3,840,000	\$ 3,840,000
11	Electrical transformer/service	LS	1	2,130,000	\$ 2,130,000
12	Contractor overhead & profit	LS	1	2,320,000	\$ 2,320,000
Subtotal					\$ 30,004,000
Contingencies (20%)					\$ 6,001,000
Subtotal					\$ 36,005,000
Sales tax (8.6%)					\$ 3,097,000
Subtotal					\$ 39,102,000
Engineering and admin (20%)					\$ 7,821,000
Subtotal					\$ 46,923,000
Land Acquisition					
Land cost					\$ 460,000
Land contingency (25%)					\$ 115,000
Land Subtotal					\$ 575,000
Total Treatment Plant Cost					\$ 47,500,000
Finished Water Pump Station					
Finished water pump station construction cost		LS	1	1,122,000	\$ 1,122,000
Associated costs (Contingency, tax, engineering, admin)					\$ 740,000
Total Finished Water Pump Station Cost					\$ 1,862,000

SNOHOMISH RIVER REGIONAL WATER AUTHORITY

ALTERNATIVE 2 DIRECT TRANSFER - FEASIBILITY COST ESTIMATE

Potable Water Treatment Plant (continued)					
Operation and Maintenance Cost (1999 Dollars)					
Item	Description	Unit	Quantity	Unit Price	Estimated Cost
Water Treatment Plant					
	Annual O&M Costs				\$ 3,900,000
	Contingency (20%)				\$ 780,000
	Treatment Plant O&M Costs				\$ 4,680,000
Finished Water Pump Station					
	Annual O&M Costs (energy only)				\$ 373,000
	Contingency (20%)				\$ 74,600
	Finished Water PS O&M Costs				\$ 450,000

SNOHOMISH RIVER REGIONAL WATER AUTHORITY

ALTERNATIVE 2 DIRECT TRANSFER - FEASIBILITY COST ESTIMATE

WWD Finished Water Pipeline Capital Cost (1999 Dollars)					
Item	Description	Unit	Quantity	Unit Price	Estimated Cost
1	Mobilization	LS	1	\$ 100,000.0	\$ 100,000
2	Clear and grub	AC	15	\$ 10,000.0	\$ 150,000
3	Grading for pipe line	AC	144	\$ 2,000	\$ 288,000
4	Pipe Material and installation	LF	91,000	\$ 190	\$ 17,290,000
5	36-inch valves & reservoir tie-in	EA	2	\$ 200,000	\$ 400,000
6	Trenching (8' deep)	CY	210,000	\$ 4	\$ 735,000
7	Bedding	CY	23,400	\$ 15	\$ 351,000
8	Pipe Zone Backfill	CY	58,000	\$ 15	\$ 870,000
9	Backfill Above Pipe Zone	CY	108,000	\$ 5	\$ 540,000
10	Bore & Jack Pits w/shoring	EA	16	\$ 40,000	\$ 640,000
11	Bore and Jack, w/Casing & grout	LF	960	\$ 600	\$ 576,000
12	Microtunnel w/Casing & grout	LF	450	\$ 800	\$ 360,000
13	Dewatering at at Shafts	LS	16	\$ 75,000	\$ 1,200,000
14	Surface Restoration, Seeding	AC	100	\$ 1,500	\$ 150,000
15	Surface Restoration, asphalt 3" Class B	SY	13,000	\$ 15	\$ 195,000
16	24-inch pipe within WWD	LF	8,000	\$ 160	\$ 1,280,000
17	Telemetry	LS	1	\$ 50,000	\$ 50,000
	Subtotal				\$ 25,175,000
	Contingencies (40%)				\$ 10,070,000
	Subtotal				\$ 35,245,000
	Sales tax (8.6 percent)				3,031,070
	Subtotal				38,276,070
	Engineering & Admin (20%)				\$ 7,655,214
	Total Estimated Cost				\$ 45,932,000

- Assumptions:
1. Pipe is 36-inch dia x 0.3125 wall steel, mortar lined and poly wrapped.
 2. Bore and jack 48-inch casing at Bear Creek is 50 feet.
 3. Bore and jack 48-inch casing at Highway 9 is 100 feet.
 4. Bore and jack 48-inch casing at SR522 is 300 feet to cross split highway and is inclined.
 5. Bore and jack 48-inch casing at BN Railroad is 100 feet and is inclined.
 6. Bore and jack 48-inch casing at Maltby road 60 feet.
 7. Microtunnel 48-inch casing at Ebey Slough is 100 feet long with 20-foot deep shaft.
 8. Microtunnel 48-inch casing at Snohomish River is 400 feet long with 60-foot deep shafts.
 9. Bore and jack 48-inch casing at BNRR/Lowell-Snohomish Road is 150-feet long with shallow shaft 20+/-
 10. Bore and jack 48-inch casing at BNRR/Lowell-Larimer Road is 100-feet long with shallow shaft.
 11. March Road will be trench and open-cut
 12. Duration of construction: 15 months.
 13. 24-inch pipeline assumes ductile iron pipe installed w/ trenching and restoration included.

APPENDIX C
WWD/CVWD AGREEMENT

AGREEMENT

This agreement (the "Agreement") between the Cross Valley Water District ("Cross Valley"), and the Woodinville Water District ("Woodinville") (collectively the "Districts") is dated this 30th day of September 1998.

Whereas, the Districts are special purpose municipal corporations formed to provide potable water to customers within their respective jurisdictions; and

Whereas, the Districts are required by state law to plan for a water supply and infrastructure to meet their current and reasonably foreseeable future needs; and

Whereas, Cross Valley, the Alderwood Water District and the Silver Lake Water District (the "Clearview Participants") are jointly developing water facilities known as the "Clearview Project," to meet water supply requirements of southwest Snohomish County for at least thirty years; and

Whereas, the Clearview Project contemplates conveying water from the City of Everett's water supply system through transmission facilities located in south-central Snohomish County in the vicinity of State Highway 9 to a reservoir in Clearview; and

Whereas, Cross Valley originally intended to participate in the cost of the project at a level that would supply it with 18 million gallons of water per day (18 MGD), but has decided to reduce its participation in the cost of the pumping facilities, the reservoir and pipelines A & B to 6 MGD, while paying for 18 MGD capacity in the river crossing; and

Whereas, such reduction means that a 36-inch pipeline will be constructed rather than a 42-inch pipeline; and

Whereas, Northshore, Woodinville and Everett are attempting to develop a source of supply in Snohomish County identified as the "Weyerhauser Project;" and

Whereas, contribution to the cost of over sizing certain facilities of the Clearview Project by Northshore and Woodinville would eliminate either the possible future duplication or an expensive upgrade of those facilities when Northshore and Woodinville need to use those facilities; and

Whereas, over-sizing the transmission line to 42-inches increases capacity in the line so that Woodinville could convey water exchanged with the City of Everett and also provide additional capacity for Silver Lake Water District ("Silver Lake") should it need such capacity; and

Whereas, Cross Valley is willing to participate in the transmission line component of the Clearview Project as it had originally intended to do, but only if Woodinville purchase 12 MGD of

Cross Valley's capacity in the transmission line of the Clearview Project under the following terms and conditions;

Now, Therefore, the Districts agree that:

1. For the purposes of this Agreement:

a. "Capacity" or "Capacity in the Clearview Project" mean the right to convey a specific quantity of water, measured in million gallons per day (MGD), through the Transmission Line and the Pumping Facilities of the Clearview Project and through any replacement facility funded through the sinking fund identified in paragraph 8 (c).

b. "Transmission Line" means the 42-inch line that will convey water from Everett's pipeline #5 to the Clearview Reservoir and includes Pipeline "A," Pipeline "B," and the River-crossing.

c. "Incremental Cost" means the cost included in Phase II Project Costs which are incurred to over-size the Transmission Line from 36-inches to 42-inches and to expand the Pumping Facilities to provide Capacity for Woodinville and to provide additional Capacity for Silver Lake. The Incremental Costs of the facilities are:

Pipeline A: 12.93% of total construction costs of that Pipeline.

Pipeline B: 12.93% of total construction costs of that Pipeline.

River-crossing: 15% of total construction costs of the River-crossing.

Pumping Facilities Upgrade: estimated to be \$221,414.00.

d. "Phase I Project Costs" means preliminary engineering, permitting and Environmental Impact Statement costs reasonably allocable to the Transmission Line and the Pumping Facilities and in which the Clearview Participants share.

e. "Phase II Project Costs" means all those costs of the Clearview Project, not included in Phase I Project Costs, which are reasonably allocable to the Transmission Line and the Pumping Facilities and in which the Clearview Participants share. Phase II Project Costs shall be allocated to Woodinville and Silver Lake according to the following ratio: 15 MGD over 48.5 MGD, with 3 MGD of the numerator allocated to Silver Lake and 12 MGD of the numerator allocated to Woodinville.

f. "Pumping Facilities" means the pump station and integral facilities designed by Montgomery Watson to convey water from Everett's pipeline #5 to the Clearview Reservoir and planned to be located at 64th Street S.E., Snohomish, WA.

2. Cross Valley agrees to sell 12 MGD of Capacity in the Clearview Project to Woodinville, and Woodinville agrees to buy 12 MGD of such Capacity, all according to the terms and conditions provided for herein.

3. The Clearview Project is a proposed water supply facility composed of pumping facilities, a transmission line and a reservoir designed by Montgomery Watson on behalf of the Alderwood Water District (AWD), the Silver Lake Water District (SWD) and the Cross Valley Water District (CVWD) and incorporated in plans and specifications prepared by Montgomery Watson. The cost of the Clearview Project is allocated to the Clearview Participants according to the capacity each desires. Under the terms of this Agreement, Cross Valley shall purchase 6 MGD of Capacity in the Transmission Line and Pumping Facilities of the Clearview Project, in addition, it shall purchase 12 MGD of incremental Capacity in those facilities; however, the base Capacity shares of the Clearview Participants will be as follows:

	AWD	SWD	CVWD	TOTAL
Pumping Facilities	18.5 MGD	9.0 MGD	6.0 MGD	33.5 MGD
Storage Reservoir	18.5 MGD	2.4 MGD	2.0 MGD	22.9 MGD
Transmission Line:				
Pipeline "A"	18.5 MGD	9.0 MGD	6.0 MGD	33.5 MGD
Pipeline "B"	18.5 MGD	1.2 MGD	6.0 MGD	25.7 MGD
River-crossing	18.5 MGD	9.0 MGD	6.0 MGD	33.5 MGD

4. In consideration of payment of the Incremental Cost of 12 MGD of Capacity as provided herein and the other payments called for herein, Cross Valley agrees to sell 12 MGD of Capacity to Woodinville (WWD), while Silver Lake has agreed with the remaining participants in the Clearview Project to purchase 3 MGD of incremental Capacity, so that upon the sale of Capacity as provided for herein, the respective Capacity shares will be as follows:

	AWD	SWD	CVWD	NUD	WWD	TOTAL
Pumping Facilities	18.5 MGD	9.0 MGD	6.0 MGD			33.5 MGD
Storage Reservoir	18.5 MGD	2.4 MGD	2.0 MGD			22.9 MGD
Transmission Line:						
Pipeline "A"	18.5 MGD	12.0 MGD	6.0 MGD		12.0 MGD	48.5 MGD
Pipeline "B"	18.5 MGD	4.2 MGD	6.0 MGD		12.0 MGD	40.7 MGD
River-crossing	18.5 MGD	12.0 MGD	6.0 MGD		12.0 MGD	48.5 MGD

5. Woodinville agrees to purchase 12 MGD of Cross Valley's Capacity and to pay its share of the Incremental Cost included in the Phase II Project Costs, including change orders and any unanticipated capital costs incurred related to placing the Transmission Line and Pumping Facilities in operation.

6. When the construction contract for Phase II is awarded, Woodinville will make an advance payment to Cross Valley of 15.0% of its share of the estimated Incremental Cost included Phase II Project Costs. Thereafter, when Cross Valley receives requests for progress payments on the Clearview Project, it shall submit requests for payment to Woodinville respectively for their share of Phase II Project Costs, supported by documentation, and Woodinville shall pay that request within thirty days of its date. Cross Valley will credit Woodinville for its advance payment in the final payment requests for the Phase II construction contract.

7. a. Provided it makes the payments required by paragraphs 5 and 6, Woodinville shall acquire from Cross Valley a eighteen year irrevocable option to purchase full ownership of its respective Capacity; provided that upon the expiration of the eighteen year period, Cross Valley may extend the option for additional ten year periods. If at the end of the eighteen year period, or at the end of any ten year option extension period, Cross Valley decides not to extend an option term, then Cross Valley shall immediately reimburse Woodinville for all payments made by them under this Agreement, plus an adjustment to be determined as provided in paragraph 8(d). If Woodinville notifies Cross Valley in writing that it relinquishes its option for Capacity in the Clearview Project, then Cross Valley shall reimburse Woodinville for all payments made under this Agreement plus an adjustment to be determined in paragraph 8(d) whenever that 12 MGD of Capacity is put to use by any agency.

b. If Woodinville exercise its option and makes all required payments, it shall own 12 MGD of capacity in the Transmission Line and the Pumping Facility; however, it shall not acquire either legal or equitable title to or ownership of any Clearview Project facilities. Until it

exercises or relinquishes its option as provided herein, Capacity that is subject to Woodinville's irrevocable option may not be sold, leased, or conveyed in any manner or used by Cross Valley or any Clearview Participant with Cross Valley's consent without the prior written agreement of Woodinville and on such terms and conditions as it may agree upon.

8. When and if Woodinville notify Cross Valley of its intent to exercise the option and as a precondition to any exercise of the option, Woodinville must pay to Cross Valley

- (a) its share of Phase II Project Costs, less amounts previously paid, such share to be determined according to the ratio used to calculate its share of Phase II Project Costs; and
- (b) its share of Phase I Project Costs as of April 30, 1998, such share to be determined according to the ratio used to calculate its share of Phase II Project Costs; and
- (c) a share of all maintenance costs and replacement sinking fund payments made by the Clearview Participants to the Clearview Project to the date Woodinville exercise its option, such share determined by the ratio used to calculate Phase II Project Costs; plus
- (d) an adjustment to the payments called for in 8 (a), (b) and (c) to be determined by the "Construction Cost Index" published by the *Engineering News and Records* (McGraw-Hill) and to be applied in the case of (a) from the date of acceptance of the project as complete to the date of payment of the Phase II Project Costs, and in the case of (b) from April 30, 1998 to the date the option is exercised, and in the case of (c) applied from April 30, 1998 to the date of payment of the Phase I Project Costs.

9. When the option is exercised as provided for herein, then from that date forward a share of maintenance and operation expenses and replacement sinking fund payments shall be allocated to and paid by Woodinville according to the ratio used to calculate their share of Phase II Project Cost.

10. The Clearview Facilities shall be operated according to a maintenance and operations agreement entered into by the Clearview Participants. Woodinville shall have an opportunity to comment upon the terms of that agreement (or any amendment thereto) before it is signed by the Clearview Participants, and Woodinville shall be bound by its terms to the same extent as the Clearview Participants; provided that such agreement does not impair its rights under the Agreement.

11. Woodinville shall reimburse Cross Valley for its out-of-pocket costs directly related to the review or administration of this Agreement or directly related to any decision to put capacity to use under this Agreement.

12. Woodinville may use its Capacity only for water supplied by the City of Everett.

13. Nothing in this Agreement prohibits Northshore and Woodinville from agreeing to any reallocation of Capacity between them, including sales thereof from one to the other. In the event either Northshore or Woodinville sells its total interest in the option to the other, then the holder of the option may exercise it; provided however, that any exercise of the irrevocable option must be for 12 MGD of Capacity.

14. All notices relating to this Agreement shall be sent to following addresses, certified mail, return receipt requested, unless the other parties are previously notified in writing:

Cross Valley Water District
Attn: General Manager
P.O. Box 131
Snohomish, WA 98291-0131

Woodinville Water District
Attn: General Manager
P.O. Box 1390
Woodinville, WA 98072--1390

15. This Agreement shall inure to the benefit of and be binding upon successors of interest and assigns of the parties. Neither this Agreement nor obligations to perform hereunder may be voluntarily assigned by any party without the other parties written consent, which shall not be unreasonably withheld. This document contains the entire agreement of the parties and it may be modified only by a writing executed by the parties.

16. Should any provision of this Agreement or its application is determined by a court to be illegal, invalid, or void but performance of this Agreement is not rendered impossible or infeasible, the parties intend that the validity of the remaining provisions of this Agreement or their application shall not be affected and shall continue in full force and effect.

17. This Agreement is intended to be and is a contract for the purchase and sale of capacity in water supply facilities and no provision hereof shall be construed to make the parties partners or joint ventures. No party is the agent of any other party, nor shall any party be held liable for the acts of another party on a theory of agency or any other representative capacity.

CROSS VALLEY WATER DISTRICT

WOODINVILLE WATER DISTRICT

By _____
President/Commissioner

By 
President/Commissioner

Appendix O
SRRWA Agreements

INTERLOCAL AGREEMENT SNOHOMISH RIVER REGIONAL WATER AUTHORITY

This Agreement, dated December 18 1996, by and between Northshore Utility District, a municipal corporation of the State of Washington ("NUD"), Woodinville Water District ("WWD"), a municipal corporation under the laws of the State of Washington and City of Everett, a municipal corporation of the State of Washington ("Everett"), hereby creates the Snohomish River Regional Water Authority, a joint administrative entity of public agencies under the laws of the State of Washington ("RWA").

1. PURPOSE.

NUD, WWD, and Everett operate water utilities and are required to optimize the use of existing water supply sources and transmission systems, and to seek development and acquisition of new water supply sources, treatment facilities, and transmission systems to meet the present and projected demand for water. Everett, NUD and WWD desire to create the RWA for the planning, development, ownership, management, and financing of water supply sources and transmission and other water supply facilities, either by itself or in cooperation with other municipal entities or utilities. The primary purpose of this Agreement is to facilitate efficient water resource development and utilization through interlocal cooperation.

The parties hereto are interested in forming a regional association to plan, develop, own, manage, and finance a regional water supply system in cooperation with other utilities, including acquisition of rights to withdraw water from ground or surface sources.

The parties are also interested in pursuing the elements of Regional Coordinated Water System Plans. The regional plans, completed under the auspices of the Washington State Department of Health, provide guidance to utilities for future regional coordination.

2. FORMATION OF REGIONAL WATER AUTHORITY.

In order to address the purposes, concerns, and interests identified in Paragraph 1 above, Everett, NUD and WWD hereby agree to create an association of public agencies for joint and cooperative action to be known as the Snohomish River Regional Water Authority ("RWA"). The RWA is created under the laws of the State of Washington, particularly Chapter 39.34 RCW. All RWA funds shall be subject to audit in the manner provided by law for the auditing of public funds.

3. MEMBERSHIP.

(a) Everett, WWD and NUD shall be the initial members of the RWA. Membership of the RWA shall be open to other municipal corporations serving as public water purveyors, subject to reasonable terms and conditions established by the Board of Directors. The Board may establish a class of "affiliates" to the RWA open to non-municipal water purveyors and other organizations interested in regional water activities. Such affiliates may attend and be heard at Board meetings. However, such affiliates shall not sit on the Board of Directors or vote on any matter. Any member may withdraw giving such notice, and upon complying with such procedures as may be specified in this agreement.

(b) Each member shall designate in writing one elected public official as the primary delegate authorized to represent the member in meetings of the membership and Board of Directors. Alternate delegates may be designated in writing at each member's discretion. One alternate delegate may serve in membership and Board of Directors meetings in the absence of the primary delegate with full rights and privileges of the primary delegate. If more than one alternate delegate designated by any member is in attendance at any meeting in the absence of that member's primary delegate, the alternate delegates shall designate one of their number as the voting delegate. All written designations shall become effective upon delivery to the Secretary of the RWA and shall remain in effect until revoked in writing by the designating member. In the event of any question of authority to act as a delegate, the determination of the Secretary based upon the records on file with the Secretary, shall be determinative.

4. GOVERNING BODY.

(a) All the functions and powers and the management of all affairs, property and interests of this RWA shall be vested in a Board of Directors (the "Board") comprised of one representative of each member as provided in 3 (b) above.

(b) A Director shall continue to serve for an indefinite term until written notice of appointment of a successor primary delegate to the Board of Directors has been filed with the Secretary or until the primary delegate no longer holds an elected office on behalf of the appointing member, in which case an alternate delegate shall serve as Director until a new primary delegate is appointed.

(c) No compensation shall be paid by the RWA for any service for any member of the Board of Directors.

(d) The Board of Directors shall adopt by-laws for the establishment of officers and for the governance of the organization.

5. AUTHORITY.

The RWA shall have all the power and authority provided for in RCW 39.34 *et seq.* The RWA shall act through its Board of Directors which shall have the authority to

Enter into contracts to implement the purposes of the organization, employ a general manager and supporting staff, and retain professional services as deemed appropriate, including but not limited to Attorneys, Engineers and Financial Consultants

Assess dues and impose assessments as necessary to pay for administration of the RWA according to an operating budget adopted by the Board; provided that the development or operation of capital facilities or projects will require separate facilities agreements and shall not be financed by dues or assessments without unanimous agreement of the members of the RWA

Plan, develop, own, manage and/or operate regional water facilities, including real property and water rights and reservations appurtenant thereto; provided that title to real property and personal property shall be held by the RWA and/or by members as tenants in common in proportion to their contribution (if any) to the cost of such property

Finance such facilities and property in any manner authorized by law

Purchase water from wholesale purveyors and sell water excess to the needs of members of the RWA to other regional water purveyors

Engage in comprehensive planning, including regional water resource planning and maintenance of data bases on water resources

Promote better water resource utilization through improved intergovernmental relations and through the creation of programs to enhance public information about water resources, conservation and planning

Contract with other regional water purveyors to further the goals of the RWA or affiliate with other public agencies to pursue water resource development, water rights or the transmission and distribution of water on a wholesale basis.

The parties to this Interlocal Agreement intend that the authority of the board shall be interpreted liberally to promote the purposes of the RWA and to facilitate management and operations of the RWA and facilities under its control.

6. BUDGET.

On or before December of each year, the RWA budget for the next year shall be adopted by the Board. The budget shall contain an estimate of all revenues to be collected during the following budget year, and an itemization of all categories of budgeted expenditures. Because the RWA's monetary needs may not be foreseeable for any annual period and because contributions/dues/assessments of the members may occur at various times, the budget may be amended by the Board as necessary.

7. DURATION.

1. Subject to the obligations to be established under separate facilities agreements which may be executed by Members, this agreement shall be for an initial five (5) year period to January 1, 2002. Thereafter, any party hereto may withdraw as provided herein.
2. In the event that water rights are acquired by the RWA, or by any member of RWA for beneficial use by other members of the RWA, then the duration of this agreement shall be perpetual, subject to the right of the Board to transfer or otherwise dispose of water rights, water delivery facilities, or any other property acquired by the RWA. Otherwise, the duration shall be as established by the Board.

8. REPRESENTATION.

Each member shall be deemed to act on behalf of the agency for which it is employed or represents. The Board may designate persons or organizations to act on behalf of the RWA under such terms and conditions as the Board deems appropriate. Any authorizations to act on behalf of the RWA shall be in a written document approved unanimously by the Board, and no person or member shall be authorized to act on behalf of the RWA except as so authorized.

9. PROJECTS.

Whenever exercising its authority to contract for the acquisition, financing, construction, management and operation of general water facilities or other major purchases not included in the RWA's operating budget, the Board shall act on behalf of only those member which have entered into facilities agreements obligating them to participate.

Projects undertaken by the RWA shall be outlined in Tasks established and approved by the Board. The Project outline shall include:

- (1) Task(s) to be performed.
- (2) Funding.
- (3) Funding source(s).
- (4) Legal authority and responsibility for Task(s).
- (5) Funding responsibility for Task(s).
- (6) If compensation is to be paid from one member to another member, said compensation shall be specifically detailed.
- (7) If contractors are to be assigned performance of a Project, or part thereof, the funding source(s) and legal and management responsibility for said contractors shall be identified.
- (8) If employees are to be hired by the RWA and to perform tasks, the funding source(s) and legal and management responsibilities for said employees shall be identified.

10. FINANCING AND BUDGETING.

- A. Members shall agree unanimously to all member assessments and budget for the RWA, to all funding arrangements for capital improvements or facilities to be designed, constructed or acquired by RWA and to any rates to be charged by RWA to members. The RWA operating budget shall be calendar year; provided that the budget may be amended at any time. Capital financial commitments extending beyond one year shall be approved by resolution of the members' Boards of Commissioners and Councils.
- B. In the event that additional members are proposed to be added to the initial members of RWA, the Board may by unanimous vote establish a system of weighted votes for member assessments and budgets.
- C. The Board may authorize the treasurer of any Board member to establish a special fund to service the RWA, to be designated "Operating Fund of the RWA".

11. LEGAL RELATIONSHIP.

The RWA shall be responsible for all RWA employees and all contracts to which it is a party. Members shall be responsible for RWA employees and contracts to the extent they may expressly contract.

12. ASSIGNABILITY.

Members shall not be authorized to transfer or otherwise assign membership, except on terms agreeable in writing by all other members. In the event that a member is fully acquired by or merged into another agency, the successor agency shall acquire all rights, duties, and liabilities of the member.

13. EXISTING WATER RIGHTS AND EXISTING WATER FACILITIES.

It is recognized that Everett owns water rights and owns and operates facilities for delivery of said water to Everett and a substantial area of Snohomish County. NUD and WWD own and operate substantial water system facilities. It is not intended by this agreement that any member acquire any interest in the existing water rights or water system facilities owned by other members.

Only water rights or water system facilities acquired through funds expended by the RWA or Projects performed by the RWA specifically authorized under RWA Motions or Resolutions shall be subject to RWA ownership. The ownership interests of each member in water rights and water system facilities shall be determined as follows:

1. By agreement of the parties; or
2. By motions or resolutions of the RWA specifically allocating ownership interests. In the event that agreements, motions or resolutions are not conclusive, ownership disputes shall be subject to mediation and arbitration as provided hereafter, provided that funds expended by each member toward acquisition of water rights, or water delivery facilities, shall be considered and weighed in the dispute resolution process.

15. DISPUTE RESOLUTION.

All unresolved disputes between members or the RWA shall be resolved as follows:

1. A member claiming an unresolved dispute shall state in writing the nature of the dispute and demand mediation through WAMS or JAMS. If the dispute is not resolved at the next meeting of the RWA Board, the member shall submit its claim to WAMS or JAMS, paying the fee therefore. All other members agree to participate in the mediation process.
2. In the event that mediation does not resolve the dispute, a member may demand arbitration in writing and shall state the name and address of an arbitrator which that member appoints to the arbitration panel. If the dispute remains unresolved at the next regular meeting of the Board, the remaining members shall appoint an

arbitrator. Arbitrators appointed by the member and the Board shall meet and appoint a presiding arbitrator.

The decision of the majority of the arbitration panel shall be final and binding on all members. The presiding arbitrator shall determine procedural disputes relating to the conduct of the arbitration.

15. AMENDMENT

This agreement may be amended by written approval of all members.

16. LIMITATION OF LIABILITY

Except as specifically agreed by separate agreement, neither the members of the RWA nor the Board or officers shall be individually liable for any debts or obligations of the RWA. Any debts or obligations of the RWA existing upon and after its termination shall be paid by assessing the members on a proportional basis pursuant to the Bylaws. Each member of the RWA shall be obligated to contribute to the RWA only those amounts determined pursuant to the procedures set forth in the Bylaws.

17. WITHDRAWAL

A member may withdraw at any time but will be subject to the dues and assessments levied prior to withdrawal and which become due within the calendar year in which the withdrawal petition is made. Withdrawal is effected by a resolution properly passed and signed by the governing body of the withdrawing member and written notice thereof to all other members at least 10 days prior to withdrawal.

A member may be removed by the Board of Directors for nonpayment of dues, or any other action or lack of action the Board considers appropriate; provided the member shall be given at least thirty (30) days written notice of the reasons for the proposed removal and an opportunity to address the Board in opposition to removal. Removal will not excuse payment of the dues for the current calendar year or payment of assessments levied prior to removal and coming due during the calendar year in which removal occurs.

Withdrawal or removal of a member from the RWA does not relieve a member of any obligations incurred in separate facilities agreements.

Bond or other financial agreements negotiated under the auspices of the RWA, but underwritten individually by one or more members by separate agreement shall continue to maturity as stated in the separate agreement regardless of any withdrawal or removal from the RWA.

18. FILING

Pursuant to Chapter 39.34.RCW, this agreement shall be effective upon its filing with the Snohomish and King County Auditors.

19. NOTICE

Notice shall be given to the initial members as follows:

City of Everett
c/o Mayor
3002 Wetmore
Everett WA 98201

Woodinville Water District
c/o Manager
PO Box 1390
Woodinville WA 98072-1390

Northshore Utility District
c/o Manager
PO Box 82489
Kenmore WA 98028

20. DISSOLUTION

On termination or dissolution, all obligations shall be paid and any assets shall be distributed in accordance with a distribution formula established under the by-laws or under the terms of member agreements.

21. COUNTERPARTS

This agreement may be signed in counterparts and, if so signed, shall be deemed one integrated agreement.

CITY OF EVERETT

Edward D. Hansen
Edward D. Hansen, Mayor

ATTEST:

[Signature]
CITY CLERK

APPROVED AS TO FORM:

[Signature]
CITY ATTORNEY

NORTHSHORE UTILITY DISTRICT

[Signature]
President, Board of Commissioners

ATTEST:

[Signature]
Secretary, Board of Commissioners

APPROVED AS TO FORM:

[Signature]
General Counsel

WOODINVILLE WATER DISTRICT

[Signature]
President

ATTEST:

[Signature]

APPROVED AS TO FORM:

[Signature]
General Counsel

**AGREEMENT TO
DEVELOP WATER SUPPLY RESOURCES**

THIS AGREEMENT between Northshore Utility District, a municipality under the laws of the State of Washington ("NUD"), Woodinville Water District, a municipality under the laws of the State of Washington ("WWD"), the City of Everett, a municipality under the laws of the State of Washington ("Everett"), and the Snohomish River Regional Water Authority, a joint administrative entity under the laws of the State of Washington ("RWA").

WITNESSES:

I. FINDINGS

- A. NUD, WWD and Everett operate water utilities and are required to optimize the use of existing water supply sources and transmission systems, and to seek development and acquisition of new water supply sources, treatment facilities, and transmission systems to meet the present and projected demand for water.
- B. RWA is a joint administrative entity organized for the planning, development, construction, ownership, management, and financing of water supply sources and transmission facilities, either by itself or in cooperation with municipal entities or utilities.
- C. The parties hereto are interested in planning, developing, owning, managing, and financing a regional water supply system in cooperation with other utilities, including acquisition of rights to withdraw water from ground or surface sources.
- D. Everett, WWD and NUD have worked together to acquire water rights and water facilities from Weyerhaeuser Company ("Weyco Rights and Facilities") and Everett, WWD and NUD, through this agreement, desire to acquire and transfer said Weyco Rights and Facilities to RWA as a regional water resource.

II. TRANSFER OF WEYCO RIGHTS AND FACILITIES

Attached hereto and incorporated herein by reference is a copy of the final draft of the "Agreement to Acquire Water Rights and Facilities" between Weyerhaeuser Company ("Weyco") and Everett ("Weyco Agreement"). By execution and acknowledgement of this agreement, Everett, WWD and NUD hereby mutually agree to the terms of said Weyco agreement and agree to convey to RWA all right, title, and interest in Weyco Rights and Facilities, except the Water Facilities between the Interconnect to the #4 Everett Water Transmission Line and the Weyco West Site (including the River Crossing)(the "North Facilities"), subject to the terms and conditions as provided herein. Said North Facilities are intended to be retained by Everett.

III. RIGHTS AND OBLIGATIONS OF EVERETT, NUD, WWD AND RWA

All parties hereto agree that the rights and obligations of Everett, WWD, NUD, and RWA under said Weyco agreement shall be shared as follows:

A. EVERETT

1. Everett agrees to pay to Weyco the full earnest money amount of \$400,000.
2. Everett agrees to exert best efforts to review all documents and information provided by Weyco under §6 and to perform due diligence inspections as required under §9.
3. Everett agrees to accept ownership and responsibility for the "North Facilities" as described in the Weyco Agreement.
4. Everett agrees to cooperate with NUD, WWD and RWA in the utilization of the water facilities and real property and water rights conveyed to RWA hereunder.
5. Everett agrees to pay \$10,000/MGD to Weyco, not to exceed \$150,000, of the purchase price for water rights.

B. NUD

1. NUD, upon performance or satisfaction of the contingencies set forth in §7 of the Weyco Agreement, agrees to pay to Weyco the amount of \$261,000.

2. NUD agrees to exert best efforts to review all documents and information provided by Weyco under §6 and to perform due diligence inspections as required under §9.
3. NUD agrees to pay \$10,000/MGD, not to exceed \$100,000, of the purchase price for Water Rights.

C. WWD

1. Upon performance or satisfaction of the contingencies set forth in §7 of the Weyco Agreement, WWD agrees to pay to Weyco the amount of \$289,000.
2. WWD agrees to exert its best efforts to review all documents and information provided by Weyco under §6 and to perform due diligence as required under §9.
3. WWD agrees to pay \$10,000/MGD not to exceed \$110,000 of the purchase price for water rights.

D. RWA

1. RWA agrees to accept title to the Weyco Water Rights and Water Facilities conveyed by Everett.
2. RWA agrees to submit all applications necessary for regulatory approval of transferred Water Rights as provided in §8 of said Weyco Agreement.
3. RWA agrees to maintain and operate Weyco Water Facilities and Water Rights acquired hereunder for the primary benefit of Everett, WWD, and NUD and, secondarily, for the benefit of other water utilities in South Snohomish County and North King County. Upon regulatory approval of transfer of Water Rights, RWA agrees to deliver to Everett up to 15 MGD of all Weyco water so approved for use by Everett's industrial water supply customers, or otherwise as Everett shall direct. RWA agrees to deliver to NUD up to 10 MGD of the Weyco water rights for use by NUD and other water utilities as NUD shall direct. RWA agrees to deliver to WWD up to 11 MGD of the Weyco Water Rights for use by WWD and other water utilities as WWD shall direct.
4. RWA agrees to charge Everett, NUD and WWD reasonable rates and charges for water withdrawn and distributed under the Weyco water rights as related to the reasonable costs of administration of the RWA and maintenance and operation of RWA Facilities. Everett, WWD and NUD's contributions toward the development

and purchase price of Weyco Water Rights and Facilities shall be considered an initial RWA member assessment which shall entitle Everett, WWD and NUD, respectively, to all Weyco water permitted for withdrawal as provided herein. In addition, Everett, WWD and NUD shall have the option to participate in all future RWA water development projects. Future membership, governance, or ownership regulations of RWA shall not affect Everett, WWD and NUD's right to the first 36 MGD which may be withdrawn under Permit No. 7998 and Certificate No. 10617-C, or such future water permits as may be issued for water withdrawal related to the Weyco Water Rights and Facilities. RWA agrees that, in the event other water utilities contract with RWA for receipt of Weyco Water, RWA agrees to establish rates and charges therefor, and to compensate Everett, WWD and NUD from such rates for their capital contributions, return on capital, and other documented costs related to changing the place and use of said Weyco Water Rights and Water Facilities.

IV. WATER RIGHTS APPLICATION

In order to effect the agreement, RWA hereby authorizes Everett, WWD, and NUD to act for and on its behalf in all matters pertaining to issuance of a Report of Examination and a Superseding Certificate by DOE out-of-pocket costs (including but not limited to engineering and legal fees) shall be shared as follows: 41% Everett, 31% WWD and 28% NUD.

V. UTILIZATION OF SOUTH FACILITIES

RWA agrees to accept responsibility for the South Facilities and their utilization and shall divide the costs thereof by separate agreement; provided that RWA shall recognize and credit said costs in future assessments to Everett, WWD, NUD and other future RWA members participating in facilities for delivery of RWA water.

VI. RESCISSION OF WEYCO AGREEMENT

- A. Section 12 of the Weyco Agreement provides for rescission thereof in the event failure to obtain approval of transfer of Water Rights. In such event, Everett retains the right to acquire the North Facilities as described in the Weyco Agreement for which Everett shall pay all costs and hold title thereto in its own name.
- B. In the event that transfer of Weyco Water Rights is approved in an amount of 14 MGD or less, this agreement shall be rescinded and Everett shall acquire and RWA shall reconvey to Everett all right, title, and interest in the Weyco Water Rights and Facilities. Everett will assume all obligations under the Weyco Agreement.

VII. RIGHT OF FIRST REFUSAL

In the event that Everett has no customers for Everett's industrial water supply and Everett decides to sell such industrial water rights as may be derived from the Weyco Water Rights, NUD and WWD shall have a right of first refusal for delivery of said industrial water subject to mutually agreeable terms.

VIII. LEGAL RELATIONSHIP

Officers and employees of NUD, WWD and Everett shall be deemed to act only on behalf of the municipality they represent or for which they are employed. RWA hereby waives any claim of conflict of interest relating to acts of officers of RWA who may also be an employee or officer of NUD, WWD or Everett.

IX. VENUE

Any litigation arising out of or in connection with this agreement shall be conducted in Snohomish County

X. NOTICE

Notice to the parties shall be in writing signed by the Director of Public Works or the Mayor of Everett, the Manager of WWD, the Manager of NUD, and the Chairman of the Board of RWA directed as follows:

To Everett

City of Everett
Attention Public Works Director
3211 Cedar Street
Everett, WA 98201

To WWD

Woodinville Water District
Attention General Manager
17238 Woodinville-Duvall Rd
P. O. Box 1390
Woodinville, WA 98072-1390

To NUD

Northshore Utility District
Attention Manager
P. O. Box 82489
Kenmore, WA 98028

To RWA

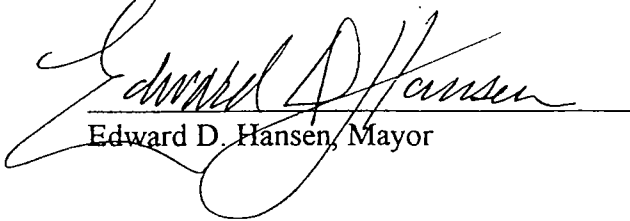
1. Snohomish River Regional Water Authority
City of Everett
3200 Cedar
Everett, WA 98201

2. Snohomish River Regional Water Authority
Attention Northshore Utility District
P. O. Box 82409
Kenmore, WA 98208

3. Snohomish River Regional Water Authority
Attention Woodinville Water District
17238 Woodinville-Duvall Rd
P. O. Box 1390
Woodinville, WA 98072-1390

DATED this 20th day of December, 1996.

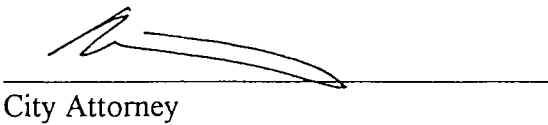
CITY OF EVERETT


Edward D. Hansen, Mayor

ATTEST:


City Clerk

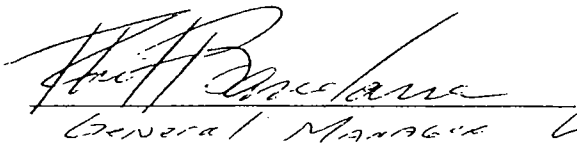
APPROVED AS TO FORM:


City Attorney

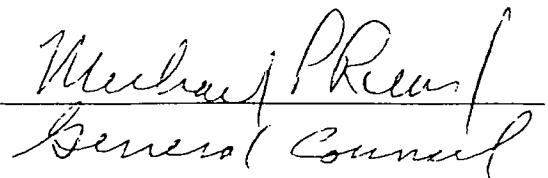
WOODINVILLE WATER DISTRICT


President

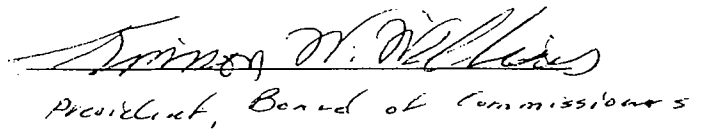
ATTEST:


General Manager

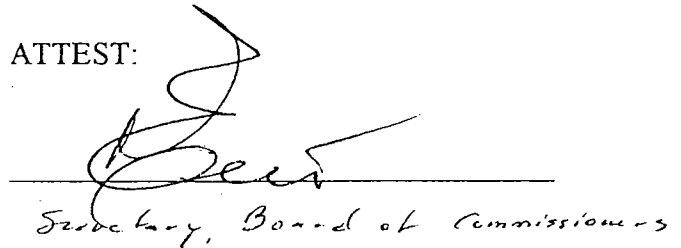
APPROVED AS TO FORM:


General Council

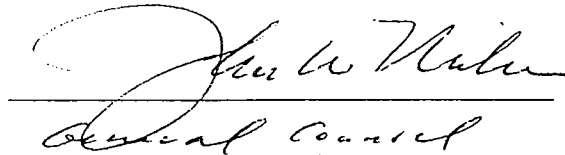
NORTHSHORE UTILITY DISTRICT


President, Board of Commissioners

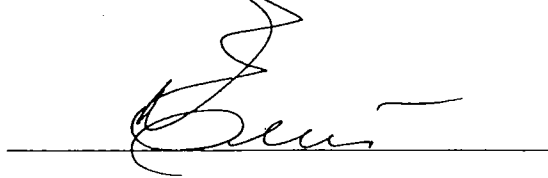
ATTEST:


Secretary, Board of Commissioners

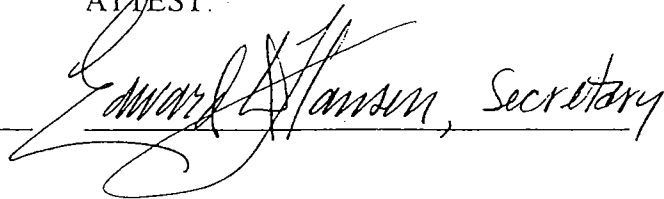
APPROVED AS TO FORM:


General Council

SNOHOMISH RIVER REGIONAL WATER AUTHORITY



ATTEST:


Secretary

APPROVED AS TO FORM:

Appendix P
DOH Letter to SRRWA



STATE OF WASHINGTON
DEPARTMENT OF HEALTH

June 25, 1997

1511 Third Ave., Suite 719 • Seattle, Washington 98101-1632

THOMAS D MORTIMER
ATTORNEY AT LAW
1325 FOURTH AVENUE SUITE 920
SEATTLE WA 98101

RE: Snohomish River Regional Water Authority

Dear Mr. Mortimer:

Thank you for the opportunity to meet on April 4, 1997 with you and representatives from the Snohomish River Regional Water Authority (RWA) consisting of Jim Miller and Ken Howe from the City of Everett, Ron Gehrke and Jon Stack from the Northshore Utility District, and Bob Bandarra from Woodinville. The Department of Health (DOH) was represented by Robert James, Nancy Feagin, and Richard Rodriguez.

The purpose of the meeting was to discuss the scope of the project as outlined in The Plan of Use Document for the Weyerhaeuser Water Rights No. SI-10617C, and to identify regulatory compliance requirements and related planning issues that must be addressed prior to in order to obtaining DOH approval for the proposed project.

We understand that the RWA has initiated the following first action and is proceeding with the second action:

1. The RWA has submitted to the Department of Ecology an application for the change in purpose and place of use of the Weyerhaeuser Water Right from industrial use at the Weyerhaeuser Timber Company sites in Snohomish County to municipal use in the RWA Service Area. The RWA Service Area is presently defined as the service areas of the Woodinville Water District, the Northshore Utility District, the Silverlake Water District, the Alderwood Water District, the Cross Valley Water District, the Mukilteo Water District, the City of Bothell, and portions of the City of Everett.
2. The RWA is in the process of preparing the SEPA documentation and environmental impact review procedure.
 - A. In order to comply with departmental requirements and to facilitate departmental review and approval for the proposed project, DOH recommends the following sequential actions to occur prior in time to the RWA securing final water right approval from Ecology:
 - 1) The RWA members should amend the Water Resource section of their respective approved water system plans (WSP) to include RWA water right (formerly Weyerhaeuser Water Right) as a potential future source of supply. DOH will accept reference to the Plan of Use document as adequate documentation as an amendment to the individual WSP pending final water right approval by Ecology.
 - 2) The RWA should begin collecting raw water data for the Snohomish River source at the potential points of withdrawal and compile a representative water quality profile. The water quality profile is essential in defining the appropriate water treatment and filtration technology.
 - B. Pursuant to the RWA securing final water right approval from Ecology, DOH would instruct the RWA to take the following actions: