WATER SYSTEM PLAN

Lake Limerick Water System

ID# 44150T

~~Mason County~~

Review Draft

August 25, 2005

Rev A-1

Prepared by:

SEMCON, Inc

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Approved From April 20, 2004 Review Draft

☑ **Engineering** ☑ **Information Technology** ☑ **Planning** ☑ **Management**

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
SOUTHWEST DRINKING WATER REGIONAL OPERATIONS
PO Box 47823, Olympia, Washington 98504-7823
TDD Relay 1-800-833-6388

April 23, 2007

Kenneth Douglas
Lake Limerick Water
East 790 Andrews Drive
Shelton, Washington 98584

Subject: Lake Limerick Water System, ID #44150, Mason County; Water System Plan, ODW Project #06-0802

Dear Mr. Douglas:

The Water System Plan (WSP) received by the Office of Drinking Water (ODW) on August 11, 2006, with revisions on February 23, 2007, has been reviewed, and in accordance with the provisions of WAC 246-290-100 (9), is **APPROVED**.

Approval of this plan is valid as it relates to current standards outlined in WAC 246-290–revised March 2003, WAC 246-293–revised September 1997, RCW 70.116, and the requirements of the Municipal Water Law, and is subject to the qualifications herein. Future revisions in the rules and statutes may be more stringent and require facility modification or corrective action.

Approval of this update of the WSP is required on or before, April 19, 2013, unless ODW requests an update or plan amendment pursuant to WAC 246-290-100 (9).

APPROVED NUMBER OF CONNECTIONS

This WSP includes capacity information that demonstrates the physical ability of the water system to provide water with any water right limitations that might occur during the period for which the approval of this WSP is valid.

Based upon the information supplied in this WSP, the water system has sufficient capacity to meet the growth projections for the identified six-year planning period. ODW will reflect this condition by noting an "**unspecified**" designation for its approved number of connections on the Water Facilities Inventory (WFI) form and Operating Permit. This District is approved for 1,250 connections as measured in Equivalent Residential Units (ERUs). The 1,250 connections will

allow the system to reach full build-out. This analysis is based on an assumed Maximum Daily Demand (MDD) of 540 gpd (gallons per day).

The Lake Limerick Water System is expected to permit additional new service connections in a manner consistent with the WSP so that the physical capacity and water rights limitations, which are represented by the approved number of total connections, is not exceeded. New non-residential connections may need to be evaluated on a case-by-case basis to determine the relative impact on the capacity limitation.

LOCAL GOVERNMENT CONSISTENCY

Robert Fink, Planning Manager for Mason County, signed the local government consistency determination on September 6, 2006. This WSP meets local government consistency requirements for WSP approval pursuant to RCW 90.03.386 and RCW 43.20.

WATER RESOURCES

The Department of Ecology (Ecology) sent a comment letter dated October 2, 2006, stating that it appeared that Lake Limerick Water System has adequate water rights for full build out. Therefore, the information presented in the WSP will be considered valid as it applies to this WSP approval.

Because Ecology has jurisdiction with respect to water rights determinations, ODW's approval cannot be construed as a guarantee of water rights or legal use of water under the approved WSP. ODW's approval is subject to subsequent determinations by Ecology concerning the water rights for this system, which may require submittal of additional planning documents or other submittals to ODW. Questions concerning water rights or any uncertainties or discrepancies concerning water rights issues should be directed to Ecology.

SERVICE AREA AND DUTY TO SERVE

Pursuant to RCW 90.03.386 (2), the service area identified in the WSP (as denoted in the enclosed service area map) may now represent an expanded "place of use" for the water system's water right. Changes in service area should be made through a WSP amendment.

Lake Limerick Water System has a duty to provide new water service within its retail service area. This WSP has incorporated information that identifies the procedures and processes put into place to ensure that the water system can provide timely and reasonable retail water service.

CONSTRUCTION WAIVERS

Standard Construction Specifications for distribution main extensions were approved in this WSP. With this approval and consistent with WAC 246-290-125 (2), Lake Limerick Water System may proceed with the installation of distribution main extensions **PROVIDED** that the

system completes and maintains the enclosed construction completion report form in accordance with WAC 246-290-125 (2) and WAC 246-290-120 (5) and makes it available for review upon request by ODW.

WATERSHED PLANNING

The Lake Limerick Water System is in the Kennedy-Goldsborough Watershed - WRIA 14. Please contact Phil Wiatrak of Ecology at (360) 407-6652 for more information on activities in the watershed. ODW encourages the Lake Limerick Water System to be involved in this process.

Thank you for your cooperation. Mason County is being notified of the terms and requirements of this approval and determination of the approved number of connections.

If you have any questions, please contact Regional Planner Karen Klocke at (360) 236-3031 or Regional Engineer Frank Meriwether at (360) 236-3036.

Sincerely,

KAREN KLOCKE
Office of Drinking Water Regional Planner

FRANK MERIWETHER, P.E.
Office of Drinking Water Regional Engineer

Enclosures

cc: John Segerson, SEMCON, Inc.
Mason County Health Department
Mason County Planning Department
Deb Hunemuller, Department of Ecology SWRO
Brad Brooks, ODW
Cheri Paine, ODW
Bonnie Waybright, ODW

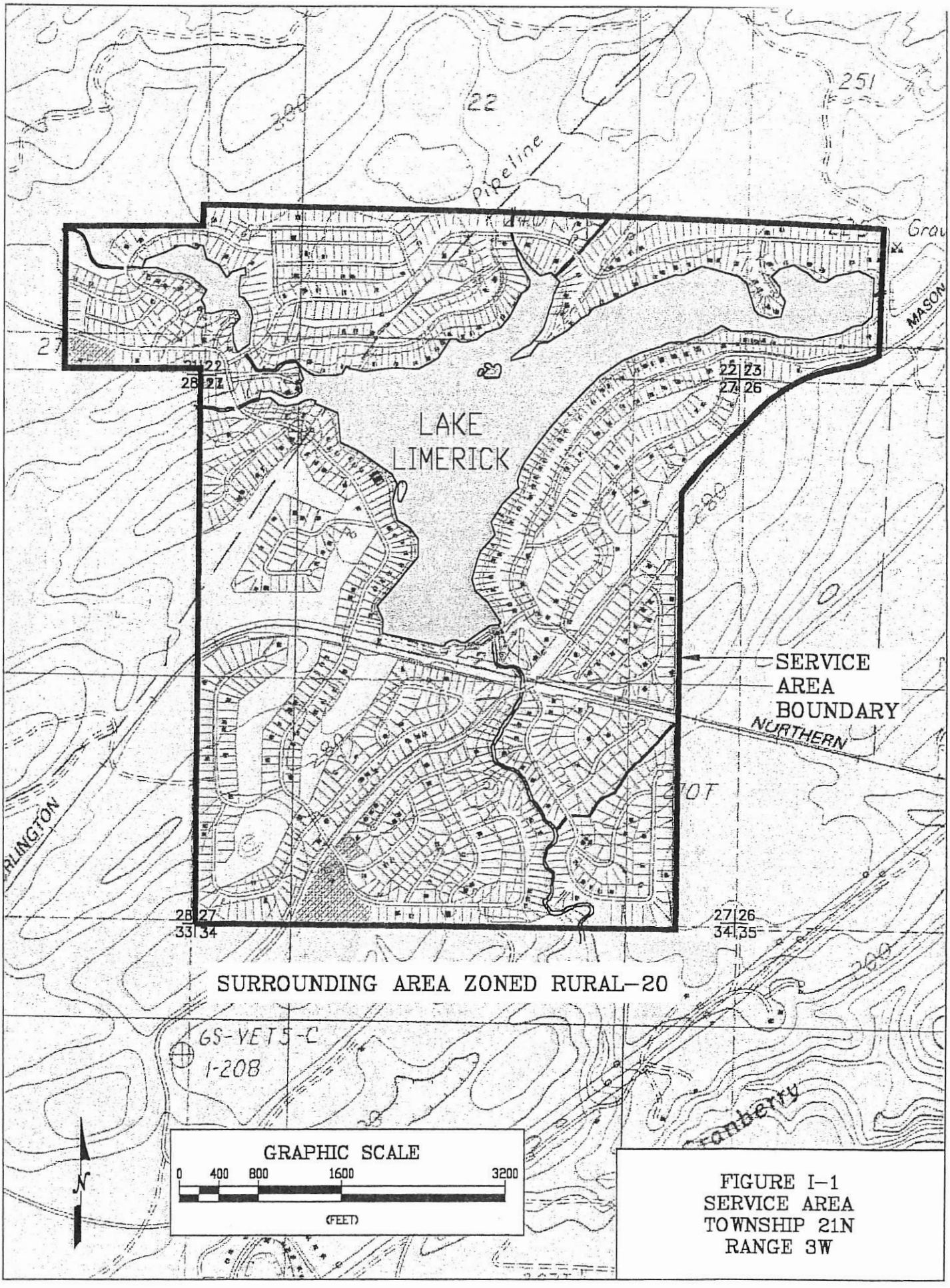

FIGURE I-1
SERVICE AREA
TOWNSHIP 21N
RANGE 3W

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Acronyms and Abbreviations Used

ac-ft	acre-feet, 1 ac-ft = 326,000 gallons
ADD	average daily demand in gpd per ERU
avg	average
BAT	backflow assembly tester
CCCP	Cross Connection Control Program
CCCS	cross connection control specialist
cu-ft	cubic foot or feet, 1 cu-ft = 7.48 gallons
DOH	Department of Health
ERU	Equivalent Residential Unit
EPA	Environmental Protection Agency
ft	foot or feet
ft/s	foot or feet per second
gpd	gallon(s) per day
gpm	gallon(s) per minute
gpy	gallon(s) per year
IOC	Inorganic chemicals
Kgal	1,000 gallons
MCL	Maximum contaminant level, as defined by WAC 246-290
MDD	Maximum daily demand in gpd per ERU
Mgal	1,000,000 gallons
mo	Month
ODW	Office of Drinking Water
PHD	Peak hourly demand for the system, converted to average gpm
SEPA	State Environmental Policy Act
SOC	Synthetic organic chemicals
SRL	State reporting level, as defined by WAC 246-290
/Sys	For the entire system
VOC	Volatile organic chemicals
WAC	Washington Administrative Code
WFI	Water facilities inventory form
WRIA	Water resource inventory area
yr	Year

I. Introduction & Description of Water System

A. Introduction & Executive Summary

1. Introduction

The Lake Limerick water system is located on the shores of Lake Limerick, northeast of Shelton, in Mason County. It is in Township 21N, Range 3W of the Public Lands Survey System. The water system's Department of Health I.D. number is 44150 T.

This water system plan has been prepared in accordance with WAC 246-290-100, and with the guidelines of the Department of Health, Office of Drinking Water and the Department of Ecology. It is intended as an update to the community's existing water system plan, which was approved by the Department of Health on October 19, 1998. The purpose of this document is to evaluate the water system's current and forecasted needs through the year 2012, and to develop a plan based on meeting those needs.

2. Executive Summary

The Lake Limerick water utility has been proactive in its planning and plan implementation since formation. This water system plan updates the previous (1998) water system plan, and consolidates the utility's own planning with the requirements of the state Board of Health and Office of Drinking Water. Water system plan elements as required by Chapter 246-290 WAC and the Municipal Water Supply Efficiency Requirements Act of 2003 (Municipal Water Law) are included. Prior to approval by the Department of Health, the plan will be reviewed by the Department of Ecology and Mason County. Below is a brief review of the plan content.

The plan presents a review of other plans, including the previous plan, the Mason County Comprehensive Plan, and the Kennedy-Goldsboro watershed plan. It also provides a discussion of the impact of the Municipal Water Law on the utility's water use policies, coordination with resource agencies, and public involvement. The utility's retail service area is described. This is the same service area identified in the 1998 plan so any service growth is of the "in-fill" type.

The plan presents an analysis of customer growth and projected water demand. Since the service area is fixed, lots are a matter of record, and the community is nearing the maximum of developed lots, the rate of growth of customer census is declining. The plan projects a maximum of 1,250 units, water demand is 270 gallons per unit per day average, and 540 gallons per unit per day maximum. A total of 123.2 million gallons per year (378 acre-feet) of water will be needed on average at the maximum build-out.

An analysis of the system water quality shows that the utility is in compliance with monitoring and contaminant limits. Inorganic and organic regulated contaminants have been tested for concentration in the sources of water supply. The distribution system has been routinely tested for the presence of coliform bacteria. The occurrence of corrosion byproducts in household plumbing was evaluated, and the utility did not exceed action levels. Overall water quality information is provided to customers each year in a "consumer confidence report."

The physical capacity of the system was assessed, and the system was found to be capable of required domestic flows. The distribution network, which surrounds the lake, does not have fire flow capability, and the Water Committee has determined that fire flow will not be included as a design criterion for pipeline installation or replacement. There is a six-inch trunk line that circumscribes about two thirds of the lake and provides good flow to all subordinate lines. A section of the six-inch trunk, along Mason Lake Road, has been out of service due to leaking joints, but as of the completion of this plan this section has been repaired.

The system has seven wells at six sites. The most recent of these is Well 6, which is now in service with 200-gpm capacity. This well pump, using a variable frequency drive pump motor with a low-level slowdown, is set to deliver a constant 200 gpm to a 160,000 gallon tank. The tank is provided with a variable frequency drive booster pumping system, and delivers nominally 200 gpm at 70psi.

Water rights for the wells are adequate for current and projected needs. However, one of the largest wells in the system, Well 3B, was constructed and commissioned without obtaining a water right. There is a pending application for water rights to correct this error, but there is no known schedule to process this application. Well 3B is important because of its production, and because it has high reliability, including auxiliary power. Storage and booster pumping are sufficient as part of the overall capacity analysis. Storage requirement is the limiting factor for capacity of the system. The number of ERUs that can be supported is 1,253, which is enough to meet the needs anticipated at buildout. If greater needs are somehow anticipated, the utility should look at increasing the actual volume of storage.

A conservation program is proposed with goals of reducing annual domestic demand per customer by 20%, and peak demand per customer by 15%. The utility has set a goal of reducing unaccounted for water to 5% of production. Based in part on "best estimates," this goal has already been met. Water audits, meter calibration, and continued leak detection are now included in the program and should help to validate the numbers.

The Lake Limerick water system has a robust operations and maintenance program. Certifications of Water Distribution Manager and Cross Connection Control Specialist are maintained. A general program of hazard mitigation and emergency response has been provided in the water system plan. For security reasons, this program is non-specific to any particular asset of the system. It is recommended that the manager begin developing a specific mitigation and contingency plan, and conduct procedure reviews with operating and maintenance staff.

The water system plan includes a Cross Connection Control Program (CCCP). The utility has decided to assume jurisdiction and responsibility for back flow assemblies where they are installed. A schedule of program development, risk assessment, and testing and record keeping is proposed. The program calls for a survey and inspection of potential backflow conditions, and for all potentially hazardous sites to be isolated. The program assumes that up to 600 premises will require isolation by a backflow control assembly. The overall schedule for implementation is about 20 months.

Design and construction standards for water facilities are to be adopted with the water system plan. Standard details are also included for most fittings and components to be installed with water mains. By submitting these specifications and drawings for approval, the Lake Limerick Water System requests exception to project approval under WAC 246-290-125.

And finally, the plan includes a system improvement program and a financial program. The system improvement program does not, within this plan's outlook period, anticipate or propose major capital construction. Rather, the addition of backflow assemblies is coupled with meter calibration and water main renewal and replacement in a program of fixed asset maintenance. The water system is in good financial condition at current rates of $17 per unit per month (metered, $5 unmetered) and $2 per thousand gallons over 12,000 gallons.[1] Reserves are forecast to accumulate, primarily from depreciation expense, to be in hand when replacements of capital assets are required.

B. Ownership and Management

The water system is owned and operated by Lake Limerick Country Club, which was incorporated as a non-profit maintenance corporation chartered to care for public amenities in the development. The corporation's owner number is 003162.

[1] Budgeted rates of $20 per unit per month for metered and $8 for unmetered will take effect October 1, 2006.

C. System History and Background

The original development established 1,397 residential lots and a 9-hole golf course. With some consolidation of lots, it is estimated that the water system serving the development will have 1,250 connections at maximum build out. The golf course is irrigated with water pumped from the lake, under separate surface water rights. The club Board of Directors has decided as a matter of policy that it does not support fire flow in the distribution system.

D. Related Plans

1. Lake Limerick's 1998 WSP & Amendments

The Lake Limerick Water System is operating under the system's current water system plan (DOH submittal #96-0804), which was developed by SEMCON, Inc., of Olympia, WA and approved by the Department of Health on October 19, 1998. This plan was amended by a "Request for increased Connection Approval" (DOH submittal #01-0609), which was approved August 29, 2001. This allowed the system to provide water for 1,250 ERUs. The request included a capacity analysis and hydraulic analysis. The complete report is attached as Appendix A.

"Source Approval and Engineering Report for Well 6, Source and Storage Facilities" (DOH submittal #02-1104) was approved by the Department of Health on December 23, 2002. The 1998 water system plan was further amended by a "State Revolving Fund Amendment", (ODW Project #04-0132) approved on April 21, 2004 and again by "Well 6 Facilities Construction and Commissioning" (ODW Project #04-0161), which was approved June 16, 2004.

The following programs were detailed in and approved with the 1998 water system plan:

Wellhead Protection Program

Conservation Program

Cross Connection Control Program

2. Policies of Lake Limerick Water Utilities

The utility is governed by Articles of Incorporation, By-Laws of the Corporation, By-Laws of the water system, and Resolution 98-01, which adopted the 1998 water system plan. See the previous water system plan for a discussion of these policies.

3. Mason County Comprehensive Plan

Mason County's comprehensive code was most recently updated in 2004. The complete Mason County Comprehensive Plan can be downloaded from the internet at: http://www.co.mason.wa.us/code/comp_plan/index.php Some of the key sections of the code that apply to Lake Limerick are:

WQ-102	Conservation and efficiency strategies should be developed and implemented County-wide to provide the most efficient use of all water resources.
WQ-110	Uses such as landfills, junk yards, salvage yards, auto wrecking yards, businesses that use hazardous substances or generate hazardous waste in their operation, solid waste disposal facilities, or other uses and activities determined by the Directors of the Mason County Department of Community Development and the Mason County Health Department that are likely to pose a threat to groundwater should be regulated via permit.
UT-101	Services and utilities should be supplied as well and as economically as possible (*1970 Mason County Comprehensive Plan*).
UT-108	Mason County should coordinate land use planning with the utility providers' planning.
UT-115	Mason County should facilitate and encourage the conservation of resources to delay the need for additional facilities for energy and water resources and achieve improved air quality.

4. Mason County Code

The electronic version of the Mason County Code is current through Ordinance 60-04, passed July 12, 2004, and Resolution 64-04, passed July 20, 2004, and is available via the internet at:

http://www.co.mason.wa.us/code/commissioners/

Title 13 of the county code deals with utilities. The following are relevant excerpts from Title 13:

13.08.010 Adopted.

The current edition of the American Public Works Association "Standard Specifications for Municipal Public Works Construction," or any subsequent edition, is adopted as part of the county standard specifications for public works construction. (Res. 980 (part), 1979).

13.08.020 Utilization.

The county public works director/county engineer is authorized and directed to utilize these standard specifications, with such amendments, modifications and special provisions as may be required to adapt to special conditions, in the preparation of contracts for construction in the county. (Res. 980 (part), 1980).

5. Watershed Management Act (RCW 90.82) of 1998

The Lake Limerick water system is in the Kennedy-Goldsborough water resource inventory area, which has been designated as WRIA-14, and as such will be subject to the Kennedy-Goldsborough management plan, when it is published and approved. The plan due date is the fourth quarter of 2005. The lead agency for the Kennedy-Goldsborough Watershed Planning is Mason County Department of Community Development. More information is available on the internet at http://www.ecy.wa.gov/watershed/14.html. The Lake Limerick Water System receives updates and notice regarding the management plan via email, and chairman of the water system committee attends some of the management planning meetings.

6. The Department of Health

The water system is required to comply with Chapter 246-290 WAC[1]. In WAC 246-290-200, this code states that:

"*... purveyors of new or expanding water systems shall consider and use, as appropriate, the following design factors:*

(a) Historical water use;

(b) Community versus recreational uses of the water;

(c) Local conditions and/or regulations;

(d) Community expectations;

(e) Public Water System Coordination Act considerations, where appropriate;

(f) Provisions for systems and component reliability in accordance with WAC 246-290-420;

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[1] "Group A Public Water Systems, Chapter 246-290 WAC", (DOH #331-010), published by Washington State Department of Health, July 2003

(g) Wind pressures, seismic risk, snow loads, and flooding;

(h) Other risks from potential disasters, as feasible; and

(i) Other information as required by the department."

WAC 246-290-230 states that:

"New public water systems or additions to existing systems shall be designed with the capacity to deliver the design PHD quantity of water at 30 psi (210 kPa) under PHD flow conditions measured at all existing and proposed service water meters or along property lines adjacent to mains if no meter exists, and under the condition where all equalizing storage has been depleted."

WAC 246-290-420 states that:

"All public water systems shall provide an adequate quantity and quality of water in a reliable manner at all times consistent with the requirements of this chapter."

7. Call-Before-You-Dig Law

The Revised Code of Washington Title 19 Business Regulations, Chapter 19.122, requires that:

1. Before commencing any excavation, excluding agriculture tilling less than twelve inches in depth, the excavator shall provide notice of the scheduled commencement of excavation to all owners of underground facilities through a one-number locator service.
2. All owners of the underground facilities within a one-number locator service area shall subscribe to the service.

The "Northwest One-Call Subsurface Warning System" is the only entity that covers service areas within Washington.

General Requirements:

- Complete a Subscription Agreement to the Master Agreement for the Northwest One Call Subsurface Warning system (Contact 1-503-232-1987).
- Designate a call location and/or contact person for the Utilities Underground Locator Center (UULC) to reach when they get a locate request.
- Complete the Member Utility Information Form.
- Provide a map showing the service area boundaries and keep it updated with any service area changes.
- Mark the underground utilities located near the excavation area within a two-business-day timeframe. Use the standard color codes of blue for potable water, green for sewers and drain lines, and purple for irrigation/reclaimed water lines.

It is recommended that all future easement agreements include a section requiring the owners of the property to contact the utility when any digging is to occur near or within the easement.

8. Safe Drinking Water Act

WAC 246-290 is "intended to conform with Public Law 93-523, the Federal Safe Drinking Water Act of 1974, and Public Law 99-339, the Safe Drinking Water Act Amendments of 1986, and certain provisions of Public Law 104-182, the Safe Drinking Water Act Amendments of 1996." Conforming to WAC 246-290 should satisfy the Safe Drinking Water Act.

9. Municipal Water Supply Efficiency Requirements Act of 2003

The Washington Legislature of 2003 enacted SHB 1338, which modified the state's water code to establish new requirements for planning by drinking water purveyors. These requirements are codified in the Municipal Water Supply - Efficiency Requirements Act of 2003. A copy of the municipal water law general checklist, along with attachments required by this law for approval of a water system plan for a system of this size are included in Appendix B.

This Plan addresses the provisions of the Act as follows:

a. Joint Plan Review with Ecology

Lake Limerick has included Ecology in the distribution for review of this Water System Plan. A water rights assessment is included in Section III.B.3. Based on the water rights assessment, the water demand forecast, and the conservation program, it is expected that the Lake Limerick Water System will meet its future requirements with existing water rights.

b. Conservation Requirements

The Conservation Planning Requirements are enforced under several authorities, primarily RCW 90.03.005, RCW 90.44.110, and RCW 90.54.180. Approval of a Conservation Plan is required for obtaining a water right, and for approval of any water system plan. The Conservation Plan includes three elements: Data Collection, Demand Forecast, and a Conservation Program. This last element includes setting conservation objectives, evaluating effectiveness, and selecting program activities. Selected activities must be monitored to determine actual performance. See Section IV.A.

c. Local Government Consistency

This Water System Plan was reviewed and approved by the Mason County planning department to ensure that it is consistent with local plans, regulations and policies. The signed local government consistency statement checklist is included in Appendix B as part of the required attachments.

d. Reclaimed Water

All lots in the Lake Limerick Community are required to have satisfactory on-site sanitary waste treatment. There is no public sewer or septic tank pumping provision. No opportunity to utilize reclaimed water exists.

e. SEPA

The environmental checklist defined in WAC 197-11-960 has been filled out for this water system plan and is provided in Appendix B. It is believed that this water system plan will have little impact on the environment. Some of the projects recommended in this plan may require separate determination of significance under SEPA.

f. Public Process

The Water System is required to follow WAC 246-290-100(8), which states "... the purveyor shall hold an informational meeting for system consumers prior to departmental approval of a ... water system plan update. The purveyor shall notify consumers in a way that is appropriate to the size of the system." Prior to submittal to the Department of Health for final approval, this water system plan will be presented at a public informational meeting. A letter describing the meeting, attendance, and response to issues raised will be attached for Department of Health Office of Drinking Water approval.

E. Service Area and Characteristics

Figure I-1 shows the Lake Limerick service area. The service area is zoned for rural residential.[1] With few exceptions, the properties are developed for single-family residences.

F. Service Area Policies

The system currently has approval from the Department of Health for 1,250 single-family residences, or equivalent. Some connections are presently not being utilized. Property owners wishing to develop their property are charged a $1,000 hookup fee and receive a certificate of water availability from the water system.

[1] Confirmed by telephone conservations with Mason County's permit assistance center.

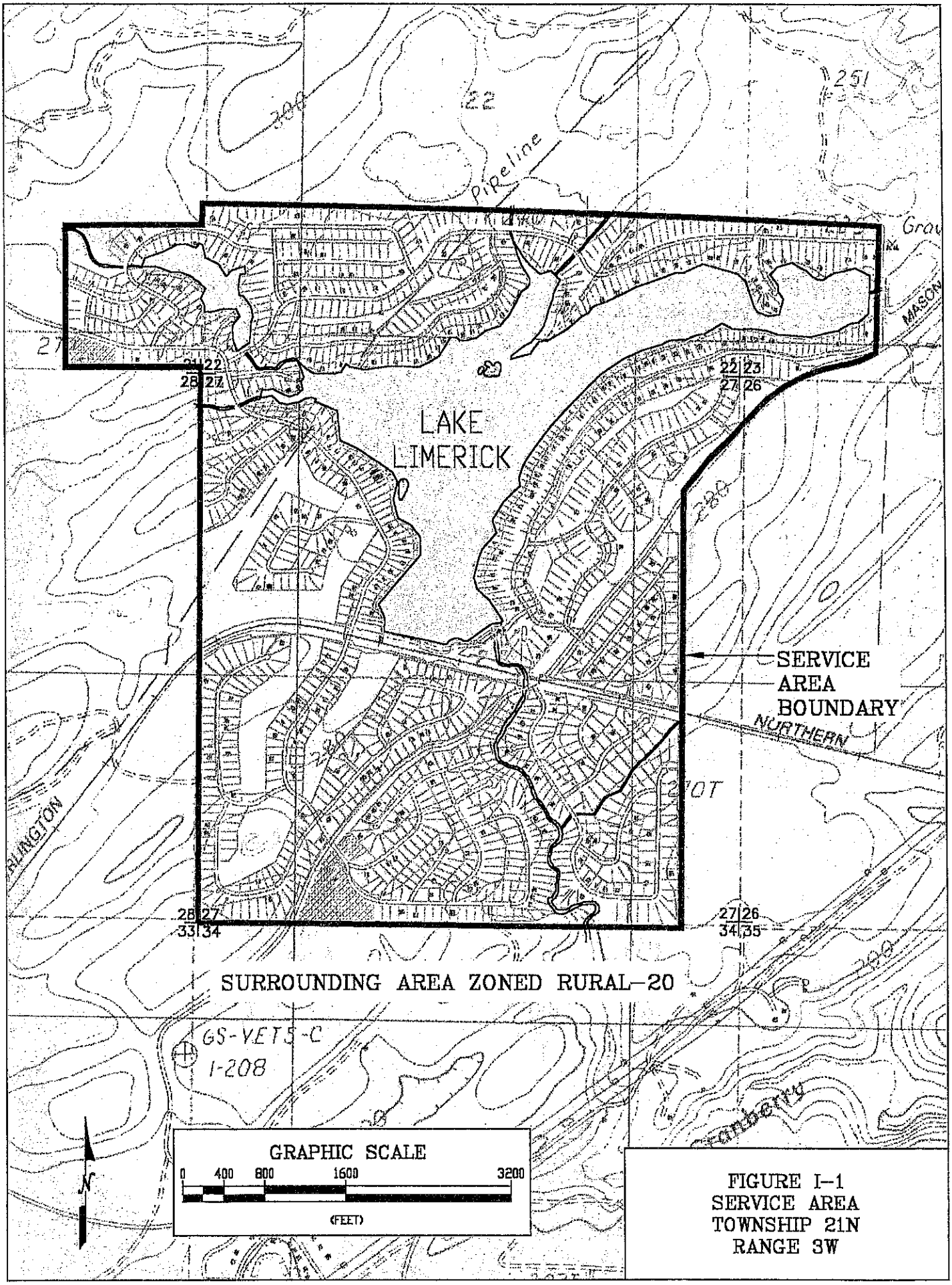


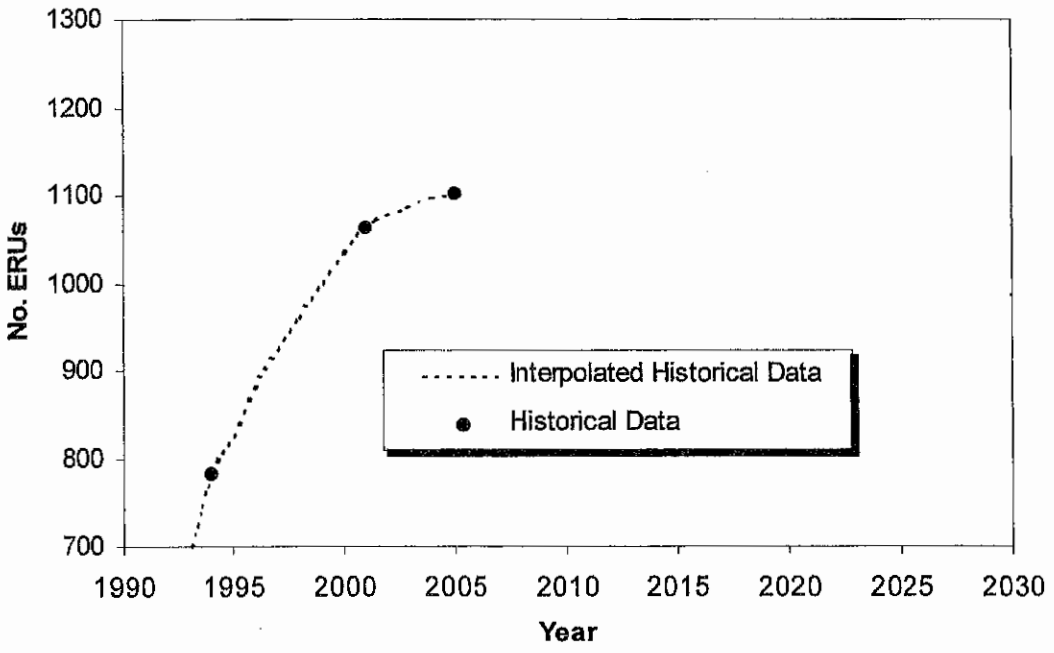
FIGURE I-1
SERVICE AREA
TOWNSHIP 21N
RANGE 3W

II. Basic Planning Data

A. Historical and Current Number of Service Connections as ERUs[1]

The original development had 1,397 lots and a 9-hole golf course, which is irrigated separately with water from the lake. The public water system currently has 1103 active connections. A growth curve has been constructed for the system based on historical data. That curve is shown below in Figure II-1.

Figure II-1: Historical Number of ERUs



[1] ERU = equivalent residential use, a unit representing the characteristic average water use of a single-family residence.

B. Historical and Current Water Use Data Reporting

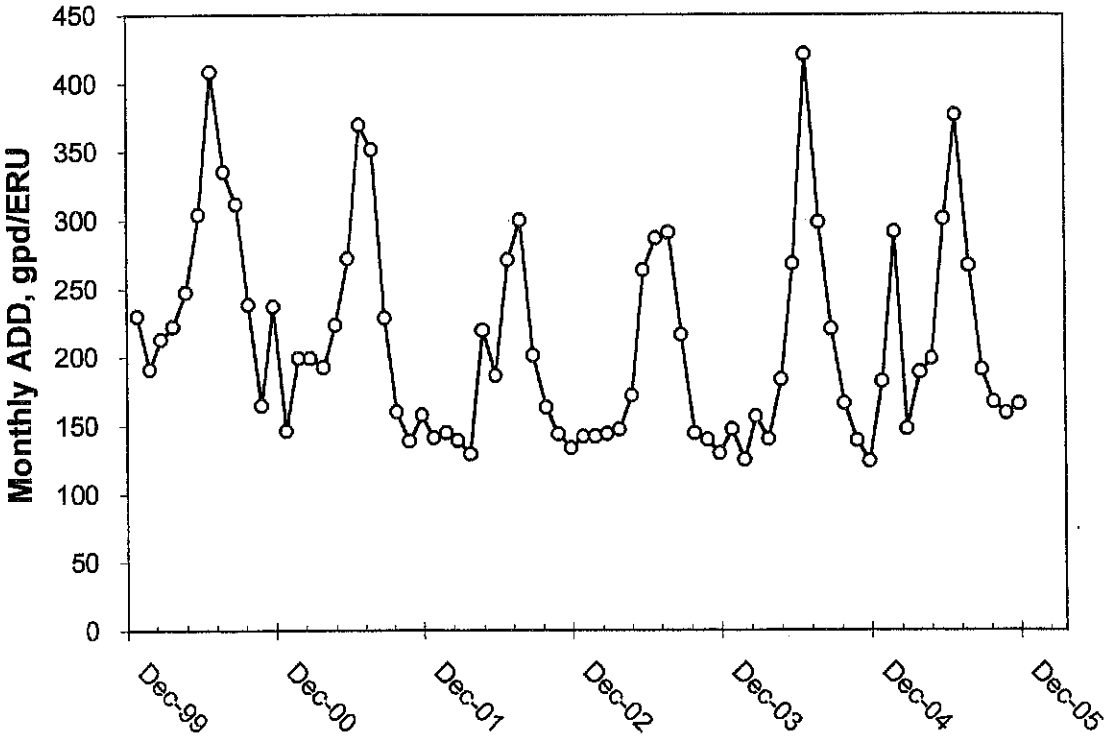
Table II-1 shows the historical annual production by the Lake Limerick sources from 1999 through 2005, along with the average daily demand (ADD) per ERU for each year. The average of yearly values of ADD in the test period is 214 gpd/ERU. In the most recent plan amendment[1] an ADD of 270 gpd/ERU was used. This value will also be used for this water system plan as it is reasonably close to historical, measured values, and is "conservative" by about 26%. Figure II-2 below shows monthly average demand per ERU for the test period. The highest monthly average in the test period was in July of 2002. During that month, the daily average demand was 425.gpd/ERU.

Table II-1: Historical Annual Production and ADD

Year	No. ERUs	Production (Mgpy)	ADD (gpd/ERU)
1999	999	97.9	268
2000	1,034	85.4	184
2001	1,063	71.3	187
2002	1,076	73.4	201
2003	1,087	80.1	220
2004	1,098	88.2	220
2005	1,103	74.9	186
		Average:	214

[1] "Request for increased Connection Approval" (DOH submittal #01-0609), which was approved August 29, 2001. See Appendix A.

Figure II-2: Monthly Average Daily Demand



Maximum daily demand (MDD) may be calculated using Equation 5-2 of the Water System Design Manual.[1] This yields a value of 540 gpd/ERU, which appears to be consistent with the measured daily averages for the peak month of July 2002. On the basis of the comparisons above, the characteristic demands of the customers of the Lake Limerick Water System for planning purposes are:

ADD: 270 gpd/ERU

MDD: 540 gpd/ERU

[1] "Water System Design Manual" (DOH # 331-123), published by the Washington State Department of Health, August 2001, pg 5-4.

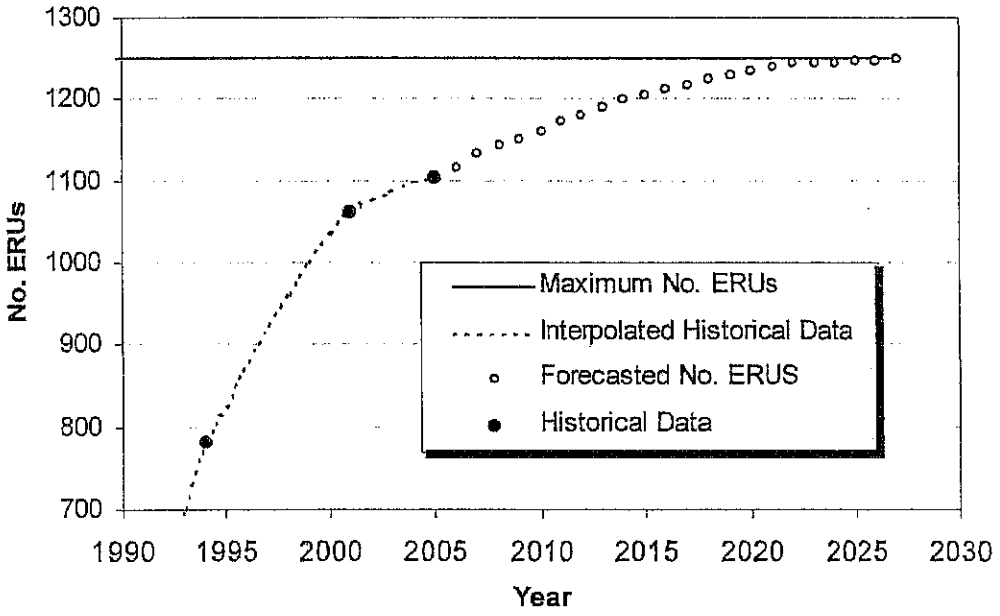
C. Current and Future Land Use

The current land use within the service area is mostly residential. There is a 9-hole golf course within the service area, a pro shop with food service, and a clubhouse with restaurant and lounge. There are no anticipated changes in the current land uses.

D. Future Number of Connections and ERUs

The number of ERUs has been forecasted based on historical growth. Due to the fact that some lots are or will be combined, and some lots may not be improved because of unfavorable site conditions, the estimated total build out is 1,250 residential units.[1] The system currently has Department of Health's approval for 1,250 connections. Thus, the growth curve has been limited to 1,250 ERUs. Figure II-3 shows the forecasted number of ERUs. Table II-2 presents this data numerically.

Figure II-3: Forecasted Number of ERUs



[1] 1998 Water System Plan, pg 15

Table II-2: Forecasted Number of ERUs

Year	No. ERUs	Year	No. ERUs
2006	1,116	2017	1,219
2007	1,133	2018	1,225
2008	1,144	2019	1,231
2009	1,151	2020	1,236
2010	1,162	2021	1,241
2011	1,173	2022	1,245
2012	1,182	2023	1,245
2013	1,191	2024	1,246
2014	1,200	2025	1,248
2015	1,205	2026	1,249
2016	1,213	2027	1,250

E. Future Water Use

The forecasted demand for the system was calculated based on the forecasted number of ERUs, an ADD of 270 gallons per day per ERU, and an MDD of 540 gallons per day per ERU. The forecasted demands are presented in Table II-3. Without conservation, the water system is forecasted to need a total of 123.2 million gallons of water per year at maximum buildout. This equates to 378 acre-feet per year.

Table II-3: Current and Forecasted Water Usage

Year	Number of ERUs	Maximum Daily Demand (gal)	Annual System Demand	
			(Mgal)	(acre-ft)
Current	1,103	595,620	108.7	334
2012	1,182	638,280	116.5	357
2016	1,213	650,700	119.5	367
Maximum Build-out	1,250	675,000	123.2	378

III. System Analysis

A. Water Quality Analysis

The results of water quality analyses performed in the past are presented below. Future water quality monitoring schedules and procedures are discussed in Section VI.D.

1. Asbestos

The distribution system was last tested for asbestos prior to 1999. The levels of asbestos in the water were below detection.

2. Bacteriological Testing

The system tests two samples from the distribution system for coliform bacteria each month. In the last five years, there have been four coliform violations. These were on August 8, 2003, November 4, 2003, March 9, 2005, and July 11, 2005. In each case, multiple repeat samples were taken. No coliform was found in any of the repeat samples.

At least two of the samples (November 4, 2003 and July 11, 2005) were taken from the hose bib on lot 476 in Division 3. Because of plastic components of this particular bib, the bib cannot be sterilized with heat. It is believed that the coliform in these two samples came from the bib itself. As part of the new coliform monitoring plan, (see Section VI.D.2.a) the system will be installing sample stations to help eliminate sample contamination from hose bibs.

3. Inorganic Chemicals (IOCs) and Physical Characteristics

Samples from Wells 1, 2, 3A, 3B, 4, & 5 taken on February 16, 2000, and a sample from Well 3B taken on February 11, 2003 were tested for inorganic chemicals and physical characteristics. The quantity of the detectable analytes and physical characteristics of the samples is presented in Table III-1.

The MCL for manganese was exceeded in Well 2 on February 16, 2000. The trigger level for turbidity was exceeded in Well 5 on the same day.

The SRL for nitrates, total nitrates and nitrites, iron, silver, zinc, sodium, hardness, conductivity, and turbidity in one or more of the system's wells was exceeded in the recent tests. See Table III-1 for the exact results. See Section III.A.4 for more information regarding nitrate testing.

Table III-1: Summary of Detectable IOC's at Sources

Analytes	Date	Source	Result	Standard Exceeded
EPA-Regulated				
Fluoride	2/16/00	Well 1	0.07 mg/L	-
"	"	Well 2	0.09 mg/L	-
"	"	Well 3A	0.10 mg/L	-
"	"	Well 3B	0.08 mg/L	-
"	"	Well 4	0.08 mg/L	-
"	"	Well 5	0.09 mg/L	-
Nitrite	2/16/00	Well 1	0.003 mg/L	-
Nitrate	2/16/00	Well 1	0.64 mg/L	SRL
"	"	Well 2	0.43 mg/L	-
"	"	Well 3A	0.56 mg/L	SRL
"	"	Well 3B	0.53 mg/L	SRL
"	"	Well 4	0.45 mg/L	-
"	"	Well 5	0.59 mg/L	SRL
Tot. Nitrate/Nitrites	2/16/00	Well 1	0.64 mg/L	SRL
"	"	Well 2	0.43 mg/L	-
"	"	Well 3A	0.56 mg/L	SRL
"	"	Well 3B	0.53 mg/L	SRL
"	"	Well 4	0.45 mg/L	-
"	"	Well 5	0.59 mg/L	SRL

(Continued on the next page)

(Table III-1: Summary of Detectable IOC's at Sources Continued)

Analytes	Date	Source	Result	Standard Exceeded
EPA-Regulated (Secondary)				
Iron	2/16/00	Well 2	0.11 mg/L	SRL
"	"	Well 5	0.29 mg/L	SRL
Manganese	2/16/00	Well 2	0.07 mg/L	MCL
Silver	2/16/00	Well 3A	0.02 mg/L	SRL
Chloride	2/11/03	Well 3B	3 mg/L	-
Sulfate	2/16/00	Well 1	0.98 mg/L	-
"	"	Well 2	0.95 mg/L	-
"	"	Well 3A	0.94 mg/L	-
"	"	Well 3B	0.94 mg/L	-
"	"	Well 4	1.03 mg/L	-
"	"	Well 5	1.21 mg/L	-
"	2/11/03	Well 3B	1 mg/L	-
Zinc	2/16/00	Well 5	0.22 mg/L	SRL
EPA-Regulated Characteristics (Secondary)				
Sodium	2/16/00	Well 1	3.83 mg/L	-
"	"	Well 2	3.77 mg/L	-
"	"	Well 3A	4.16 mg/L	-
"	"	Well 3B	2.95 mg/L	-
"	"	Well 4	3.57 mg/L	-
"	"	Well 5	3.82 mg/L	-
"	2/11/03	Well 3B	6 mg/L	SRL

(Continued on the next page)

(Table III-1: Summary of Detectable IOC's at Sources Continued)

Analytes	Date	Source	Result	Standard Exceeded
Hardness	2/16/00	Well 1	32.2 mg/L	SRL
"	"	Well 2	20.0 mg/L	SRL
"	"	Well 3A	15.9 mg/L	SRL
"	"	Well 3B	20.0 mg/L	SRL
"	"	Well 4	40.3 mg/L	-
"	"	Well 5	20.0 mg/L	SRL
"	2/11/03	Well 3B	58 mg/L	SRL
Conductivity	2/16/00	Well 1	111 μmhos/cm	SRL
"	"	Well 2	108 μmhos/cm	SRL
"	"	Well 3A	131 μmhos/cm	SRL
"	"	Well 3B	86 μmhos/cm	SRL
"	"	Well 4	100 μmhos/cm	SRL
"	"	Well 5	103 μmhos/cm	SRL
Turbidity	2/16/00	Well 1	0.33 NTU	SRL
"	"	Well 2	0.72 NTU	SRL
"	"	Well 3A	0.40 NTU	SRL
"	"	Well 3B	0.87 NTU	SRL
"	"	Well 4	0.55 NTU	SRL
"	"	Well 5	2.55 NTU	Action Trigger
"	2/11/03	Well 3B	0.4 NTU	SRL
Color	2/16/00	Well 2	1 color units	-
"	"	Well 5	2 color units	-

(Continued on the next page)

(Table III-1: Summary of Detectable IOC's at Sources Continued)

Analytes	Date	Source	Result	Standard Exceeded
Total Dissolved Solids (TDS)	2/16/00	Well 1	75 mg/L	-
"	"	Well 2	100 mg/L	-
"	"	Well 3A	96 mg/L	-
"	"	Well 3B	65 mg/L	-
"	"	Well 4	72 mg/L	-
"	"	Well 5	76 mg/L	-

4. Lead/Copper

The system has routinely tested for lead and copper in the distribution system. Although the system has detected some lead and copper, it has been below the action level of the Lead/copper Rule, and no treatment is required.

5. Nitrates

In addition to the nitrate testing done as part of the complete IOC testing, the samples from Wells 1, 2, 3A, 3B, 4, & 5 were tested for nitrates on February 26, 2001, July 2, 2002, and December 4, 2004. The quantities detected in these samples are shown in Table III-2. By examining the data from Table III-1 and Table III-2, it can be seen that the nitrate levels in all five wells tested has been steadily declining. For example, for Well 2, the levels 0.43 mg/L on February 16, 2000, 0.30 mg/L on February 26, 2001, and below the detection level on December 4, 2004.

It should be noted that the detection level of the tests performed on the samples taken on July 2, 2002 was 1.0 mg/L. Thus the tests on these samples were not sensitive enough to be useful in determining whether the nitrates were increasing or decreasing. The detection level for the December 4, 2004 test was 0.02 mg/L.

Table III-2: Summary of Detectable Nitrates at Sources

Analytes	Date	Source	Result	Standard Exceeded
Nitrates	2/26/01	Well 1	0.39 mg/L	-
"	"	Well 2	0.30 mg/L	-
"	"	Well 3A	0.32 mg/L	-
"	"	Well 3B	0.31 mg/L	-
"	"	Well 4	0.33 mg/L	-
"	"	Well 5	0.29 mg/L	-
"	12/04/04	Well 1	0.30 mg/L	-

6. Radionuclides

Samples taken from Wells 1, 2, 3A, 3B, 4 & 5 taken on December 14, 1998 and on June 24, 2003. The samples taken in 1998 were tested for both gross alpha and gross beta particles. The samples taken in 2003 were tested for gross alpha particles only. Neither alpha nor beta particles were detected in any of the samples.

7. Disinfectant Byproducts

The water system does not treat its water, therefore no byproduct testing has been done.

8. VOCs

A combined sample was taken from Wells 3A, 3B & 5 on March 27, 2001. A combined sample was taken from Wells 1, 2 & 4 on March 29, 2001. Individual samples were taken from Wells 2, 3A & 4 on March 26, 2003. Also, individual samples were taken from Wells 1, 3, & 5 on December 7, 2004. Each of these samples were tested for VOCs using EPA test method 524.2. No VOCs were detected in any of the samples.

9. SOCs

On February 16, 2000 a combined sample was taken from Wells 3A, 3B & 5. The sample was tested for SOCs using EPA test method 525.2. Individual samples were taken from the same wells on the same day and tested for SOCs using EPA test method 531.1. On July 25, 2000, two combined samples were taken from Wells 1, 2 and 4. One sample was tested using EPA method 525.2 and the other sample was tested using EPA test method 515.1. Individual samples were also taken from those three wells on the same day. The individual samples were tested using EPA test method 531.1. No SOCs were detected in any of the samples.

B. System Inventory, Description and Analysis

1. System Overview

Lake Limerick water system consists of a distribution system and six well sites. See Figure III-1 for a map showing a layout of the water system. Storage tanks, booster pumps, and backup generators are located at some of these sites. Table III-3 identifies the system components at each well site.

Table III-3: Summary of Well Sites

Well Site	Wells	Tanks	Booster Pumps	Backup Power
1	Well 1	Tank 1	Booster 1	None
2	Well 2	None	None	Generator 2[1]
3	Wells 3A & 3B	Tank 3	Boosters 3A & 3B	Generator 3
4	Well 4	Tank 4	Booster 4	None
5	Well 5	None	None	None
6	Well 6	Tank 6	Booster 6A & 6B	Generator 6

[1]Generator 2 is not currently hooked up, but can be hooked up in a matter of hours if needed.

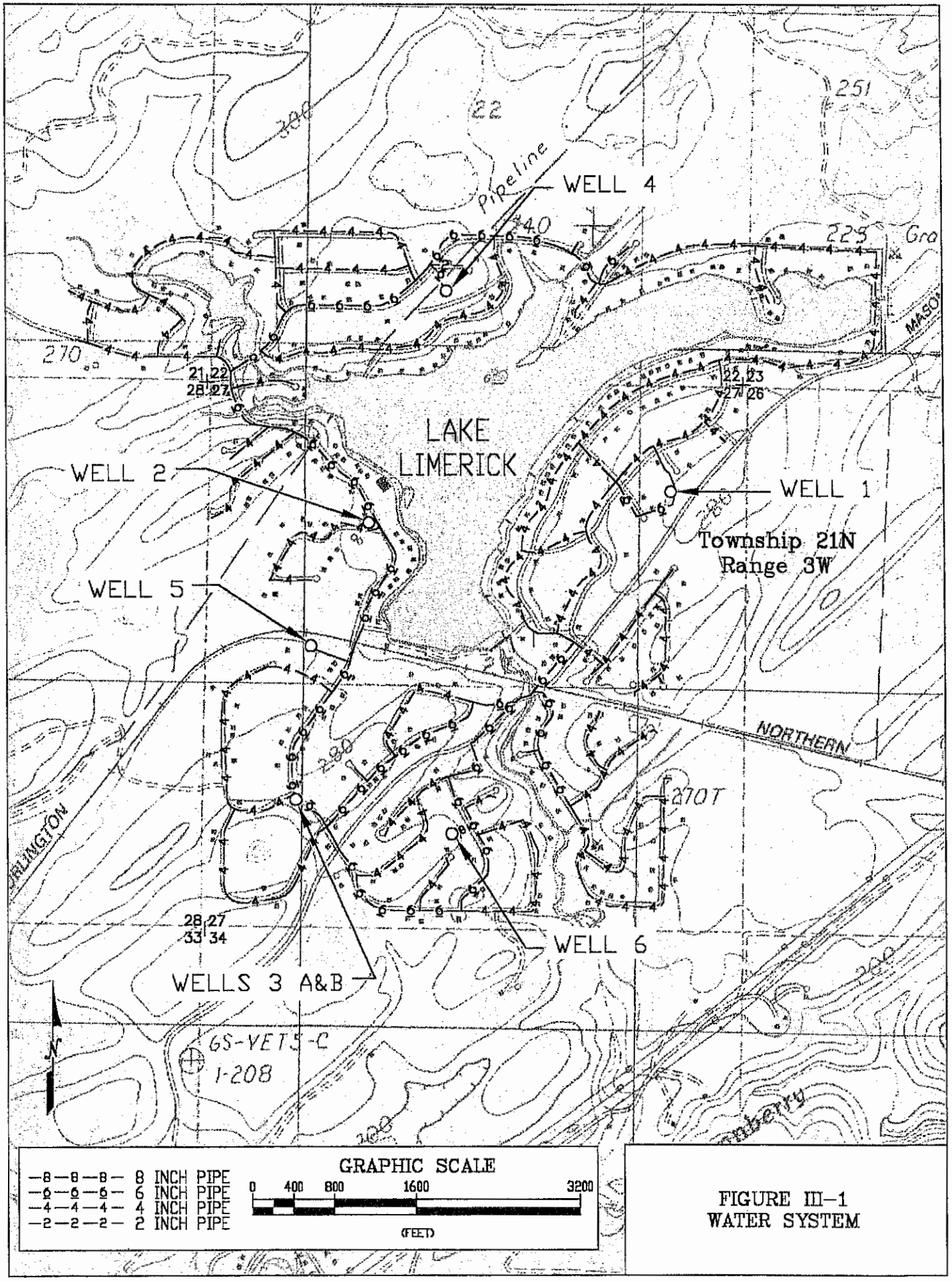


FIGURE III–1
WATER SYSTEM

2. Sources

Lake Limerick has seven wells at six sites. The current WFI, WFI update form, well log and pump curve for each well are provided in Appendix C. Table III-4 presents the wellhead elevation of each well, the well pump discharge point, and how the pumps are controlled. For the pumps that discharge directly into the distribution system, the low pressure set points are set to turn the pumps on when the hydraulic grade of the distribution system drops to 617' at the pump. The high pressure set points for these pumps are set to turn the pumps off when the hydraulic grade reaches 644'.

Table III-4: Well Elevations and Controls

Well	Elevation (ft)	Pumps To:	Controlled by:
1	310	Tank 1	Water Level in Tank 1 & Timer
2	268	Distribution System	Pressure in Distribution System
3A & 3B	320	Tank 3	Water Level in Tank 3
4	280	Tank 4	Pressure in Distribution System & Timer
5	320	Distribution System	Pressure in Distribution System
6	300	Tank 6	Water Level in Tank 6

3. Water Rights and Pumping Capacities

Table III-5 summarizes the water rights and pumping capacities of each well. A copy of the available water rights certificates can be found in Appendix D. As discussed in the 1998 water system plan, there are no water rights for Well 3B. An application for permit for Well 3B as an additional point of withdrawal from Well 3A was filed before 1998, and is still pending. Meanwhile, Well 6, with very good quality was placed into service in 2005.

The total pumping capacity of all seven wells is 1,000 gallons per minute. Without Well 3B, the total pumping capacity of the system is 810 gallons per minute. With Well 6 recently being put into service, the water system is not planning to operate Well 2 except for routine flushing and maintenance, and emergency backup.

The system's current annual water rights allow for the withdrawal of 606 acre-feet of water. At maximum buildout, the system is forecasted to require 387 acre-feet per year. Therefore, the system has sufficient annual water rights.

Table III-5: Summary of Water Rights and Pumping Capacities

Well	Certificate Number	Priority Date	Q_i[1] (gpm)	Q_a[2] (ac-ft/yr)	Service Factor[3]	Pumping Capacity (gpm)
Well 1	5566	04/19/66	100	117	72.5	45
Well 2	5887	06/30/67	200	166	51.5	200
Well 3A	5888	06/30/67	100	84	52.1	100
Well 3B	-	-	0	0	-	190
Well 4	7012	11/19/68	100	79	49.0	75
Well 5	G2-27215C	11/17/87	190	152[4]	49.6	190
Well 6	G2-27443C	10/26/88	200	160	49.6	200
		Total	890	606	-	1000

4. Treatment

Lake Limerick does not treat its water.

5. Storage

Lake Limerick has four storage tanks. Table III-6 gives the dimensions and storage volume of the tanks. The system has a total of approximately 634,500 gallons of storage. A capacity analysis of the system at maximum build out provided in Appendix E shows that the system has sufficient storage to meet future needs.

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[1] Qi is defined as instantaneous withdrawal allowed by the water rights.

[2] Qa is defined as the annual withdrawal allowed by the water rights.

[3] Service factor is the percent of time during the year the source must be run at Qi to use up its entire allowable annual withdrawal (Qa).

[4] The annual water rights for Well 5 is supplemental to previous water rights and therefore not included in the total annual water rights.

Table III-6: Summary of Storage Volumes

Name	Height (ft)	Diameter (ft)	Total Storage (Kgal)	Usable Storage[1] (Kgal)	Operational Storage (Kgal)
Tank 1	24	25	84.6	30.6	18.0
Tank 3	30	30	158.6	95.2	31.7
Tank 4	30	21	77.0	51.3	15.4
Tank 6	30	30	158.6	158.6	13.2
		Total	478.8	335.7	78.3

6. Booster Pumps

Lake Limerick has six booster pumps. Sites 1 & 4 have one booster pump, and Sites 3 & 6 have two booster pumps each. The booster pump curves are provided in Appendix F. The booster pumps at Sites 1, 3 & 4 are controlled by the pressure in the distribution system at the sites. The pressure set points on each of boosters at these three sites are to turn on if the hydraulic grade drops to 617', and will turn off when the hydraulic grade reaches 664'. Boosters 1 & 4 are on timers and are to balance the water withdrawal from all the wells. This helps prevent exceeding annual water rights. It also ensures that equipment is in working order and reduces stagnant water in the system. Site 6 has two variable frequency booster pumps that were installed in 2005. This booster station was designed to deliver a constant 225 feet of total dynamic head. The two boosters together can deliver up to 300 gallons per minute to the system.

7. Distribution System/Hydraulics

The distribution system is looped around the lake with a combination of 6" and 4" mains. Multiple sources and storage tanks are distributed within the system. The system is closed; that is, it has no open gravity storage, and its pressure is maintained entirely by the booster pumps, and by the pumps at Wells 2 and 5.

[1] Usable Storage ≡ Total Storage - Foot Volume

The distribution system was modeled in WaterCAD®. Five scenarios were analyzed. These scenarios represent the system before and after installation of Tank 6C, pipe repairs along Mason Lake Road and capital improvements. The model predicts pressure above 30 psi and velocities below 7.0 ft/s throughout the system for all five scenarios. See Appendix G for more details.

8. Fire Flow

The system is not required to provide fire flow. Although the water system does have fire hydrants, the system may not be able to deliver the required fire flow while maintaining the minimum pressure. As a matter of policy, the Lake Limerick water system has decided not to develop fire flow capability. The local fire district and the local fire marshal have been notified and have agreed not to draw water from the hydrants. Copies of these letters can be found in the appendix of the 1998 water system plan.

C. Summary of System Deficiencies

Analysis of the Lake Limerick Water System shows that the capacity is comfortably sufficient for anticipated future growth and both water quality and water use efficiency (Section IV) are excellent. With the completion of the Well 6 project, the system does not require any major capital improvements. However, the following are some areas in which the system could be improved, in anticipation of future needs:

1. Well No. 3B Water Rights.

Any use of Well 3B takes place without legal authorization under RCW 90.44. Well 3B is capable of pumping 190 gpm. It has been used as a baseline supply as one of the most reliable sources in the system. The Department of Ecology was informed in 1997 of the lack of a permit, and application G2-29483A was filed on 4/2/97 to appropriate 210 gallons per minute and up to 254 acre-feet per year.

Wells 2, 5, and 6 are the only other wells of similar capacity to Well 3B, but Wells 2 and 5 are to be operated only occasionally. This means that the system will be heavily dependent on Well 6, and permitting of Well 3B should be prioritized. It is not known when Ecology will process pending applications in the Limerick vicinity, but Limerick should monitor this activity and be prepared to engage Ecology to finalize the Well 3B permit.

Because Well 6 is now fully in service, the quantities of water allocation requested under the application for Well 3B could be accepted by the Lake Limerick Water System as "supplemental" and thus not additive to other water rights. Under this proviso, Well 3B could be operated in lieu of Well 6, or others, as deemed necessary by the system manager, but it could not be pumped in order to increase the total produced water to more than the total authorization of all other wells. The specific authorization will be detailed in Ecology's report of examination that will be filed if Ecology has processed the application.

Additional studies may be required by Ecology, but the scope and amount are not known. An estimated budget of $15,000 is assumed.

2. Routine Meter Calibration.

In order to maintain the accuracy of water use measurements, as will be required under the Municipal Water Law guidelines, a program of routine calibration of service meters and source meters. The service meters are most important because they are generally in more severe service due to sediment impacts and frequent cycles of high and low values. Calibration should be done on a regular schedule (typically a five year cycle), and defective meters should be replaced immediately.

3. Water Main Renewal and Replacement.

Any water main over 40 years old can be considered to be approaching the end of its useful life. For older distribution systems constructed as a single development over a few years, a program of renewal and replacement is needed. Annual pipeline replacements, according to a ranking of probable need, are scheduled. Problem areas and areas known to be oldest in service should be prioritized. An annual sinking fund, maintained by a constant revenue source, should be set up to fund the replacements.

4. Fire Flow.

This may or may not be a possible deficiency. The local fire district may not, for instance, have the capability for full fire flow usage. Providing fire flow is a system-wide decision, as it involves infrastructure changes throughout the distribution system. The principal deficiencies identified with lack of fire flow are not having the ability, in most cases, to knock down a residential fire but rather only the ability to prevent communication of a fire to adjacent buildings. Adding fire flow to a system not presently equipped for it is a significant expense.

D. Analysis of Possible Improvements

System capacity and hydraulic analyses were conducted to evaluate the impact of improvements. Among the improvements considered were: adding Well 6, repair of the booster pump at Well 1, and replacement of the Mason Lake Road pipeline. The analysis (See Appendix E and Appendix G) showed that, after improvements were completed, there were no remaining capacity or hydraulic deficiencies. However, no further treatment of these possible improvements is relevant since all of them were completed by the utility prior to completion of this plan.

IV. Conservation & Source of Supply Analysis

A. Conservation Program

1. Past Conservation and Goals

The 1998 water system plan established a conservation program and established the following goals:

- Reduce annual domestic demand per customer by 20%
- Reduce peak demand per customer by 15%
- Achieve 5% or less unaccounted-for water[1]

a. Annual Domestic Demand Reduction

The 1998 water system plan reported that from 1994 to 1997, the ADD averaged 400 gallons per day per ERU.[2] With the targeted 20% reduction, the system's goal was to achieve an ADD of 320 gallons per day per ERU. From 1999 to 2004, the system's measured ADD averaged 213 gallons per day per ERU. This represents a 46.8% reduction in annual domestic demand per customer.

b. Peak Demand Reduction

The goal of the 1998 water system plan was a 15% reduction in the peak demand per customer. The "peak demand" referred to in the 1998 water system plan has been taken to be equivalent to the terms "peak day ERU water requirement" and "MDD". For 1993 to 1997, the MDD was 850 gallons per minute per ERU.[3] With a targeted 15% reduction, the system's goal was to achieve an MDD of 723 gallons per day per ERU. Based on available average daily demand data, it is estimated that the MDD for 1999 to 2004 is 540 gallons per minute. This represents a 63.5% reduction in the MDD, however, this may be somewhat artificial because the MDD is only derived by calculation.

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[1] "Water System Plan – Lake Limerick Water System", published by SEMCON, Inc., Olympia, WA, approved by Department of Health on October 19, 1998, pg 55

[2] Ibid., pg 18

[3] Ibid.

c. Unaccounted-For Water

For the purpose of this water system plan, the terms "non-revenue water production", "non-revenue water usage", and "unaccounted-for water" are defined by the following equations and definitions:

- Production - Consumption = Non-Revenue Water Production
- Non-Revenue Water Production = Non-Revenue Water Usage + Unaccounted for Water
- Non-Revenue Water Usage is defined as water used for flushing, hydrant testing, etc.
- Unaccounted-For Water is defined as water from leaks, net meter-reading error for the system, etc.

These equations and definitions are based on the terms as they are used in "Water Conservation Planning Handbook"[1] and "Conservation Planning Requirements".[2] Non-revenue water usage is based on estimates. It should be noted the net meter-reading error for the system, which is part of the unaccounted-for water, can be either positive or negative.

The quantity of unaccounted-for water for the last five years is presented in Table IV-1. The percent of unaccounted-for water has averaged 3.5% over this period. The percent of unaccounted-for water is 33% lower than the goal established in the 1998 water system plan.

[1] "Water Conservation Planning Handbook for Public Water Systems", (Publication #331-053), published by Washington State Department of Ecology, November 1991

[2] "Conservation Planning Requirements", (Ecology Publication # 92-24 & DOH #331-008), published by Washington State Department of Ecology in conjunction with the Department of Heath, March 1994

Table IV-1: Unaccounted-For Water

Year	1999	2000	2001	2002	2003	2004	Avg:
No. of ERUs	999	1,034	1,063	1,076	1,090	1,100	-
Production Data (Mgpy/sys)	97.9	85.4	71.3	73.4	80.1	88.2	-
Consumption Data (Mgpy/sys)	94.3	82.5	69.2	70.8	76.6	84.4	-
Non-Revenue Water Production (Mgpy/sys)	3.6	3.0	2.1	2.6	3.5	3.8	3.1
Estimated Volume of Non-Revenues Water Usage (Mgpy/sys)	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Unaccounted-For (Mgpy/sys)	3.5	2.9	2.0	2.5	3.4	3.7	3.0
% Unaccounted-For	2.7	3.4	2.9	3.5	4.3	4.2	3.5

2. Future Conservation Goals

Because the system's current conservation program has been so successful, it may not be possible for the system to continue to reduce consumption, non-revenue water usage, and unaccounted-for water. However, the system should continue to try to increase its conservation. The goals of the conservation program should be:

- Source and customer meter calibration program
- 5% reduction in average production per day per ERU
- Continue to maintain less than 10% unaccounted-for water

3. Continuing Planned Conservation Measures

The Lake Limerick Water System is classified as a medium sized system by the "Conservation Planning Requirements". The conservation measures that are recommended for a system of this size and which have been implemented by the system are listed below.[1] The system will continue to implement each of these measures.

a. Program Promotion

The system encourages conservation through public meetings, news letters and billing statements.

b. Customer Assistance

The system promotes conservation by providing customer assistance through the same methods mentioned above. Customers can also call the water system for assistance with conservation.

c. Bill Showing Consumption History

The water system has implemented a billing system that shows consumption history on the bill.

d. Source Meters

The system has meters on all its sources.

e. Service Meters

The system has meters on all its existing service connections, and requires all new connections to have service meters.

f. Unaccounted Water/Leak Detection

The system will do monthly audits to monitor the unaccounted-for water. The system has been very proactive in finding and eliminating leaks.

g. Landscape Management

During the summer, the customers are restricted from watering their lawns on either even or odd days, depending on their address. The community golf course is watered with surface water from the lake.

h. Conservation Pricing

The system's current rate structure is designed to encourage conservation.

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[1] "Conservation Planning Requirements", (Ecology Publication # 92-24 & DOH #331-008), published by Washington State Department of Ecology in conjunction with the Department of Heath, March 1994, pg 23

4. New Planned Conservation Measures

Because the current water conservation program has proven to be so effective, the water system will continue to follow the existing program. In addition to the previously mentioned measures, the water system will implement the following measures:

- source and customer meter calibration program
- replacement of aging pipes that are likely to leak

5. Forecasted Water Savings with Current and Planned Conservation

It is difficult to determine the amount of conservation that will be achieved in the next six years. Because the system has been so successful at conservation in the past, it is unlikely that the system will be able to reduce its water production by a larger percentage. Table IV-2 shows the ADD averaged over the last seven years (see Section II.B), the MDD and the forecasted annual production with the current conservation measures. With the current conservation, the ADD and MDD are forecasted to remain the same. They are provided in Table IV-2 for purposes of comparison with forecasted ADDs and MDDs in Table IV-3 and Table IV-4.

Table IV-2: Forecasted Production with Current Conservation

Year	No. ERUs	Measured Historical ADD (gpd/ ERU)	MDD (gpd/ERU)	Annual Production (Mgpy)
2006	1116	214	540	87.0
2012	1182	214	540	92.1
2016	1213	214	540	94.6
2026	1249	214	540	97.4

Table IV-3 shows the forecasted ADD, MDD and annual production with the planned conservation measures, as well as forecasted annual savings. This is based on the assumption of 1.02% annual reduction, which equates to 5% reduction when compounded yearly for six years.

Table IV-3: Forecasted Production with Planned Conservation

Year	No. ERUs	ADD (gpd/ ERU)	MDD (gpd/ERU)	Annual Production (Mgpy)	Annual Savings (Mgal)
2006	1116	209	529	85.2	1.8
2012	1182	197	477	83.6	7.3
2016	1213	189	477	83.6	10.9
2026	1249	170	431	77.7	19.7

6. Analysis of Cost-Effectiveness of Conservation Measures Not Used

Below are the measures, recommended for a system of this size[1], that the system has chosen not to implement, along with an analysis of the cost-effectiveness of the measure.

a. Purveyor Assistance

The system does not supply water to any purveyors; therefore, this measure does not apply.

b. Single-Family/ Multi-Family Kits

This is likely to be expensive. Because customer consumption is already so low, it is not likely to yield significant water savings.

c. Nurseries/Agricultural

The system does not provide service to any nurseries or agricultural customer; therefore, this measure does not apply.

[1] "Conservation Planning Requirements", (Ecology Publication # 92-24 & DOH #331-008), published by Washington State Department of Ecology in conjunction with the Department of Heath, March 1994, pg 23

7. Forecasted Water Savings with Additional Conservation

With the 46.8% reduction from the current conservation and the estimated 5% reduction from planned conservation measures, it is unlikely that the system could achieve much more than 1% reduction with additional measures. Table IV-4 shows the forecasted ADD, MDD and annual production with additional conservation, as well as the additional annual savings. This is based on a 0.2% annual reduction, which equates to a 1% reduction when compounded annually for six years. By examining the savings, it can be seen that the yield of additional conservation is likely to be insignificant compared to the yield from current and planned conservation.

Table IV-4: Forecasted Production and Savings with Additional Conservation

Year	No. ERUs	ADD (gpd/ ERU)	MDD (gpd/ERU)	Annual Production (Mgpy)	Additional Annual Savings (Mgal)
2006	1116	208	527	84.9	0.3
2012	1182	184	466	81.6	1.4
2016	1213	184	466	81.6	2.0
2026	1249	163	412	74.3	3.4

8. Reclaimed Water Use

The only potential source for reclaimed water within the system is from sanitary waste. This is not currently feasible as all the buildings are on septic systems. To reclaim the wastewater, sewers would need to be installed or the current septic systems would need to be converted to stepped-type septic systems with holding tanks for the graywater until the graywater could be reclaimed through pumping.

The potential for using reclaimed water is also limited. Reclaimed water could be used for toilets and for domestic landscape irrigation, but this would require replumbing the existing houses. It could be used to fill the tender trucks for fire suppression; however, the amount of water saved is unlikely to justify the construction of a reclamation facility. The golf course is currently irrigated with water from the lake; therefore irrigating the golf course with reclaimed water will not reduce the use of potable water within the system. It could, however, provide the potential beneficial use of displacement of water taken from the Lake. A feasibility study is recommended before pursuing the use of reclaimed water within the water system.

B. Source of Supply Analysis

Plan guidelines recommend an adjunct to the formal conservation program that analyzes current sources of supply, with the goal of identifying opportunities to improve source utilization and forego any planned new water rights. As seen in Section IV, the Lake Limerick Water System expects to be able to meet anticipated needs without increasing water rights. The current pending application is to add the existing Well 3B to current water rights, without an increase in total allocation. No other water rights action is anticipated in the next twenty years.

The Lake Limerick Water System has shown good efficiency gains in the last 5-10 years, suggesting that sources are at least partially optimized. Enhanced conservation measures that may be employed include intensive public promotion and customer education, systematic optimization of metering, increased investigation of unaccounted-for water, management of non-potable uses such as landscaping, and inclined block water rates. All of these are identified in the Conservation Program set forth in Section IV.A.

C. Source Reliability Analysis

The sources of the Lake Limerick water system have an inherent reliability due to the number of sites available (Section III.B). Wells 3A & B and Well 6 are each part of a site complex that includes a back up power generator, a storage tank, and booster pumps. In case another well is lost for some reason, Well 6 or one of the Wells at site 3, if not already in use, can be started to maintain public health and safety until the failed well is repaired. In addition to Wells 3 & 6, Wells 2 & 5 are maintained as secondary back-up wells, and if line power is available, these can be brought into full operation to make up for supply loss. The multiplicity of wells, both in primary and secondary use, allow the Lake Limerick water system manager a significant degree of flexibility, and thus increase the likelihood that community water needs will be met.

D. Water Shortage Response Plan

In the very unlikely event of multiple well failures, severe drought, aquifer contamination, or other conditions that create an overall shortage of supplies to the Lake Limerick System, a series of steps should be taken to curtail all but the most necessary water demand. The following are recommended in response to a system-wide water shortage:

- Customers should be notified of pending emergency as soon as possible.
- One member of the water system staff should be appointed Water Shortage Response Officer, who will coordinate all response activities.
- Response officer will consult with water committee to determine degree of expected shortage and commensurate response.
- Community property irrigation from potable supply should be shut off
- Customer use curtailment measures implemented as follows

  Level I voluntary compliance with directives
  Level II mandatory curtailment of outdoor use on staggered schedule
  Level III mandatory curtailment of all non-essential use.

The Water Committee should evaluate the nature of any shortage to determine if there are measures that could mitigate the cause of shortage. During any curtailment period, water system staff should be vigilant in making sure that leaks and losses are strictly controlled.

E. Interties

There are no nearby systems; therefore, it is unlikely that Lake Limerick will develop interties in the near future.

V. Source Water Protection

A. Wellhead Protection Program

A wellhead protection program was part of the 1998 water system plan. That plan used the calculated fixed radius method[1] to delineate the zones of protection. These radii have been recalculated to reflect the updated forecasted production for each well. The radii of the zones of protection have been calculated using the following calculation:

$$r = \sqrt{\frac{Qt}{nH\pi}}$$

In which

r = radius of zone of protection, feet

Q = forecasted production of well, cubic feet per year

t = travel time to well, years

n = aquifer porosity, defaults to 0.22

H = height of screened interval of the well, feet

π = 3.14

Table V-1 gives the radii of the zones of protection for 6 months, 1 year, 5 years, and 10 years of travel time. A map of the wellhead protection zones is provided in Figure V-1.

[1] "Wellhead Protection Program Guidance Document", (DOH #331-018), published by the Washington State Department of Health, April 1995, pgs 30-32

Table V-1: Calculated Radii of Zones of Protection

Source	Forecasted % of Production (%)	Forecasted Production of Well (Mgpy)	Forecasted Production of Well (cu-ft/yr)	Screened Interval (ft)	Calculated Radius for Given Interval (ft) 6 mo	1 yr	5 yr	10 yr
Well 1	10	12.3	1,650,000	25	218	309	690	976
Well 2	0	0.0	0	18	0	0	0	0
Well 3 A & B	20	24.6	3,290,000	10	488	690	1,544	2,183
Well 4	20	24.6	3,290,000	20	345	488	1,091	1,544
Well 5	20	24.6	3,290,000	20	345	488	1,091	1,544
Well 6	30	37.0	4,940,000	5	845	1,196	2,674	3,781

1. Inventory of Potential Sources of Contamination

The following can be found within the wellhead protection zones:

- High density population with individual septic systems
- Lake Limerick Golf Course
- Rural areas
- Lake Limerick and associated creeks
- State Highway 3
- A natural gas pipeline
- The Burlington Northern Rail Road

With the exception of rural areas and State Highway 3, each of these potential sources of contamination can be found within the 6-month zone of one or more of the wells. There is only a small area of rural development within the 1-year zone of Wells 1 & 6. There is a much larger area of rural development within the 5- and 10-year zones of the wells. These rural areas are zoned "Rural-20", which allows one house per 20 acres.

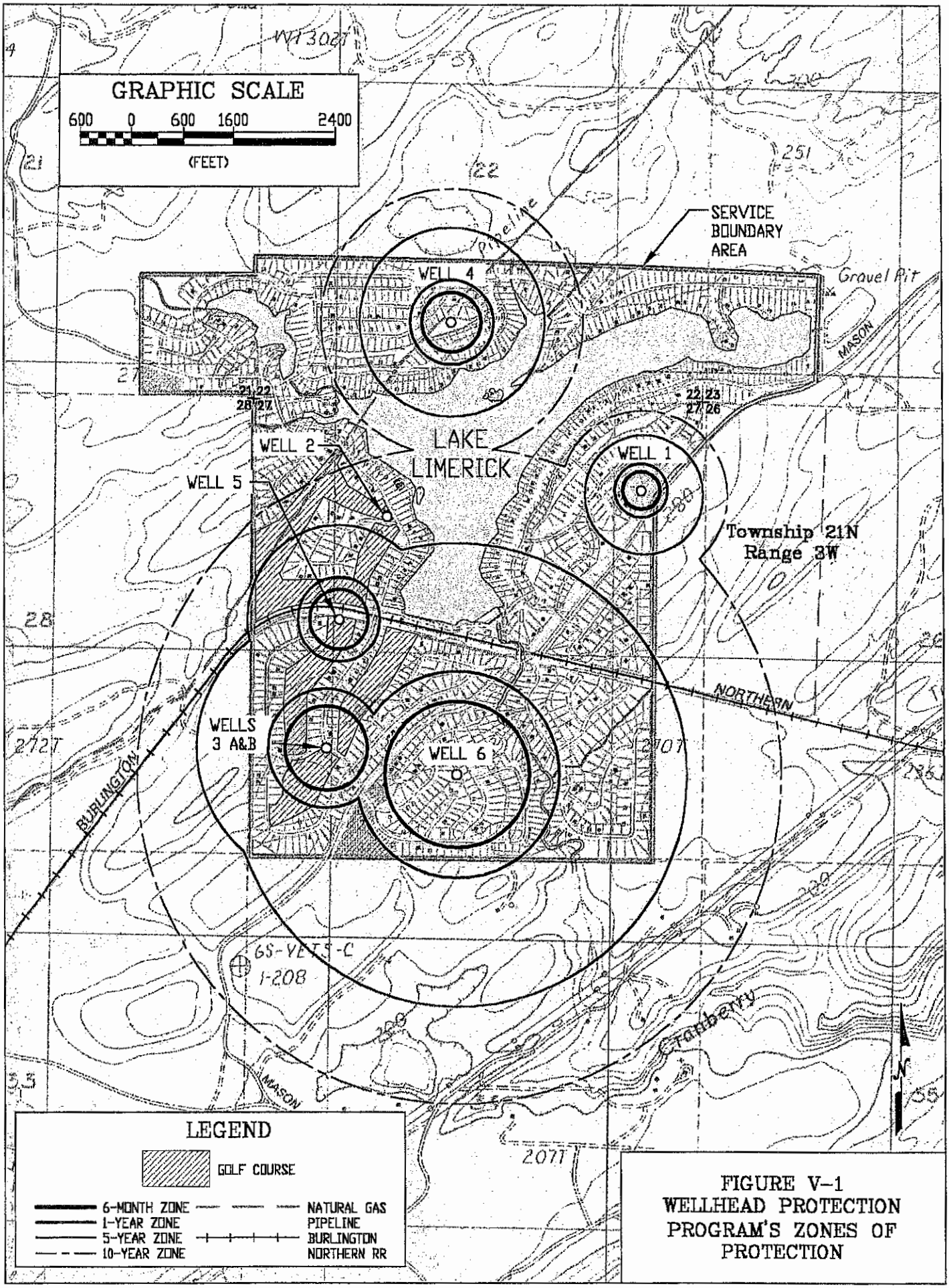

FIGURE V–1
WELLHEAD PROTECTION
PROGRAM'S ZONES OF
PROTECTION

The area inside the Lake Limerick Water System service boundary is a high-density population area. The residences within this area are all on individual septic systems. Septic tank drainfields that are working properly will provide effective treatment. If improperly designed or not maintained, septic drainfields can fail and result in a source of contamination.

Another possible source of contamination is the golf course. The golf course personnel should be notified of the potential risk to drinking water and encouraged to use minimal amounts of fertilizer, pesticides, and herbicides on the golf course.

Spills or defoliation treatments sometimes occur along the roads and highways within the wellhead protection area.

Although a natural gas pipeline passes within Well 4's 6-month zone of protection, and the Burlington Northern Railroad passes within Well 5's 6-month zone of protection, these are not likely sources of contamination. If the natural gas pipeline were to leak, the gas would evaporate. The likelihood of a railroad accident is small. There is a remote possibility of a catastrophic accident and spill. First responders to the emergency should have information about wellhead protection for drinking water.

2. Notification

Listed below are the authorities that are to be notified of the wellhead protection program by the Lake Limerick Water System, in accordance with State regulations WAC 246-290-135. A recommended notification letter is given in Appendix H.

Mason County Sheriff's Department
P.O. Box 1037
Shelton, WA 98584
360-427-9670 x540

Mason County Fire Marshall
410 W. Business Pk. Rd.
Shelton, WA 98584
360-427-9670 x313

Lake Limerick Golf Course
Head Groundskeeper
790 E. St. Andrews
Shelton WA, 98584
360-4267807

Washington State Department of Health
Southwest Regions Office of Drinking Water
P.O. Box 47823
Olympia, WA 98504-7823
360-664-0768

Washington State Department of Ecology
PO Box 47775
Olympia, WA 98504-7775
360-407-6300

B. Watershed Control Program

None of the system's sources of supply are under the influence of surface water, therefore no watershed control program is required.

VI. Operation & Maintenance Program

A. Operations Program

1. Organizational Structure

The authority for the water system is vested in the Board of Directors. To fulfill that responsibility, the Board of Directors created a six-member Water Committee in 1976. The actions of the Water Committee are accountable to the Board of Directors. The Water Committee is charged with the responsibility of overseeing the operation and maintenance of the water system. The six members of the Water Committee are elected, two at each Annual Membership Meeting, to serve three-year terms. The Board of Directors entrusts the day-to-day operations of the water system to the Water Committee, which in turn directs the operations of the system by a certified water distribution manager (WDM), who is employed by Lake Limerick Country Club.

It is the responsibility of all of the personnel to perform their duties in a manner that promotes a safe and reliable water supply, and to follow the laws set forth by the Department of Health, the Department of Ecology, and Mason County. The specific responsibilities of key District personnel are summarized below.

Personnel	Responsibilities
Director/Committee	Adopt rates and fees
	Set general policy and represent the community
	Set and approve budgets and plans
	Resolve personnel problems
Water Distribution Manager	Ensure the water system is properly operated and maintained
	Conduct trouble shooting
	Supervise repairs
	Deal directly with customers
Office Personnel	Assist the directors and committee members and the system operators
	Manage receivables and payables
	Deal directly with customers
	Maintain records

2. Telephone Contacts

The following are key telephone contact numbers for water system.

Office:	360-426-3581
Engineer:	SEMCON, Inc 360-753-5269 360-753-5636 (fax)
Certified System Operator	Ken Douglas (Certificate No. 6766) WDM1 360-426-4563
Cross Connection Control Specialist	Ken Douglas (Certificate No. 6766) 360-426-4563
The Department of Health Regional Engineer:	Sheri Miller, P.E. 360-664-2543
Department of Health Coliform Program:	Sandy Brentlinger 360-735-5090
Drinking Water Program Coordinator Mason County Department of Health	Arlene Hyatt (360) 427-9670 ext.293 FAX: 427-8442
Mason County Fire Marshall:	(360) 427-9670 ext 273
Kennedy-Goldsborough Watershed Planning (WRIA 14)	Lead agency contact: Diane Marcus-Jones (360) 427-9670 ext. 363 DianeM@co.mason.wa.us
Call-Before-You-Dig	800-424-5555

B. Operator Certification

The system is operated by a certified water distribution manager (WDM1). The manager is responsible for the day-to-day operation of the system, as well as maintenance and repairs made to the system.

C. Routine Operating Procedures

1. Daily During Times Of Peak Usage

   Keep record of:

   - Flow total reading from well meters

2. On a weekly basis:

   Check generator propane tanks for leaks.

   Order propane as required

   Keep record of:

   - Flow total reading from well meters (during non-peak use)
   - Condition of all equipment

3. On a monthly basis:

   Inspect the pump houses, filters, and booster equipment. Conduct an overall site inspection and clean up.

   Keep a record of:

   - Booster system pressure
   - Water level in well, if level instrument is installed (Note whether pump is on or off during this reading.)
   - If the motors sound good
   - Status of well head vent and screen
   - Signs of leaks or corrosion
   - Customer meter readings

4. Inspect tanks:

   Keep record of:

   - Condition of gate, lock, and fence.
   - Condition of tank ladder. Ensure that it is secured.
   - Condition of tank vent and screen. Ensure that they are secured.

5. On a semi-annual basis:

   Exercise blow-off valves; continue flushing as needed for each.

   Exercise each distribution main shutoff valve.

   Conduct customer service meter inspection.

   Open hatch on tanks. Check water levels against instruments that may be installed.

6. On a five year basis:

   Open and inspect the tank.

   Clean tank as needed.

D. Water Quality Sampling Procedures

1. Susceptibility & Vulnerability

The water quality tests that are required are dependent on the well's susceptibility and vulnerability ratings. Table VI-1 shows the ratings for each of the system's wells, which are established by the Department of Health, based on the Wellhead Protection Program presented in Section V.A. A Groundwater Contamination Susceptibility Survey Form for Well 6 is provided in Appendix I.

Table VI-1: Well Susceptibility and Vulnerability Ratings

	Susceptibility Rating	Vulnerability Rating
Well 1	Moderate	Moderate
Well 2	Moderate	Moderate
Well 3A	Moderate	Low
Well 3B	Low	Low
Well 4	Low	Low
Well 5	Moderate	Moderate
Well 6	Unrated	Unrated

2. Water Quality Monitoring

Table VI-2 shows the current water quality monitoring requirement, which is set by the Department of Health. The Code of Federal Regulations, Title 40, Section 141, which is adopted by WAC 246-290-025 by reference states that, when samples are for organic and inorganic analysis, *"[i]f a system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operation conditions."*[1] Therefore, the system should sample Wells 3A & 3B at the outlet of Tank 3.

a. Bacteriological Testing

Bacteriological tests are performed once a month on samples taken from the distribution system. Table VI-3 gives the location of the sample sites, which are shown on the map in Figure VI-1. Routine samples are taken alternately from three different routine sample sites. See Table VI-4 for the schedule.

[1] "Group A Public Water Systems, Chapter 246-290 WAC", (DOH #331-010), published by Washington State Department of Health, July 2004, pgs 234, 251, 257, 344 & 350.

Table VI-2: Water Quality Monitoring Requirements

Monitoring Group	Testing Method	Sample Location	Schedule/ Status
Asbestos	ASB	Distribution	1 sample every 9 years
Bacteriological	Coli	Distribution	2 samples/ month
Dioxin	SOC-1613	All Sources	No samples required through 2007
Endothall	SOC-547.1	Each Source	No samples required through 2007
EDB and other soil fumigants	SOC-504	Wells 1, 2, 3A, 3B, 4, & 5	No samples required through 2007
Glyphosphate	SOC-549.1	All Sources	No samples required through 2007
Herbicides	SOC-515.1	Wells 1, 2, 3A, 3B, 4, & 5	1 sample every 3 years
Insecticides	SOC-531.1	Wells 1, 2, 3A, 3B, 4, & 5	1 sample every 3 years
IOC	IOC	Wells 1, 2, 3A, & 4	1 complete IOC sample between Jan 2002 & Dec 2010
		Wells 3B, & 5	1 sample every 3 years
Nitrates	NIT	Wells 1, 2, 3A, 3B, 4, & 5	1 sample/ year
General Pesticides	SOC-525.1	Wells 1, 2, 3A, 3B, 4, & 5	1 sample every 3 years
Diquat	SOC-548.1	All Sources	No samples required through 2007
Radium	RAD 228	Wells 1, 2, 3A, 3B, 4, & 5	2 samples every 3 years
VOC	VOC-524.2	Wells 2, 3A 3B, 4, & 5	1 sample every 3 years

Table VI-3: Coliform Sample Sites

Sample Site Number	Sample Site Lot Number		
	Routine Site	Upstream Site	Downstream Site
1	1-31	1-34	1-99
2	1-194	1-123	1-197
3	4-41	4-5	4-44
4	3-175	3-134	3-128
5	2-120	2-153	2-147
6	5-76	5-92	5-73
7	3-405	3-49	3-56
8	3-462	3-478	3-472
9	2-67	2-16	2-22
10	2R-36	2-287	2R-2

Table VI-4: Coliform Sample Site Rotation Schedule

Month	Sample Sites
January	1 & 6
February	2 & 7
March	3 & 8
April	4 & 9
May	5 & 10
June	1 & 6

Month	Sample Site
July	2 & 7
August	3 & 8
September	4 & 9
October	5 & 10
November	2 & 7
December	3 & 8

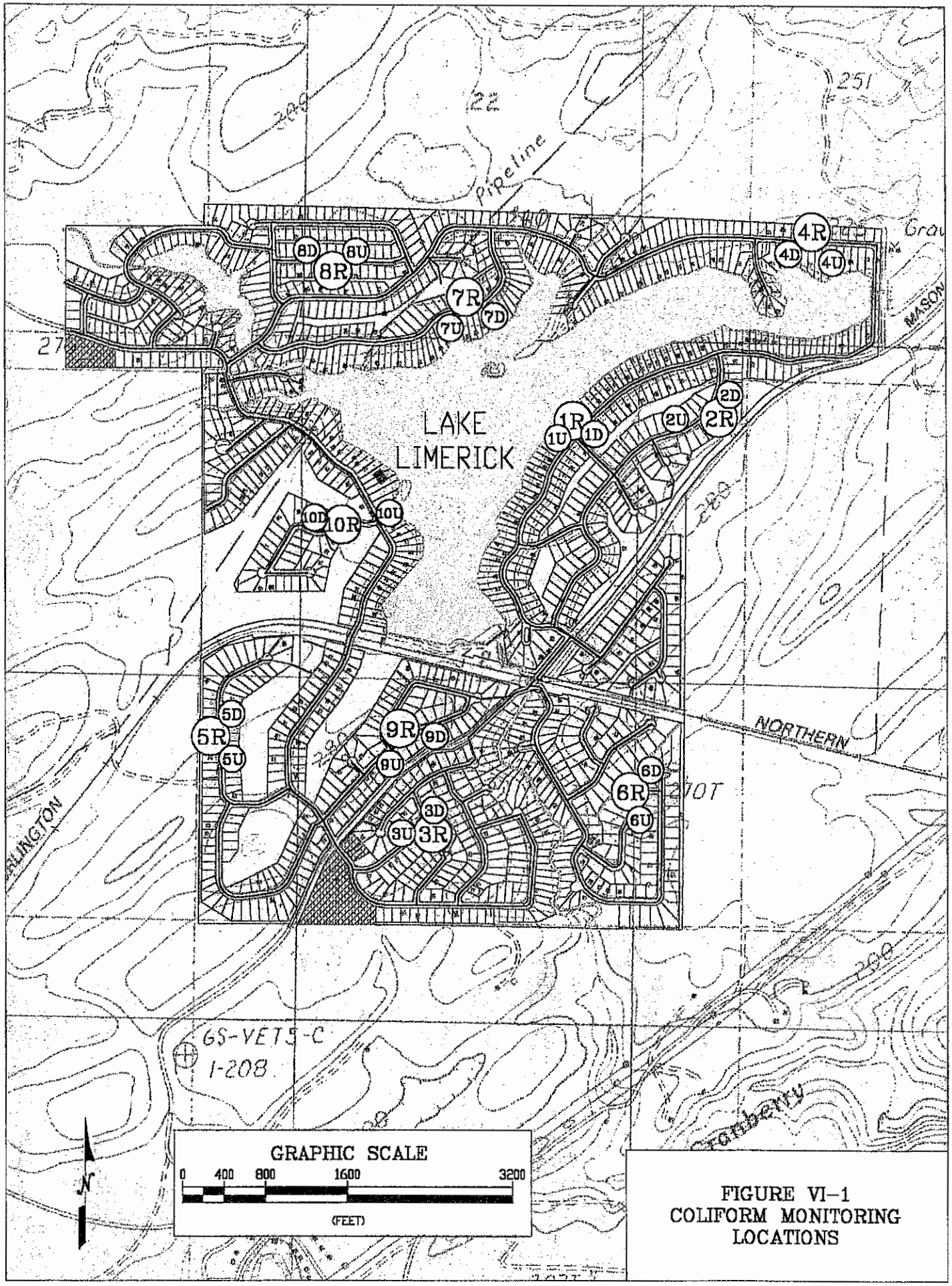

FIGURE VI–1
COLIFORM MONITORING
LOCATIONS

If coliform is found to be present in a sample, the sample is considered an "unsatisfactory sample." If a sample is determined to be invalid under WAC 246-290-320(2)(d) the procedures outlined in WAC 246-290-320(2)(e) & (f) are to be followed. For each valid unsatisfactory sample, a set of three repeat samples must be taken within 24 hours. The system should NOT be shock chlorinated before collection of repeat samples without prior approval by the Department of Health. If samples cannot be taken as outlined above or if any repeat samples are unsatisfactory, the system operator is to contact the Southwest Regional Office Department of Heath, Coliform Program at (360) 753-5090. If the repeat samples test positive for coliform, it will likely be considered an MCL violation. The system will be required to send out notification. The type of notification will depend on whether the system experienced an acute or non-acute violation.[1] Sample notifications for coliform violations are provided in Appendix J. These notifications can also be downloaded from the Department of Health, Department of Drinking Water's website at: http://www4.doh.wa.gov/dw/publications/publications.cfm. The downloaded forms can then be edited in Microsoft® Word.

The month after a positive coliform sample, the water system will take five routine samples. This will include the two sites scheduled for that month, the site(s) that tested positive the previous month, and one or more of the repeat sample sites associated with a positive result.

E. Emergency Response Program

The purpose of hazard mitigation is to maintain operational control of the water supply in the face of adverse conditions. The adverse conditions can be natural disasters, such as earthquake, storm, or flood; or man-made emergencies, such as a terrorist act or employee accident. Preparedness is the key to effective emergency response and recovery. Employees will need to be trained in procedures developed based on this program. Drills are a highly effective method of training. It is recommended that employees be cross-trained so that, in the event of an emergency, they may perform tasks normally performed by others.

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[1] "Follow-up to an Unsatisfactory Coliform Sample" (DOH #331-187), published by Washington State Department of Health, October 2002

Emergency plans and contact information should be available to the employees. Please note, however, the general public should not have access to the detailed emergency response plan. Persons seeking to create a threat could use this information to gain access to vulnerable parts of the water system. Also, the tools and equipment that employees might need in an emergency should be kept handy, and be well maintained. The type of response will, naturally, depend on the type of emergency.

1. Natural Disaster

Quality construction and maintenance are the best ways to mitigate a disruption of the water supply during a natural disaster. While it is impractical or impossible to build a water system sound enough to withstand the most extreme natural disasters, a well-constructed water system should be able to withstand the types and intensities of natural disasters that have a significant potential to occur within the lifetime of the system.

2. 911 Emergency

If an employee sees a situation that requires immediate response from police, the fire department or an ambulance, the employee should call 911.

3. Contaminated Water

Per Section VI.D of the water system plan, the water quality is routinely monitored. If monitoring shows that the water has become contaminated, or if there is some other reason to suspect contamination, such as a chemical spill in the area, or receipt of a credible threat, further testing may be required. Also, shutting down part or all of the water system may be required. Further response would depend on which parts of the system are shut down.

4. Well Problems

The Lake Limerick Water System has seven wells. If there is a problem with only one well, the other wells should be sufficient to provide water to the system during repairs. If a well becomes contaminated, the other wells may need to be tested as well. In the unlikely event that all wells are contaminated, immediate water use reduction must be initiated and other sources of supply will need to be found, such as trucked-in water, etc.

5. Storage or Distribution Problems

If a storage tank or part of the distribution system fails or becomes contaminated, it will have to be isolated from the rest of the system, and repaired, disinfected and/or decontaminated as needed.

6. Catastrophic Disasters

Catastrophic disasters include complete system failure, major natural disasters, and terrorist attacks, to name a few. Plans for a disaster of this magnitude should include designating a command station, establishing a command hierarchy, and communication protocols including protocols for contacting the police, the fire department, medical personnel, the media, affected residences, and/or calling in off-duty employees, as needed. A secondary location for the command station should also be designated, in case the primary location is compromised. Each location should have all the necessary tools, equipment, documentation and emergency supplies to operate as a command station in case of emergency. The command station's first priority should be to eliminate or mitigate the immediate threat, as much as possible. There should be a contingency plan for supplying the residents with a minimum requirement of potable water and to attend to any customers known to have critical water needs.

In the event of a region-wide disaster, such as earthquake, flood, or major fire, the state and county emergency response teams will implement disaster plans. The first steps in these plans will be to establish communications and conduct damage assessment. The first priority of these programs is preventing loss of life and treating injuries. Restoration of public services will take place as needed. As a rule of thumb, local areas should be prepared to be self sufficient for 72 hours.

In the initial 72 hours after a disaster, off-duty water system personnel should make an effort to contact the office after dealing with their own families' safety and security. Once on station, water system personnel should secure the major facilities as needed to minimize loss of water. The tanks should be secured and tests should be done to determine if the wells are serviceable. See Section IV.D for dealing with storage problems. Administrative facilities, such as customer records and computers, should also be secured.

A patrol should be sent to identify any main breaks, and determine which can be isolated. During this patrol, an assessment of other damage to the community should be made. At the same time as the local damage assessment is underway, attempts should be made to establish communication with local emergency services and the media.

One person should be assigned to all media contacts. Personnel in the field should attend to the system needs only, and refer all requests for information to the media spokesperson. Press releases and press conferences should be utilized as much as possible. Individual interviews should be denied as long as critical restoration is in progress and the system is unstable.

7. Retrospective

Following any threat, potential threat, or "near miss" incident, Lake Limerick staff should complete an incident report that identifies the conditions, actions, and elements of vulnerability that characterized the incident, and make any recommendations for review or action by the Board.

F. Safety Procedures

All personnel are required to adhere to the rules concerning elevated areas, confined spaces, and electrical safety as regulated by OSHA and WSHA. These include fall protection when accessing the top of the reservoir, ventilation and standby personnel when accessing the interior of the reservoir, and insuring that power is disconnected to any electrically powered device at the facilities, like pumps and controls. Open flames should not be permitted near the propane tanks. Asbestos cement pipes should not be disturbed, except by personnel trained in asbestos handling.

OSHA and WSHA regulations also apply to personnel working within trenches. Most of the underground pipelines have about 36" of cover and therefore should not require trench wall shoring. Nonetheless, personnel should be familiar with and strictly adhere to shoring requirements in the unlikely event that trench wall shoring is required.

G. Cross-Connection Control Program

On June 20, 1998, the Lake Limerick Country Club Board of Directors adopted Resolution 98-1, which approved the 1998 Water System Plan. This plan included several mandated programs and initiatives for the water system, including a Cross Connection Control Program. However, no implementation schedule was adopted and, to date, the Cross Connection Control Program has not begun its implementation.

The Cross Connection Control Program (CCCP) is created based on the authority conveyed by WAC 246-290-490, which states that:

> *"... All community water systems shall comply with the cross connection control requirements..." and,*
>
> *"... The purveyor's responsibility for cross connection control shall begin at the water supply source, include all the public water treatment, storage, and distribution facilities, and end at the point of delivery to the consumer's water system...."*

The Cross Connection Control Program is aimed at protection of the water system distribution network from contamination that might enter through one of the active service connections. Metered connections usually have a check valve, but these are known to be unreliable, and there is no way of detecting that a back-flow condition exists. An approved backflow assembly is designed with redundant components to prevent flow from reversing and, more importantly, there are pressure ports which a qualified technician can use to measure directly the performance of the backflow assembly in place.

To be effective, a cross connection control program must identify the potential hazard from backflows at every connection to the distribution system. This is accomplished by an ongoing program of inspection of all connections, in some cases of the on-premises plumbing systems, and frequent testing and servicing the backflow assemblies. State law provides a certification for backflow assembly testers (BATs), and for cross connection control specialists (CCCS), who have the training and credentials to conduct satisfactory inspections and judge the risk of contamination.

The first step in developing a program is to decide its basic structure. The Lake Limerick Water Committee elected to develop a program based on ownership by the water system of the backflow assemblies themselves. The water system would then be responsible for purchasing and installing the BAs, and also for the routine testing and reporting. Using this approach, it is believed that the lowest overall life-cycle cost to the members would be achieved.

The most common assemblies could be purchased in quantity, and be of interchangeable design. An open bid process could be used to contract with a licensed BAT to perform the testing. And finally, the cost of the basic program would be spread out among all customers, since the program is intended to cover all of them, eventually, and has as its goal the protection of the water quality in the entire system.

To initiate implementation, the Board needs to create sufficient authorization. For that purpose, a draft resolution is provided in Appendix K with the necessary provisions. Once the authorizing instrument is adopted, the Lake Limerick Water System should identify a program manager, who should be a CCCS.

The Lake Limerick Water Distribution Manager has a CCCS license and can be assigned to review and implement the CCC Program, and to manage and train staff to carry out the day-to-day activities. The designated CCCS is responsible for initial and annual review of the program, daily field work, hazard assessments, staff training, inventory management, public contacts, and recordkeeping. The Water Committee should encourage other personnel to obtain CCCS certification so that cross training and back-up will be available.

The CCCP is to be implemented on the following schedule, based upon the adoption date of the Water System Plan:

Implementation Date	Item:
1 month after plan adoption	Adoption of enabling resolution
	Designate CCC Specialist (contract, if required)
	CCC Specialist review and approve program
	Beginning training water system staff
	Refine and initiate record keeping procedures
2 month after plan adoption	Hire or contract BA Tester for routine circuit
	Initiate program consumer education
3 month after plan adoption	Conduct survey, identify potential high risk sites
	Establish inspection procedures for new services
	Obtain quotations for BA supplier, select
	Develop incident response procedures & records
4 month after plan adoption	Begin routine inspection of med/low risk sites
	Establish scheduling of annual inspections
10 month after plan adoption	Complete inspection of all med risk connections
	(assume average of 1.5 per work day, 600 total)

As noted in the discussion above, the water utility chooses to own and inspect the backflow prevention assemblies, and schedule and conduct regular (annual) inspection and service. In the aggregate, the cost of this activity is estimated, for each unit, to be:

Start-up	
$ 45	Hazard assessment and database input
180	Furnish and install BAs
$ 225	Installed cost, including indirect cost
Annual	
$ 20	

H. Service Reliability

The ability of the Lake Limerick Water System to provide service during certain adverse conditions has been analyzed and is detailed below. As discussed below, the system should be able to maintain service during power failure or during the loss of any one well site. However, it is important that these problems be rectified as soon as is reasonably possible in order to maintain the system's reliability.

1. Power Failure

During a power failure, the system will operate on primary backup generators at Well Sites 3 & 6. A backup generator at Well Site 2 can be hooked up. With the four wells at these three sites, the system can produce 535 gallons per minute. At maximum buildout, the PHD is calculated to be 852 gallons per minute. The system would need 47,550 gallons of equalizing storage.[1] The operational storage at the three sites with backup power equals 44,942 gallons. Therefore, the system will need a minimum of 92,492[2] gallons of usable storage to maintain daily service to the system. The system has 284,407 gallons of usable storage at these sites. Therefore, the system could run indefinitely on backup power.

2. Well Site Failure

Well 6 is one of the two largest wells in the system, each producing approximately 200 gallons per minute. Tank 6 has the largest volume of usable storage of all the system's tanks. Because of this, the system depends on Well Site 6 more than the other well sites.

If a problem developed with Well Site 6, the system would have to rely on the other five well sites. All the other wells combined can produce 800 gallons per minute. The other tanks combined have 177,106 gallons of usable storage. Calculations show that, if there are no other problems in the system, Lake Limerick Water System can sustain service indefinitely using this combination. However, the calculations also show that without Well Site 6, the system has insufficient standby storage.

Based on this, it can be concluded that, the system can function with any one well site out of service. However, for reliability, all six well sites should be maintained in proper working condition.

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[1] ES = 150 (PHD - Q), Eq 9-1, "Water Conservation Planning Handbook for Public Water Systems", (Publication #331-053), published by Washington State Department of Ecology, November 1991.

[2] 47,550 + 44,942 = 92,492

VII. Distribution Facilities Design & Construction Standards

A. Design & Construction Standards

All construction of new or replacement facilities shall be subject to the following specifications:

- The current Standard Specifications of the Washington Department of Transportation, including APWA Supplements;
- The Recommended Standards for Water Works, A Committee Report of the Great Lakes - Upper Mississippi River Board of State Public Health and Environmental Managers (The Ten States Standards);
- Any standards or specifications incorporated by a registered engineer in a project design approved by the Lake Limerick Water System, including the standard details that follow;
- Standard plans and details adopted by the Lake Limerick Water System. See Appendix L.
- Applicable Standards adopted under Washington Administrative Code.

The water system will require that plans and specifications for any new project be prepared in writing under the supervision of a registered professional engineer licensed to practice in the State of Washington. A project file will be opened and all design documents, construction bids and contracts, progress reports, field reports, change orders, test results, and project-related correspondence will be copied to this file. Projects involving construction or major modifications of wells, storage facilities, pump stations, and interties will be reviewed and approved by the Department of Health prior to construction. A construction certification by the engineer, indicating that the project was inspected and found to be in compliance with the required specifications, will be placed in the file for all projects.

By submittal of this water system plan, the Lake Limerick Water System requests project approval exemptions in accordance with WAC 246-290-125. The projects that exemptions are requested for are outlined in the capital improvement program (Section VIII) of this water system plan. In requesting these exceptions, the Lake Limerick Water System will:

- Maintain an approved water system plan with the Department of Health, per WAC 246-290-100(5).
- Employ the services of a licensed engineer. The Lake Limerick Water System will notify the Department of Health in writing before changing their designated review engineer.
- Amend the water system plan to indicate any further capital improvements not included in the capital improvement program

section of this water system plan, and request the exemption designated in WAC 246-290-125 in writing. Treatment improvements ineligible for exemption, or not included in this water system plan or future amendments, will be submitted for Department of Health review and approval.

- Maintain a project summary file and construction documentation for each system improvement completed under this exemption. This summary file will be available to the Department of Health upon request, and will include as-built drawings and engineering certificate.
- Submit a construction completion report in accordance with WAC 246-290-120(5) for new supply lines and water treatment facility, and maintain a construction completion report for all other distribution system related projects.

B. Procedures For Commissioning New Mains

1. Disinfection of new water mains[1]

Before being placed into service, all new mains and repaired portions of, or extensions to, existing mains shall be chlorinated so that a free chlorine residual of not less than 25 mg/l remains in the water after standing 24 hours in the pipe. The initial chlorine content of the water shall be not less than 50 mg/l.

Chlorine shall be applied by one of the following methods, to give a dosage of not less than 50 mg/l of available free chlorine.

As each length of pipe is laid, sufficient high-test calcium hypochlorite (65-70% chlorine) shall be placed in the pipe to yield a dosage of not less than 50 mg/l available chlorine, calculated on the volume of the water which the pipe and appurtenances will contain. The number of grams of 65% test calcium hypochlorite required for a 20-foot length of pipe equals $0.008431 \times d^2$, in which "d" is the diameter in inches.

Alternately, a chlorine gas-water mixture shall be applied by means of a solution-feed chlorinating device, or the dry gas may be fed directly through proper devices for regulating the rate of flow and providing effective diffusion of the gas into the water within the pipe being treated. Chlorinating devices for feeding solutions of the chlorine gas, or the gas itself, must provide means for preventing the backflow of water into the chlorine.

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[1] "Standard Specifications for Road, Bridge, and Municipal Construction", (Manual M 41-10), published by the Washington State Department of Transportation, 2004, Section 7-09.3(24) B

A mixture of water and high-test calcium hypochlorite (65-70% Cl) may be substituted for the chlorine gas-water mixture. The dry powder shall first be mixed as a paste and then thinned to a 1 percent chlorine solution by adding water to give a total quantity of 7.5 gallons of water per pound of dry powder. This solution shall be injected in one end of the section of main to be disinfected while filling the main with water.

Sodium hypochlorite, commercial grade (12.5% Cl) or in the form of liquid household bleach (5-6% Cl), may be substituted for the chlorine gas-water mixture. This liquid chlorine compound may be used full strength or diluted with water and injected into the main in correct proportion to the fill water so that dosage applied to the water will be at least 50 mg/l.

The preferred point of application of the chlorinating agent is at the beginning of the pipeline extension or any valved section of it, and through a corporation stop inserted in the horizontal axis of the pipe. The water injector for delivering the chlorine-bearing water into the pipe should be supplied from a tap on the pressure side of the gate valve controlling the flow into the pipeline extension. Alternate points of applications may be used when approved by the Engineer.

2. Flushing[1]

Sections of pipe to be disinfected shall first be flushed to remove any solids or contaminated material that may have become lodged in the pipe. If a hydrant is not installed at the end of the main, then a tap shall be provided large enough to develop a flow velocity of at least 2.5 ft/s in the water main.

Taps required by the Contractor for temporary or permanent release of air, chlorination or flushing purposes shall be provided by the Contractor as part of the construction of water mains.

Where dry calcium hypochlorite is used for disinfection of the pipe, flushing shall be done after disinfection.

The Contractor shall be responsible for disposal of treated water flushed from mains and shall neutralize the wastewater for protection of aquatic life in the receiving water before disposal into any natural drainage channel. The Contractor shall be responsible for disposing of disinfecting solution to the satisfaction of the Contracting Agency and local authorities. If approved by the Engineer, disposal may be made to an available sanitary sewer provided the rate of disposal will not overload the sewer.

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[1] "Standard Specifications for Road, Bridge, and Municipal Construction", (Manual M 41-10), published by the Washington State Department of Transportation, 2004, Section 7-09.3(24) A

3. Bacteriological Testing[1]

Before placing the lines into service, a satisfactory report shall be received from the local or State health department on samples collected from representative points in the new system. Samples will be collected and bacteriological tests obtained by the Engineer.

Should the initial treatment result in an unsatisfactory bacteriological test, the original chlorination procedure shall be repeated by the Contractor until satisfactory results are obtained. Failure to get a satisfactory test shall be considered as failure of the Contractor to keep the pipe clean during construction, or to properly chlorinate the main.

4. Pressure Testing[2]

All water mains and appurtenances shall be tested in sections of convenient length under a hydrostatic pressure equal to 150 psi in excess of that under which they will operate or in no case shall the test pressure be less than 200 psi. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished and operated by the Contractor.

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 Contractor shall furnish and install temporary blocking and remove it after testing.

The mains shall be filled with water and allowed to stand under pressure a sufficient length of time to allow the escape of air and allow the lining of the pipe to absorb water. The Lake Limerick Water System will furnish the water necessary to fill the pipelines for testing purposes at a time of day when sufficient quantities of water are available for normal system operation.

The test shall be accomplished by pumping the main up to the required pressure, stopping the pump for 15 minutes, and then pumping the main up to the test pressure again. During the test, the Section being tested shall be observed to detect any visible leakage.

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[1] "Standard Specifications for Road, Bridge, and Municipal Construction", (Manual M 41-10), published by the Washington State Department of Transportation, 2004, Sections 7-09.3(24) N, 0

[2] "Standard Specifications for Road, Bridge, and Municipal Construction", (Manual M 41-10), published by the Washington State Department of Transportation, 2004, Section 7-09.3(23)

A clean container shall be used for holding water for pumping up pressure on the main being tested. This makeup water shall be sterilized by the addition of chlorine to a concentration of 50 mg/l.

The quantity of water required to restore the pressure shall be accurately determined by pumping through a positive displacement water meter. The meter shall be approved by the Engineer.

Acceptability of the test will be determined as follows:

The quantity of water lost from the main shall not exceed the number of gallons per hour as determined by the formula:

$$L = \frac{ND\sqrt{P}}{7400}$$

In which

L = allowable leakage, gallons/hour

N = number of joints in the length of pipeline tested

D = nominal diameter of the pipe in inches

P = average test pressure during the leakage test, psi

Alternately, the following formula[1] may be used to determine acceptability of the pressure test:

$$L = \frac{SD\sqrt{P}}{266{,}400}$$

In which

L = allowable leakage, gallons/hour

S = gross length of pipe tested, feet

D = nominal diameter of the pipe in inches

P = average test pressure during the leakage test, psi

There shall not be an appreciable or abrupt loss in pressure during the 15-minute test period.

[1] "Standard Specifications for Road, Bridge, and Municipal Construction", (Manual M 41-10), published by the Washington State Department of Transportation, 2004, Section 7-09.3(23)

Note: Both of these formulae calculate an allowable loss of water. A measurement of actual water loss to compare to the allowable loss is a requirement. Gauges used in the test shall be accompanied with certifications of accuracy from a laboratory approved by the Engineer.

Any visible leakage detected shall be corrected by the Contractor regardless of the allowable leakage specified above.

Should the tested section fail to meet the pressure test successfully as specified, the Contractor shall, at no expense to the Lake Limerick Water System, locate and repair the defects and then retest the pipeline.

All tests shall be made with the hydrant auxiliary gate valves open and pressure against the hydrant valve. After the test has been completed, each gate valve shall be tested by closing each in turn and relieving the pressure beyond. This test of the gate valve will be acceptable if there is no immediate loss of pressure on the gauge when the pressure comes against the valve being checked. The Contractor shall verify that the pressure differential across the valve does not exceed the rated working pressure of the valve.

Sections to be tested shall normally be limited to 1,500 feet. The Engineer may require that the first Section of pipe, not less than 1,000 feet in length, installed by each of the Contractor's crews, be tested in order to qualify the crew and the material. Pipe laying shall not be continued more than an additional 1,000 feet until the first Section has been tested

Prior to calling out the Engineer to witness the pressure test, the Contractor shall have all equipment set up completely ready for operation and shall have successfully performed the test to ensure that the pipe is in a satisfactory condition.

Defective materials or workmanship, discovered as a result of hydrostatic field test, shall be replaced by the Contractor at no expense to the Lake Limerick Water System. Whenever it is necessary to replace defective material or correct the workmanship, the hydrostatic test shall be re-run at the Contractor's expense until a satisfactory test is obtained.

VIII. Improvement Program Schedule

The Lake Limerick Water System has accomplished most of the significant improvements recommended in the 1998 Water System Plan, and as a result, the system now has only limited deficiencies. Water meter installation has been completed and with additional conservation measures has resulted in measurable improvement of water use efficiency. A pipeline on St. Andrews Drive was determined to be a six inch main rather than the expected 4 inch. This line was indicated by hydraulic analysis to be a significant bottleneck, but the discovery that it was actually six inch made this issue moot.

The most significant system improvement undertaken since the 1998 plan was the testing and commissioning of Well 6 in 2001. Pumping tests and water quality evaluation were conducted to assess the suitability of this well to be added to the system. The tests confirmed that Well 6 could sustain a yield of about 200 gpm, and the quality of the water is excellent. Following this, a design was prepared and funds were obtained from the state revolving fund in order to complete installation of a permanent well and a storage tank. This project was completed in the spring of 2005, and the well was commissioned.

With the exception of obtaining an appropriate water right certificate for Well 3B(application pending), there are no known specific deficiencies of a critical nature in the Lake Limerick Water System. However, there is a need to continuously carry out system improvement by regular renewal and replacement of any part of the infrastructure that may be nearing the end of its useful life. A program of regular renewal and replacement is recommended; to be continued until all facilities have been serviced. The key elements of the recommended system improvement program are as follows:

A. System improvement program

1. Meter calibration program

   To ensure accurate billing and to track water use efficiency as required by the Municipal Water Law, the service and source meters need to be calibrated every 5 years, or more often if an error is evident. Calibrating all service meters will require calibration of about 250 meters per year over the 5 year cycle.

   Estimated annual cost: $5,200

2. Backflow prevention assemblies

As set forth in Section VI-G, some residential connections will require backflow prevention assemblies (BAs). To estimate the cost, it is assumed that a total of 600 units will be installed, all double-check-valve assemblies, and the cost per unit is $180 installed. Due to the large number of connections and the time and expense of installation of the BAs, the installation is scheduled to extend over a period of about a year and a half. The testing and maintenance of the assemblies will be included in the operating and maintenance budget for the system.

Estimated cost: $ 108,000

3. Water main replacement program

The distribution system is comprised mainly of asbestos-cement pipe. As the service life of the pipe approaches, a long term approach to replacement of the pipe should be to replace, as funds are available, older sections, and sections known to have operational deficits, such as leaks. This item is budgeted as a certain amount each year, which is to be expended for a specific project, or carried to the next year as a sinking fund for water main renewal and replacement.

Estimated annual cost: $10,000-$30,000

The following is a proposed time schedule for improvements:

Table VIII-1: System Improvement Schedule

(Costs in Current Dollars)

YEAR →	2006	2007	2008	2009	2010	2011	2012	2013
Meter Calibration	5,200	5,200	5,200	5,200	5,200	5,200	5,200	5,200
Backflow Prevention		58,000	50,000					
Main Replacement			10,000	10,000	20,000	20,000	30,000	30,000
Total	5,200	63,200	65,200	15,200	25,200	25,200	35,200	35,200

IX. Financial Program

The Lake Limerick Country Club is a multipurpose mutual association that provides for many of the community's needs. The water system is a part of the constellation services, and some of the water system transaction records are kept in accounts consolidated with other enterprise units within the Association. The water utility has gradually been setting up a compiled set of all accounts for the water system alone. Presently, Income Statements are developed separately for the water system, but some components of Balance Sheets are consolidated. Thus, a complete balance sheet for the water system alone is not available.

A. Rates and Charges

Since October, 2004, charges for water service include an annual fee of $204 for a metered lot, and a separate annual fee for a non-metered lot of $60. A metered lot is charged $17/month base rate which carries an allotment of 12,000 gallons per month. Additional use above the allotment is charged at $2.00 per thousand gallons. A non-metered lot is charged a fixed monthly rate of $5. The installation of a meter incurs a one-time charge of $1,000. In 2006, the Water Committee approved a change for metered use to a total of $20 per unit per month, and $8/month non-metered, both effective October 1, 2006.

The fixed allotment of 12,000 gallons per month is equivalent to 394 gal/day/account. This value lies between the estimated average daily use (270 g/d) and maximum daily use (540 g/d). During peak demand season, a residential unit would be likely to exceed 270 g/d a number of times, but whether this makes the monthly total exceed the allotment would depend on the duration of high demand conditions, such as weather.

At the current fixed rate of $17/mo, and if consumption was just 12,000 gallons in that month, the customer would theoretically sense that the marginal cost of water is $1.42 per thousand gallons. Above the allotment, the use charge of $2.00 per thousand rate represents an increase in the marginal cost of water of 40%. The informed customer would be expected to avoid the marginal cost change, a tendency referred to as "price elasticity."

At the new rate of $20/month, the perceived marginal cost just at the threshold of 12,000 gallons is $1.67 per thousand gallons. The "above-allotment" cost of $2.00 per thousand then is an increase of 20% in marginal rate. Although the customer may actually have greater monthly expense for water, there is a lowered price elasticity due to the smaller percentage difference. For future rate increases, it is recommended that the utility consider shifting a greater share of rates to the water consumption charge, and also reducing the amount of the allotment for the base rate.

B. Current Financial Condition

The following table summarizes actual Income Statements for fiscal years 2004 and 2005, and an adopted budget for 2006.

Table IX-1: Income Statements and Current Budget

Year →	2004	2005	Budget 2006
Sales	345,029	262,580	282,784
Connection Fees	5,120	21,000	10,000
Other Charges	148	830	300
Gross Income	350,297	284,410	293,084
Labor	85,246	75,666	80,460
Taxes	17,007	1,249	1,000
Accounting	795	2,062	1,000
Advertising	-	-	100
Bank Charges	211	2,164	1,200
Depreciation	39,587	45,000	52,905
Subscriptions	175	-	500
Engineering	2,751	11,212	10,000
Equip. Rent	705	570	800
Insurance	11,437	6,730	6,000
Legal	10,052	6,695	12,000
Licenses, Permits	2,670	2,506	2,000
Newsletter	1,691	1,636	1,500
Postage	4,892	5,299	7,000
Prof Services	134	143	1,500
Maintenance	17,871	15,650	14,000
Security Contract	2,606	2,500	7,500
Service Contract	1,000	2,500	
Supplies	4,717	5,559	5,200
Telephone	1,645	1,842	2,000
Utilities	15,664	16,749	20,000
Vehicle	2,009	2,441	2,000
Testing	489	1,738	3,000
Total Expenses	223,354	209,911	231,665
Net Operating Income	126,943	74,499	61,419
Interest Income	2,553	1,260	1,000
Non-Op Income	6,013	2,229	1,700
Interest Expense	(1,031)	1,063	-
Non-Op Expense	15	434	15,000
Subtotal Other Income & Expenses	7,520	1,992	(12,300)
Net Income	134,463	76,491	49,119

The recent income statements reflect a positive net operating income, and significant depreciation expenses. These factors suggest that current revenue requirements are being met. Actual revenue in 2005 averaged $227 per year, or $19 per month per lot. This value is in the lower half of average water rates in the region.

Balance sheets are only available for the entire organization, since assets and liabilities are generally not disaggregated to show the water system portion. However, the whole balance sheets for the last five years give some useful insights.

Table IX-2: Recent Balance Sheets, Lake Limerick Country Club

	2001	2002	2003	2004	2005
Current Assets	273,952	359,203	361,721	310,834	473,477
Fixed Assets	2,573,542	2,656,487	2,837,916	3,022,480	3,849,414
Less Accumulated Depreciation	(1,380,731)	(1,422,096)	(1,604,001)	(1,715,614)	(1,706,825)
Net Book Value	1,192,811	1,234,391	1,233,915	1,306,866	2,142,589
Other Assets	46,013	54,888	63,318	99,938	79,386
Total Assets	1,512,776	1,648,482	1,658,954	1,717,638	2,695,452
Current Liabilities	72,254	117,712	75,468	62,951	169,596
Long Term Liabilities	76,178	36,732	3,193	26, 172	494,817
Capital	1,364,343	1,494,038	1,580,293	1,628,515	2,031,039
Total Liabilities	1,512,775	1,648,482	1,658,954	1,717,638	2,695,452

The current assets are typically 3 or 4 times the current liabilities. Net book value remained steady in the early years, but in recent years has shown significant increase. This reflects the commitment to maintain and improve capital facilities. The increase in debt (long term liabilities) in 2005 is an impact of developing the Well 6 facilities using a State Revolving Fund loan. Debt-equity ratio is still far less than one.

Also, a brief inspection of the 2004 depreciation schedule for the organization was conducted to identify likely assets of the water system. As a result of this analysis, the following estimates are made:

Table IX-3: Net Current Value of Water System

Total Cost of Plant in Service	$ 1,757,236
Total Depreciation (EOY 2004)	(632,192)
Net Plant in Service	$ 1,125,044

C. Forecasted Financial Conditions

The 2006 budget adopted for the water system, together with the proposed system improvements, was used to estimate the financial conditions of the water system through 2013. This forecast is shown in the table below:

Table IX-4: Forecasted Financial Conditions

YEAR -->	Budget 2006	2007	2008	2009	2010	2011	2012	2013
Sales	282,784	296,923	311,769	327,357	343,725	360,911	378,957	397,905
Connection Fees	10,000	10,000	11,000	7,000	11,000	11,000	9,000	9,000
Other Charges	300	500	500	500	500	500	500	500
Gross Income	293,084	307,423	323,269	334,857	355,225	372,411	388,457	407,405
Expenses w/o Depr	178,760	193,061	208,506	225,186	243,201	262,657	283,670	306,364
Depreciation	52,905	75,000	75,000	75,000	75,000	75,000	75,000	75,000
Total Operating Expense	231,665	268,061	283,506	300,186	318,201	337,657	358,670	381,364
Net Operating Income	61,419	39,362	39,763	34,671	37,024	34,754	29,787	26,041
Reverse Depreciation	52,905	75,000	75,000	75,000	75,000	75,000	75,000	75,000
Other Income	2,700	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Other Expense	(15,000)	(10,000)	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)
Loan Payment	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)	(20,000)
Improvement Program	(5,200)	(63,200)	(65,200)	(15,200)	(25,200)	(25,200)	(35,200)	(35,200)
Net Funds Forward	23,919	24,162	31,563	76,471	68,824	66,554	51,587	47,841
Funds Accumulated	23,919	48,081	79,644	156,115	224,939	291,493	343,080	390,921

In this table, sales are escalated at 5% annually, and total expenses are increased at 8%. It is believed this escalation will cover increased testing requirements. The connection fees are calculated at $1,000 per new service (See Section II). Depreciation is increased in 2006 to recognize booking the Well 6 facility in 2005 at $ 548,000 (25 year S/L). The loan payment is also budgeted from 2005. The total system improvement cost, as estimated in Section VIII is included as debits. "Other expense" shows an entry in 2005 and 2006 for payment to reserves, with an accumulated amount of about $30,000.

The calculated funds carried forward, if depreciation is included, indicate that the financial conditions produce a steady accumulation of reserves, with a balance of over $390,000 predicted for 2013.

Appendix A: Request for Increased Connection Approval (Approved in 2001)

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
SOUTHWEST DRINKING WATER OPERATIONS
2411 Pacific Ave. • P.O. Box 47823 • Olympia, Washington 98504-7823
(360) 664-0768 • FAX (360) 664-8058
TDD Relay Service: 1-800-833-6388

August 29, 2001

Kenneth Douglas
Lake Limerick Water
East 790 Saint Andrews Drive
Shelton, Washington 98584

Subject: Lake Limerick Water System, ID # 44150,Mason County; Analysis with New Demand Data, DOH Project #01-0609, **FINAL APPROVAL**

Dear Mr. Douglas:

This letter acknowledges receipt of the Construction Report for the completion of installation of the subject project for this water system that was signed by your engineer John Segerson and dated July 2, 2001. The construction report indicates that this project has been completed according to plans and specifications that were approved by this office. On the basis of the design analysis for this project, which was prepared by your engineer and approved by this department, this water system is approved **for 1250 Equivalent Residential Units.**

Sincerely,

JERROD DAVIS
WSDOH Regional Engineer

cc: John Segerson, PE
Mason County Health Services

SEMCON, Inc.

618 South Quince St. Suite C, Olympia, WA 98501-1535
Phone: 360-753-5269 ☎ Fax/Data: 360-753-5636 🖳 Internet: semcon@olywa.net
☑ Engineering ☑ Planning ☑ Management ☑ Information Technology

June 7, 2001

Mark Toy, Regional Engineer
Southwest Drinking Water Operations
Department of Health
P.O. Box 47823
Olympia, WA 98504-7823

Subject: Lake Limerick Water System, ID#44150T, Mason County
Request for Increased Connection Approval

Dear Mark,

In 1998, the Department approved a water system plan for the Lake Limerick water system, and subsequently approved the capacity of the system for 1,100 ERU. A recent census of the customers of the Lake Limerick system revealed that there are currently 1,068 residences and community facilities for which water is being supplied. The assessment of system capacity in the approved water plan utilized the following estimated values of water requirement per ERU.

Average Day	400 gal/ERU
Maximum Day	850 gal/ERU
Maximum Hour	60 gal/ERU

Production statistics of the system, dating from 1993 to 1997, were used to establish these values. At the time, the values were noted as being somewhat high for the customer characteristics of Lake Limerick.

In 1998, the duties of water system manager were assumed by Mr. Ken Douglas (WDM-I). Since that time, an aggressive conservation program has produced a significant change in the characteristic water use by the system. In addition to optimizing well controls and eliminating frequent tank overtopping, all connection to the golf course irrigation has been eliminated, and the system has been audited for leaks and other wasteful water uses. A significant number of both system and customer leaks have been identified and corrected. Recently, all connections have been provided with meters and data is being collected for the purpose of setting future water rates based on use.

In the attached Figure 1, the monthly water production is plotted from 1993 to the present. The successful reduction in water use is readily seen in these data, together with the increase in the number of customers served. The peak monthly water use has been reduced from about 19 million gallons to about 12 million gallons, while at the same time the number of connections has

increased from 783 to 1,068. The average daily production per ERU in the 12 months from November 1999 to December 2000 was 227 gallons.

In Figure 2, there is a plot of daily production in August of 2000 (this was a special study, since daily readings are not normally taken), expressed in gallons per ERU. The highest recorded demand was just over 500 gallons per day per ERU. The trend in the data is down, suggesting that higher demand may have been experienced in the previous month. In fact, the total production for July was 12.2 million gallons, whereas August production was 11.6 million gallons. It is possible that the maximum daily production occurred in July, but there is high confidence that the amount would have been below 650 gallons per day per ERU.

Based on the above, the following values should be reasonable for revising the system capacity:

Average Day	300 gal/ERU
Maximum Day	650 gal/ERU
Maximum Hour	40 gal/ERU

This letter report is to request, and provide justification for, increasing the approved connections for the Lake Limerick system to 1,250 ERU, which is the expected full buildout.

Evaluation of Source Capacity

The Lake Limerick Water System enjoys water rights for 890 gpm and 446 acre-feet per year. The 890 gpm (instantaneous withdrawal) includes Well 6. Due to an oversight at the time of construction, a water right was not obtained for Well 3B, which has a capacity of 210 gpm. An application for this water right has been pending since April 24, 1997. The 446 acre-feet per year (annual withdrawal) provides enough commodity for 1,328 ERU

The current source pumping capacity is 850 gallons per minute, including Well 3B. This total was determined by reviewing the actual metered flows. In addition, where wells are pumped directly to the distribution system, the pump curves were evaluated to determine the pumping rate that would be expected at a hydraulic grade elevation of 535 feet. At this grade elevation, there would be 30 psi at all services. The number of ERUs that could be supported by the source pumping capacity of 850 gpm is 1,695.

Total capacity of pumps delivering to the distribution system is 1,150 gpm. This total includes the production of Wells 2, and 5, which deliver directly to the distribution system, and booster pumps at Wells 1, 3, and 4. This peak

pumping rate will support 1,427 ERU, using peak hourly flow estimated from maximum daily demand. (See attached calculations)

Source capacity is thus most constrained by the annual water rights, which support 1,328 ERU using the revised demand factors.

Evaluation of Storage Capacity

The storage capacity was evaluated using the methodology of the June 1999 Water System Design Manual. The calculations are included in an attachment. The storage system is capable of supporting 1,632 ERU, using an actual storage volume of 335,000 gallons, with the following allocation of storage components:

Operational Storage		8,600 gallons
Equalizing Storage		67,234
Standby Storage		
In Tank Volume	259,166	
Source Credit	855,360	
Total Standby Storage		1,114,526
Overall Total Volume		1,190,360 gallons

Evaluation of Distribution

In addition to the distribution pumping capacity evaluated above, the piping network was also evaluated by hydraulic analysis (model output data attached) to determine the probable maximum flow capacity. Using the analysis constructed for the water system plan, total demand was adjusted until an unacceptable condition was identified. At the total demand of 1,091 gpm, the limit was determined to be the 4" main from Well 3 to the Road of Tralee, which experienced 7 ft per sec velocity. The demand of 1,091 gpm is equivalent to 1,345 ERU (See attached calculations)

Summary of Capacity Evaluation

The following summarizes the estimation of capacity of the Lake Limerick water system:

Source Capacity, Average Day	1,328 ERU
Source Capacity, Maximum Day	1,695
Distribution Pump Capacity	1,427
Storage Capacity	1,632
Distribution Line Capacity	1,345

The above evaluation indicates that, as a result of good management of water use, there should be sufficient capacity in the system to serve the intended buildout of 1,250 ERU. Hopefully this information will permit you to approve the requested connection increase. If you need clarification of any of the above, or have any other questions, please feel free to call me.

Sincerely,

John Segerson, P.E.

Figure 1
Monthly Total Water Production

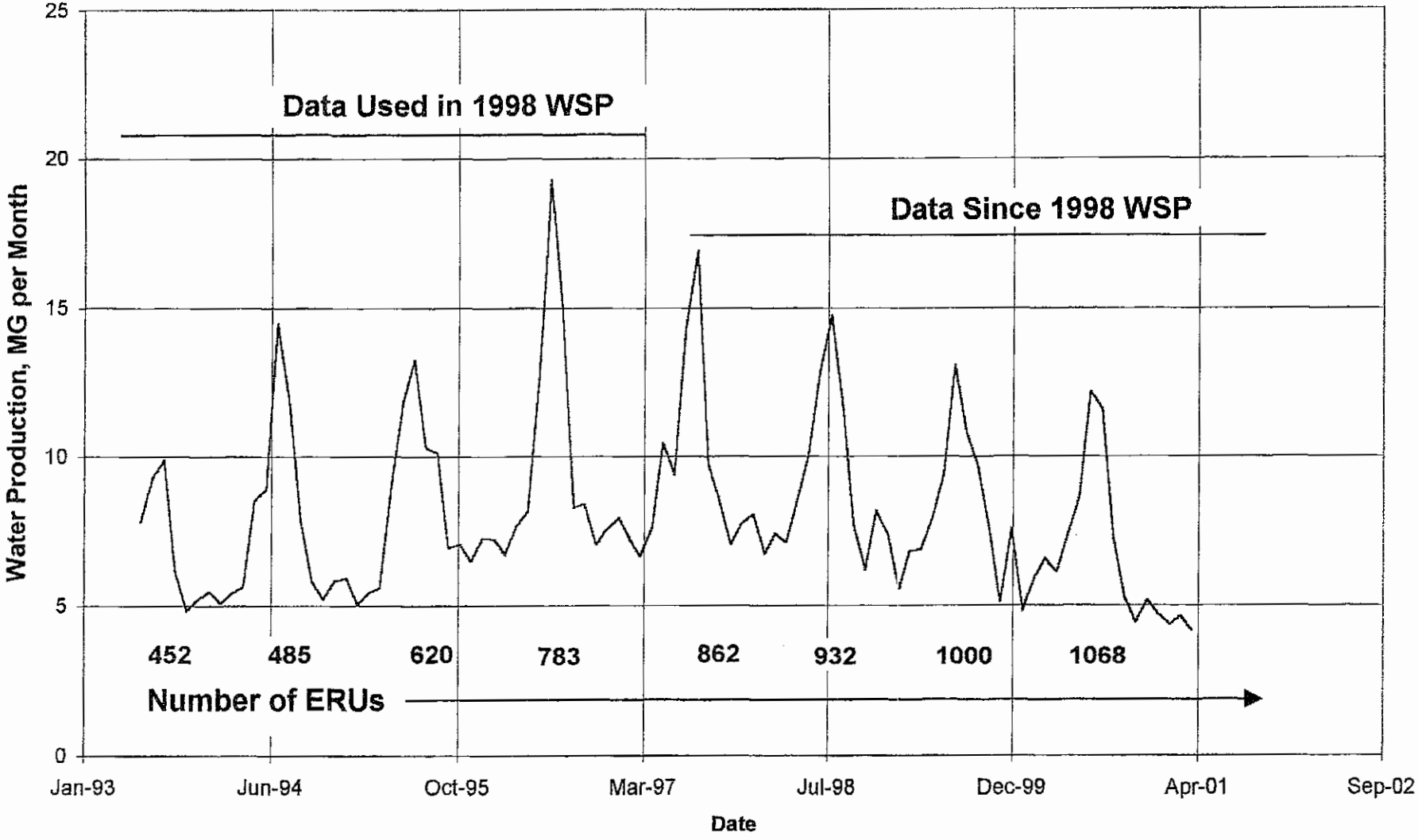
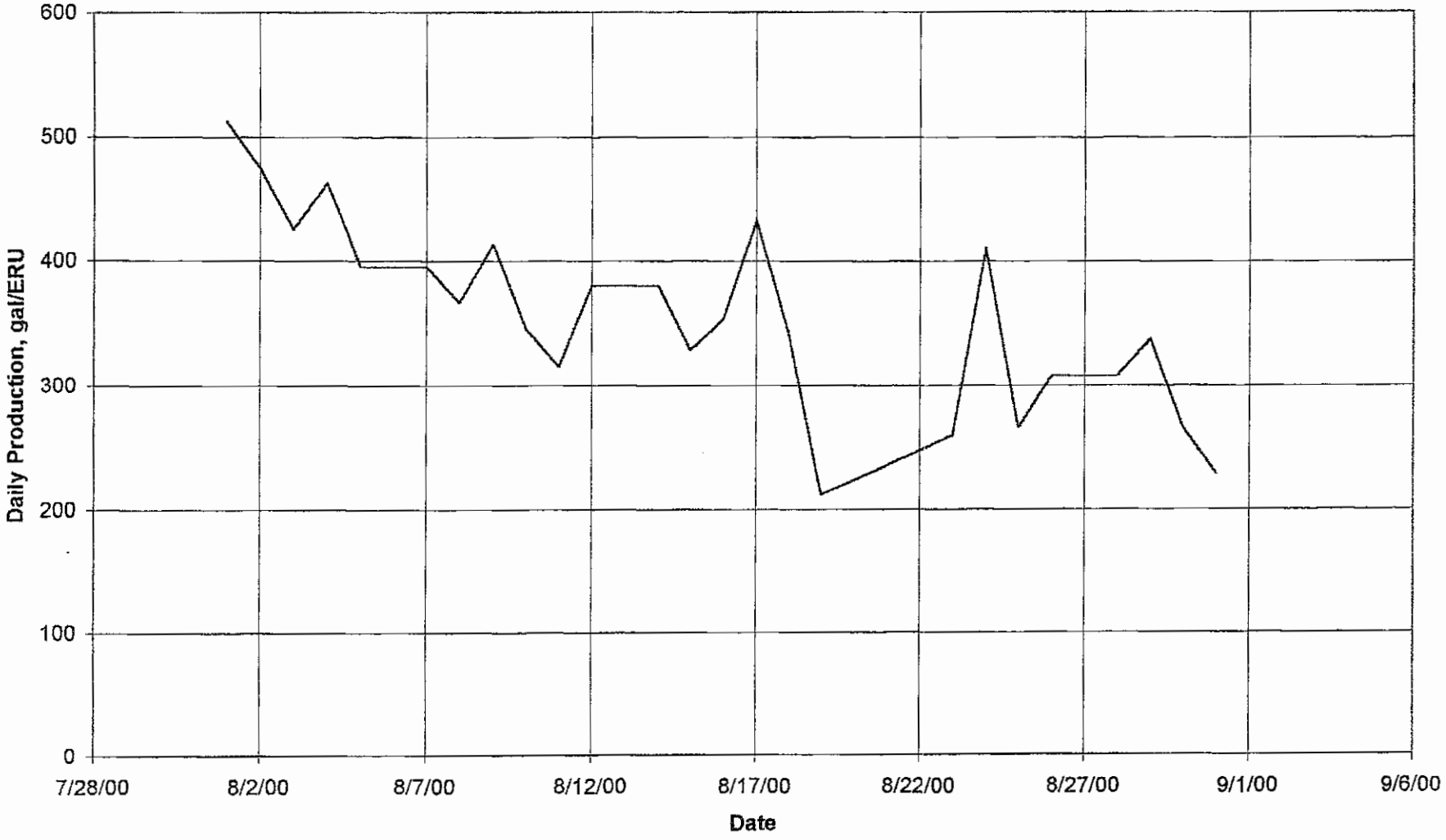


Figure 2
Daily Water Use, August, 2000



Calculation of System Capacity,
Lake Limerick Water System
June, 2001

ERU FACTORS

$ADD := 270$ Average daily demand, gallons/day/ERU

$MDD := 650$ Maximum daily demand, gallons/day/ERU

$C := 1.6 \quad F := 225$

$N := 1068$ Current ERUs

$$PHD := \frac{MDD}{1440} \cdot (C \cdot N + F) + 18$$

$PHD = 891$ Maximum hourly demand, gallons per minute

$\frac{PHD \cdot 60}{N} = 50.05$ Maximum hourly demand, gallons per hour per ERU

PLANT IN SERVICE DATA

Total Source Production

$Q := 850$ Actual Total Pumping Capacity, gpm

$Q_1 := 190$ Largest Pump in Service, without standby capability

$t := 90$ Average Pump Duty, in percent of 24 hr day

$Q_r := Q - Q_1$ Actual Reliable Pumping Capacity (remove largest source), gpm

$t_r := 90$ Pump Duty, reliable capacity, percent of 24 hr day

$V_{TS} := 14.4 \cdot Q \cdot t$ Volume from source production $V_{TS} = 1101600$

$V_r := 14.4 \cdot Q_r \cdot t_r$ Reliable Volume, without largest source $V_r = 855360$

Total Distribution Pumping Capacity

$Q_D := 1150$ Total pumping capacity to distribution system

Total Useable Actual Storage Volume, gallons

$V := 335000$ Gross total

$V_O := 8600$ Operational Storage

$V_{AV} := V - V_O$ Available for Equalizing and Standby $V_{AV} = 326400$

$CRS := V_{AV} + V_r$ Total Capacity-Related Storage $CRS = 1181760$

CAPACITY BASED ON CRS

NUMBER OF ERUs

$$N := \frac{CRS + 150 \cdot \left[Q - \left(\frac{MDD}{1441} \right) \cdot F \right] - 2700}{150 \cdot \left(\frac{MDD}{1440} \right) \cdot C + MDD}$$

SELECT ERU CAPACITY BASED ON MINIMUM REQUIRED VOLUME

$$ERU(N) := \begin{cases} N \text{ if } \frac{(V_{AV})}{N} > 200 \\ \frac{(V_{AV})}{200} \text{ otherwise} \end{cases}$$

$\frac{(V_{AV})}{N} = 192$ $\frac{(V_{AV})}{200} = 1632$

$\frac{(V - V_O)}{ERU(N)} = 200$

$N := ERU(N)$ $N = 1632$

ALLOCATION OF STORAGE

$$V_{ES} := 150 \cdot \left[\left(\frac{MDD}{1440} \right) (C \cdot N + F) + 18 - Q \right]$$

$V_{SA} := V_{AV} - V_{ES}$

$V_{SM} := CRS - V_{SA}$

$V_O = 8600$ Operational Storage

$V_{ES} = 67234$ Equalizing Storage

$V_{SA} + V_r = 1114526$ Total Standby Storage

$V_{SA} = 259166$ Standby Storage, in actual volume

$V_r = 855360$ Standby Storage, in source credit

$V_O + V_{ES} + V_{SA} = 335000$ Check Sum, actual storage

CAPACITY BASED ON PEAK PUMPING RATE AVAILABLE

$$N := \frac{1}{C} \cdot \left[(Q_D - 18) \cdot \left(\frac{1440}{MDD} \right) - F \right]$$

$N = 1427$

CAPACITY BASED ON MAXIMUM DISTRIBUTION RATE

$Q_D := 1091$ **Reset peak pumping rate based on distribution limit**

$$N := \frac{1}{C} \cdot \left[(Q_D - 18) \cdot \left(\frac{1440}{MDD} \right) - F \right]$$

$N = 1345$

Lake Limerick Water System hydraulic analysis. Demands increased until minimum pressures and maximum velocities obtained to determine maximum allowable demand on system.

MAXIMUM DIMENSIONS	
Number of pipes	1000
Number of pumps	250
Number junction nodes	1000
Flow meters	250
Boundary nodes	100
Variable storage tanks	250
Pressure switches	250
Regulating Valves	250
Items for limited output	1000
limit for non-consecutive numbering	10260

Cybernet version 2.18. SN: 1132180497-1000

Extended Description:

U N I T S S P E C I F I E D

FLOWRATE ..... = gallons/minute
HEAD (HGL) ..... = feet
PRESSURE ..... = psig

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
ALL PIPES
ALL JUNCTION NODES

MAXIMUM AND MINIMUM PRESSURES = 6

S Y S T E M C O N F I G U R A T I O N

NUMBER OF PIPES .....(p) = 102
NUMBER OF JUNCTION NODES .....(j) = 80
NUMBER OF PRIMARY LOOPS .....(l) = 17
NUMBER OF BOUNDARY NODES .....(f) = 6
NUMBER OF SUPPLY ZONES .....(z) = 1

****
S I M U L A T I O N R E S U L T S
****

The results are obtained after 6 trials with an accuracy = 0.00162

S I M U L A T I O N D E S C R I P T I O N

CyberNet Version 2.18. Copyright 1991,92 Haestad Methods Inc.
Run Description: Basic Network
Drawing: LIMERICK

P I P E L I N E R E S U L T S

STATUS CODE: XX -CLOSED PIPE BN -BOUNDARY 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)	MINOR LOSS (ft)	LINE VELO. (ft/s)	HL/ 1000 (ft/ft)
1	224	101	123.70	0.73	0.00	0.00	1.40	1.55
2	102	101	-56.73	1.60	0.00	0.00	1.45	2.63
3	102	103	50.18	1.21	0.00	0.00	1.28	2.09
5	105	103	-10.28	0.13	0.00	0.00	0.26	0.11
6	106	105	3.62	0.02	0.00	0.00	0.09	0.02
7	108	106	10.99	0.15	0.00	0.00	0.28	0.13
10	108	111	-33.89	1.62	0.00	0.00	0.87	1.01
14	115	111	62.52	0.54	0.00	0.00	0.71	0.44
16	117	115	-12.63	0.12	0.00	0.00	0.32	0.16
18	117	119	-2.10	0.01	0.00	0.00	0.05	0.01
20	119	121	-19.28	0.32	0.00	0.00	0.49	0.36
22	121	122	-8.95	0.01	0.00	0.00	0.10	0.01
24	122	124	-37.02	0.22	0.00	0.00	0.42	0.17
25	125	124	81.85	0.15	0.00	0.00	0.93	0.72
26	115	125	-84.96	0.59	0.00	0.00	0.96	0.77
27	126	124	-36.65	0.19	0.00	0.00	0.94	1.17
28	126	128	13.94	0.17	0.00	0.00	0.36	0.20
30	129	128	-7.40	0.04	0.00	0.00	0.19	0.06
31	129	130	1.67	0.00	0.00	0.00	0.04	0.00
32	130	131	-21.33	0.05	0.00	0.00	0.54	0.43
33	132	131	7.16	0.03	0.00	0.00	0.18	0.06
34	132	126	-13.71	0.13	0.00	0.00	0.35	0.19
35	130	133	14.82	0.15	0.00	0.00	0.38	0.22
36	133	135	9.91	0.12	0.00	0.00	0.25	0.10
38	136	135	-2.38	0.00	0.00	0.00	0.06	0.01
39	136	137	-3.34	0.01	0.00	0.00	0.09	0.01
40	137	138	-7.43	0.04	0.00	0.00	0.19	0.06
41	139	138	-8.83	0.04	0.00	0.00	0.23	0.08
42	135	139	-3.11	0.00	0.00	0.00	0.08	0.01
43	140	138	21.99	0.26	0.00	0.00	0.56	0.45
44	141	140	28.54	0.16	0.00	0.00	0.73	0.74
45	141	142	-47.86	0.04	0.00	0.00	0.54	0.27
47	142	144	-55.22	0.20	0.00	0.00	0.63	0.35
49	144	146	-65.04	0.12	0.00	0.00	0.74	0.47
50	145	146	-12.27	0.04	0.00	0.00	0.31	0.15
53	150	146	77.31	0.52	0.00	0.00	0.88	0.65
54	151	150	87.12	0.29	0.00	0.00	0.99	0.81

55	152	151	-70.30	0.05	0.00	0.00	0.80	0.54
56	152	153	18.00	0.30	0.00	0.00	0.46	0.31
59	156	152	-49.04	0.25	0.00	0.00	0.56	0.28
60	157	156	-36.77	0.09	0.00	0.00	0.42	0.16
61	158	157	-68.26	0.17	0.00	0.00	0.77	0.51
62	158	160	35.62	1.64	0.00	0.00	0.91	1.11
64	160	162	19.26	0.30	0.00	0.00	0.49	0.36
66	163	162	-60.31	1.13	0.00	0.00	1.54	2.94
68	165	163	-52.95	3.13	0.00	0.00	1.35	2.31
69	166	165	-41.50	0.70	0.00	0.00	1.06	1.47
70	167	166	403.38	6.21	0.00	0.00	4.58	13.80
72	162	167	-49.23	1.25	0.00	0.00	1.26	2.02
74	170	167	25.27	0.55	0.00	0.00	0.65	0.59
75	158	170	29.36	0.14	0.00	0.00	0.75	0.78
76	166	171	261.42	3.66	0.00	0.00	2.97	6.18
77	171	172	255.69	2.17	0.00	0.00	2.90	5.93
78	174	172	-54.53	3.20	0.00	0.00	1.39	2.44
80	172	174	188.08	3.20	0.00	0.00	2.13	3.36
82	174	189	230.33	2.04	0.00	0.00	2.61	4.89
84	178	176	-70.35	0.38	0.00	0.00	0.80	0.54
85	178	179	58.08	0.24	0.00	0.00	0.66	0.38
86	179	180	13.91	0.10	0.00	0.00	0.36	0.19
89	179	188	37.63	0.59	0.00	0.00	0.96	1.23
90	188	183	12.36	0.21	0.00	0.00	0.32	0.16
92	185	183	-0.09	0.00	0.00	0.00	0.00	0.00
94	185	188	-11.36	0.21	0.00	0.00	0.29	0.13
96	189	176	327.09	1.92	0.00	0.00	3.71	9.36
97	190	189	96.76	0.26	0.00	0.00	1.10	0.98
98	190	191	-100.03	6.54	0.00	0.00	2.55	7.52
99	192	191	71.85	0.20	0.00	0.00	0.82	0.57
101	192	195	-76.76	0.18	0.00	0.00	0.87	0.64
102	197	195	2.28	0.01	0.00	0.00	0.06	0.01
104	199	197	22.73	0.60	0.00	0.00	0.58	0.48
107	195	199	-81.02	0.61	0.00	0.00	0.92	0.71
108	200	199	107.02	0.47	0.00	0.00	1.21	1.18
110	202	200	120.11	1.18	0.00	0.00	1.36	1.46
112	202	204	47.81	2.25	0.00	0.00	1.22	1.92
114	191	204	-34.72	0.39	0.00	0.00	0.89	1.06
115	213	176	153.07	1.42	0.00	0.00	1.74	2.29
116	213	212	25.36	0.21	0.00	0.00	0.65	0.59
117	212	210	18.00	0.27	0.00	0.00	0.46	0.31
120	210	208	8.18	0.05	0.00	0.00	0.21	0.07
123	215	214	88.35	1.09	0.00	0.00	2.26	5.97
124	215	217	-97.35	6.52	0.00	0.00	2.49	7.15
126	217	219	-31.22	0.59	0.00	0.00	0.80	0.87
127	218	217	76.77	2.55	0.00	0.00	1.96	4.60
128	223	218	85.77	3.63	0.00	0.00	2.19	5.65
130	103	223	26.81	1.07	0.00	0.00	0.68	0.66
132	222	223	75.31	2.34	0.00	0.00	1.92	4.44
133	101	222	61.25	1.55	0.00	0.00	1.56	3.03
134	219	222	-138.47	7.93	0.00	0.00	3.54	13.72
135	220	219	-100.71	3.17	0.00	0.00	2.57	7.61
136	214	220	-94.99	5.03	0.00	0.00	2.42	6.83
137	221	222	157.45	0.95	0.00	0.00	1.79	2.42
138	221	224	-161.54	1.33	0.00	0.00	1.83	2.53
139	131	122	-17.44	0.13	0.00	0.00	0.45	0.30
140	166	202	176.10	1.63	0.00	0.00	2.00	2.97

141	214	213	178.43	0.57	0.00	0.00	2.02	3.05
142	121	141	-16.05	0.01	0.00	0.00	0.18	0.04
201-BN	224	0	-286.87	0.51	0.00	0.00	3.25	7.34
202-BN	151	0	-159.06	0.08	0.00	0.00	1.80	2.46
203-BN	167	0	-436.34	1.42	0.00	0.00	4.95	15.96
204-BN	125	0	-174.17	0.88	0.00	0.00	1.98	2.91
205-BN	0	157	34.76	0.47	0.00	0.00	0.89	1.06
206-XXBN	0	195						

J U N C T I O N N O D E R E S U L T S

JUNCTION NUMBER	JUNCTION TITLE	EXTERNAL DEMAND (gpm)	HYDRAULIC GRADE (ft)	JUNCTION ELEVATION (ft)	PRESSURE HEAD (ft)	JUNCTION PRESSURE (psi)
101-1	Hyd 27	5.73	603.25	500.00	103.25	44.74
102-1		6.54	601.65	500.00	101.65	44.05
103-1	Hyd 26	13.09	600.44	475.00	125.44	54.36
105-1	Hyd 25	13.91	600.31	475.00	125.31	54.30
106-1	Hyd 24	7.36	600.33	475.00	125.33	54.31
108-1	Hyd 23	22.90	600.47	475.00	125.47	54.37
111-1	Hyd 22	28.63	602.10	470.00	132.10	57.24
115-1	Hyd 21	9.82	602.63	475.00	127.63	55.31
117-1	Hyd 20	14.72	602.52	475.00	127.52	55.26
119-1	Hyd 18	17.18	602.52	475.00	127.52	55.26
121-1		5.73	602.84	475.00	127.84	55.40
122-1	Hyd 15	10.63	602.85	475.00	127.85	55.40
124-1		8.18	603.07	477.00	126.07	54.63
125-1	Hyd 19, W-4	7.36	603.22	475.00	128.22	55.56
126-1		9.00	602.88	475.00	127.88	55.41
128-1	Hyd 16	6.54	602.70	475.00	127.70	55.34
129-1		5.73	602.67	475.00	127.67	55.32
130-1		8.18	602.67	475.00	127.67	55.32
131-1		3.27	602.71	475.00	127.71	55.34
132-1	Hyd 17	6.54	602.75	475.00	127.75	55.36
133-1	Hyd 14	4.91	602.51	475.00	127.51	55.26
135-1	Hyd 13	10.63	602.40	480.00	122.40	53.04
136-1		5.73	602.39	490.00	112.39	48.70
137-1		4.09	602.40	500.00	102.40	44.37
138-1	Hyd 12	5.73	602.44	500.00	102.44	44.39
139-1		5.73	602.40	500.00	102.40	44.37
140-1		6.54	602.70	500.00	102.70	44.50
141-1		3.27	602.85	500.00	102.85	44.57
142-1	Hyd 11	7.36	602.90	500.00	102.90	44.59
144-1		9.82	603.09	460.00	143.09	62.01
145-1	Hyd 10	12.27	603.18	500.00	103.18	44.71
146-1		0.00	603.22	500.00	103.22	44.73
150-1	Hyd 9	9.82	603.74	480.00	123.74	53.62
151-1	Well 2	1.64	604.02	480.00	124.02	53.74
152-1		3.27	603.97	470.00	133.97	58.06
153-1	Hyd 8	18.00	603.68	475.00	128.68	55.76
156-1	Hyd 7	12.27	603.72	475.00	128.72	55.78
157-1	Well 5	3.27	603.63	490.00	113.63	49.24
158-1		3.27	603.46	500.00	103.46	44.83
160-1	Hyd 5	16.36	601.82	505.00	96.82	41.96
162-1		8.18	601.52	525.00	76.52	33.16
163-1	Hyd 4	7.36	600.39	515.00	85.39	37.00

165-1 Hyd 3	11.45	597.27	500.00	97.27	42.15
166-1	7.36	596.56	500.00	96.56	41.84
167-1 Well 3	9.00	602.77	510.00	92.77	40.20
170-1 Hyd 6	4.09	603.32	510.00	93.32	40.44
171-1 Hyd 2	5.73	592.90	500.00	92.90	40.26
172-1	13.09	590.73	500.00	90.73	39.32
174-1 Hyd 1	12.27	587.53	480.00	107.53	46.60
176-1	409.82	583.58	470.00	113.58	49.22
178-1 Hyd 40	12.27	583.19	475.00	108.19	46.88
179-1	6.54	582.96	475.00	107.96	46.78
180-1 Hyd 43	13.91	582.86	475.00	107.86	46.74
183-1	12.27	582.15	500.00	82.15	35.60
185-1 Hyd 42	11.45	582.15	475.00	107.15	46.43
188-1 Hyd 41	13.91	582.36	475.00	107.36	46.52
189-1	0.00	585.50	465.00	120.50	52.21
190-1 Hyd 39	3.27	585.76	475.00	110.76	47.99
191-1	6.54	592.30	495.00	97.30	42.16
192-1 Hys 36	4.91	592.49	490.00	102.49	44.41
195-1	6.54	592.68	480.00	112.68	48.83
197-1 Hyd 38	20.45	592.68	480.00	112.68	48.83
199-1 Hyd 37	3.27	593.28	505.00	88.28	38.26
200-1	13.09	593.75	500.00	93.75	40.63
202-1 Hyd 34	8.18	594.93	500.00	94.93	41.14
204-1 Hyd 35	13.09	592.68	500.00	92.68	40.16
208-1 Hyd 33	8.18	584.47	480.00	104.47	45.27
210-1	9.82	584.52	500.00	84.52	36.62
212-1 Hyd 32	7.36	584.78	490.00	94.78	41.07
213-1	0.00	585.00	480.00	105.00	45.50
214-1	4.91	585.57	475.00	110.57	47.91
215-1 Hyd 31	9.00	586.66	470.00	116.66	50.55
217-1	10.63	593.18	465.00	128.18	55.54
218-1 Hyd 30	9.00	595.73	470.00	125.73	54.48
219-1 Hyd 28	6.54	593.77	480.00	113.77	49.30
220-1 Hyd 29	5.73	590.59	480.00	110.59	47.92
221-1	4.09	602.65	460.00	142.65	61.81
222-1	4.91	601.70	495.00	106.70	46.24
223-1	16.36	599.36	475.00	124.36	53.89
224-1 Well 1	1.64	603.98	480.00	123.98	53.72

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)
144	62.01	162	33.16
221	61.81	183	35.60
152	58.06	210	36.62
111	57.24	163	37.00
156	55.78	199	38.26
153	55.76	172	39.32

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

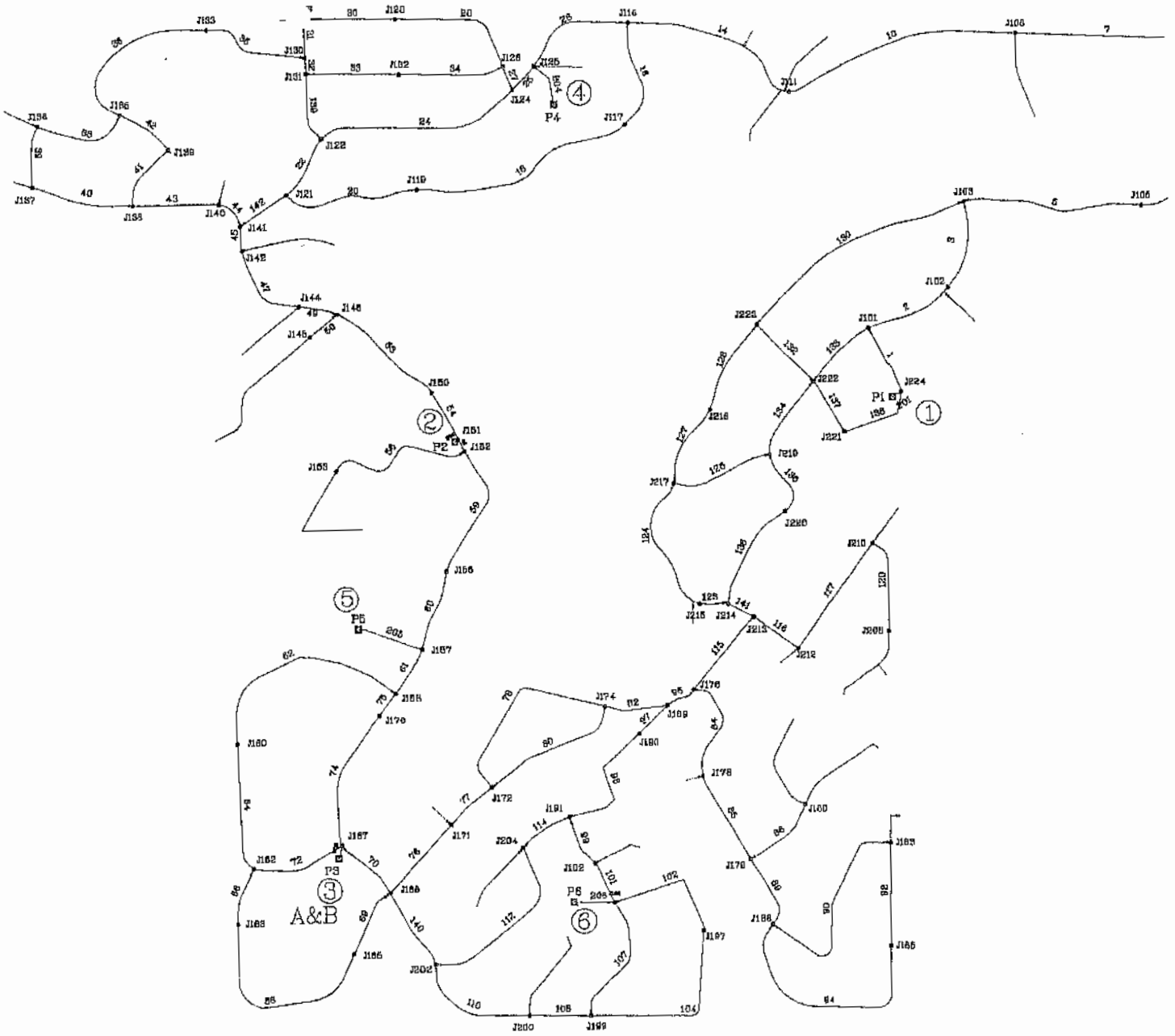
(+) INFLOWS INTO THE SYSTEM FROM BOUNDARY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO BOUNDARY NODES

PIPE NUMBER	FLOWRATE (gpm)
201	286.87
202	159.06
203	436.34
204	174.17
205	34.76

NET SYSTEM INFLOW = 1091.21
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 1091.21

**** CYBERNET SIMULATION COMPLETED ****

DATE: 3/29/2001
TIME: 11:54:45


P1
P2
P3
P4
P5
P6
A&B
1
2
3
4
5
6

Appendix B: Municipal Water Law and Required Attachments

Lake Limerick Water System (44150 T)

Attachment 2: Municipal Water Law Water System Plan/Small Water System Management Program General Approval Checklist

For each element, please identify where in your Water System Plan (WSP) or Small Water System Management Program (SWSMP) submittal the requirements of the Municipal Water Law identified in the column labeled "Element" are addressed.

The "Application" column identifies the type of plan (WSP or SWSMP) and the size of system the element applies to.

Application	Element	Addressed in plan on pages indicated	Documentation Attached
Water rights and system capacity			
WSP and SWSMP All size systems	The water rights self-assessment you have included in your WSP and SWSMP must be complete and must adequately reflect your water right status. Please review your self-assessment for completeness, accuracy and consistency with your water rights. If there are factors (i.e. supplemental, seasonal, etc.) to your water right that are not addressed in the self-assessment format, provide additional statements on how those factors affect your self-assessment.	Page(s) III-10, App D	
WSP and SWSMP All size systems	The system capacity analysis must incorporate the water right quantity parameters (QaQi) found in your water rights self-assessment. Identify the number of connections, population served, and/or Equivalent Residential Units (ERUs) that you are currently serving and identify your current instantaneous and annual water usage. Water use demand should not exceed existing water right QaQi.	Page(s) II-5 App E	
WSP All size systems	The system capacity analysis must incorporate the water right quantity parameters (QaQi) found in your water rights self-assessment. For a 6-year planning horizon, evaluate the number of connections, population served, and/or Equivalent Residential Units (ERUs) that you are planning on serving, utilizing historical water usage and future population projections. Water use demand projections should not exceed existing water right QaQi.	Page(s) II-4 & -5	
Service Area Delineation			
WSP and SWSMP All size systems	Provide a map and description of the water system service area. The map must delineate your retail service area (existing and future) as well any other service area (existing and future) you wish to include in your water right place of use. Provide clear differentiation between the two boundaries.	Page(s) I-8	
WSP and SWSMP All size systems	Provide a copy of the land use map(s) for jurisdictions served by your system.	Page(s) I-8	

Application	Element	Addressed in plan on pages indicated	Documentation Attached
Conservation			
WSP and SWSMP All size systems	New language has been added to RCW 70.119A, which states, "...municipal water suppliers shall continue to meet the existing conservation requirements of the department and shall continue to implement their current water conservation programs." Describe what, if any, previous efforts will be discontinued. For discontinued efforts, identify why continuation of these efforts would be ineffective or provide documentation that the discontinued program had a prescribed end date or savings level.	Page(s) N/A	
WSP All size systems	Must meet current conservation requirements. Please review the requirements (attached) and provide identification of where in your current WSP each of the elements is included.	Page(s) II-4, III-10, IV-1 to 9, App D & E	
SWSMP All size systems	Provide a completed Water Conservation Program (Element 14 of the SWSMP).	Page(s) N/A	
WSP Systems serving 1000 or more connections	Describe the projects, technologies, and other cost-effective measures that comprise your water conservation program.	Must be attached	
WSP Systems serving 1000 or more connections	Describe the improvements in the efficiency of water system use resulting from implementation of your water conservation program over the last six years.	Page(s) IV-4	
WSP Systems with inchoate water rights serving 1000 or more connections	Provide a demand forecast for the next 6-years based on the water savings expected from the planned conservation measures.	Page(s) IV-5	
WSP Systems with inchoate water rights serving 1000 or more connections	Provide a demand forecast for the next 6-years based on the water savings expected if implementing additional conservation measures that were considered cost-effective, including those that were not chosen to be implemented at this time.	Must be attached	

Application	Element	Addressed in plan on pages indicated	Documentation Attached
Reclaimed Water			
WSP Systems with greater than 1000 connections	Exploring opportunities for water reclamation is an element of the Municipal Water Law that must be addressed in this plan Systems > 1000 Connections must complete Attachment 9: Water Reclamation Checklist for Systems with 1,000 or more Connections or provide comparable documentation.	Page(s) IV-6	
Duty to Serve			
WSP All size systems	Describe how your system responds to requests for new water service by providing: 1. The process for service requests, including timeframes 2. How you determine that your system's capacity is adequate to provide new water service (including sufficient water rights) 3. Conditions of a non-technical nature that may affect your ability to provide new water service (annexation procedures, water rights issues, local ordinances, etc.) 4. Your system's procedures for granting or requesting extensions of time during a water service related project, and describe your procedure for handling disputes and appeals when water service requests are denied	Must be attached	
Local Government Consistency			
WSP or SWSMP All size systems	*Consistency with applicable adopted local plans, regulations and policies must be determined prior to plan submittal. For each appropriate planning agency provide a completed "Consistency Statement Checklist" or analogous documentation.*	Must be attached	
Watershed Coordination			
WSP or SWSMP All size systems In Watershed Planning Process per RCW 90.82	If your system is located in an area developing a watershed plan per RCW 90.82, describe your efforts to coordinate with the local planning unit. We have attached a list of Water Resource Inventory Areas (WRIA) where watershed plans are currently in development along with contact names for each area.	Pg I-4	

Attachment 5: Water System Plan and Small Water System Management Program Consistency Statement Checklist

This checklist is intended to ensure consistency of water system planning documents with adopted local comprehensive plans and development regulations. Each local planning jurisdiction in which the water utility provides service will review the relevant water system planning information and provide a signed consistency statement to the utility for submittal to the Department of Health. If the local planning agency will not respond, the highest authority within the utility (chair of governing body, executive director of private companies, etc.) must sign to verify consistency of the plan information.

Water System Name: Lake Limerick PWS ID: 44150 T

Planning Document Title: Water System Plan Plan Date: Nov 2005

Local Planning Jurisdiction: Mason County

Consistency Statement (Reference Municipal Water Law Section 5 and 8, amendment to chapter 90.03.386 and chapter 43.20 RCW)	Page(s) in Planning Document (completed by utility)	Yes – No – Not Applicable
The retail service area, and any other areas not served by a separate public water system, and land use identified in the WSP is consistent with the *adopted comprehensive plan and adopted development regulations and policies.*	Pages I-7 & -8	
For WSPs only: The growth projection used to forecast water demand for the retail service area is consistent with the adopted city/county's population growth projections (and commercial development projection if applicable). If a different growth projection was used, the alternative growth projection and methodology proposed is acceptable based on explanation given.	Pages II-1 to -4	
For WSPs only: New potential large water users (that may have a significant impact on the water system) that the city/county is aware of have been identified in the WSP.	N/A	
For city-owned systems only: All policies regarding water service outside the corporate boundaries are included in this WSP. These policies are consistent with the adopted *comprehensive plan* and *development regulations.*	N/A	
Where the local planning agency is unable to sign a Consistency Statement: Provide documentation of efforts to coordinate with local agencies with a 60-day timeline for local agency to respond. Include: name of contact, date, type of effort attempted, and response from local agency.	N/A	

I certify that the above statements are true to the best of my knowledge and that these statements support the conclusion that the subject-planning document is consistent with adopted comprehensive plans, development regulations, and other policies.

Signature Date

Printed Name, Title, & Jurisdiction

****For any issues of inconsistency, please provide comments on how they can be resolved. ****

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November 25, 2005

Lake Limerick Water System's Forecasted Water Savings With Conservation

Prepared by: Mary Wilkes
Engineering Technician

The following is intended to satisfy the Department of Health requirement set forth on Page 2 of Attachment 2 of the Municipal Water Supply - Efficiency Requirements Act of 2003. It was prepared as an attachment to be submitted to the Department of Health along with the review draft of the Water System Plan.

The System's water conservation program is detailed in its water system plan, which states:

"5. Forecasted Water Savings with Current and Planned Conservation

It is difficult to determine the amount of conservation that will be achieved in the next six years. Because of the system has been so successful at conservation in the past, it is unlikely that the system will be able to reduce its water production by a larger percentage. Table IV-2 shows the forecasted ADD, MDD and annual production with the current conservation measures. Table IV-3 shows the forecasted ADD, MDD and annual production with the planned conservation measures, as well as forecasted annual savings. This is based on the assumption of 1.02% annual reduction, which equates to 5% reduction when compounded yearly for six years.

Table IV-2: Forecasted Production with Current Conservation

Year	No. ERUs	Measured ADD (gpd/ ERU)	Measured MDD (gpd/ERU)	Annual Production (Mgpy)
2005	1111	213	540	86.5
2011	1173	213	540	91.3
2015	1205	213	540	93.8
2025	1248	213	540	97.2

Table IV-3: Forecasted Production with Planned Conservation

Year	No. ERUs	ADD (gpd/ ERU)	MDD (gpd/ERU)	Annual Production (Mgpy)	Annual Savings (Mgal)
2005	1111	211	534	85.6	0.9
2011	1173	199	482	85.0	6.3
2015	1205	191	482	83.8	10.0
2025	1248	172	435	78.4	18.8

6. Analysis of Cost-Effectiveness of Conservation Measures Not Used

Below are the measures, recommended for a system of this size1, that the system has chosen not to implement, along with an analysis of the cost-effectiveness of the measure.

a. Purveyor Assistance

The system does not supply water to any purveyors; therefore, this measure does not apply.

b. Single-Family/ Multi-Family Kits

This is likely to be expensive. Because customer consumption is already so low, it is not likely to yield significant water savings.

---

1 "Conservation Planning Requirements", (Ecology Publication # 92-24 & DOH #331-008), published by Washington State Department of Ecology in conjunction with the Department of Heath, March 1994, pg 23

c. Nurseries/Agricultural

The system does not provide service to any nurseries or agricultural customer; therefore, this measure does not apply.

7. Forecasted Water Savings with Additional Conservation

With the 46.8% reduction from the current conservation and the estimate 5% reduction from planned conservation measures, it is unlikely that the system could achieve much more than 1% reduction with additional measures. Table IV-4 shows the forecasted ADD, MDD and annual production with additional conservation, as well as the additional annual savings. This is based on a 0.200% annual reduction, which equates to a 1% reduction when compounded annually for six years. By examining the savings, it can be seen that the yield of additional conservation is likely to be insignificant compared to the yield from current and planned conservation.

Table IV-4: Forecasted Production and Savings with Additional Conservation

Year	No. ERUs	ADD (gpd/ ERU)	MDD (gpd/ERU)	Annual Production (Mgpy)	Addition Annual Savings (Mgal)
2005	1111	211	533	85.5	0.2
2011	1173	186	472	83.8	1.2
2015	1205	186	472	82.0	1.8
2025	1248	165	417	75.1	3.3

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November 25, 2005

Lake Limerick Water System's Conservation Projects, Technologies & Measures

Prepared by: Mary Wilkes
Engineering Technician

The following is intended to satisfy the Department of Health requirement set forth on Page 2 of Attachment 2 of the Municipal Water Supply - Efficiency Requirements Act of 2003. It was prepared as an attachment to be submitted to the Department of Health along with the review draft of the Water System Plan.

The System's water conservation program is detailed in its water system plan, which states:

"3. Continuing Planned Conservation Measures

The Lake Limerick Water System is classified as a medium sized system by the "Conservation Planning Requirements". The conservation measures that are recommended for a system of this size and which have been implemented by the system are listed below.1 The system will continue to implement each of these measures.

a. Program Promotion

The system encourages conservation through public meetings, news letters and billing statements.

---

1 "Conservation Planning Requirements", (Ecology Publication # 92-24 & DOH #331-008), published by Washington State Department of Ecology in conjunction with the Department of Heath, March 1994, pg 23

b. Customer Assistance

The system promotes conservation by providing customer assistance through the same methods mentioned above. Customers can also call the water system for assistance with conservation.

c. Bill Showing Consumption History

The water system has implemented a billing system that shows consumption history on the bill.

d. Source Meters

The system has meters on all its sources.

e. Service Meters

The system has meters on all its existing service connections, and requires all new connections to have service meters.

f. Unaccounted Water/Leak Detection

The system will do monthly audits to monitor the unaccounted-for water. The system has been very proactive in finding and eliminating leaks.

g. Landscape Management

During the summer, the customers are restricted from watering their lawns on either even or odd days, depending on their address. The community golf course is watered with surface water from the lake.

h. Conservation Pricing

The system's current rate structure is designed to encourage conservation.

4. New Planned Conservation Measures

Because the current water conservation program has proven to be so effective, the water system will continue to follow the existing program. In addition to the previously mentioned measures, the water system will implement the following measures:

- source and customer meter calibration program
- replacement of aging pipes that are likely to leak"

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November 25, 2005

Lake Limerick Water System's Response to Requests for New Water Services

Prepared by: Mary Wilkes
Engineering Technician

The following is intended to satisfy the Department of Health requirement set forth on Page 3 of Attachment 2 of the Municipal Water Supply - Efficiency Requirements Act of 2003. It was prepared as an attachment to be submitted to the Department of Health along with the review draft of the Water System Plan.

The System's response to requests for water service is detailed in its water system plan, which states:

"F. Service Area Policies

The system currently has approval from the Department of Health for 1,250 single-family residences, or equivalent. Some connections are presently not being utilized. Property owners wishing to develop their property are charged a $1,000 hookup fee and receive a certificate of water availability from the water system. "

WAC 197-11-960 Environmental checklist.

ENVIRONMENTAL CHECKLIST

Purpose of checklist:

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

Instructions for applicants:

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

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

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

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

Use of checklist for nonproject proposals:

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

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

A. BACKGROUND

1. Name of proposed project, if applicable:
   Lake Limerick Water System Plan
2. Name of applicant:
   Lake Limerick Water System
3. Address and phone number of applicant and contact person:
   Kirk Osborne
   E 790 St. Andrew Dr
   Shelton, WA, 98584
   (360) 426-4563
4. Date checklist prepared:
   Nov 2, 2005
5. Agency requesting checklist:
   Department of Health
6. Proposed timing or schedule (including phasing, if applicable):
   N/A
7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain. **Some infrastructure replacement is forecasted by the water system plan. These projects will take place after plan approval. Some projects may require separate SEPA compliance.**

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

None

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

No

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

Plan approvals by Washington State Departments of Health, Ecology, and Mason County Department of Community Development.

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.)

Proposing a water system plan, pursuant to WAC 246-290-100

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.

Within the Lake Limerick Water System service boundary area, as depicted in Figure I-1 of the proposed water system plan. This area is located in Township 21N, Range 3W, in Mason County

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

B. ENVIRONMENTAL ELEMENTS

1. **Earth**

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

b. What is the steepest slope on the site (approximate percent slope)? **67%**

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.

Clay, gravel, sand, top soil, and fill (based on well logs)

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

No

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

None

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

No

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

N/A

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

N/A

a. **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.

None

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

No

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

None

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

3. **Water**

a. Surface:

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

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.
Not relevant to plan

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

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.
No

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

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.
N/A

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 water system currently withdraws water from its wells to supply the water to the local population. The water system plan does not propose significant change to this.

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.
All the houses in the area are on septic systems. Development permits and domestic waste systems are subject to approval under county code.

c. Water runoff (including stormwater):

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

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

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

4. **Plants**

a. Check or circle types of vegetation found on the site: - **N/A**

———— deciduous tree: alder, maple, aspen, other
———— evergreen tree: fir, 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?
None

c. List threatened or endangered species known to be on or near the site.
None

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:
None

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: - **N/A**

birds: hawk, heron, eagle, songbirds, other:
mammals: deer, bear, elk, beaver, other:
fish: bass, salmon, trout, herring, shellfish, other:

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

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

N/A

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

None

6. **Energy and natural resources**

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

None, as directly part of the water system plan

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

N/A

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

Water conservation is part of the plan. This could lead directly to reduced energy consumption.

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.

No

1) Describe special emergency services that might be required.

None

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

The water quality is routinely monitored for contaminates.

b. **Noise**

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

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

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

None

8. **Land and shoreline use**

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

Current vicinity of plan area is mostly residential. There is one golf course and associated shops. Surround area is rural.

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

N/A

c. Describe any structures on the site.

Houses, pro shop, clubhouse, pump houses, water tanks, workshop for water system.

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

N/A

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

Rural residential.

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

Lake Limerick Country Club

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

N/A

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

N/A

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

Approximately 2500, same as it is now.

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

N/A

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

N/A

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:
Approval by Department of Health, Department of Ecology, and Mason County Department of Community Development.

9. **Housing**

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

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

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

10. **Aesthetics**

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

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

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

11. **Light and glare**

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

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

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

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

12. **Recreation**

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

N/A

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

N/A

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

N/A

13. **Historic and cultural preservation**

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

N/A

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

N/A

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

N/A

14. **Transportation**

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

N/A

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

N/A

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

N/A

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

N/A

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

N/A

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

N/A

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

N/A

15. **Public services**

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

Water System Plan must be consistent with county growth management. Will include programs to increase safety and reliability of public drinking water within its service area. Projects recommended for infrastructure improvement will require separate SEPA compliance.

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

N/A

16. **Utilities**

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

N/A

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

None, plan only

C. SIGNATURE

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

Signature: Kurt Osborne Concurrence WDM-1 Ken Douglas

Date Submitted: 12/12/2005 12/12/05

TO BE COMPLETED BY APPLICANT

EVALUATION FOR
AGENCY USE ONLY

D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS

(do not use this sheet for project actions)

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

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

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

No increase is anticipated.

Proposed measures to avoid or reduce such increases are:

Not applicable

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

No change

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

Not applicable

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

The water system currently withdraws water from its wells to provide water for the current population. This does use water and a small amount of energy. A water conservation program is part of the water system plan, which could reduce the amount of water withdrawn from the wells and the amount of energy consumed.

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

See above

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?

No effect is anticipated.

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

Not applicable

TO BE COMPLETED BY APPLICANT

EVALUATION FOR AGENCY USE ONLY

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?

No effect is anticipated.

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

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

No effect is anticipated.

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

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.
Every effort has been taken to ensure that the proposed water system plan is consistent with applicable laws. Review and approval by the Department of Health, Department of Ecology, and the Mason County Department of Community Development are being concurrently sought.

Appendix C: WFI, WFI Update, Well Logs, and Well Pump Curves

Washington State Department of Health
Environmental Health Programs
Division of Drinking Water

Date Updated: 01/08/2003

WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

RETURN TO: Southwest Regional Office, PO Box 47823, Olympia, WA, 98504

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
44150 T	LAKE LIMERICK WATER	MASON	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS	7. OWNER NAME & MAILING ADDRESS	8. Owner Number 003162
KENNETH DOUGLAS TITLE: WDM 1 F 790 ST ANDREWS DR SHELTON WA 98584	LAKE LIMERICK COUNTY CLUB INC KENNETH DOUGLAS TITLE: MANAGER F 790 ST ANDREWS DR SHELTON, WA 98584	
STREET ADDRESS IF DIFFERENT FROM ABOVE	STREET ADDRESS IF DIFFERENT FROM ABOVE	
ATTN	ATTN	
ADDRESS	ADDRESS	
CITY STATE ZIP	CITY STATE ZIP	

9. 24 HOUR PRIMARY CONTACT INFORMATION		10. OWNER CONTACT INFORMATION	
Primary Contact Daytime Phone: (360) 426-4563		Owner Daytime Phone: (360) 426-4563	
Primary Contact Evening Phone: (360) 426-0775		Owner Evening Phone:	
Primary Contact Mobile/Cell		Owner Mobile/Cell Phone: (360) 426-0775	
Fax: (360) 426-8922	E-mail lws@hctc.com	Fax: (360) 956-8967	E-mail

WAC 246-290-420(9) requires that water systems provide 24-hour contact information for emergencies.

11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)

- [x] Not applicable (Skip to #12)
- [ ] Owned and Managed — SMA NAME: _____ SMA Number: _____
- [ ] Managed Only
- [ ] Owned Only

12. WATER SYSTEM CHARACTERISTICS (mark ALL that apply)

[ ] Agricultural	[ ] Hospital/Clinic	[x] Residential
[ ] Commercial / Business	[ ] Industrial	[ ] School
[ ] Day Care	[ ] Licensed Residential Facility	[ ] Temporary Farm Worker
[x] Food Service/Food Permit	[ ] Lodging	[x] Other (church, fire station, etc.):
[x] 1,000 or more person event for 2 or more days per year	[x] Recreational / RV Park	

13. WATER SYSTEM OWNERSHIP (mark only one)				14. STORAGE CAPACITY (gallons)
[ ] Association	[ ] County	[ ] Investor	[ ] Special District	
[ ] City / Town	[ ] Federal	[x] Private	[ ] State	320,000

--- SEE NEXT PAGE FOR A COMPLETE LIST OF SOURCES ---

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
44150 T	LAKE LIMERICK WATER	MASON	A	Comm

15	16	17	18										19			20	21						22	23	24			
	SOURCE NAME	INTERTIE	SOURCE CATGORY										USE				TREATMENT						DEPTH		SOURCE LOCATION			
Source Number	LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SEATTLE	INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL IN A WELL FIELD	SPRING	SPRING FIELD	SPRING IN SPRING FIELD	SEA WATER	SURFACE WATER	RANNEY TYP. GALLERY	OTHER	PERMANENT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLORIDATION	IRRADIATION (UV)	OTHER	(FEET)	CAPACITY GALLONS PER MINUTE	1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S02	WELL # 2		X										X			Y	X						103	200	NE NW	27	21N	03W
S03	WELL # 3_A		X										X			Y	X						131	146	SW SW	27	21N	03W
S04	WELL # 4		X										X			Y	X						92	92	SE SW	22	21N	03W
S05	WELL #1		X										X			Y	X						89	75	NE NE	27	21N	03W
S06	WELL #3B		X										X			Y	X						167	210	SW SW	27	21N	03W
S07	WELL #5		X										X			Y	X						110	200	NW SW	27	21N	03W
S08	WELL #6		X												X		X						434	110	SE SW	27	21N	03W

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
44150 T	LAKE LIMERICK WATER	MASON	A	Comm

If this water system serves 500 OR MORE single-family residences, please enter the total number of service connections on line 25, then skip to lines 29, 35 and 36. If this water system serves LESS THAN 500 single-family residences, complete entire form.	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)	0	695	1250
A. Full Time Single Family Residences (Occupied 180 days or more per year)	695		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	0		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	0		
B. Full Time Residential Units in Apartments, Condos, Duplexes, Dorms that are occupied 180 days or more a year	0		
C. Part Time Residential Units in Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services (Campsites, RV Sites, Spigots, etc.)	215	215	0
B. Institutional, Commercial or Industrial Services	2	2	0
28. TOTAL SERVICE CONNECTIONS		912	1250

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per: 1400

30. PART-TIME RESIDENTIAL POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many part-time residents are present each month?												
B. How many days per month are they present?												

31. TEMPORARY & TRANSIENT USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
How many visitors, attendees, travelers, campers, ents or customers have access to the water system each month?	900	900	900	3000	6000	6000	9000	9000	6000	6000	900	900
B. How many days per month are they present?	30	30	30	30	30	30	30	30	30	30	30	30

32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students daycare children and/or employees are present each month?												
B. How many days per month are they present?												

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	2	2	2	2	2	2	2	2	2	2	2	2

35. Reason for Submitting WFI:

☐ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other _____

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: _____ DATE: _____

PRINT NAME: _____ TITLE: _____

Washington State Department of Health
Environmental Health Programs
Division of Drinking Water

WATER FACILITIES INVENTORY (WFI) UPDATE FORM

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
44150 T	Lake Limerick Water System	Mason County	A	Comm.

6. PRIMARY CONTACT NAME & MAILING ADDRESS	7. OWNER NAME & MAILING ADDRESS	8. Owner Number:
Kenneth Douglas TITLE: WDM1	Lake Limerick Country Club, Inc.	003162
E 790 St. Andrews Dr.	Kenneth Douglas	TITLE: Mananger
Shelton, WA 98584	E 790 St. Andrews Dr	
	Shelton, WA 98584	
STREET ADDRESS	STREET ADDRESS IF DIFFERENT FROM ABOVE	
ATTN:	ATTN	
ADDRESS	ADDRESS	
CITY STATE ZIP	CITY STATE ZIP	

9. 24 HOUR PRIMARY CONTACT INFORMATION		10. OWNER CONTACT INFORMATION	
Primary Contact Daytime Phone: 360-426-4563		Owner Daytime Phone: 360-426-4563	
Primary Contact Mobile/Cell Phone:		Owner Mobile/Cell Phone:	
Primary Contact Evening Phone: 360-426-0775		Owner Evening Phone: 360-426-0775	
Fax: 360-426-8922	E-mail llws@hctc.com	Fax 360-426-8922	E-Mail: llws@hctc.com

WAC 246-290-420(9) requires that water systems provide 24 hour contact information for emergencies

11. SATELLITE MANAGEMENT AGENCY – SMA (check only one)

☒ Not applicable (Skip to #12)

☐ Owned and Managed
☐ Managed Only
☐ Owned Only

SMA NAME: _____ SMA Number: _____

12. WATER SYSTEM CHARACTERISTICS (check ALL that apply)

☐ Agricultural	☐ Hospital/Clinic	☒ Residential
☐ Commercial / Business	☐ Industrial	☐ School
☐ Day Care	☐ Licensed Residential Facility	☐ Temporary Farm Worker
☒ Food Service/Food Permit	☐ Lodging	☒ Other (church, fire station, etc.): Country Club
☒ 1,000 or more person event for 2 or more days per year	☒ Recreational / RV Park	

13. WATER SYSTEM OWNERSHIP (mark only one)

☐ Association	☐ County	☐ Investor	☐ Special District
☐ City / Town	☐ Federal	☒ Private	☐ State

14. STORAGE CAPACITY (gallons)

15.	16	17.	18.										19.			20	21.						22.	23.	24.			
	SOURCE NAME	INTERTIE	SOURCE CATEGORY										USE				TREATMENT						DEPTH		SOURCE LOCATION			
SOURCE NUMBER	LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SEATTLE	INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL IN A WELLFIELD	SPRING	SPRING FIELD	SPRING IN SPRING FIELD	SEA WATER	SURFACE WATER	RANNEY / INF. GALLERY	OTHER	PERMANENT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	DEPTH TO FIRST OPEN INTERVAL IN FEET	CAPACITY (GALLONS PER MINUTE)	¼, ¼ SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S02	Well 2		X										X			Y	X						103	200	NE NW	27	21N	3W
S03	Well 3A		X										X			Y	X						131	100	SW SW	27	21N	3W
S04	Well 4		X										X			Y	X						92	75	SE SW	27	21N	3W
S05	Well 1		X										X			Y	X						89	45	NE NE	27	21N	3W
S06	Well 3B		X										X			Y	X						167	190	SW SW	27	21N	3W
S07	Well 5		X										X			Y	X						110	190	NW SW	27	21N	3W
S08	Well 6		X										X			Y	X						434	200	SE SW	27	21N	3W

	ACTIVE SERVICE CONNECTIONS	CALCULATED ACTIVE CONNECTIONS	DOH APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES / Houses / Mfg Housing / Travel Trailers/ RVs *(How many do you have?)*	**Connections**		
A. *Full Time* Single Family Residences noted on line 25 (Occupied *180 days or more per year*)	1,114		
B. *Part Time* Single Family Residences (Occupied *> 180 days per year*)(Example: Summer homes used by owners)	0		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS *(How many do you have?)*	**Connections**		
A. List the Total number of Apartment *Buildings*, condos, duplexes, barracks, dorms etc on your Water System	0		
B. *Full Time* Residential *Units* in the Apartment Bldgs, Condos, Duplexes, Dorms that are occupied *< 180 days per year*	0		
C. *Part Time* Residential *Units* in the Apartment Bldgs, Condos, Duplexes, Dorms that are occupied *> 180 days per year*	0		
27. NON-RESIDENTIAL CONNECTIONS / Buildings / Factories / Services *(How many do you have?)*	**Connections**		
A. Recreational Services (Campsites, RV Sites, Spigots, Cabins, etc.) Connections occupied *180 days or more per year by the same person(s),* those connections belong in 25A	134		
B. Institutional, Commercial / Business, School, Day Care, Churches, Fire Stations, Industrial Services, etc.	2		
28. TOTAL SERVICE	1,250		

29. FULL-TIME RESIDENTIAL POPULATION — **FULL-TIME RESIDENTIAL POPULATION**

A. How many *Full Time residents* are served by this system *180 or more days per year*? (Residents Living on the connections from lines 25A and 26B) 2,500

30. PART-TIME RESIDENTIAL POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. *How many part-time residents per month?* (Snow Birds) (Property Owners Visiting/Living on the connections from line 25B)												
B. *How many days per* month are the Part Time Residents from line 30A present?												

31. TEMPORARY & TRANSIENT USERS / POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. *How many visitors, attendees, travelers, campers, patients or customers per month* have access to the water system? People per month using the facilities from line 27A)												
B. *How many days per month* is water accessible to the Public in line 31A? *(How many days per month is the facility / business open?)*												

32. REGULAR NON-RESIDENTIAL USERS / POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, churches or businesses connected to your water system, **how many students, daycare children and/ or employees are present each month?** (People Working, studying, or cared for, on connections from line 27B)												
B. *How many days per month* is water accessible to the Public noted in line 32A? *(How many days per month is your facility / business open?)*												

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
33. ROUTINE COLIFORM SCHEDULE												
34. GROUP B NITRATE SCHEDULE	**QUARTERLY**				**ANNUALLY**					**ONCE EVERY 3 YEARS**		

35. Reason for Submitting WFI: Check the appropriate reason for this WFI correction below

Update-Changes ☑ Update-No Changes ☐ Inactivate ☐ New System ☐ Pre-Active ☐ Name change ☐ Re-Activate ☐ Other _____

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: Kenneth Douglas DATE: 11/25/05

PRINT NAME: Kenneth Douglas TITLE: WDM

	ACTIVE SERVICE CONNECTIONS	CALCULATED ACTIVE CONNECTIONS	DOH APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES / Houses / Mfg Housing / Travel Trailers/ RVs *(How many do you have?)*	**Connections**		
A. ***Full Time*** Single Family Residences **noted on line 25** (Occupied ***180 days or more per year***)	1,114		
B. ***Part Time*** Single Family Residences (Occupied ***> 180 days per year***)(Example: Summer homes used by owners)	0		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS *(How many do you have?)*	**Connections**		
A. List the Total number of Apartment ***Buildings***, condos, duplexes, barracks, dorms etc on your Water System	0		
B. ***Full Time*** Residential ***Units*** in the Apartment Bldgs, Condos, Duplexes, Dorms that are occupied ***< 180 days per year***	0		
C. ***Part Time*** Residential ***Units*** in the Apartment Bldgs, Condos, Duplexes, Dorms that are occupied ***> 180 days per year***	0		
27. NON-RESIDENTIAL CONNECTIONS / Buildings / Factories / Services *(How many do you have?)*	**Connections**		
A. Recreational Services (Campsites, RV Sites, Spigots, Cabins, etc.) Connections occupied ***180 days or more per year by the same person(s),*** those connections belong in **25A**	134		
B. Institutional, Commercial / Business, School, Day Care, Churches, Fire Stations, Industrial Services, etc.	2		
28. TOTAL SERVICE	1,250		

29. FULL-TIME RESIDENTIAL POPULATION **FULL-TIME RESIDENTIAL POPULATION**

A. How many ***Full Time residents*** are served by this system ***180 or more days per year***? (Residents Living on the connections **from lines 25A and 26B**) 2,500

30. PART-TIME RESIDENTIAL POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. ***How many part-time residents per month?*** (Snow Birds) (Property Owners Visiting/Living on the connections **from line 25B**)												
B. ***How many days per*** month are the Part Time Residents **from line 30A** present?												

31. TEMPORARY & TRANSIENT USERS / POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. ***How many visitors, attendees, travelers, campers, patients or customers per month*** have access to the water system? People per month using the facilities **from line 27A)**												
B. ***How many days per month*** is water accessible to the Public **in line 31A?** *(How many days per month is the facility / business open?)*												

32. REGULAR NON-RESIDENTIAL USERS / POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, churches or businesses connected to your water system, **how many students, daycare children and/ or employees are present each month?** (People Working, studying, or cared for, on connections **from line 27B)**												
B. ***How many days per month*** is water accessible to the Public noted **in line 32A?** *(How many days per month is your facility / business open?)*												

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
33. ROUTINE COLIFORM SCHEDULE												
34. GROUP B NITRATE SCHEDULE	**QUARTERLY**				**ANNUALLY**					**ONCE EVERY 3 YEARS**		

35. Reason for Submitting WFI: Check the appropriate reason for this WFI correction below

Update-Changes ☑ **Update-No Changes** ☐ **Inactivate** ☐ **New System** ☐ **Pre-Active** ☐ **Name change** ☐ **Re-Activate** ☐ **Other** _____

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: _____ **DATE:** _____

PRINT NAME: _____ **TITLE:** _____

505
Well #1

WATER WELL REPORT
STATE OF WASHINGTON

File Original and First Copy with the Division of Water Resources
Second Copy — Owner's Copy
Third Copy — Driller's Copy

Application No. .....
Permit No. .....

(1) OWNER:
Name Lake Limerick Associates
Address 1132 No. 128th St
Seattle, Wn. 98133

(2) LOCATION OF WELL:
County Kitsap (Owner's number, if any) -
NE ¼ NE ¼ Section 27 T 25N R 3 W. W.M.
Bearing and distance from section or subdivision corner

(3) TYPE OF WORK (check):
New Well [X] Deepening [ ] Reconditioning [ ] Abandon [ ]
If abandonment describe material and procedure in Item 11

(4) PROPOSED USE (check):
Domestic [ ] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

(5) TYPE OF WELL:
Rotary [ ] Driven [ ]
Cable [X] Jetted [ ]
Dug [ ] Bor d [ ]

(6) CASING INSTALLED: Threaded [ ] Welded [X]
10" Diam. from 0 ft to 116 ft Gage .279
" Diam. from ft to ft Gage
" Diam. from ft to ft Gage

(7) PERFORATIONS: Perforated? [ ] Yes [ ] No
Type of perforator used
SIZE of perforations in by in
perforations from ft to ft
perforations from ft to ft
perforations from ft to ft
perforations from ft to ft
perforations from ft to ft

(8) SCREENS: Well screen installed [X] Yes [ ] No
Manufacturer's Name Edward E. Johnson Inc.
Type Stainless steel Model No.
Diam. 10" Slot size .050 Set from 69' ft to 90' ft
Diam. 10" Slot size .020 Set from 99 ft to 114 ft

(9) CONSTRUCTION:
Was well gravel packed? [ ] Yes [ ] No. Size of gravel
Gravel placed from ft to ft
Was a surface seal provided? [ ] Yes [X] No. To what depth? ft
Material used in seal— Drill cuttings
Did any strata contain unusable water? [ ] Yes [ ] No
Type of water? Depth of strata
Method of sealing strata off

(10) WATER LEVELS:
Static level 51 ft below land surface Date 3/25/66
Artesian pressure lbs per square inch Date
Water is controlled by (Cap, valve, etc.)

(11) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? [X] Yes [ ] No If yes, by whom? Driller
Yield: 95 gal/min with 41 ft. drawdown after 6 hrs.
" " " " " "
" " " " " "
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level
3:10	92	3:30	72' 4"
3:15	79	3:35	71
3:20	76	3:40	70' 6"
3:25	73' 6"	3:45	69' 6"

Date of test 3/25/66
Bailer test gal/min with ft drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? [X] Yes [ ] No

(12) WELL LOG: Diameter of well 10 inches.
Depth drilled 116 ft. Depth of completed well 114 ft.
Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Sand, clay & gravel	0	6
Hardpan	6	27
Gravel - dry	1	28
Hardpan	20	48
Gravel	3	51
Hardpan	6	60
Gravel - some water	10	78
Sand & gravel	10	88
" " " - water bearing	13	101
Sand	5	106
" & gravel	2	108
Sand	8	116
Muddy sand & gravel		116

Work started 19 Completed 19

(13) PUMP:
Manufacturer's Name
Type H.P.

Well driller's Statement:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Ivan Well Drilling Co. (Person, firm, or corporation) (Type or print)
Address Division Tacoma Pump & Drilling Co. Inc
P.O. Box 3, Silverdale

[Signed] (Well Driller)

License No. Date 3/28/66, 19

USE ADDITIONAL SHEETS IF NECESSARY)

CK/WR

S02
Well 2

WATER WELL REPORT
STATE OF WASHINGTON

File Original and First Copy with the Division of Water Resources
Second Copy — Owner's Copy
Third Copy — Driller's Copy

Application No. 8833
Permit No. ...

(1) OWNER:
Name LAKE LIMERICK COUNTRY CLUB, INCORPORATED
Address 5125 25th N.E.
SEATTLE, WN.

(2) LOCATION OF WELL:
County MASON Owner's number, if any — 2
SE ¼ NW ¼ Section 27 T. 21N R 3W W.M.
Bearing and distance from section or subdivision corner
~~460~~ SOUTH & ~~660~~ EAST OF NW. COR. SECTION 27
1405 1565
Elev. 330

(3) TYPE OF WORK (check):
New Well [X] Deepening [ ] Reconditioning [ ] Abandon [ ]
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic [ ] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

(5) TYPE OF WELL:
Rotary [ ] Driven [ ]
Cable [X] Jetted [ ]
Dug [ ] Bored [ ]

(6) CASING INSTALLED: Threaded [ ] Welded [ ]
10" Diam. from 1 ft. to 103 ft. Gage
" Diam. from ft. to ft. Gage
" Diam. from ft. to ft. Gage

(7) PERFORATIONS: Perforated? [ ] Yes [X] No
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

(8) SCREENS: Well screen installed [X] Yes [ ] No
Manufacturer's Name JOHNSON
Type STAINLESS STEEL Model No.
Diam. 10" Slot size 35 Set from 103 ft. to 121 ft.
Diam. Slot size Set from ft. to ft.

(9) CONSTRUCTION:
Was well gravel packed? [ ] Yes [X] No Size of gravel:
Gravel placed from ft. to ft.
Was surface seal provided? [ ] Yes [ ] No To what depth? ft.
Material used in seal
Did any strata contain unusable water? [ ] Yes [X] No
Type of water? Depth of strata
Method of sealing strata off

(10) WATER LEVELS:
Static level 11' ft. below land surface Date JUNE 17-67
Artesian pressure lbs. per square inch Date
Water level controlled by (Cap, valve, etc.)
OK/PE

(11) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? [X] Yes [ ] No If yes, by whom? Russell Drilling
Yield: 200 gal./min. with 84 ft. drawdown after 4 hrs.
" " " "
" " " "
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level

Date of test 6/17/67
Bailer test 132 gal./min. with 24 ft. drawdown after 4 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? [ ] Yes [ ] No

(12) WELL LOG: Diameter of well 10" inches.
Depth drilled 121 ft. Depth of completed well 121 ft.
Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
TOPSoil Gr.	0	2
Cem. Gr.	2	10
Cem. Gr	10	40
Cem. Gr + clay	40	50
Cem. Gr + clay	50	75
Clay Blue + Gray	75	78
Brown clay & Gr.	78	85
" " "	85	95
Blue clay & Sand	95	100
Blue clay & Sand water	100	104
Sand & Gr. small stream	104	121

Work started May 3 1967 Completed May 8 1967

(13) PUMP:
Manufacturer's Name
Type: H.P.

Well Driller's Statement:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Russell Well Drilling Co. (Person, firm, or corporation) (Type or print)
Address P.O. Box 433 Shelton Wash
[Signed] William J. Russell (Well Driller)
License No. 223-01-5124 Date June 19, 1967

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7336 — Rev. 9-62 — 8-62 — 5M. 75108

8

S03

Well 3A

WATER WELL REPORT
STATE OF WASHINGTON

File Original and First Copy with The Division of Water Resources
Second Copy — Owner's Copy
Third Copy — Driller's Copy

Application No. 5834

Permit No. ....

(1) OWNER:
Name LAKE LIMERICK COUNTRY CLUB, INCORPORATED
Address 5125 25th N.E.
Seattle, Wn.

(2) LOCATION OF WELL: #3
County MASON Owner's number, if any
SW ¼ SW ¼ Section 27 T 21N. R 3W. W.M
Bearing and distance from section or subdivision corner
~~1200~~ 1165' NORTH & ~~650~~ 520' EAST OF S.W. Cor. Sec. 27
Elv. 240'

(11) TYPE OF WORK (check):
New Well [X] Deepening [ ] Reconditioning [ ] Abandon [ ]
If abandonment, describe material and procedure in Item 11

(4) PROPOSED USE (check):
Domestic [ ] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

(5) TYPE OF WELL:
Rotary [ ] Driven [ ]
Cable [X] Jetted [ ]
Dug [ ] Bored [ ]

(6) CASING INSTALLED: Threaded [ ] Welded [X]
10" Diam. from 1 ft. to 148 ft. Gage
Diam. from ft. to ft. Gage
Diam. from ft. to ft. Gage

(7) PERFORATIONS: Perforated? [ ] Yes [X] No
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

(8) SCREENS: Well screen installed? [X] Yes [ ] No
Manufacturer's Name JOHNSON
Type STAINLESS STEEL Model No.
Diam. 10" Slot size 30 Set from 131 ft. to 146 ft.
Diam. Slot size Set from ft. to ft.

(9) CONSTRUCTION:
Was well gravel packed? [ ] Yes [X] No Size of gravel
Gravel placed from ft. to ft.
Was a surface seal provided? [ ] Yes [ ] No To what depth? ft.
Material used in seal
Did any strata contain unusable water? [ ] Yes [ ] No
Type of water? Depth of strata
Method of sealing strata off

(10) WATER LEVELS:
Static level 5.0 ft. below land surface Date June 19-67
Artesian pressure lbs. per square inch Date
Water is controlled by (Cap, valve, etc.)
OK/PE

(11) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? [X] Yes [ ] No If yes, by whom? Russell Drilling
Yield 90 gal./min. with 79 ft. drawdown after 4 hrs.
" " " "
" " " "
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level

Date of test June 17-1967
Bailer test 80 gal./min. with 60 ft. drawdown after 4 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? [ ] Yes [ ] No

(12) WELL LOG: Diameter of well 10 inches.
Depth drilled 148 ft. Depth of completed well 148 ft.
Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Fill	0	3
Cem. Gr.	3	72
Gr. Sand (water)	72	77
Cem. Gr.	77	79½
Sand & Gr. (water)	79½	80½
Cem. Gr.	80½	92
Cem. Gr.	92	110
Gr. & Sand	110	111
Cem. Gr.	111	112
Gr. Sand	112	113
Cem. Gr.	113	126
Cem. Gr.	126	128
Sand & Gr.	128	148

Work started June 19 Completed 19

(13) PUMP:
Manufacturer's Name
Type: H.P.

Well Driller's Statement:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Russell Drilling Co. (Person, firm, or corporation) (Type or print)
Address P.O. Box 433 Shelton Wash
[Signed] William J. Russell (Well Driller)
License No. 223-01-5124 Date June 19, 1967

(USE ADDITIONAL SHEETS IF NECESSARY)

U. S. F. No. 1336—(Rev. 5-62)—8-62—5M—751bd

9

306, Well 3B

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. _____
Permit No. _____

(1) OWNER: Name Lake Limerick Address 90 St. Andrews Dr, Shelton, Wash.

(2) LOCATION OF WELL: County Mason #36 - SW ¼ SW ¼ Sec. 27 T. 21 N., R. 3W W.M.
Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☑
Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) .... (OLD #3)
New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☑ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 177 ft. Depth of completed well 177 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 8 " Diam. from 0 ft. to 177 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☑ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☑
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☑ No ☐ Johnson SS 10'
Manufacturer's Name Type #100 slot Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☑ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☑ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☑
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land surface elevation above mean sea level 840 ft.
Static level 61 ft. below top of well Date 5/4/81
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☑ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 210 gal./min. with 10 ft. drawdown after 1 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☑

(10) WELL LOG:
Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Shot clay	0	3'
Hard pan	3	72'
Gravel & sand	72	77'
hard pan	77	81'
Gravel & sand	81	95'
Hard pan	95	112'
Gravel & sand	112	120'
Cemented gravel	120	134'
Sand, gravel & water	134	150'
Hard pan	150	161'
Gravel & water	161	177'

Work started 4/28, 19 Completed 5/4/81, 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Bedell Pump & Drilling Co.
(Person, firm, or corporation) (Type or print)
Address 1583 E. Mckinson St. Shelton, Wash.

[Signed] Vern L Bedell
(Well Driller)

License No. 0032 Date 5/26/81, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

10

So 4, Well 4

File Original and First Copy with the Division of Water Resources
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. 9889
Permit No. 9218

(1) OWNER: Name Lake Isabella Address

(2) LOCATION OF WELL: County Mason E¼ SE¼ SW¼ Sec. 22 T. 21 N., R. 3W W.M.
Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 10 inches.
Drilled 111 ft. Depth of completed well 111 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 10" Diam. from 1 ft. to 111 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☐
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type SS. Steel Model No.
Diam. 10" Slot size from 91 ft. to 111 ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☐ No ☐ To what depth? ft.
Material used in seal
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level
Static level 54 ft. below top of well Date 8-1-68
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test 8-
Bailer test 93 gal./min. with ft. drawdown after 4 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

OK/WR

(10) WELL LOG:
Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Top Soil	1	2
Com Gravel	2	10
" "	10	35
" "	35	49
Com. Gr. (Blue)	49	50
" " "	50	58
Gr. & Sand	58	60
Brown Clay & Gr	60	70
" " "	70	78
Blue Clay & Sand	78	88
Brown Clay	88	92
Gr. & Sand	92	95
" "	95	106
" "	106	111

Work started , 19 Completed , 19

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Russell Drilling Co
(Person, firm, or corporation) (Type or print)

Address P.O. Box 433 Shelton, Wash

[Signed] Williams J. Russell
(Well Driller)

License No. 225-5146 Date 11-12, 19 69

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 1336 (Rev. 3/68)—3-Co—581, 4516.

507
Well 5

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. .....
Permit No 62-2715

(1) OWNER: Name Lake Limerick Address E. 740 St. Andrews Drive

(2) LOCATION OF WELL: County Mason — NW¼ SW¼ Sec. 27 T. 21 N. R. 3 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one).... 5
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Drive ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 10 inches.
Drilled 130 ft. Depth of completed well 130 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 10" Diam. from 0 ft. to 130 ft.
Threaded ☐ ____" Diam. from ____ ft. to ____ ft.
Welded ☒ ____" Diam. from ____ ft. to ____ ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations ____ in. by ____ in.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type SS Model No.
Diam. 8 Slot size 30 from 110 ft. to 130 ft.
Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ____ ft. to ____ ft.

Surface seal: Yes ☒ No ☐ To what depth? 22 ft.
Material used in seal Neat Cement
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level.... 600 ft.
Static level 48 ft. below top of well Date 10-30-86
Artesian pressure ____ lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom?
Yield: ____ gal/min. with ____ ft drawdown after ____ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 120 gal/min. with 5 ft. drawdown after 4 hrs.
Artesian flow ____ g.p.m. Date
Temperature of water ____ Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:
Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Brown Clay & Gravel	0	27
Sand	27	59
Brown Clay & Sand	59	74
Brown Clay & Gravel	74	109
Gravel & Water	109	130

RECEIVED
NOV 13 1986
WATER RESOURCES PROGRAM

Work started 10-23 19 86 Completed 10-30 19 86

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Arcadia Drilling
(Person, firm, or corporation) (Type or print)
Address 170 SE Walker Pk Dr.
(Signed) Willi M. Mull IV
(Well Driller)
License No. 1455 Date 11-3 19 86

(USE ADDITIONAL SHEETS IF NECESSARY)

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Well 6
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pg 1 of 2

Page 1

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. 019887

Water Right Permit No. _____

(1) OWNER: Name Lake Limerick Country Club Address _____

(2) LOCATION OF WELL: County MASON SE ¼ SW ¼ Sec 27 T 21 N, R 3W W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) _____

(3) PROPOSED USE: ☐ Domestic ☐ Industrial ☐ Municipal ☒ ☐ Irrigation ☐ Test Well ☐ Other ☐ ☐ DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) #6
Abandoned ☐ New well ☒ Method: Dug ☐ Bored ☐ Deepened ☐ Cable ☐ Driven ☐ Reconditioned ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches. Drilled 539 feet. Depth of completed well 539 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 10" Diam. from 0' ft. to 284' ft.
Welded ☒ 8" Diam. from +1' ft. to 539 ft.
Laser installed ☐ Threaded ☐ _____ Diam. from _____ ft. to _____ ft.

Perforations: Yes ☐ No ☒
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes ☒ No ☐
Manufacturer's Name JOHNSON
Type _____ Model No. _____
Diam. 7" Slot size 80 from 529 ft. to 539 ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes ☐ No ☒ Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes ☒ No ☐ To what depth? 284 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? Yes ☒ No ☐
Type of water? HEAVY IRON SALTS Depth of strata 175'
Method of sealing strata off CASED OFF

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 189 ft. below top of well Date _____
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? ARCADIA
Yield: 110 gal./min. with 52 ft. drawdown after 4 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
8:40 AM	199	9:05	173	9:41	189
9:25 AM	137	10:36	137	11:00	232
12:50	137	1:05	137		

Date of test 10/19/88

Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Airlift _____ gal./min. with _____ ft. dr. after _____ hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formations: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
FILL	0'	1'
~~BROWN SAND~~	~~1'~~	~~5'~~
ROCKY SAND	1'	5'
BROWN HARDPAN	5'	16'
BROWN SANDY CLAY	16'	22'
BROWN ROCKY CLAY	22'	27'
BROWN HARDPAN	27'	45'
BROWN ROCKY CLAY	45'	50'
BROWN HARDPAN W/LARGE ROCK	50'	58'
BROWN ROCKY CLAY	58'	64'
BROWN SANDY CLAY	64'	71'
SANDY GRAVEL - H₂O	71'	72'
BROWN HARDPAN	72'	82'
BROWN ROCKY CLAY	82'	89'
BROWN HARDPAN	89'	108'
BROWN ROCKY CLAY	108'	120'
BROWN SANDY CLAY	120'	138'
GRAVELLY SAND H₂O	138'	140'
BROWN HARDPAN	140'	145'
BROWN ROCKY CLAY	145'	151'
BLUE CLAY	151'	161'
BLUE HARDPAN W/BOULDERS	161'	164'
GRAY CEMENTED GRAVEL H₂O	164'	166'
SANDY GRAVEL	166'	175'
BLUE SHALE	175'	178'
GRAY GRAVELLY CLAY	178'	185'
GRAY GUMMY CLAY	185'	190'
BLACK SILTY CLAY	190'	198'
BLACK ROCKY CLAY	198'	205'
BLACK HARDPAN	205'	219'
BLUE CLAY	219'	225'
BLACK SILTY CLAY	225'	232'
GRAY GRAVELLY CLAY	232'	239'
GRAY HARDPAN	239'	263'

Work started 10/01 19 88 Completed 10/07 19 88

WELL CONSTRUCTOR CERTIFICATION:
I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME ARCADIA Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address SE 178 WAIKen PK Shelton
(Signed) Jack Watkins (WELL DRILLER) License No. 1465
Contractor's Registration No. ARCADD*147K1 Date 10-5-88

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) --1328-

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Well 6
508
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Page 2

Start Card

WATER WELL REPORT

STATE OF WASHINGTON

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

Start Card No. 18887

Water Right Permit No. _____

(1) OWNER: Name Lake Limerick Country Club Address _____

(2) LOCATION OF WELL: County Mason SE ¼ SW ¼ Sec 27 T 21 N, R 3 W W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) _____

(3) PROPOSED USE: ☐ Domestic ☐ Irrigation ☐ DeWater ☐ Industrial ☐ Test Well ☐ Municipal ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
Abandoned ☐ New well ☐ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Cable ☐ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well _____ inches.
Drilled _____ feet. Depth of completed well _____ ft.

(6) CONSTRUCTION DETAILS:
Casing installed: _____ " Diam. from _____ ft. to _____ ft.
Welded ☐ Threaded ☐ _____ " Diam. from _____ ft. to _____ ft.
Liner installed ☐ _____ " Diam. from _____ ft. to _____ ft.
Perforations: Yes ☐ No ☐
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
Screens: Yes ☐ No ☐
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Gravel packed: Yes ☐ No ☐ Size of gravel _____
Gravel placed from _____ ft. to _____ ft.
Surface seal: Yes ☐ No ☐ To what depth? _____ ft.
Material used in seal _____
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level _____ ft. below top of well Date _____
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom? _____
Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.
" " " "
" " " "
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test _____
Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formations: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
SANDY CLAY W/SOME GRAVEL - H₂O	283'	287'
BROWN CLAY	287'	298'
GRAY SANDY CLAY	298'	306'
BROWN HARDPAN	306'	309'
GRAVELLY SANDY CLAY	309'	312'
BROWN HARDPAN	312'	316'
BROWN SANDY CLAY	316'	320'
BROWN HARDPAN	320'	324'
BROWN GRAVELLY CLAY	324'	340'
BROWN SANDY CLAY	340'	412'
BROWN HARDPAN	412'	420'
SANDY GRAVEL - H₂O	420'	434'
BROWN CLAY	434	

Work started 10/01/88 19 Completed 10/07/88 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Arcadia Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address SE 170 Wortker Park, Shelton

(Signed) _____ (WELL DRILLER) License No. 1465

Contractor's Registration No. ARCADDR117K Date 10/25/88 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1220-

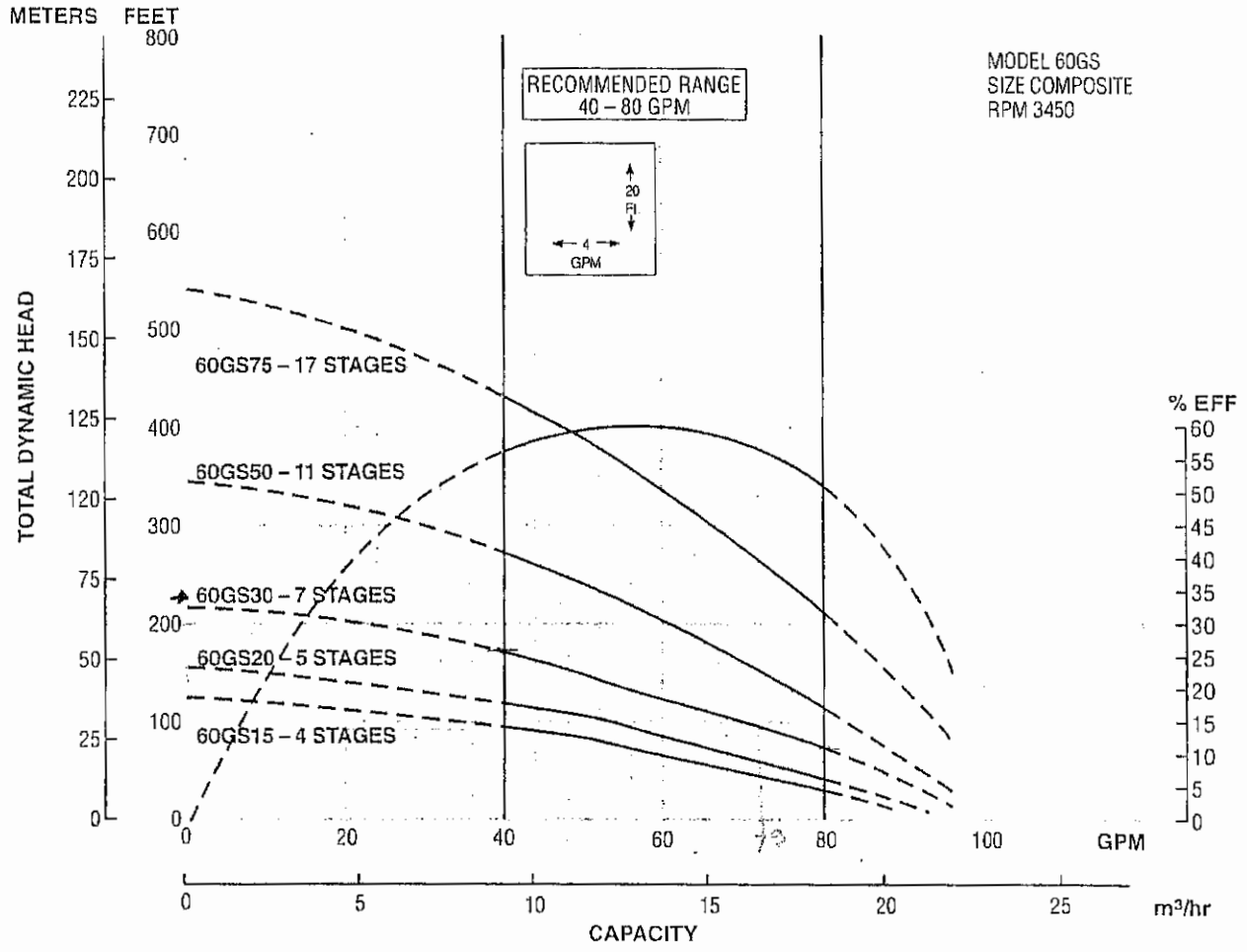
14

Well 1

Model 60GS

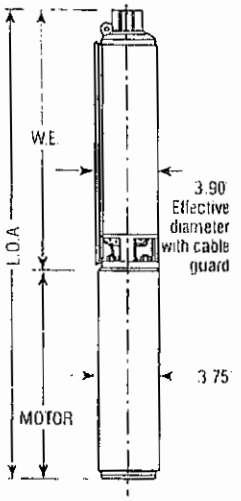
Well #1

GOULDS PUMPS



DIMENSIONS AND WEIGHTS

HP	Stages	W.E. Order No.	Motor Order No.	PH	Motor Volts	Motor Length	W.E.(1) Length	L.O.A.(2)	W.E. and Motor Weight
1½	4	60GS15	S07940	1	230	13.6	15.0	28.6	35.6
			S07978	3	200	11.8	15.0	26.8	30.6
			S07970		230				
			S07975		460				
			S07979*		575				
2	5	60GS20	S08940	1	230	15.1	17.1	32.2	38.5
			S08978	3	200	13.6	17.1	30.7	36.5
			S08970		230				
			S08975		460				
			S08979		575				
3	7	60GS30	S09940	1	230	23.5	21.2	44.7	62.2
			S09978	3	200	20.6	21.2	41.8	53.2
			S09970		230				
			S09975		460				
			S09979		575				
5	11	60GS50	S10940	1	230	29.5	30.9	60.4	83.2
			S10978	3	200	23.6	30.9	54.5	67.2
			S10970		230				
			S10975		460				
			S10979*		575				
7½	17	60GS75	S119784	3	200	29.6	43.2	72.8	85.2
			S119704		230				
			S119754		460				



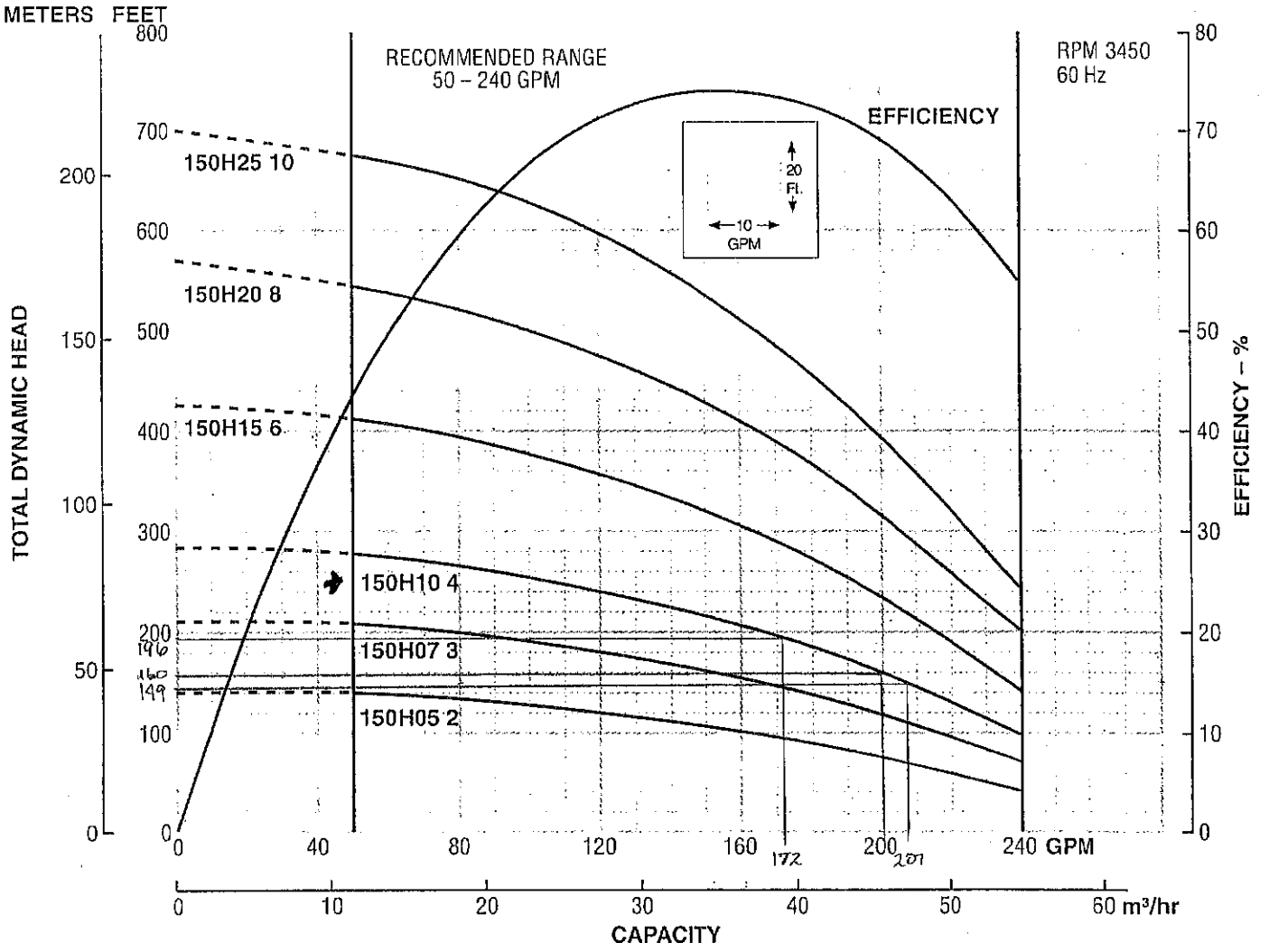
NOTES:
For complete pump, order water end and motor.
(1) W.E. = water end or pump without motor.
(2) L.O.A. = length of assembly – complete pump – water end and motor.
* Non-stock motors have a 6 week lead time.

Well 2

Model 150H

Well #2

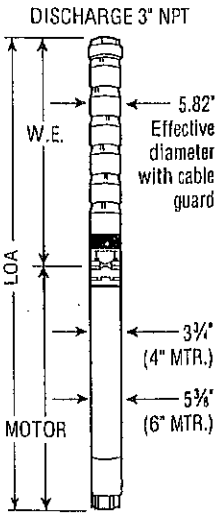
GOULDS PUMPS



Curve Reference SU 507

DIMENSIONS AND WEIGHTS

HP	Stages	W.E. Order No.	Motor Order No.	PH	Motor Volts	Motor Lgth.	W.E. Lgth.	LOA	Wt. (lbs.)
5	2	150H05 2	S10940	1	230	29.5	18.0	47.5	95
			S10978 S10970 S10975 S10979	3	200 230 460 575	23.5	18.0	41.5	95
7.5	3	150H07 3	S11970	1	230	28.0	24.3	52.3	185
			S11978 S11971 S11972 *S11979	3	200 230 460 575	24.2	24.3	48.5	160
10	4	150H10 4	S12970	1	230	30.6	29.3	59.9	215
			S12978 S12971 S12972 *S12979	3	200 230 460 575	25.5	29.3	54.8	185
15	6	150H15 6	S13970	1	230	33.1	39.3	72.4	255
			S13978 S13971 S13972 *S13979	3	200 230 460 575	28.0	39.3	67.3	229
20	8	150H20 8	S14978 S14971 S14972 *S14979	3	200 230 460 575	30.6	49.3	79.9	274
25	10	150H25 10	S15978 S15971 S15972 *S15979	3	200 230 460 575	33.2	59.3	92.5	316



(All dimensions are in inches and weights in lbs. Do not use for construction purposes.)
*Non-stock motors have a six (6) week lead time.

Water end and motor must be ordered separately and are packaged separately.

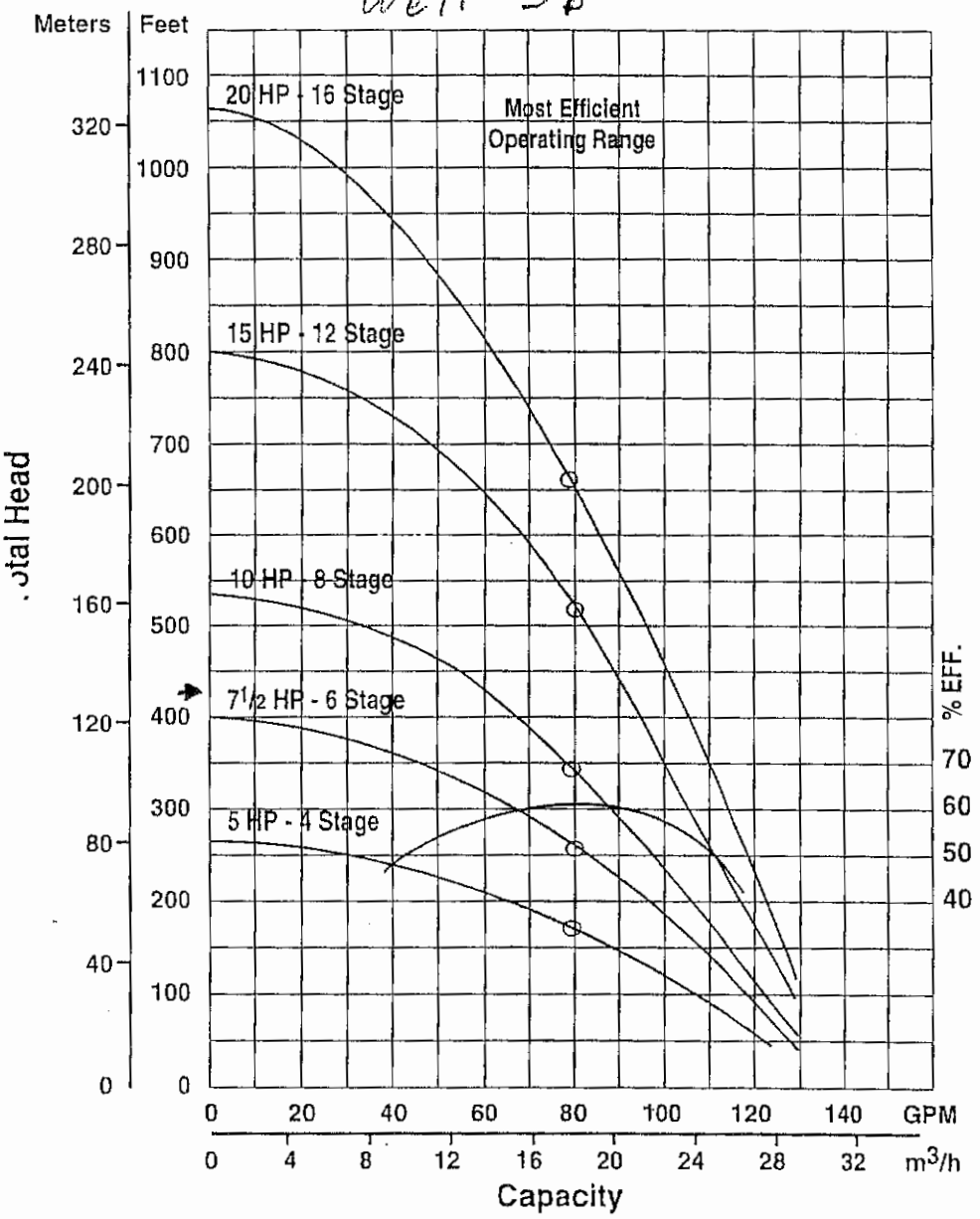
16

Well 3B

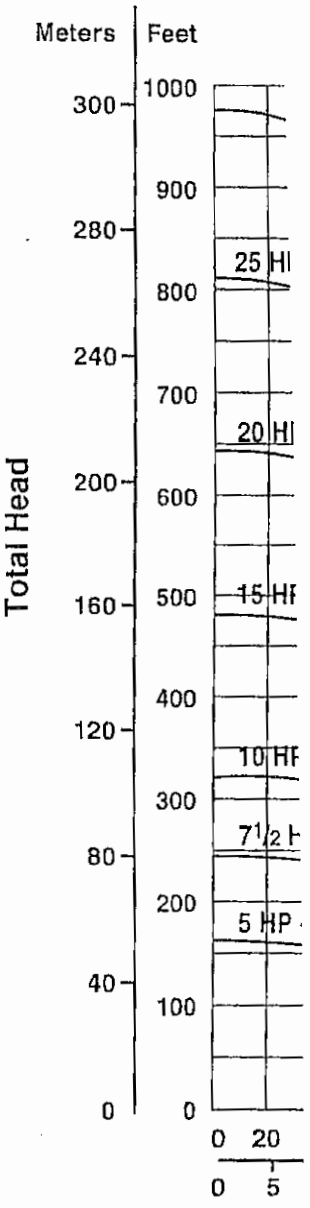
Composite Performance Curves
Minimum Well Size 6″ ID

80 GPM • 5 thru 20 HP • 3450 RPM • 60 Hz • 6P

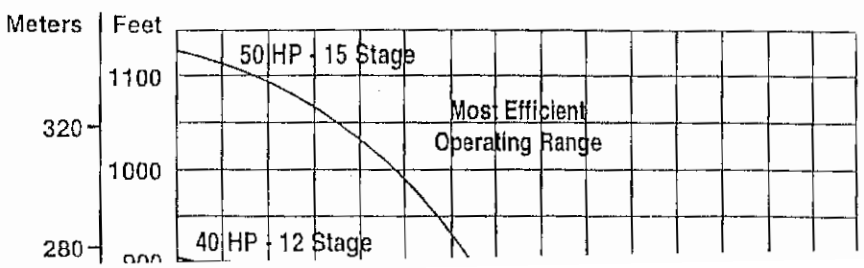
Well 3b



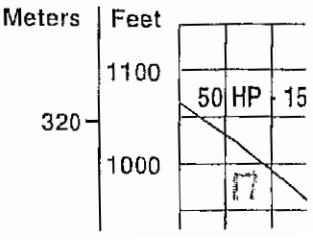
120 GPM • 5 thru



200 GPM • 5 thru 50 HP • 3450 RPM • 60 Hz • 6T



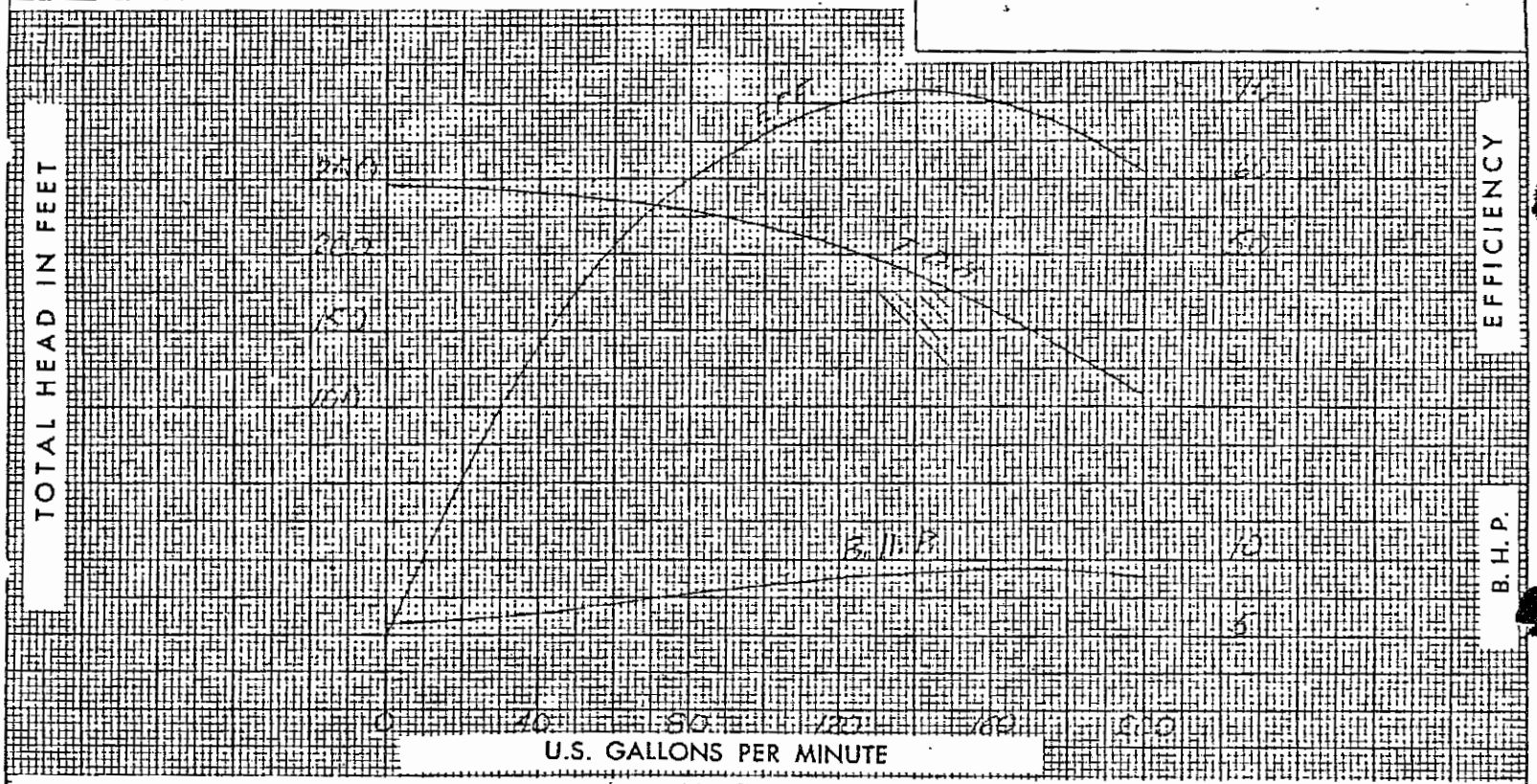
250 GPM • 5 thru



Well 4

85' SETTING

10 HP DEEP WELL TURBINE PUMP



VALLEY PUMP SERVICE
1408 18TH AVENUE N. W.
PUYALLUP, WASHINGTON

FLOWAY PUMPS, INC., FRESNO, CALIF.

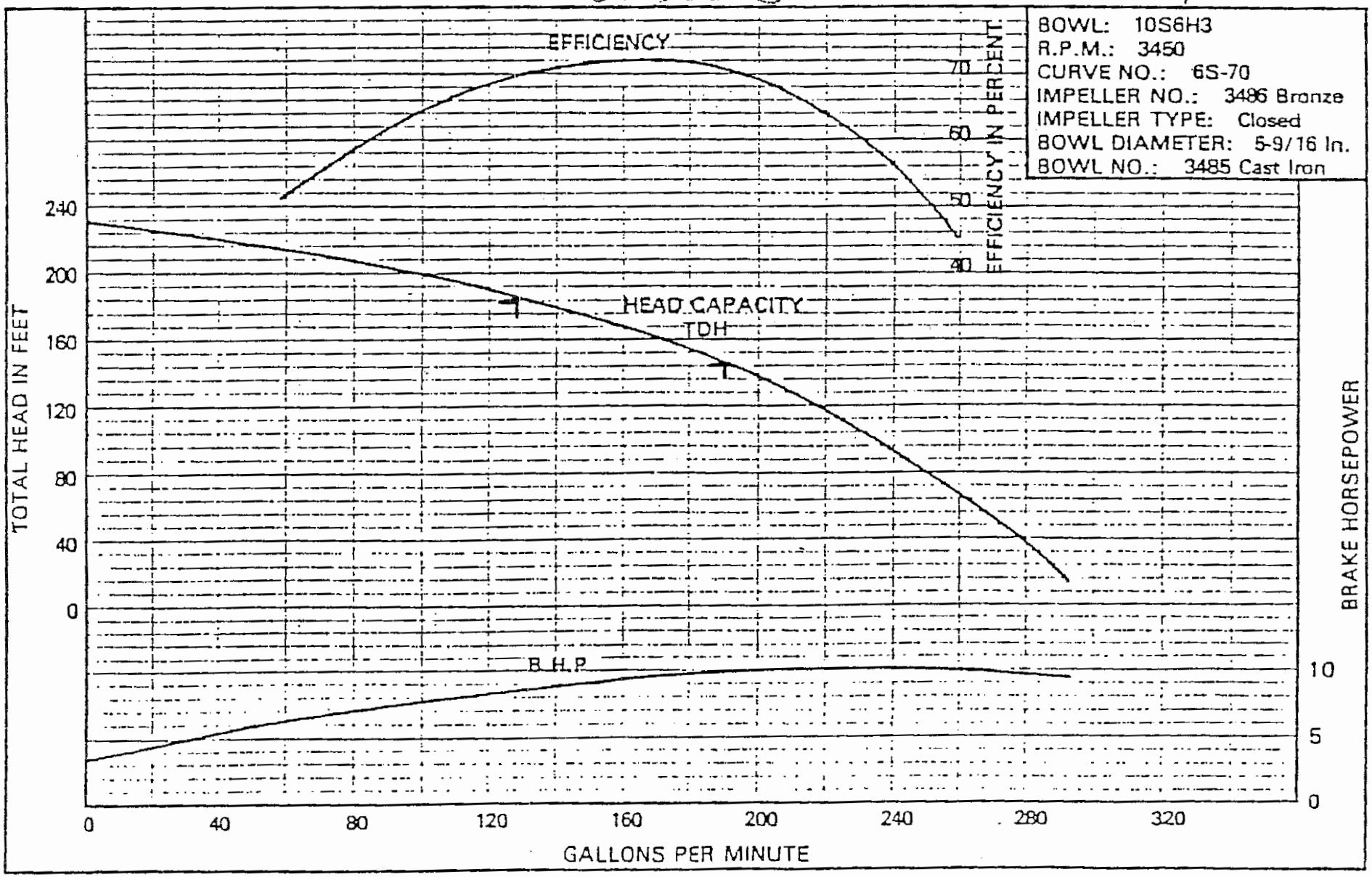
TYPE 6 JOLL
NO. OF STAGES 4
R.P.M. 3475
PUMP SERIAL NO. 68-3977

WELL NO. 4

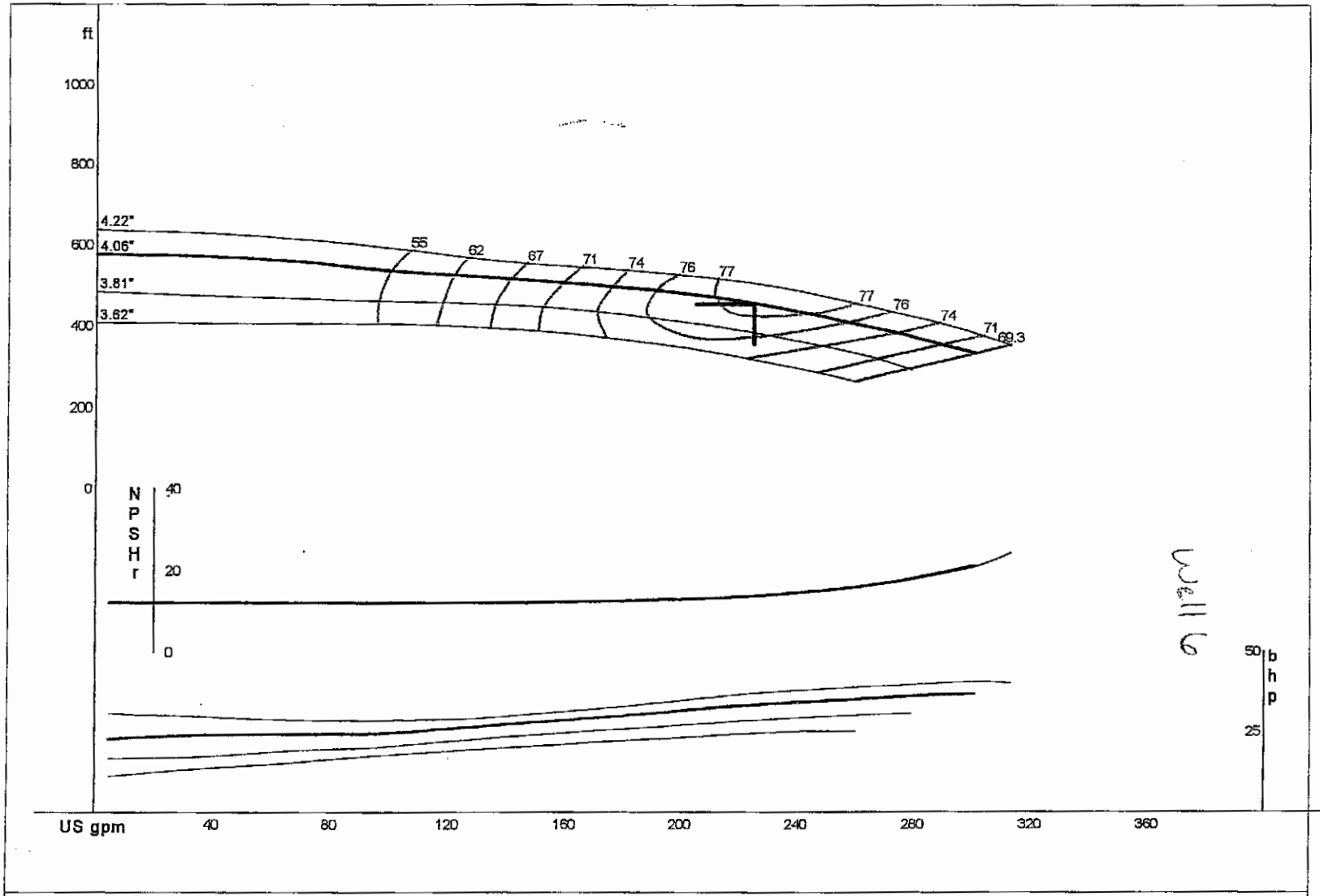
DWN. BY D.Z. DATE 1-11-23

18

Jacuzzi



Well 5



Well 6

Arcadia Drilling	Turbine ~~60 Hz~~ 56.2 Hz	TURBINE - 3600
	Catalog: SUB60.MPC, vers 2.01	Size: 6CHC; - 7 Stg
08/06/04	Curve: 3016	Speed: 3450 rpm
Selection file: (untitled)	Design Point: 225 US gpm, 456 ft	Impeller: 4.06 in

Well 6

Appendix D: Available Water Rights Certificates and Application for Water Rights for Well 3B

CERTIFICATE RECORD NO. 12 PAGE NO. 5566-A

505
Well # 1

STATE OF WASHINGTON, COUNTY OF Mason

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the State Supervisor of Water Resources thereunder.

THIS IS TO CERTIFY That LAKE LIMERICK CORPORATION AND OSBERG CONSTRUCTION COMPANY

of Seattle, Washington has made proof to the satisfaction of the State Supervisor of Water Resources of Washington, of a right to the use of the ground waters of a well located within Plat of Lake Limerick Division No. 1, NE¼NE¼ Sec. 27, Twp. 21 N., R. 3 W. W.M., for the purpose of community domestic supply under and subject to provisions contained in Ground Water Permit No. 7551 issued by the State Supervisor of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Water Resources of Washington and entered of record in Volume 12 at page 5566-A; that the right hereby confirmed dates from April 19, 1966; that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 100 gallons per minute; 117 acre-feet per year, for community domestic supply.

DF 33 117

Special provisions required by the Supervisor of Water Resources: Keith E. Boysen

6 16 66 9:37

A description of the lands to which such ground water right is appurtenant: State of Washington Dept of Conservation 330 Dexter Horton Bldg. Olympia, Wn

Plat of Lake Limerick, Division No. 1, within Secs. 22 & 27, T. 21 N., R. 3 W.W.M.

Mail To: Lake Limerick Corp. 2126-25th Ave S.E. Seattle, Wash.

Platted
Recorded
Compared
Issued

WN. REAL ESTATE EXCISE TAX PAID NOV 1 8 1966 JOHN B. COLF Treas., Mason County

The right to the use of the ground water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

WITNESS the seal and signature of the State Supervisor of Water Resources this 16th day of November, 19 66

State Supervisor of Water Resources.

K. P. No. 1301—(M) B.M.

(Well No. 2 (Div 2))

Reel 361 Fr. 001

S22

Well #2

Certificate Record No. 12 Page No. 5887-A

State of Washington, County of Mason

239084

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Water Resources thereunder.

This Is To Certify That LAKE LIMERICK COUNTRY CLUB, INC.

of Seattle, Washington *, has made proof to the satisfaction of the Department of Water Resources of Washington, of a right to the use of the ground waters of a* well (#2)

located within Lot 1, Plat of Lake Limerick Division No. 2 (SE¼NW¼)

Sec. 27 *Twp.* 21 *N., R.* 3 W *W.M.*

for the purpose of community domestic supply

under and subject to provisions contained in Ground Water Permit No. 8164 *issued by the Department of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the Department of Water Resources of Washington and entered of record in Volume* 12 *at page* 5887-A*;*

that the right hereby confirmed dates from June 30, 1967*; that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed* 200 gallons per minute; 166 acre-feet per year, for community domestic supply for 2000 persons as of 1970

Special provisions required by the Department of Water Resources:

A description of the lands to which such ground water right is appurtenant:

Sec. 27, LESS that part of the easterly 630 feet thereof located southerly of the Mason Lake Road; the S½S½ of Sec. 22; the south 200 feet of the N½S½ of Sec. 22; the SE¼SE¼ of Sec. 21; that portion of the SW¼SW¼ of Sec. 23 lying northerly of the southerly right-of-way line of Mason Lake Road; AND the southerly 200 feet of the NW¼SW¼ of Sec. 23; All in T. 21 N., R. 3 W.W.M., LESS rights of way.

Indexed [illegible]
Recorded [illegible]
Compared [illegible]
Paged [illegible]

RECORDED 2 FILED
REEL 42 FRAME 601
AUDITOR MASON COUNTY
Ruth E. Boyer
'67 DEC 7 AM 9:44
REQUEST OF Dept. Water Res.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

This certificate of ground water right is specifically subject to relinquishment for nonuse of water as provided in Section 18, Chapter 233, Laws of 1967.

WITNESS the seal and signature of the Assistant Director, Division of Water Management, Department of Water Resources affixed this 5th *day of* December*,* 19 67

Mailed: Lake Limerick Corp. Country Club Secy
5125 - 25th Ave NE
Seattle, Wn. 98105

[signature]
Assistant Director
Division of Water Management
Department of Water Resources

2

SFT 2WC1381—OS—6-67.

REEL 42 FR. 602

Sec 3

Well #3 A

CERTIFICATE RECORD No. 12 PAGE No. 5888-A

STATE OF WASHINGTON, COUNTY OF Mason

230985

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Water Resources thereunder.

THIS IS TO CERTIFY THAT LAKE LIMERICK COUNTRY CLUB, INC.

of Seattle, Washington, has made proof to the satisfaction of the Department of Water Resources of Washington, of a right to the use of the ground waters of a well (#3)

located within Lot 5, Plat of Lake Limerick Division No. 2 (SW¼SW¼)

Sec. 27, Twp. 21 N., R. 3 W. W.M.

for the purpose of community domestic supply

under and subject to provisions contained in Ground Water Permit No. 8165 issued by the Department of Water Resources and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the Department of Water Resources of Washington and entered of record in Volume 12 at page 5888-A; that the right hereby confirmed dates from June 30, 1967; that the quantity of ground water under the right hereby confirmed for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 100 gallons per minute; 84 acre-feet per year, continuously each year for community domestic supply for 2000 persons as of 1970

Special provisions required by the Department of Water Resources:

A description of the lands to which such ground water right is appurtenant:

Sec. 27, LESS that part of the easterly 630 feet thereof located southerly of the Mason Lake Road; the S½S½ of Sec. 22; the south 200 feet of the N½S½ of Sec. 22; the SE¼SE¼ of Sec. 21; that portion of the SW¼SW¼ of Sec. 23 lying northerly of the southerly right-of-way line of Mason Lake Road; AND the southerly 200 feet of the NW¼SW¼ of Sec. 23; All in T. 21 N., R. 3 W.W.M., LESS rights-of-way.

Recorded 2 Filed
Reel 42 Frame 602
Mason County

'67 DEC 7 AM 9:48

REQUEST OF

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Sections 6 and 7, Chapter 122, Laws of 1929.

This certificate of ground water right is specifically subject to relinquishment for nonuse of water as provided in Section 18, Chapter 233, Laws of 1967.

WITNESS the seal and signature of the Assistant Director, Division of Water Management, Department of Water Resources affixed this 5th day of December 1967.

Assistant Director
Division of Water Management
Department of Water Resources

#2541272

CERTIFICATE RECORD NO. 15, PAGE NO. 7012-A

STATE OF WASHINGTON, COUNTY OF Mason

504

Well 4

CERTIFICATE OF GROUND WATER RIGHT

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology thereunder.)

THIS IS TO CERTIFY *That* LAKE LIMERICK COUNTRY CLUB ESTATES

of Seattle, Washington, *has made proof to the satisfaction of the Department of Ecology of a right to the use of the public ground waters of the State of Washington from* a well *located within* Lot 506, of the Plat of Lake Limerick Division No. 3 *Sec.* 22, *Twp.* 21 *N., R.* 3 *W.W.M.,* *for the purpose(s) of* community domestic supply *under and specifically subject to provisions contained in Ground Water Permit No.* 9218 *issued by the Department of Ecology and that said right to the use of said ground waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the Department of Ecology and entered of record in Volume* 15 *at page* 7012-A *that the priority of the right hereby confirmed dates from* November 19, 1968; *that the quantity of ground water under the right hereby confirmed for the aforesaid purposes, is limited to an amount actually beneficially used for said purposes, and shall not exceed* 100 gallons per minute, 79 acre-feet per year for community domestic supply during entire year.

A description of the lands to which such ground water right is appurtenant is as follows:

Plat of Lake Limerick, Division No. 3 located in Secs. 21, 22, 23 and 27, T. 21 N., R. 3 W.W.M.

RECORDED 2 - FILED
REC'D 72 FRAME 926
AUD. FOR MASON COUNTY
RUTH C. BOYCE

'70 SEP 30 AM 10:32

REQUEST OF Dept of Ecology

Issued 21.00
Recorded 2.00
Certified 1.00
Total 24.00

The right to use of water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390 and 90.44.020.

This certificate of ground water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and seal of this office at Olympia, Washington, this 29th *day of* September, *19*70.

JOHN A. BIGGS, Director
Department of Ecology

Engineering Data
OK

mail to:
Stevens-Ross
701 Tacoma Mills
Tacoma Wash 98402

by Glen H. Fiedler

4

DEPARTMENT OF ECOLOGY

560615

CERTIFICATE OF WATER RIGHT

Sec 7 well #5

☐ Surface Water (issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
November 17, 1987	G2-27215	G2-27215 P	G2-27215 C

NAME
Lake Limerick Community

mail

ADDRESS (STREET)	CITY	STATE	ZIP CODE
East 790 St. Andrew Drive	Shelton	Washington	98584

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
A well

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	190	152

QUANTITY, TYPE OF USE, PERIOD OF USE		
152 acre-feet per year (supplemental)	Community domestic supply	Year-round, as needed

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION-WITHDRAWAL
150 feet north and 1,200 feet east of the west quarter corner of Section 27.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, (E. OR W.) W.M.	W.R.I.A.	COUNTY
S½ NW¼	27	21	3W	14	Mason

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the Lake Limerick Community Water System.

Dept of Ecology
REQUEST OF:
93 MAR -2 AM 10: 27
BOOK 80
REC. 557 PAGE 025-026
MASON COUNTY
AUDITOR

5

CERTIFICATE

PROVISIONS

The well access port shall be maintained at all times.

*Issued as a supplemental source of supply to rights enjoyed under Ground Water Certificates 5566-A, 5887-A, 5888-A, and 7012-A.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.160.

Given under my hand and the seal of this office at Olympia, Washington,

this 1st *day of* March, *19* 93.

Mary Riveland, Director
Department of Ecology

ENGINEERING DATA
OK WW

by [signature]

FOR COUNTY USE ONLY

Well # 6

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

CERTIFICATE OF WATER RIGHT

☐ Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

☒ Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
October 26, 1988	G2-27443	G2-27443 P	G2-27443 C

NAME
Lake Lemerick Country Club

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
E. 790 St. Andrews Drive	Shelton	Washington	98584

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
A well (No. 6)

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
	200	160

QUANTITY, TYPE OF USE, PERIOD OF USE		
160 acre-feet per year	Community domestic supply	Year-round, as needed

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWAL
850 feet north and 350 feet west of the south quarter corner of Section 27.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE, E. OR W.) W.M.	W.R.I.A.	COUNTY
SE¼ SW¼	27	21	3W	14	Mason

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the Lake Lemerick community water system.

PROVISIONS

The well access port shall be maintained at all times.

The Water Resources Act of 1971 specifies certain criteria regarding utilization and management of the waters of the state in the best public interest. Use of water may be subject to regulation at certain times, based on the necessity to maintain water quantities sufficient for preservation of the natural environment.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.160.

Given under my hand and the seal of this office at Olympia, Washington,

this 1st *day of* March, *19* 93.

Mary Riveland, Director

Department of Ecology

ENGINEERING DATA

by _____

FOR COUNTY USE ONLY

RECEIVED MAY 2 1 1997

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

May 13, 1997

Lake Limerick Country Club
East 790 St. Andrews Drive
Shelton, Washington 98584-9688

Dear Sir or Madame:

Re: Ground Water Application No. G 2-29483

Your application for the appropriation of water has been assigned the above referenced number. Please refer to this number in future correspondence.

Enclosed is a notice of your application which must be published once a week for two consecutive weeks in a qualified legal newspaper of general circulation in the County or Counties is which the storage, diversion, and use is to be made and in other newspapers as directed. A list of these newspapers in your county is enclosed. The applicant is responsible for the payment of the publication. Please read the notice carefully to make sure it is correct. Should you find an error, please return the notice to our office for correction.

You should mail or deliver the enclosed notice to a newspaper regarding publication as soon as possible. When you receive the affidavit of publication with the news clipping from the newspaper, please forward the original to this office promptly.

Since your application is for service of more than one residence, it is considered a public water supply. Public water supply systems are required to be approved by either the Local Health Department or the State Department of Health, depending upon system size. If you have not already done so, I suggest that you contact your Local Health Department or DOH, Drinking Water Section, Olympia, Washington, for further information.

Sincerely,

Sheri Carroll
Shorelands & Water Resources

SC:th
Enclosures

State of Washington
Application for a Water Right

Please follow the attached instructions to avoid unnecessary delays.

For Ecology Use
Fee Paid ✓
Date

Section 1. APPLICANT - PERSON, ORGANIZATION, OR WATER SYSTEM

Name LAKE LIMERICK COUNTRY CLUB (ID#44150T) Home Tel:(360) 426 - 7892
Mailing Address EAST 790 ST. ANDREWS DRIVE Work Tel:(360) 426 - 7892
City SHELTON State WA Zip+4 98584 + 9688 FAX:(360) 426 -8922

Section 2. CONTACT - PERSON TO CALL ABOUT THE APPLICATION

☐ Same as above

Name John Segerson Home Tel:( ) N/A
Mailing Address 2845 Schirm Loop Rd NW Work Tel:(360) 866-4165
City Olympia State WA Zip+4 98502 + 9685 FAX:(360) 866-1695
Relationship to applicant Consulting Engineer

Section 3. STATEMENT OF INTENT

The applicant requests a permit to use not more than 210 (☒ gallons per minute or ☐ cubic feet per second) from a ☐ surface water source or ☒ ground water source (check only one) for the purpose(s) of Community Domestic. Attach a "legal" description of the place of use. (See instructions.) *NOTE: A tax parcel number or a plat number is not sufficient.*
Attachment A Area Served by Lake Limerick Water System
Estimate a maximum annual quantity to be used in acre-feet per year: 254

☐ Check if the water use is proposed for a short-term project. Indicate the period of time that the water will be needed:
From ___/___/___ to ___/___/___

Section 4. WATER SOURCE

If SURFACE WATER	If GROUNDWATER
Name the water source and indicate if stream, spring, lake, etc. If unnamed, write "unnamed spring," "unnamed stream," etc.: Number of diversions:	A permit is desired for 1 well(s). Constructed May 1997 Well 3B
Source flows into (name of body of water):	Size & depth of well(s): Casing 10" Depth 177' Screened Interval 167-177'

LOCATION

Enter the north-south and east-west distances in feet from the point of diversion or withdrawal to the nearest section corner:
Approx. 1165' N & 790' E fr SW cnr Sec 27 T21N R3WWM
(Approx 30' west of Well 3A - G2*08834C, Cert 05B88)

¼ of	¼ of	Section	Township	Range(E/W)	County	If location of source is platted, complete below: Lot	Block	Subdivision
SW	SW	27	21N	3W	Mason			

For Ecology Use Date Received: 4/24/97 Priority Date: 4/24/97
SEPA: Exempt / Not Exempt FERC License # Dept. Of Health #
Date Accepted As Complete 4/30/97 By SC Date Returned By WRIA: 14

ECY 040-1-14
Rev 12/94 F

APPLICATION

Appl. No.: G2-29483

Section 5. GENERAL WATER SYSTEM INFORMATION

Name of system, if named: LAKE LIMERICK WATER SYSTEM (DOH ID#44150T)

B. Briefly describe your proposed water system. (See instructions.)

An existing Type A water system in a platted development of 1380 lots. This is for an existing well, designated Well #3A, which is used as primary supply for the entire year. The well delivers to an existing 150,000 gallon storage tank, which has booster pumps for distribution. The well is presently equipped with a pump capable of 210 gpm output.

Attachment B, Drillers Report

C. Do you already have any water rights or claims associated with this property or system? ☒ YES ☐ NO
PROVIDE DOCUMENTATION.

Attachment C, Existing Water Rights

Section 6. DOMESTIC / PUBLIC WATER SUPPLY SYSTEM INFORMATION
(Completed for all domestic/public supply uses.)

A. Number of "connections" requested: 1,100 Type of connection Residential (Homes, Apartment, Recreational, etc.)

B. Are you within the area of an approved water system? ☒ YES ☐ NO
If yes, explain why you are unable to connect to the system. *Note: Regional water systems are identified by your County Health Department.*

Complete C. and D. only if the proposed water system will have fifteen or more connections.

C. Do you have a current water system plan approved by the Washington State Department of Health? ☐ YES ☒ NO
If yes, when was it approved? _____ Please attach the current approved version of your plan.

Water System Plan In Progress

Do you have an approved conservation plan? ☐ YES ☒ NO
If yes, when was it approved? _____ Please attach the current approved version of your plan.

Conservation Plan In Progress

Section 7. IRRIGATION/AGRICULTURAL/FARM INFORMATION
(Complete for all irrigation and agriculture uses.)

A. Total number of acres to be irrigated: _____

B. List total number of acres for other specified agricultural uses:

Use _____ Acres _____
Use _____ Acres _____
Use _____ Acres _____

C. Total number of acres to be covered by this application: _____

D. Family Farm Act (Initiative Measure Number 59, November 3, 1977)
Add up the acreage in which you have a controlling interest, including only:
‡ Acreage irrigated under water rights acquired after December 8, 1977;
‡ Acreage proposed to be irrigated under this application;
‡ Acreage proposed to be irrigated under other pending application(s).

1. Is the combined acreage greater than 2000 acres? ☐ YES ☐ NO
2. Do you have a controlling interest in a Family Farm Development Permit? ☐ YES ☐ NO
If yes, enter permit no: _____

E. Farm uses:
Stockwater - Total # of animals _____ Animal type _____ (If dairy cattle, see below)
Dairy - # Milking _____ # Non-milking _____

Section 8. WATER STORAGE

Will you be using a dam, dike, or other structure to retain or store water? ☐ YES ☒ NO

NOTE: If you will be storing 10 acre-feet or more of water and/or if the water depth will be 10 feet or more at the deepest point, and some portion of the storage will be above grade, you must also apply for a reservoir permit. You can get a reservoir permit application from the Department of Ecology.

Section 9. DRIVING DIRECTIONS

Provide detailed driving instructions to the project site.

Follow State Highway 3 north from Shelton about 3.5 miles. Turn Left, following signs to Lake Limerick. Proceed approx 2 miles to St. Andrews Dr. Turn left on St Andrews. Well site is approx 700 ft, at corner of St Andrews and Penzance.

Section 10. REQUIRED MAP

A. Attach a map of the project. (See instructions.)

Attachment A, Map

Section 11. PROPERTY OWNERSHIP

A. Does the applicant own the land on which the water will be used? ☐ YES ☒ NO
If no, explain the applicant's interest in the place of use and provide the name(s) and address(es) of the owner(s):

Owners of property are customers of the water system

B. Does the applicant own the land on which the water source is located? ☒ YES ☐ NO
If no, submit a copy of agreement:

I certify that the information above is true and accurate to the best of my knowledge. I understand that in order to process my application, I grant staff from the Department of Ecology access to the site for inspection and monitoring purposes. Even though I may have been assisted in the preparation of the above application by the employees of the Department of Ecology, all responsibility for the accuracy of the information rests with me.

Kirk W. Osborne - Chairman L Water Committee 4/19/97
Applicant (or authorized representative) Date

Landowner for place of use (if same as applicant, write "same") Date

Lake Limerick Country Club, Inc.
E 790 St. Andrews Drive
Shelton, WA 9 8584
Phone: (360) 426-3581
FAX: (360) 426-8922

June 17, 1997

Department of Ecology
PO Box 47775
Olympia, WA 98504-7775

RE: Ground Water Application No. G2-29483

Dear Sirs:

Enclosed is the notice of our application for water right allocation for the Lake Limerick Water System which was published once a week for two consecutive weeks in a qualified legal newspaper of general circulation per your letter of May 13, 1997.

Thank you for your cooperation in this matter.

Sincerely,

Kirk Osborne,
Chair person Water Department

KO/ SCS

Enclosure: Affidavit of Publication - Original

DOE Letter of May 13, 1997

cc: File, Water Committee, Ken Douglas, John Segerson, P.E.

DEPARTMENT OF ECOLOGY
NOTICE OF APPLICATION TO
APPROPRIATE PUBLIC WATERS

TAKE NOTICE:

That Lake Limerick Country Club of Shelton, Washington on April 24, 1997, under Application No. G2-29483 filed for permit to appropriate public waters, subject to existing rights, from a well in the amount of 210 gallons per minute as needed year round each year, for community domestic supply. The source of the proposed appropriation is located within SW 1/4 SW 1/4 Section 27, Township 21 N., Range 3 W.W.M., in Mason County.

Protests or objections to approval of this application must include a detailed statement of the basis for objections; protests must be accompanied by a two dollar ($2.00 recording fee and filed with the Department of Ecology, at the address shown below, within thirty (30) days from: June 12, 1997.

Department of Ecology
P.O. Box 47775
Olympia, WA 98504-7775

6/5-12 2t

Affidavit of Publication

ASHINGTON,
OF MASON } ss.

Julie G. Orme, being first duly sworn

ses and says that he is the clerk
LTON-MASON COUNTY JOURNAL, a weekly newspaper. That said
a legal newspaper and it is now and has been for more than six months
late of the publication hereinafter referred to, published in the English
inuously as a weekly newspaper in SHELTON, Mason County, Washington,
nd during all of said time was printed in an office maintained at the aforesaid
place of publication of said newspaper. That the said SHELTON-MASON COUNTY JOURNAL was on the 9th day of August, 1941, approved as a legal newspaper by the Superior Court of said Mason County.

That the annexed is a true copy of a Notice of Appl. To Appr. Public Waters G2-29483 - Lake Limerick Country Club

as it was published in regular issues (and not in supplement form) of said newspaper once each week for a period of two consecutive weeks, commencing on the

5th day of June, 1997, and ending on the 12th day of June, 1997, both dates inclusive, and that such newspaper was regularly distributed to its subscribers during all of said period. That the full amount of the fee charged for the foregoing publication is the sum of $ 49.00

Julie G Orme

Subscribed and sworn to before me this 12th day of June, 1997.

CORYL J. CLARK
COMMISSION EXPIRES
NOTARY PUBLIC
FEB 4, 2000
STATE OF WASHINGTON

Coryl J. Clark
Notary Public in and for the State of Washington
Residing at Shelton, Washington

My commission expires 2-4, 2000

DOE CK 3142 rec'd 6/13/97 orig. app. sent to Co.

Appendix E: Capacity Analysis

Capacity Analysis

Lake Limerick Water System

2006

Prepared By: Mary Wilkes, E.I.T
SEMCON, Inc.
Olympia, WA

Design Assumptions: Multiple Source, No Fireflow

DEMAND FACTORS

ADD,cal = Average daily demand per ERU based on average annual rainfall. See WSDM Eq 5-1.

ADD,cal = (8000/AAR) + 200 Eq 1

Where: AAR = Average Annual Rainfall

Given:	AAR =	38.82	in/yr	Shelton - Western Regional Climate Center
Then:	ADD,cal =	406	gpd/ERU	

ADD = Average daily demand per ERU based on historical production data, adjusted up

Given:	ADD =	270*	gpd/ERU	

MDD = Maximum daily demand. See WSDM Eq 5-2.

MDD = 2 x ADD Eq 2

Then:	MDD =	540	gpd/ERU	

WELL CAPACITIES

The installed pumping capacity (Q) and instantaneous water rights (Qi,prim) are given for each source on page 6, along with other data relevant to the sources. The value (Qi,prim - Q) is greater than or equal to zero for each source, indicating that installed pumping capacities do not exceed the primary instaneous water rights.

Qs = Sum of installed pumping capacities.

Given:	=	810	gpm	See page 6.

Q_L = Installed pumping capacity of largest source.

Given:	=	200	gpm	See page 6.

---

* This low number is due to Lake Limerick's extremely successful conservation program.

Capacity Analysis

Lake Limerick Water System

2006

SYSTEM CAPACITY

Based on Water Available Annual (Na)

Na = No. of ERUs the system can support based on volume of water available annually

= Va,total / (365 x ADD) See WSDM Eq 6-1. Eq 3

Where: Va,total = Volume available annual, based on installed pumping capacities and water rights

Given: Va,total = 232,709,400 gal/yr See page 6.

Then: **Na = 2,361 ERUs**

Based on Water Available Daily (Nd)

Nd = No. of ERUs the system can support based on volume of water available daily

= Vd / (MDD) See WSDM Eq 6-2. Eq 4

Where: Vd = Volume available for maximum day's demand, based on installed pumping capacities

= Qs x 1440 See page 1 for definition of Qs. Eq 5

= 1,166,400 gal/day

Then: **Nd = 2,160 ERUs**

Based on Storage Capacity (Ns)

Ns = No. of ERUs the system can support based on storage

CRS = Total existing capacity-related storage of the system

CRS,min = Minimum capacity related storage required

ES = Minimum equalizing storage required

SB = Minimum standby storage required

PHDs = Peak hourly demand, base on Ns

SC = Source credit

Capacity Analysis

Lake Limerick Water System

2006

To calculate Ns, equations are developed for CRS,min, ES, SB, PHD and SC, and then these equations are solved simultaneously solved for Ns. To do this, several assumptions must be made. These assumptions are then verified once Ns is calculated.

Existing Capacity-Related Storage (CRS)

CRS = TS - OS - FV. See WSDM pg 6-16. Eq 6

Where:
- TS = Total storage
- OS = Operational storage
- FV = Foot volume

Given:	TS =	478,792	gallon(s)	See page 6
	OS =	78,332	gallon(s)	"
	FV =	143,090	gallon(s)	"
Then:	CRS =	257,370	gallon(s)	

Peak Hourly Demand (PHD) & Equalizing Storage (ES)

ES = 150(PHDs - Qs) or 0, whichever is greater. See WSDM Eq 9-1. Eq 7

Where:
- PHDs = (MDD/1440) (C x Ns + F) + 18. See WSDM Eq 5-1. Eq 8
- C = coefficient See WSDM Table 5-1.
- F = factor See WSDM Eq 5-1.

Source Credit (SC) & Standby Storage (SB)

SB = (2 x ADD x Ns - SC) or 200 x Ns, whichever is greater. See WSDM Eq 9-3. Eq 9

Where:
- SC = tm(Qs - Q_L) Eq 10
- tm = Length of time sources can run in a day

See page 1 for definitions of Qs and Q_L.

Given:	tm =	1,440	minute(s)
Then:	SC =	878,400	gallon(s)

Capacity Analysis

Lake Limerick Water System

2006

Required Capacity-Related Storage (CRS,min) & System's Storage-Base Capacity (Ns)

CRS,min = ES + SB (See WSDM pg 6-16) Eq 11

Let: CRS = CRS,min Eq 12

Then: CRS = ES + SB Eq 13

Assuming: 1) 150 (PHDs - Qs) > 0,

therefore, ES = 150(PHDs - Qs) See Eq 7.

2) 200 Ns > (2 ADD x Ns - SC)

therefore, SB = 200 Ns See Eq 9.

Then: $CRS = 150 \times \left(\frac{MDD}{1440} \times (C \times Ns + F) + 18 - Qs \right) + 200 \times Ns$ See Eq 7, Eq 8, and Eq 9. Eq 14

$$Ns = \frac{CRS - \frac{MDD}{1440} 150 \times F - 2700 + 150 \times Qs}{\frac{MDD}{1440} 150 \times C + 200}$$ Eq 15

Assuming: 3) Ns is greater than 500,

therefore, C = 1.6 and F = 225. See WSDM Table 5-1.

Then: Ns = 1,253 ERUs

Verifying Assumptions Made

Assumption: *1) 150 (PHDs - Qs) > 0,*

therefore, ES = 150(PHDs - Qs) *See Eq 7.*

Ns = 1,253

C = 1.6

F = 225

Then: PHDs = 854 gpm See Eq 8

150(PHDs - Qs) = 6,600 gallons

Therefore: Assumption 1 is valid and ES = 6,600 gallons.

Capacity Analysis

Lake Limerick Water System

2006

Assumption: 2) *200 Ns > (2 ADD x Ns - SC)*

therefore, SB = 200 Ns *See Eq 9.*

200 Ns = 250,600 gallons

2 ADD x Ns - SC = -201,780 gallons

Therefore: Assumption 2 is valid and SB = 250,600 gallons.

Assumption: 3) *Ns is greater than 500,*

therefore, C = 1.6 and F = 225. See WSDM Table 5-1.

Ns = 1,253

Therefore: Assumption 3 is valid.

All 3 assumptions are valid.

Therefore: **Ns = 1,253**

CONCLUSION

N_{cap} = Number of ERUs the system can support based on storage, installed pumping capacities and water rights.

= Na, Nd, or Ns, whichever is less Eq 16

= 1,253 ERUs

Conclusion: System's capacity, based on storage, installed pumping capacities and water rights, is 1,253 ERUs. The system's storage and installed pumping capacities are the limiting factors.

Capacity Analysis

Lake Limerick Water System

2006

Source Data*

Well	Qi,prim (gpm)	Qa,prim (ac-ft)	Q (gpm)	Qi,prim - Q (gpm)	SFp (%)	Va (gal/yr)
Well 1	100	117	45	55	161	23,652,000
Well 2	200	166	200	0	51	53,611,200
Well 3A	100	84	100	0	52	27,331,200
Well 4	100	79	75	25	65	25,623,000
Well 5	190	152	190	0	50	49,932,000
Well 6	200	160	200	0	50	52,560,000
Total	**890**	**606**	**810**	**80**	-	**232,709,400**

Qi,prim is defined as primary instantaneous withdrawal allowed by the water rights.

Qa,prim is defined as the primary annual withdrawal allowed by the water rights.

Q is defined as the installed source capacity.

SFp is defined as the service factor (e.g. average percentage time pump may be operated) based on the pumping capacity and primary annual water rights. SFp = (Qa,prim x 100 /Q) x .62 gpm/ac-ft/yr.

Va is defined as annual volume available from all sources. If SFp < 100, then Va = Q x (SFp/100) x 525,600 min/yr. If SFp ≥ 100, then Va = Q x 525,600 min/yr.

Tank Data

Tank	Height (ft)	Diameter (ft)	Height of Operat- ional Storage (ft)	Height of Foot Volume (ft)	Total Reservoir Storage (gal)	Operational Storage (gal)	Foot Volume (gal)
Tank 1	23.5	24.75	5.0	15	84,569	17,993	53,980
Tank 3	30.0	30.00	6.0	12	158,619	31,724	63,448
Tank 4	30.0	20.90	6.0	10	76,985	15,397	25,662
Tank 6	30.0	30.00	2.5	0	158,619	13,218	0
				Total	**478,792**	**78,332**	**143,090**

Height of operational volume is equal to the drop in water level in the tank before the tank begins to fill.

Height of footer volume: If a tank has booster pump(s) the height of the footer volume is equal to the minimum level of water in the tank required to provide sufficient net suction head for the pump. If the tank gravity-feeds the system, the height of the footer volume is equal to the height of water in the tank is 69' above highest residence and 46' above highest hydrant in pressure zone.

* Excluding Well 3B

Capacity Analysis

Lake Limerick Water System

2006

SHELTON, WASHINGTON (457584)

Period of Record Monthly Climate Summary

Period of Record : 6/ 2/1948 to 11/8/2002

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	44.5	49.1	53.4	59.5	66.9	71.8	77.1	76.9	71.9	60.9	50.7	45.0	60.6
Average Min. Temperature (F)	33.1	34.5	35.7	38.9	44.2	49.2	52.3	52.6	48.1	42.1	37.6	34.4	41.9
Average Total Precipitation (in.)	10.47	8.41	6.93	4.37	2.26	1.67	0.94	1.29	2.50	5.84	10.43	11.09	66.19
Average Total SnowFall (in.)	3.9	0.7	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.1	8.2
Average Snow Depth (in.)	0	0	0	0	0	0	0	0	0	0	0	0	0

Percent of possible observations for period of record.
Max. Temp.: 98.5% Min. Temp.: 98.4% Precipitation: 98.3% Snowfall: 96.6% Snow Depth: 94.9%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

Appendix F: Booster Pump Curves

BERTS PUMP AND EQUIP

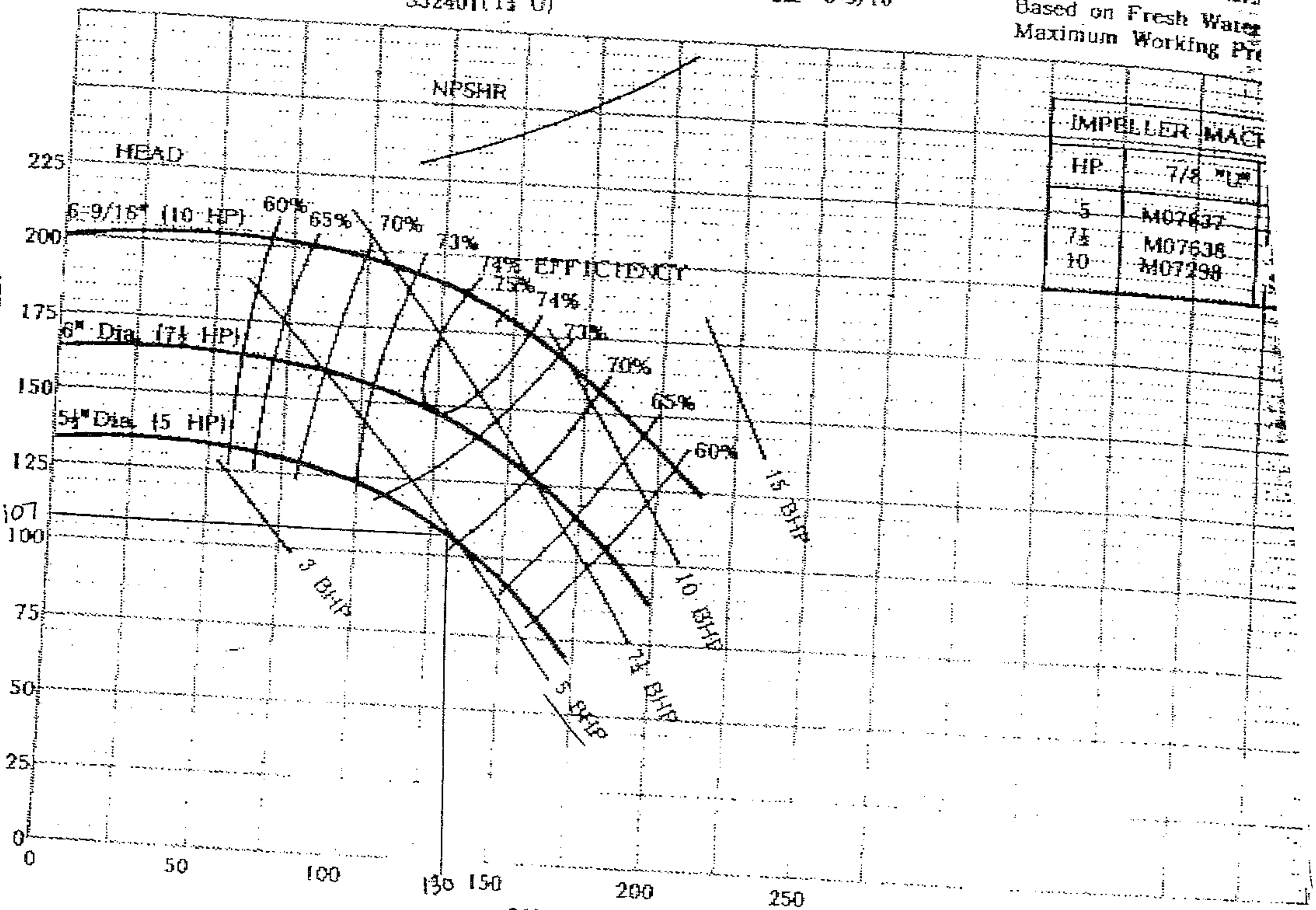
Case: Material C.I. Patt. No. L01018 Mach. No. L01018

Impeller: Material C.I. Patt. No. M07298 (7/8U) S32401 (1¼ U) Mach. No. See below Dia. 6-9/16"

Nominal

Based on Fresh Water
Maximum Working Pr

MODEL



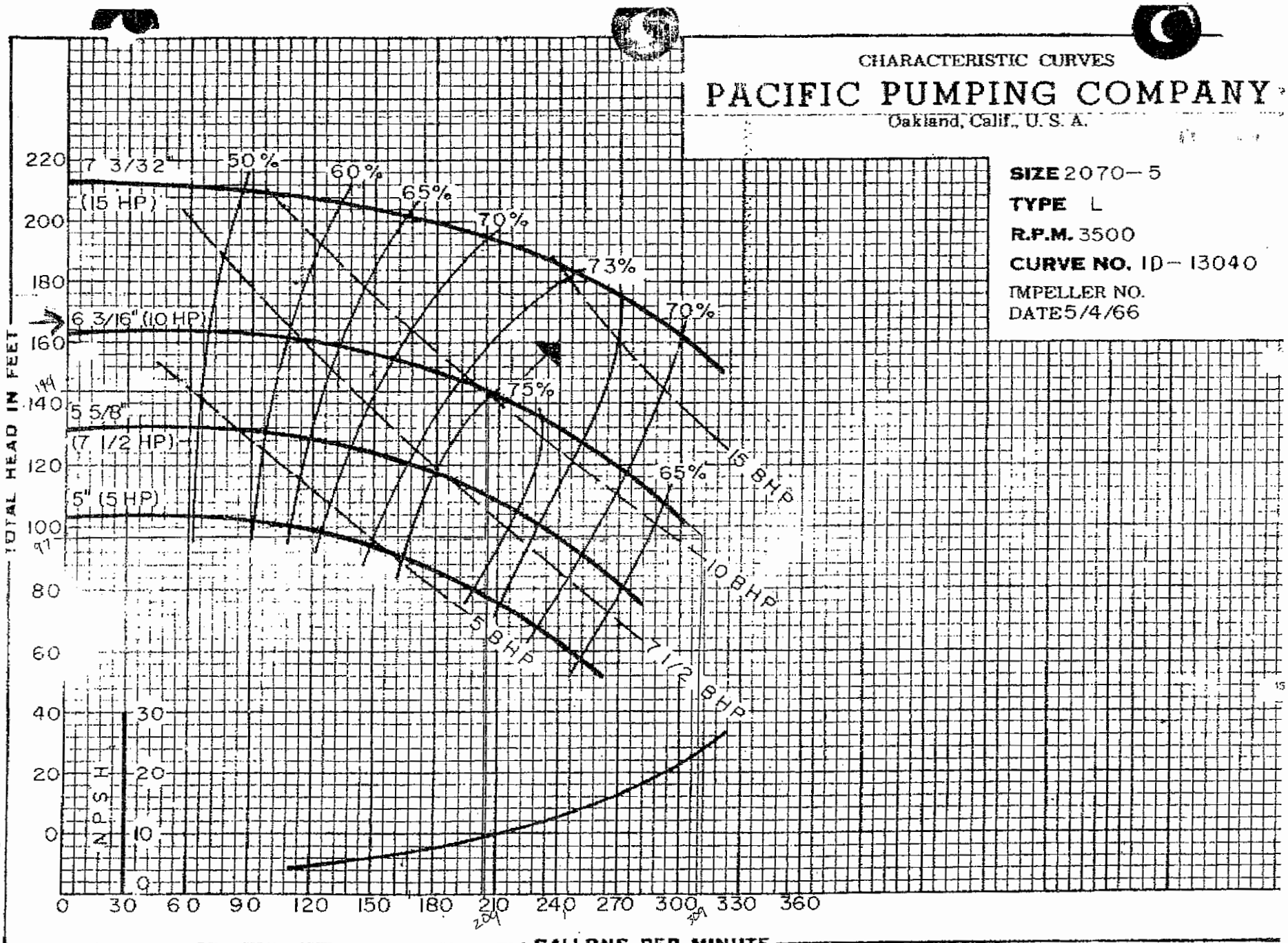
IMPELLER	MACH
HP	7/8 "U"
5	M07637
7½	M07638
10	M07298

C-8888 Based on T-3957, -1, -2

Supersedes C-8888 Dated 12-7-83

Date 7-30-85 MODEL B1½TPM

Booster Pump 1



Form RB448 2/54

240 @ 162'

Main Pumps

Booster Pumps 3A 4 5 6

CHARACTERISTIC CURVES

PACIFIC PUMPING COMPANY

Oakland, Calif., U. S. A.

SIZE 1570 – 1 6"

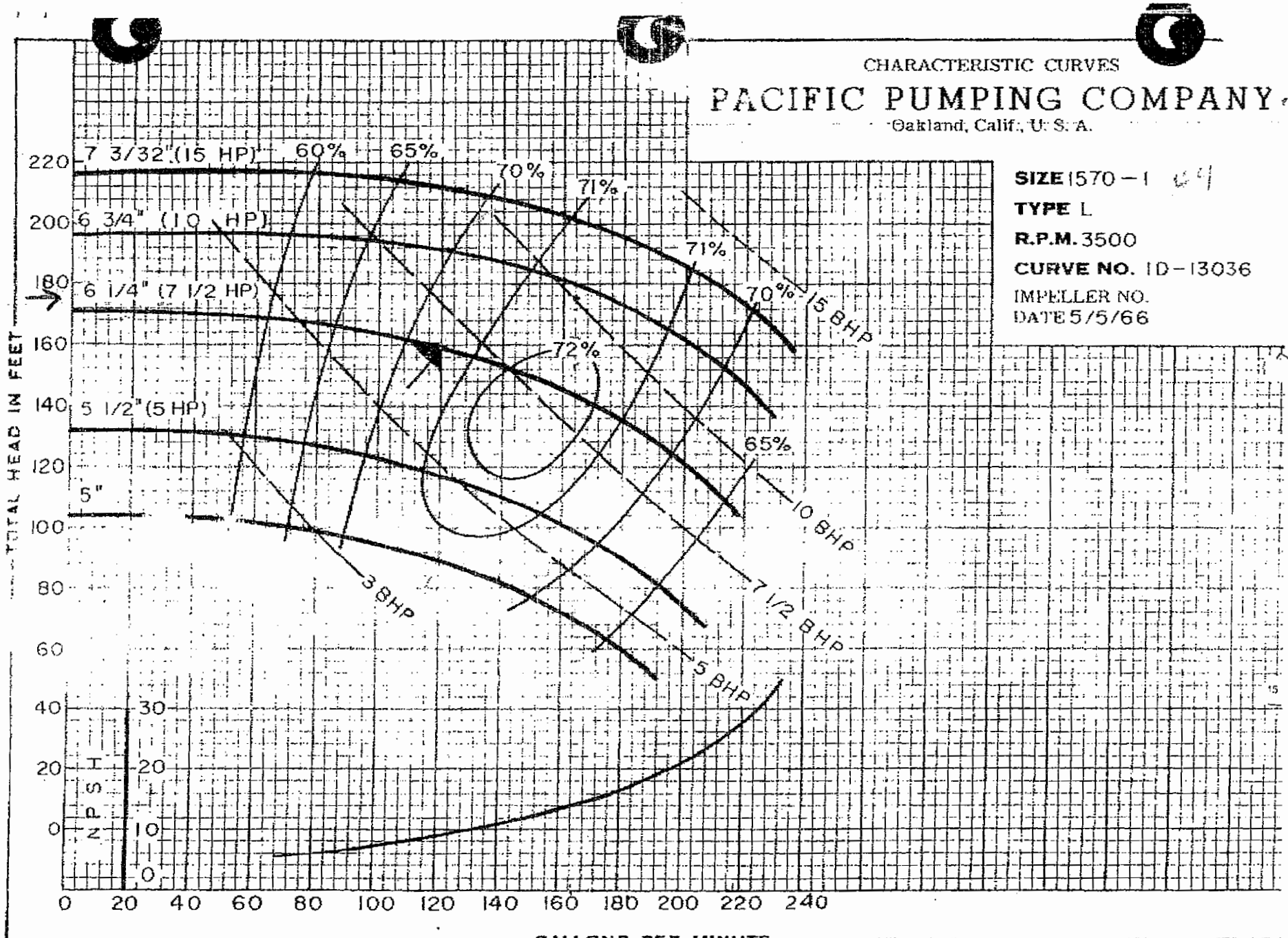
TYPE L

R.P.M. 3500

CURVE NO. 1D – 13036

IMPELLER NO.

DATE 5/5/66

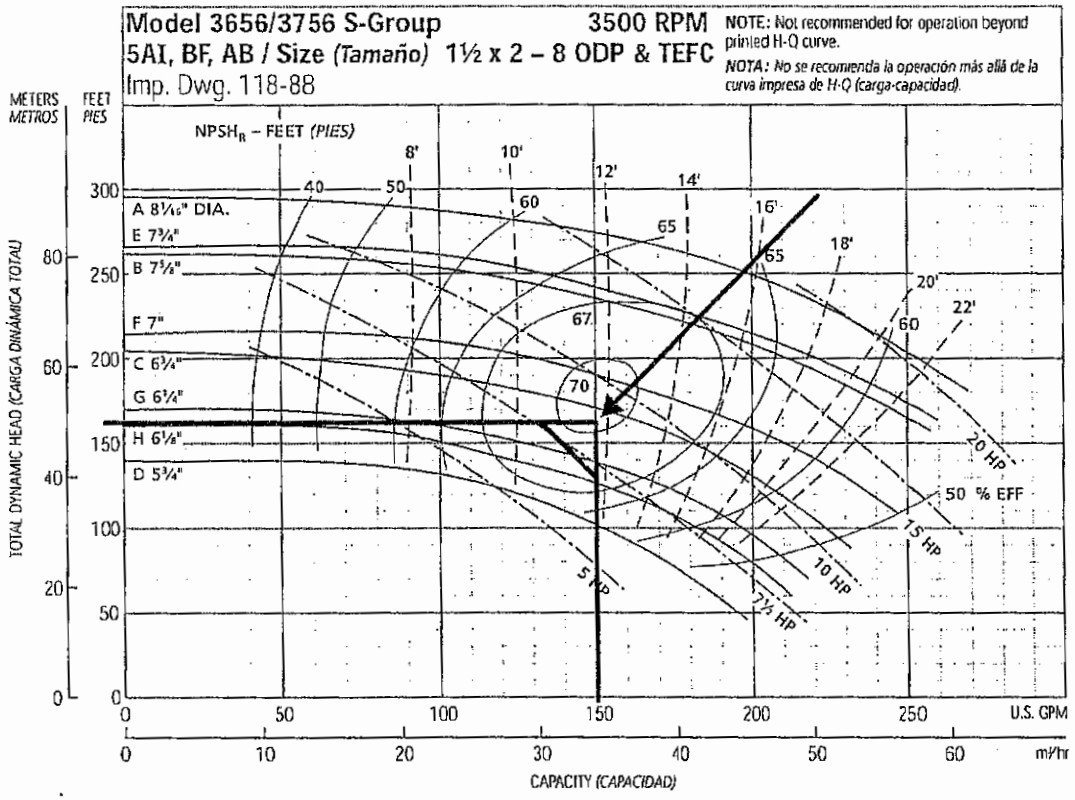


Form R8448 2/54

120c162' LEAD Pump

Booster Pump 4

Performance Curves – 60 Hz, 3500 RPM
Curvas de desempeño – 60 Hz, 3500 RPM



Optional Impeller *Impulsor optativo*	
Ordering Code *Código de pedido*	Dia. *Diá.*
A	8 1/16"
E	7 3/4"
B	7 5/8
F	7
C	6 3/4
G	6 1/4
H	6 1/8
D	5 3/4

NOTE: Pump will pass a sphere to 5/16" diameter.

Lake Limerick, P1,2, 150 GPM
@ 163' TDH, 70%, 10 hp
9/1/04 FJT

Appendix G: Hydraulic Analysis

SEMCON, Inc.

1211 Fourth Avenue East, Suite 101, Olympia, WA 98506-4211
Phone: 360-753-5269x103 ☎ Fax: 360-753-5636 🖷 e-mail: mary@semcon.us
☑ Engineering ☑ Planning ☑ Management ☑ Information Technology

November 11, 2005

Lake Limerick Hydraulic Analysis

Prepared by: Mary Wilkes, E.I.T.
Engineering Technician

The Lake Limerick Water System was modeled in WaterCAD®. Five scenarios were analyzed. The data for each of the scenarios are provided in the following pages. Figures 1 and 2 present the schematics of the model showing the designations and locations of the pipes, junctions, tanks, pumps, and wells.

System Background

A section of the pipeline under Mason Lake Road has been closed for several years due to significant leaks from improperly made joints. The utility recently commissioned Well 6 at 200 gpm, along with Tank 6. After Tank 6 was in operation, the booster pump at Tank 1 failed, so Well 1 is modeled as pumping directly into the distribution system.

Scenario Details

The model represents the system at maximum build-out (1,250 ERUs), during peak hourly demand (PHD = 852 gpm/system).

The scenarios are summarized in Table 1 below. The first scenario represents the system after the Mason Lake Road pipeline was closed and before Tank 6 was built (Pipe P-115 is closed, and Pump PMP-BOOST-T6 is off). Scenario 2 represents the system after Tank 6 was put into service (Pump PMP-BOOST-T6 on). Scenario 3 represents the system after the Tank 1 booster pump failed and Well 1 is pumping directly into the distribution system (Pump PMP-BOOST-T1 off and Pump PMP-W1 on).

The system is planning to repair the Tank 1 booster pumps and the Mason Lake Road pipeline as part of its capital improvement program. Scenario 4 represents the system after the pipeline has been repaired (Pipe P-115 is open). Scenario 5 represents the system after the both the Mason Lake Road pipeline and the Tank 1 booster pump have been repaired (Pump PMP-BOOST-T1 on and Pump PMP-W1 off).

Table 1: Summary of Scenarios

Scenario No.	Description	Tank 6 Working	Mason Lake Road Pipeline Open	Booster Pump 1 Working
1	Before Tank 6			X
2	After Tank 6	X		X
3	Existing Conditions	X		
4	Existing with Only Mason Lake Rd Repaired	X	X	
5	After Capital Improvement Program Completed	X	X	X

Results

The model predicts pressure above 30 psi and velocities below 7 ft/s throughout the system for all five scenarios. The minimum system pressure and maximum flow velocities for each are presented in Table 3, along with the junction and pipes in which these conditions occur.

Table 3: Minimum System Pressure and Maximum Flow Velocity

Scenario	Minimum System Pressure (psi)	In Junction	Maximum Flow Velocity (ft/s)	In Pipe(s)
1	58.25	J-162	5.97	P-T3AB & P-BOOST3AB
2	60.92	J-210	5.36	P-T3AB & P-BOOST3AB
3	33.27	J-210	5.92	P-75
4	61.14	J-162	5.66	P-T3AB & P-BOOST3AB
5	63.02	J-162	5.44	P-T3AB & P-BOOST3AB

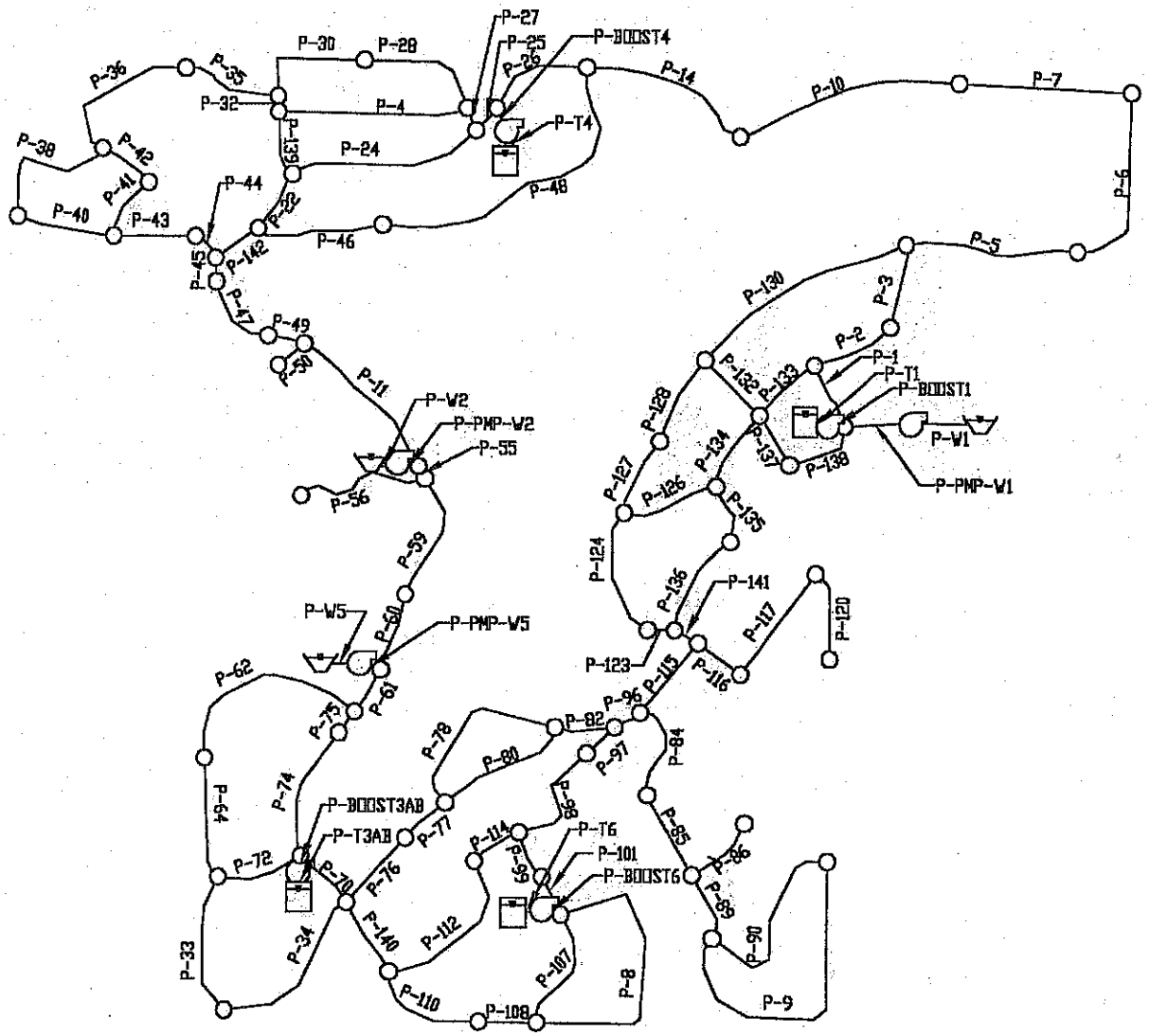


FIGURE 1
MODEL SCHEMATIC SHOWING
PIPE LOCATIONS AND
DESIGNATORS

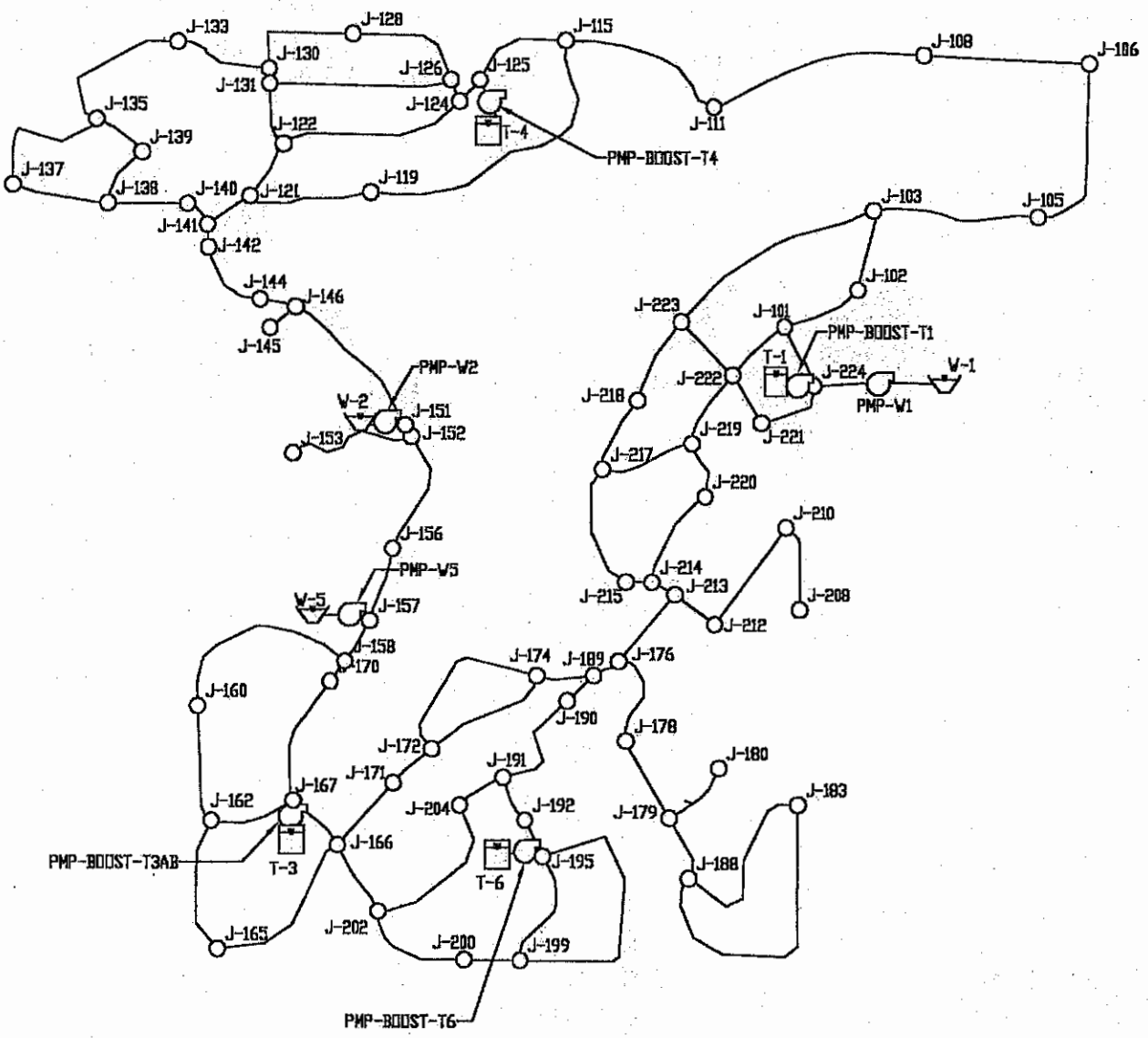


FIGURE 2
MODEL SCHEMATIC SHOWING JUNCTION AND EQUIPMENT LOCATIONS AND DESTIGNATORS

Scenario: Scenario 1
Steady State Analysis
- Junction Report -

Label	Elevation (ft)	Demand (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-101	300.00	5.44	437.67	59.68
J-102	300.00	6.12	437.16	59.46
J-103	275.00	21.76	436.83	70.16
J-105	275.00	6.80	436.89	70.18
J-106	275.00	12.92	437.11	70.28
J-108	275.00	26.52	437.84	70.60
J-111	270.00	39.44	441.49	74.35
J-115	275.00	29.92	442.59	72.65
J-119	275.00	14.96	442.96	72.81
J-121	275.00	6.12	443.58	73.08
J-122	275.00	4.76	443.49	73.04
J-124	277.00	15.64	443.47	72.17
J-125	275.00	14.28	443.52	73.06
J-126	275.00	21.76	443.24	72.93
J-128	275.00	13.60	443.10	72.87
J-130	275.00	12.92	443.10	72.87
J-131	275.00	2.72	443.18	72.91
J-133	275.00	12.24	442.91	72.79
J-135	280.00	4.08	442.89	70.62
J-137	300.00	19.72	442.85	61.93
J-138	300.00	8.16	442.97	61.98
J-139	300.00	5.44	442.91	61.95
J-140	300.00	5.44	443.53	62.22
J-141	300.00	1.36	443.81	62.34
J-142	300.00	7.48	444.03	62.44
J-144	260.00	12.24	444.91	80.16
J-145	300.00	12.24	445.34	63.01
J-146	300.00	11.56	445.38	63.03
J-151	280.00	5.44	448.25	72.94
J-152	270.00	6.80	448.49	77.38
J-153	275.00	23.12	448.01	75.01
J-156	275.00	11.56	451.73	76.62
J-157	290.00	2.72	453.88	71.05
J-158	300.00	3.40	455.27	67.31
J-160	305.00	26.52	456.83	65.82
J-162	325.00	12.92	459.36	58.25
J-165	300.00	14.96	459.35	69.08
J-166	300.00	10.20	459.53	69.16
J-167	310.00	7.48	462.21	65.99
J-170	310.00	7.48	459.17	64.67
J-171	300.00	8.16	458.74	68.82
J-172	300.00	15.64	458.32	68.63
J-174	280.00	17.00	457.81	77.08
J-176	270.00	0.00	457.39	81.24
J-178	275.00	18.36	456.80	78.82
J-179	275.00	4.08	456.47	78.67
J-180	275.00	18.36	456.30	78.60
J-183	300.00	13.60	455.46	67.40
J-188	275.00	34.00	455.55	78.27
J-189	265.00	2.72	457.56	83.48
J-190	275.00	0.00	457.57	79.15

Scenario: Scenario 1
Steady State Analysis
- Junction Report -

Label	Elevation (ft)	Demand (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-191	295.00	6.80	457.84	70.59
J-192	290.00	3.40	457.85	72.77
J-195	280.00	23.80	457.86	77.11
J-199	305.00	21.76	457.98	66.32
J-200	300.00	17.68	458.16	68.57
J-202	300.00	10.20	458.74	68.81
J-204	300.00	18.36	457.88	68.44
J-208	280.00	10.20	435.34	67.34
J-210	300.00	11.56	435.40	58.70
J-212	290.00	8.84	435.79	63.20
J-213	280.00	0.00	436.09	67.67
J-214	275.00	4.76	436.11	69.84
J-215	270.00	12.24	436.14	72.02
J-217	265.00	12.92	436.69	74.43
J-219	280.00	7.48	436.74	67.95
J-220	280.00	6.12	436.44	67.82
J-222	295.00	2.72	437.72	61.87
J-223	275.00	27.88	436.69	70.09
J-224	280.00	4.08	437.72	68.37

Scenario: Scenario 1
Steady State Analysis
- Pipe Report -

Label	Length (ft)	Dia. (in)	Hazen-Williams C	Minor Loss Coef.	Velocity (ft/s)	Control Status	Q (gpm)	HGL Up (ft)	HGL Dn (ft)	Head-loss (ft)	Headloss Gradient (ft/1000ft)	User Defined Length?
P-1	472.00	6.0	130.0	0.00	0.31	Open	27.30	437.72	437.67	0.04	0.09	false
P-2	609.00	4.0	130.0	0.00	0.78	Open	-30.74	437.16	437.67	0.52	0.85	false
P-3	578.00	4.0	130.0	0.00	0.63	Open	24.62	437.16	436.83	0.32	0.56	false
P-4	1,302.00	4.0	130.0	0.00	0.15	Open	-6.00	443.18	443.24	0.05	0.04	false
P-5	1,192.00	4.0	130.0	0.00	0.16	Open	6.25	436.89	436.83	0.05	0.04	false
P-6	1,313.00	4.0	130.0	0.00	0.33	Open	13.05	437.11	436.89	0.23	0.17	false
P-7	1,180.00	4.0	130.0	0.00	0.66	Open	25.97	437.84	437.11	0.73	0.62	false
P-8	2,074.00	4.0	130.0	0.00	0.19	Open	-7.36	457.86	457.98	0.12	0.06	false
P-9	2,250.00	4.0	130.0	0.00	0.15	Open	5.87	455.55	455.46	0.09	0.04	false
P-10	1,602.00	4.0	130.0	0.00	1.34	Open	-52.49	437.84	441.49	3.65	2.28	false
P-11	1,161.00	6.0	130.0	0.00	1.81	Open	-159.38	445.38	448.25	2.87	2.47	false
P-14	1,226.00	6.0	130.0	0.00	1.04	Open	91.93	442.59	441.49	1.09	0.89	false
P-22	442.00	6.0	130.0	0.00	0.47	Open	41.84	443.58	443.49	0.09	0.21	false
P-24	1,350.00	6.0	130.0	0.00	0.11	Open	10.05	443.49	443.47	0.02	0.01	false
P-25	210.00	6.0	130.0	0.00	0.52	Open	45.88	443.52	443.47	0.05	0.25	false
P-26	762.00	6.0	130.0	0.00	1.24	Open	-109.03	442.59	443.52	0.93	1.22	false
P-27	165.00	4.0	130.0	0.00	1.03	Open	-40.30	443.24	443.47	0.23	1.40	false
P-28	886.00	4.0	130.0	0.00	0.32	Open	12.53	443.24	443.10	0.14	0.16	false
P-30	861.00	4.0	130.0	0.00	0.03	Open	1.07	443.10	443.10	1.43e-3	1.67e-3	false
P-32	106.00	4.0	130.0	0.00	0.77	Open	-30.31	443.10	443.18	0.09	0.82	false
P-33	981.00	4.0	130.0	0.00	0.07	Open	2.80	459.36	459.35	0.01	0.01	false
P-34	1,233.00	4.0	130.0	0.00	0.31	Open	-12.16	459.35	459.53	0.19	0.15	false
P-35	700.00	4.0	130.0	0.00	0.42	Open	16.32	443.10	442.91	0.18	0.26	false
P-36	1,122.00	4.0	130.0	0.00	0.10	Open	4.08	442.91	442.89	0.02	0.02	false
P-38	1,026.00	4.0	130.0	0.00	0.16	Open	-6.23	442.85	442.89	0.05	0.04	false
P-40	688.00	4.0	130.0	0.00	0.34	Open	-13.49	442.85	442.97	0.13	0.18	false
P-41	453.00	4.0	130.0	0.00	0.30	Open	-11.67	442.91	442.97	0.06	0.14	false
P-42	402.00	4.0	130.0	0.00	0.16	Open	-6.23	442.89	442.91	0.02	0.04	false
P-43	567.00	4.0	130.0	0.00	0.85	Open	33.32	443.53	442.97	0.56	0.98	false
P-44	213.00	4.0	130.0	0.00	0.99	Open	38.76	443.81	443.53	0.28	1.30	false
P-45	162.00	6.0	130.0	0.00	1.31	Open	-115.86	443.81	444.03	0.22	1.37	false
P-46	889.00	4.0	130.0	0.00	0.71	Open	27.79	443.58	442.96	0.62	0.70	false
P-47	572.00	6.0	130.0	0.00	1.40	Open	-123.34	444.03	444.91	0.88	1.54	false
P-48	2,203.00	4.0	130.0	0.00	0.33	Open	12.83	442.96	442.59	0.37	0.17	false
P-49	258.00	6.0	130.0	0.00	1.54	Open	-135.58	444.91	445.38	0.47	1.83	false
P-50	232.00	4.0	130.0	0.00	0.31	Open	-12.24	445.34	445.38	0.04	0.15	false
P-52	1.00	4.0	130.0	0.00	0.75	Open	-29.57	436.69	436.69	7.93e-4	0.79	true
P-53	1.00	6.0	130.0	0.00	1.19	Open	-104.48	437.72	437.72	1.13e-3	1.13	true
P-55	91.00	6.0	130.0	0.00	1.87	Open	164.82	448.49	448.25	0.24	2.63	false
P-56	953.00	4.0	130.0	0.00	0.59	Open	23.12	448.49	448.01	0.48	0.50	false
P-59	904.00	6.0	130.0	0.00	2.21	Open	194.74	451.73	448.49	3.24	3.58	false
P-60	540.00	6.0	130.0	0.00	2.34	Open	206.30	453.88	451.73	2.15	3.99	false
P-61	339.00	6.0	130.0	0.00	2.37	Open	209.03	455.27	453.88	1.38	4.09	false
P-62	1,476.00	4.0	130.0	0.00	0.88	Open	-34.64	455.27	456.83	1.56	1.06	false
P-64	837.00	4.0	130.0	0.00	1.56	Open	-61.16	456.83	459.36	2.53	3.02	false
P-70	450.00	6.0	130.0	0.00	2.91	Open	256.28	462.21	459.53	2.68	5.96	false
P-72	619.00	4.0	130.0	0.00	1.96	Open	-76.88	459.36	462.21	2.86	4.62	false
P-74	931.00	6.0	130.0	0.00	2.10	Open	-185.26	459.17	462.21	3.04	3.27	false
P-75	179.00	4.0	130.0	0.00	4.54	Open	-177.78	455.27	459.17	3.90	21.82	false
P-76	592.00	6.0	130.0	0.00	1.30	Open	114.15	459.53	458.74	0.79	1.33	false
P-77	366.00	6.0	130.0	0.00	1.20	Open	105.99	458.74	458.32	0.43	1.16	false

Scenario: Scenario 1
Steady State Analysis
- Pipe Report -

Label	Length (ft)	Dia. (in)	Hazen-Williams C	Minor Loss Coef.	Velocity (ft/s)	Control Status	Q (gpm)	HGL Up (ft)	HGL Dn (ft)	Head-loss (ft)	Headloss Gradient (ft/1000ft)	User Defined Length?
P-78	1,309.00	4.0	130.0	0.00	0.52	Open	-20.30	457.81	458.32	0.51	0.39	false
P-80	952.00	6.0	130.0	0.00	0.79	Open	70.05	458.32	457.81	0.51	0.54	false
P-82	417.00	6.0	130.0	0.00	0.83	Open	73.35	457.81	457.56	0.24	0.59	false
P-84	706.00	6.0	130.0	0.00	1.00	Open	-88.40	456.80	457.39	0.59	0.83	false
P-85	622.00	6.0	130.0	0.00	0.79	Open	70.04	456.80	456.47	0.34	0.54	false
P-86	515.00	4.0	130.0	0.00	0.47	Open	18.36	456.47	456.30	0.17	0.33	false
P-89	481.00	4.0	130.0	0.00	1.22	Open	47.60	456.47	455.55	0.91	1.90	false
P-90	1,354.00	4.0	130.0	0.00	0.20	Open	7.73	455.55	455.46	0.09	0.07	false
P-96	207.00	6.0	130.0	0.00	1.00	Open	88.40	457.56	457.39	0.17	0.83	false
P-97	264.00	6.0	130.0	0.00	0.20	Open	17.77	457.57	457.56	0.01	0.04	false
P-98	870.00	4.0	130.0	0.00	0.45	Open	-17.77	457.57	457.84	0.27	0.31	false
P-99	347.00	6.0	130.0	0.00	0.16	Open	14.52	457.85	457.84	0.01	0.03	false
P-101	287.00	6.0	130.0	0.00	0.20	Open	-17.92	457.85	457.86	0.01	0.04	false
P-107	858.00	6.0	130.0	0.00	0.39	Open	-34.36	457.86	457.98	0.12	0.14	false
P-108	399.00	6.0	130.0	0.00	0.72	Open	63.48	458.16	457.98	0.18	0.45	false
P-110	806.00	6.0	130.0	0.00	0.92	Open	81.16	458.74	458.16	0.57	0.71	false
P-112	1,174.00	4.0	130.0	0.00	0.73	Open	28.40	458.74	457.88	0.86	0.73	false
P-114	367.00	4.0	130.0	0.00	0.26	Open	-10.04	457.84	457.88	0.04	0.11	false
P-115	620.00	6.0	130.0	0.00	0.00	Closed	0.00	436.09	457.39	0.00	0.00	false
P-116	356.00	4.0	130.0	0.00	0.78	Open	30.60	436.09	435.79	0.30	0.84	false
P-117	856.00	4.0	130.0	0.00	0.56	Open	21.76	435.79	435.40	0.38	0.45	false
P-120	623.00	4.0	130.0	0.00	0.26	Open	10.20	435.40	435.34	0.07	0.11	false
P-123	183.00	4.0	130.0	0.00	0.34	Open	13.29	436.14	436.11	0.03	0.18	false
P-124	912.00	4.0	130.0	0.00	0.65	Open	-25.53	436.14	436.69	0.55	0.60	false
P-126	677.00	4.0	130.0	0.00	0.23	Open	-8.88	436.69	436.74	0.06	0.08	false
P-130	1,636.00	4.0	130.0	0.00	0.23	Open	9.12	436.83	436.69	0.15	0.09	false
P-132	526.00	4.0	130.0	0.00	1.23	Open	48.33	437.72	436.69	1.03	1.96	false
P-133	511.00	4.0	130.0	0.00	0.23	Open	-8.88	437.67	437.72	0.04	0.08	false
P-134	578.00	4.0	130.0	0.00	1.14	Open	-44.55	436.74	437.72	0.97	1.68	false
P-135	417.00	4.0	130.0	0.00	0.72	Open	-28.19	436.44	436.74	0.30	0.72	false
P-136	736.00	4.0	130.0	0.00	0.56	Open	-22.07	436.11	436.44	0.34	0.46	false
P-139	456.00	4.0	130.0	0.00	0.69	Open	-27.03	443.18	443.49	0.30	0.67	false
P-140	548.00	6.0	130.0	0.00	1.36	Open	119.77	459.53	458.74	0.80	1.46	false
P-141	187.00	6.0	130.0	0.00	0.35	Open	30.60	436.11	436.09	0.02	0.12	false
P-142	362.00	6.0	130.0	0.00	0.86	Open	-75.75	443.58	443.81	0.23	0.62	false
P-BOOST1	123.00	6.0	130.0	0.00	1.54	Open	135.87	437.94	437.72	0.23	1.84	false
P-BOOST3AB	102.00	6.0	130.0	0.00	5.97	Open	525.91	464.52	462.21	2.30	22.56	false
P-BOOST4	151.00	6.0	130.0	0.00	1.92	Open	169.19	443.94	443.52	0.42	2.76	false
P-BOOST6	129.00	6.0	130.0	0.00	7.67e-6	Open	-6.76e-4	457.86	457.86	0.00	0.00	false
P-PMP-W1	114.00	10.0	130.0	0.00	3.86e-6	Open	9.45e-4	437.72	437.72	0.00	0.00	true
P-PMP-W2	145.00	6.0	130.0	0.00	1.53e-5	Open	-1.35e-3	448.25	448.25	0.00	0.00	false
P-PMP-W5	125.00	6.0	130.0	0.00	1.29e-5	Open	-1.14e-3	453.88	453.88	0.00	0.00	false
P-T1	120.00	6.0	130.0	0.00	1.54	Open	135.87	335.00	334.78	0.22	1.84	false
P-T3AB	71.00	6.0	130.0	0.00	5.97	Open	525.91	344.00	342.40	1.60	22.56	false
P-T4	160.00	6.0	130.0	0.00	1.92	Open	169.19	304.00	303.56	0.44	2.76	false
P-T6	156.00	6.0	130.0	0.00	7.66e-6	Open	-6.75e-4	307.50	307.50	0.00	0.00	false
P-W1	1.00	10.0	130.0	0.00	4.42e-6	Open	1.08e-3	229.00	229.00	0.00	0.00	true
P-W2	118.00	6.0	130.0	0.00	1.53e-5	Open	-1.35e-3	147.00	147.00	0.00	0.00	false
P-W5	119.00	6.0	130.0	0.00	1.29e-5	Open	-1.14e-3	200.00	200.00	0.00	0.00	false

Scenario: Scenario 1
Steady State Analysis
- Pump Report -

Label	Elev. (ft)	Q (gpm)	H in (ft)	H out (ft)	Pump Head (ft)	Press. in (psi)	Shutoff H (ft)	Shutoff Q (gpm)	Design H (ft)	Design Q (gpm)	Max. Op. H (ft)	Max. Op. Q (gpm)
PMP-BOOST-T1	310.00	135.87	334.78	437.94	103.16	10.74	130.00	0.00	107.00	130.00	65.00	175.00
PMP-BOOST-T3AB	320.00	525.91	342.40	464.52	122.12	9.71	164.00	0.00	144.00	408.00	97.00	618.00
PMP-BOOST-T4	280.00	169.19	303.56	443.94	140.38	10.21	170.00	0.00	160.00	120.00	104.00	218.00
PMP-BOOST-T6	280.00	0.00	307.50	457.86	0.00	11.92	165.00	0.00	155.00	200.00	10.00	300.00
PMP-W1	229.00	0.00	229.00	437.72	0.00	0.00	170.00	0.00	145.00	52.00	75.00	80.00
PMP-W2	147.00	0.00	147.00	448.25	0.00	0.00	300.00	0.00	196.00	207.00	100.00	240.00
PMP-W5	200.00	0.00	200.00	453.88	0.00	0.00	232.00	0.00	176.00	130.00	16.00	290.00

Scenario: Scenario 1
Steady State Analysis
- Tank Report -

Label	Zone	Elevation (ft)	Minimum Elevation (ft)	Initial HGL (ft)	Maximum Elevation (ft)	Tank Dia. (ft)	Inflow (gpm)	Current Status	Calculated Hydraulic Grade (ft)	Calculated Percent Full (%)	Total Active Volume (gal)	Total Volume (gal)
T-1	Zone-1	310.00	310.00	335.00	340.00	30.00	-135.87	Draining	335.00	83.3	158,630.0	158,630.0
T-3	Zone-1	320.00	320.00	344.00	350.00	30.00	-525.91	Draining	344.00	80.0	158,630.0	158,630.0
T-4	Zone-1	280.00	280.00	304.00	310.00	30.00	-169.19	Draining	304.00	80.0	158,630.0	158,630.0
T-6	Zone-1	300.00	280.00	307.50	310.00	30.00	6.75e-4	Steady	307.50	91.7	158,630.0	158,630.0

Scenario: Scenario 2
Steady State Analysis
- Junction Report -

Label	Elevation (ft)	Demand (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-101	300.00	5.44	442.81	61.91
J-102	300.00	6.12	442.41	61.74
J-103	275.00	21.76	442.18	72.47
J-105	275.00	6.80	442.42	72.58
J-106	275.00	12.92	442.97	72.82
J-108	275.00	26.52	444.16	73.33
J-111	270.00	39.44	448.89	77.55
J-115	275.00	29.92	450.17	75.94
J-119	275.00	14.96	450.71	76.17
J-121	275.00	6.12	451.46	76.50
J-122	275.00	4.76	451.28	76.42
J-124	277.00	15.64	451.17	75.50
J-125	275.00	14.28	451.18	76.38
J-126	275.00	21.76	450.98	76.29
J-128	275.00	13.60	450.86	76.24
J-130	275.00	12.92	450.87	76.24
J-131	275.00	2.72	450.95	76.28
J-133	275.00	12.24	450.74	76.19
J-135	280.00	4.08	450.74	74.02
J-137	300.00	19.72	450.71	65.33
J-138	300.00	8.16	450.85	65.40
J-139	300.00	5.44	450.77	65.36
J-140	300.00	5.44	451.49	65.68
J-141	300.00	1.36	451.81	65.81
J-142	300.00	7.48	452.12	65.95
J-144	260.00	12.24	453.32	83.81
J-145	300.00	12.24	453.92	66.73
J-146	300.00	11.56	453.95	66.74
J-151	280.00	5.44	457.63	77.01
J-152	270.00	6.80	457.94	81.48
J-153	275.00	23.12	457.46	79.10
J-156	275.00	11.56	461.92	81.03
J-157	290.00	2.72	464.54	75.67
J-158	300.00	3.40	466.22	72.06
J-160	305.00	26.52	468.54	70.90
J-162	325.00	12.92	471.75	63.62
J-165	300.00	14.96	471.87	74.51
J-166	300.00	10.20	472.64	74.84
J-167	310.00	7.48	474.23	71.20
J-170	310.00	7.48	470.73	69.68
J-171	300.00	8.16	472.05	74.59
J-172	300.00	15.64	471.73	74.45
J-174	280.00	17.00	471.38	82.97
J-176	270.00	0.00	471.05	87.16
J-178	275.00	18.36	470.47	84.74
J-179	275.00	4.08	470.13	84.59
J-180	275.00	18.36	469.96	84.52
J-183	300.00	13.60	469.13	73.32
J-188	275.00	34.00	469.22	84.20
J-189	265.00	2.72	471.22	89.40
J-190	275.00	0.00	471.26	85.08

Scenario: Scenario 2
Steady State Analysis
- Junction Report -

Label	Elevation (ft)	Demand (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-191	295.00	6.80	472.15	76.80
J-192	290.00	3.40	472.23	79.00
J-195	280.00	23.80	472.30	83.37
J-199	305.00	21.76	472.30	72.53
J-200	300.00	17.68	472.31	74.70
J-202	300.00	10.20	472.42	74.75
J-204	300.00	18.36	472.15	74.63
J-208	280.00	10.20	440.54	69.60
J-210	300.00	11.56	440.61	60.96
J-212	290.00	8.84	440.99	65.46
J-213	280.00	0.00	441.29	69.92
J-214	275.00	4.76	441.31	72.10
J-215	270.00	12.24	441.34	74.28
J-217	265.00	12.92	441.90	76.69
J-219	280.00	7.48	441.94	70.20
J-220	280.00	6.12	441.64	70.07
J-222	295.00	2.72	442.84	64.09
J-223	275.00	27.88	441.90	72.35
J-224	280.00	4.08	442.84	70.60

Scenario: Scenario 2
Steady State Analysis
- Pipe Report -

Label	Length (ft)	Dia. (in)	Hazen-Williams C	Minor Loss Coef.	Velocity (ft/s)	Control Status	Q (gpm)	HGL Up (ft)	HGL Dn (ft)	Head-loss (ft)	Headloss Gradient (ft/1000ft)	User Defined Length?
P-1	472.00	6.0	130.0	0.00	0.28	Open	24.26	442.84	442.81	0.04	0.08	false
P-2	609.00	4.0	130.0	0.00	0.68	Open	-26.70	442.41	442.81	0.40	0.65	false
P-3	578.00	4.0	130.0	0.00	0.53	Open	20.58	442.41	442.18	0.23	0.40	false
P-4	1,302.00	4.0	130.0	0.00	0.09	Open	-3.67	450.95	450.98	0.02	0.02	false
P-5	1,192.00	4.0	130.0	0.00	0.36	Open	14.17	442.42	442.18	0.24	0.20	false
P-6	1,313.00	4.0	130.0	0.00	0.54	Open	20.97	442.97	442.42	0.55	0.42	false
P-7	1,180.00	4.0	130.0	0.00	0.87	Open	33.89	444.16	442.97	1.20	1.01	false
P-8	2,074.00	4.0	130.0	0.00	0.03	Open	1.04	472.30	472.30	3.27e-3	1.57e-3	false
P-9	2,250.00	4.0	130.0	0.00	0.15	Open	5.87	469.22	469.13	0.09	0.04	false
P-10	1,602.00	4.0	130.0	0.00	1.54	Open	-60.41	444.16	448.89	4.73	2.96	false
P-11	1,161.00	6.0	130.0	0.00	2.07	Open	-182.29	453.95	457.63	3.68	3.17	false
P-14	1,226.00	6.0	130.0	0.00	1.13	Open	99.85	450.17	448.89	1.28	1.04	false
P-22	442.00	6.0	130.0	0.00	0.67	Open	59.13	451.46	451.28	0.17	0.39	false
P-24	1,350.00	6.0	130.0	0.00	0.30	Open	26.14	451.28	451.17	0.12	0.09	false
P-25	210.00	6.0	130.0	0.00	0.29	Open	25.87	451.18	451.17	0.02	0.09	false
P-26	762.00	6.0	130.0	0.00	1.29	Open	-114.05	450.17	451.18	1.01	1.33	false
P-27	165.00	4.0	130.0	0.00	0.93	Open	-36.37	450.98	451.17	0.19	1.15	false
P-28	886.00	4.0	130.0	0.00	0.28	Open	10.94	450.98	450.86	0.11	0.12	false
P-30	861.00	4.0	130.0	0.00	0.07	Open	2.66	450.87	450.86	0.01	0.01	false
P-32	106.00	4.0	130.0	0.00	0.74	Open	-29.18	450.87	450.95	0.08	0.77	false
P-33	981.00	4.0	130.0	0.00	0.28	Open	-11.12	471.75	471.87	0.13	0.13	false
P-34	1,233.00	4.0	130.0	0.00	0.67	Open	-26.08	471.87	472.64	0.77	0.62	false
P-35	700.00	4.0	130.0	0.00	0.35	Open	13.60	450.87	450.74	0.13	0.19	false
P-36	1,122.00	4.0	130.0	0.00	0.03	Open	1.36	450.74	450.74	2.96e-3	2.64e-3	false
P-38	1,026.00	4.0	130.0	0.00	0.13	Open	-5.27	450.71	450.74	0.03	0.03	false
P-40	688.00	4.0	130.0	0.00	0.37	Open	-14.45	450.71	450.85	0.14	0.21	false
P-41	453.00	4.0	130.0	0.00	0.34	Open	-13.43	450.77	450.85	0.08	0.18	false
P-42	402.00	4.0	130.0	0.00	0.20	Open	-7.99	450.74	450.77	0.03	0.07	false
P-43	567.00	4.0	130.0	0.00	0.92	Open	36.04	451.49	450.85	0.64	1.14	false
P-44	213.00	4.0	130.0	0.00	1.06	Open	41.48	451.81	451.49	0.31	1.47	false
P-45	162.00	6.0	130.0	0.00	1.57	Open	-138.77	451.81	452.12	0.31	1.91	false
P-46	889.00	4.0	130.0	0.00	0.78	Open	30.68	451.46	450.71	0.75	0.84	false
P-47	572.00	6.0	130.0	0.00	1.66	Open	-146.25	452.12	453.32	1.21	2.11	false
P-48	2,203.00	4.0	130.0	0.00	0.40	Open	15.72	450.71	450.17	0.54	0.24	false
P-49	258.00	6.0	130.0	0.00	1.80	Open	-158.49	453.32	453.95	0.63	2.45	false
P-50	232.00	4.0	130.0	0.00	0.31	Open	-12.24	453.92	453.95	0.04	0.15	false
P-52	1.00	4.0	130.0	0.00	0.80	Open	-31.26	441.90	441.90	8.85e-4	0.89	true
P-53	1.00	6.0	130.0	0.00	1.13	Open	-99.61	442.84	442.84	1.04e-3	1.04	true
P-55	91.00	6.0	130.0	0.00	2.13	Open	187.73	457.94	457.63	0.30	3.35	false
P-56	953.00	4.0	130.0	0.00	0.59	Open	23.12	457.94	457.46	0.48	0.50	false
P-59	904.00	6.0	130.0	0.00	2.47	Open	217.65	461.92	457.94	3.98	4.40	false
P-60	540.00	6.0	130.0	0.00	2.60	Open	229.21	464.54	461.92	2.62	4.85	false
P-61	339.00	6.0	130.0	0.00	2.63	Open	231.93	466.22	464.54	1.68	4.95	false
P-62	1,476.00	4.0	130.0	0.00	1.10	Open	-42.99	466.22	468.54	2.32	1.57	false
P-64	837.00	4.0	130.0	0.00	1.77	Open	-69.51	468.54	471.75	3.21	3.83	false
P-70	450.00	6.0	130.0	0.00	2.19	Open	193.40	474.23	472.64	1.59	3.54	false
P-72	619.00	4.0	130.0	0.00	1.82	Open	-71.31	471.75	474.23	2.49	4.02	false
P-74	931.00	6.0	130.0	0.00	2.27	Open	-199.82	470.73	474.23	3.50	3.76	false
P-75	179.00	4.0	130.0	0.00	4.91	Open	-192.34	466.22	470.73	4.52	25.24	false
P-76	592.00	6.0	130.0	0.00	1.11	Open	97.90	472.64	472.05	0.59	1.00	false
P-77	366.00	6.0	130.0	0.00	1.02	Open	89.74	472.05	471.73	0.31	0.85	false

Scenario: Scenario 2
Steady State Analysis
- Pipe Report -

Label	Length (ft)	Dia. (in)	Hazen-Williams C	Minor Loss Coef.	Velocity (ft/s)	Control Status	Q (gpm)	HGL Up (ft)	HGL Dn (ft)	Head-loss (ft)	Headloss Gradient (ft/1000ft)	User Defined Length?
P-78	1,309.00	4.0	130.0	0.00	0.43	Open	-16.65	471.38	471.73	0.36	0.27	false
P-80	952.00	6.0	130.0	0.00	0.65	Open	57.45	471.73	471.38	0.36	0.37	false
P-82	417.00	6.0	130.0	0.00	0.65	Open	57.10	471.38	471.22	0.15	0.37	false
P-84	706.00	6.0	130.0	0.00	1.00	Open	-88.40	470.47	471.05	0.59	0.83	false
P-85	622.00	6.0	130.0	0.00	0.79	Open	70.04	470.47	470.13	0.34	0.54	false
P-86	515.00	4.0	130.0	0.00	0.47	Open	18.36	470.13	469.96	0.17	0.33	false
P-89	481.00	4.0	130.0	0.00	1.22	Open	47.60	470.13	469.22	0.91	1.90	false
P-90	1,354.00	4.0	130.0	0.00	0.20	Open	7.73	469.22	469.13	0.09	0.07	false
P-96	207.00	6.0	130.0	0.00	1.00	Open	88.40	471.22	471.05	0.17	0.83	false
P-97	264.00	6.0	130.0	0.00	0.39	Open	34.02	471.26	471.22	0.04	0.14	false
P-98	870.00	4.0	130.0	0.00	0.87	Open	-34.02	471.26	472.15	0.89	1.02	false
P-99	347.00	6.0	130.0	0.00	0.50	Open	43.71	472.23	472.15	0.08	0.23	false
P-101	287.00	6.0	130.0	0.00	0.53	Open	-47.11	472.23	472.30	0.07	0.26	false
P-107	858.00	6.0	130.0	0.00	0.05	Open	4.84	472.30	472.30	3.27e-3	3.81e-3	false
P-108	399.00	6.0	130.0	0.00	0.18	Open	15.88	472.31	472.30	0.01	0.03	false
P-110	806.00	6.0	130.0	0.00	0.38	Open	33.56	472.42	472.31	0.11	0.14	false
P-112	1,174.00	4.0	130.0	0.00	0.39	Open	15.46	472.42	472.15	0.28	0.24	false
P-114	367.00	4.0	130.0	0.00	0.07	Open	2.90	472.15	472.15	3.91e-3	0.01	false
P-115	620.00	6.0	130.0	0.00	0.00	Closed	0.00	441.29	471.05	0.00	0.00	false
P-116	356.00	4.0	130.0	0.00	0.78	Open	30.60	441.29	440.99	0.30	0.84	false
P-117	856.00	4.0	130.0	0.00	0.56	Open	21.76	440.99	440.61	0.38	0.45	false
P-120	623.00	4.0	130.0	0.00	0.26	Open	10.20	440.61	440.54	0.07	0.11	false
P-123	183.00	4.0	130.0	0.00	0.34	Open	13.48	441.34	441.31	0.03	0.18	false
P-124	912.00	4.0	130.0	0.00	0.66	Open	-25.72	441.34	441.90	0.55	0.61	false
P-126	677.00	4.0	130.0	0.00	0.19	Open	-7.37	441.90	441.94	0.04	0.06	false
P-130	1,636.00	4.0	130.0	0.00	0.33	Open	12.99	442.18	441.90	0.28	0.17	false
P-132	526.00	4.0	130.0	0.00	1.18	Open	46.16	442.84	441.90	0.94	1.80	false
P-133	511.00	4.0	130.0	0.00	0.20	Open	-7.88	442.81	442.84	0.03	0.07	false
P-134	578.00	4.0	130.0	0.00	1.09	Open	-42.86	441.94	442.84	0.90	1.56	false
P-135	417.00	4.0	130.0	0.00	0.71	Open	-28.00	441.64	441.94	0.30	0.71	false
P-136	736.00	4.0	130.0	0.00	0.56	Open	-21.88	441.31	441.64	0.33	0.45	false
P-139	456.00	4.0	130.0	0.00	0.72	Open	-28.23	450.95	451.28	0.33	0.72	false
P-140	548.00	6.0	130.0	0.00	0.67	Open	59.22	472.64	472.42	0.22	0.40	false
P-141	187.00	6.0	130.0	0.00	0.35	Open	30.60	441.31	441.29	0.02	0.12	false
P-142	362.00	6.0	130.0	0.00	1.09	Open	-95.93	451.46	451.81	0.35	0.97	false
P-BOOST1	123.00	6.0	130.0	0.00	1.45	Open	127.95	443.05	442.84	0.20	1.65	false
P-BOOST3AB	102.00	6.0	130.0	0.00	5.36	Open	472.02	476.12	474.23	1.88	18.47	false
P-BOOST4	151.00	6.0	130.0	0.00	1.75	Open	154.20	451.53	451.18	0.35	2.33	false
P-BOOST6	129.00	6.0	130.0	0.00	0.87	Open	76.79	472.38	472.30	0.08	0.64	false
P-PMP-W1	114.00	10.0	130.0	0.00	3.93e-6	Open	9.63e-4	442.84	442.84	0.00	0.00	true
P-PMP-W2	145.00	6.0	130.0	0.00	1.58e-5	Open	-1.39e-3	457.63	457.63	0.00	0.00	false
P-PMP-W5	125.00	6.0	130.0	0.00	1.35e-5	Open	-1.19e-3	464.54	464.54	0.00	0.00	false
P-T1	120.00	6.0	130.0	0.00	1.45	Open	127.95	335.00	334.80	0.20	1.65	false
P-T3AB	71.00	6.0	130.0	0.00	5.36	Open	472.02	344.00	342.69	1.31	18.47	false
P-T4	160.00	6.0	130.0	0.00	1.75	Open	154.20	304.00	303.63	0.37	2.33	false
P-T6	156.00	6.0	130.0	0.00	0.87	Open	76.79	307.50	307.40	0.10	0.64	false
P-W1	1.00	10.0	130.0	0.00	3.81e-6	Open	9.34e-4	229.00	229.00	0.00	0.00	true
P-W2	118.00	6.0	130.0	0.00	1.58e-5	Open	-1.39e-3	147.00	147.00	0.00	0.00	false
P-W5	119.00	6.0	130.0	0.00	1.35e-5	Open	-1.19e-3	200.00	200.00	0.00	0.00	false

Scenario: Scenario 2
Steady State Analysis
- Pump Report -

Label	Elev. (ft)	Q (gpm)	H in (ft)	H out (ft)	Pump Head (ft)	Press. in (psi)	Shutoff H (ft)	Shutoff Q (gpm)	Design H (ft)	Design Q (gpm)	Max. Op. H (ft)	Max. Op. Q (gpm)
PMP-BOOST-T1	310.00	127.95	334.80	443.05	108.24	10.75	130.00	0.00	107.00	130.00	65.00	175.00
PMP-BOOST-T3AB	320.00	472.02	342.69	476.12	133.43	9.84	164.00	0.00	144.00	408.00	97.00	618.00
PMP-BOOST-T4	280.00	154.20	303.63	451.53	147.91	10.24	170.00	0.00	160.00	120.00	104.00	218.00
PMP-BOOST-T6	280.00	76.79	307.40	472.38	164.98	11.88	165.00	0.00	155.00	200.00	10.00	300.00
PMP-W1	229.00	0.00	229.00	442.84	0.00	0.00	170.00	0.00	145.00	52.00	75.00	80.00
PMP-W2	147.00	0.00	147.00	457.63	0.00	0.00	300.00	0.00	196.00	207.00	100.00	240.00
PMP-W5	200.00	0.00	200.00	464.54	0.00	0.00	232.00	0.00	176.00	130.00	16.00	290.00

Scenario: Scenario 2
Steady State Analysis
- Tank Report -

Label	Zone	Elevation (ft)	Minimum Elevation (ft)	Initial HGL (ft)	Maximum Elevation (ft)	Tank Dia. (ft)	Inflow (gpm)	Current Status	Calculated Hydraulic Grade (ft)	Calculated Percent Full (%)	Total Active Volume (gal)	Total Volume (gal)
T-1	Zone-1	310.00	310.00	335.00	340.00	30.00	-127.95	Draining	335.00	83.3	158,630.0	158,630.0
T-3	Zone-1	320.00	320.00	344.00	350.00	30.00	-472.02	Draining	344.00	80.0	158,630.0	158,630.0
T-4	Zone-1	280.00	280.00	304.00	310.00	30.00	-154.20	Draining	304.00	80.0	158,630.0	158,630.0
T-6	Zone-1	300.00	280.00	307.50	310.00	30.00	-76.79	Draining	307.50	91.7	158,630.0	158,630.0

Scenario: Scenario 3
Steady State Analysis
- Junction Report -

Label	Elevation (ft)	Demand (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-101	300.00	5.44	378.63	34.09
J-102	300.00	6.12	379.14	34.31
J-103	275.00	21.76	379.82	45.44
J-105	275.00	6.80	387.72	48.87
J-106	275.00	12.92	397.63	53.16
J-108	275.00	26.52	408.78	58.00
J-111	270.00	39.44	431.13	69.85
J-115	275.00	29.92	434.90	69.32
J-119	275.00	14.96	436.60	70.06
J-121	275.00	6.12	438.08	70.70
J-122	275.00	4.76	437.69	70.53
J-124	277.00	15.64	437.26	69.47
J-125	275.00	14.28	437.25	70.34
J-126	275.00	21.76	437.18	70.31
J-128	275.00	13.60	437.13	70.29
J-130	275.00	12.92	437.17	70.30
J-131	275.00	2.72	437.23	70.33
J-133	275.00	12.24	437.15	70.29
J-135	280.00	4.08	437.21	68.15
J-137	300.00	19.72	437.20	59.48
J-138	300.00	8.16	437.42	59.57
J-139	300.00	5.44	437.27	59.51
J-140	300.00	5.44	438.36	59.98
J-141	300.00	1.36	438.79	60.17
J-142	300.00	7.48	439.36	60.42
J-144	260.00	12.24	441.52	78.69
J-145	300.00	12.24	442.57	61.81
J-146	300.00	11.56	442.60	61.82
J-151	280.00	5.44	448.55	73.07
J-152	270.00	6.80	449.03	77.61
J-153	275.00	23.12	448.56	75.24
J-156	275.00	11.56	455.03	78.05
J-157	290.00	2.72	458.90	73.22
J-158	300.00	3.40	461.37	69.96
J-160	305.00	26.52	465.31	69.50
J-162	325.00	12.92	469.83	62.79
J-165	300.00	14.96	470.22	73.79
J-166	300.00	10.20	471.57	74.38
J-167	310.00	7.48	472.65	70.51
J-170	310.00	7.48	467.76	68.39
J-171	300.00	8.16	471.03	74.15
J-172	300.00	15.64	470.75	74.02
J-174	280.00	17.00	470.43	82.56
J-176	270.00	0.00	470.13	86.76
J-178	275.00	18.36	469.54	84.34
J-179	275.00	4.08	469.21	84.19
J-180	275.00	18.36	469.04	84.12
J-183	300.00	13.60	468.20	72.92
J-188	275.00	34.00	468.29	83.80
J-189	265.00	2.72	470.30	89.00
J-190	275.00	0.00	470.35	84.69

Scenario: Scenario 3
Steady State Analysis
- Junction Report -

Label	Elevation (ft)	Demand (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-191	295.00	6.80	471.47	76.50
J-192	290.00	3.40	471.59	78.72
J-195	280.00	23.80	471.69	83.10
J-199	305.00	21.76	471.57	72.21
J-200	300.00	17.68	471.55	74.37
J-202	300.00	10.20	471.55	74.37
J-204	300.00	18.36	471.44	74.32
J-208	280.00	10.20	376.68	41.91
J-210	300.00	11.56	376.75	33.27
J-212	290.00	8.84	377.13	37.77
J-213	280.00	0.00	377.43	42.24
J-214	275.00	4.76	377.45	44.42
J-215	270.00	12.24	377.49	46.60
J-217	265.00	12.92	378.06	49.02
J-219	280.00	7.48	378.06	42.51
J-220	280.00	6.12	377.77	42.39
J-222	295.00	2.72	378.61	36.25
J-223	275.00	27.88	378.06	44.68
J-224	280.00	4.08	378.61	42.75

Scenario: Scenario 3
Steady State Analysis
- Pipe Report -

Label	Length (ft)	Dia. (in)	Hazen-Williams C	Minor Loss Coef.	Velocity (ft/s)	Control Status	Q (gpm)	HGL Up (ft)	HGL Dn (ft)	Head-loss (ft)	Headloss Gradient (ft/1000ft)	User Defined Length?
P-1	472.00	6.0	130.0	0.00	0.21	Open	-18.86	378.61	378.63	0.02	0.05	false
P-2	609.00	4.0	130.0	0.00	0.78	Open	30.59	379.14	378.63	0.51	0.84	false
P-3	578.00	4.0	130.0	0.00	0.94	Open	-36.71	379.14	379.82	0.68	1.17	false
P-4	1,302.00	4.0	130.0	0.00	0.15	Open	6.04	437.23	437.18	0.05	0.04	false
P-5	1,192.00	4.0	130.0	0.00	2.39	Open	93.43	387.72	379.82	7.90	6.63	false
P-6	1,313.00	4.0	130.0	0.00	2.56	Open	100.23	397.63	387.72	9.91	7.55	false
P-7	1,180.00	4.0	130.0	0.00	2.89	Open	113.15	408.78	397.63	11.15	9.45	false
P-8	2,074.00	4.0	130.0	0.00	0.19	Open	7.29	471.69	471.57	0.12	0.06	false
P-9	2,250.00	4.0	130.0	0.00	0.15	Open	5.87	468.29	468.20	0.09	0.04	false
P-10	1,602.00	4.0	130.0	0.00	3.57	Open	-139.67	408.78	431.13	22.35	13.95	false
P-11	1,161.00	6.0	130.0	0.00	2.68	Open	-236.12	442.60	448.55	5.94	5.12	false
P-14	1,226.00	6.0	130.0	0.00	2.03	Open	179.11	434.90	431.13	3.76	3.07	false
P-22	442.00	6.0	130.0	0.00	1.03	Open	91.20	438.08	437.69	0.39	0.88	false
P-24	1,350.00	6.0	130.0	0.00	0.60	Open	52.76	437.69	437.26	0.43	0.32	false
P-25	210.00	6.0	130.0	0.00	0.16	Open	-14.40	437.25	437.26	0.01	0.03	false
P-26	762.00	6.0	130.0	0.00	2.04	Open	-179.74	434.90	437.25	2.35	3.09	false
P-27	165.00	4.0	130.0	0.00	0.58	Open	-22.73	437.18	437.26	0.08	0.48	false
P-28	886.00	4.0	130.0	0.00	0.18	Open	7.01	437.18	437.13	0.05	0.05	false
P-30	861.00	4.0	130.0	0.00	0.17	Open	6.59	437.17	437.13	0.04	0.05	false
P-32	106.00	4.0	130.0	0.00	0.64	Open	-24.91	437.17	437.23	0.06	0.57	false
P-33	981.00	4.0	130.0	0.00	0.52	Open	-20.39	469.83	470.22	0.39	0.40	false
P-34	1,233.00	4.0	130.0	0.00	0.90	Open	-35.35	470.22	471.57	1.35	1.10	false
P-35	700.00	4.0	130.0	0.00	0.14	Open	5.40	437.17	437.15	0.02	0.03	false
P-36	1,122.00	4.0	130.0	0.00	0.17	Open	-6.84	437.15	437.21	0.06	0.05	false
P-38	1,026.00	4.0	130.0	0.00	0.05	Open	-1.78	437.20	437.21	4.39e-3	4.28e-3	false
P-40	688.00	4.0	130.0	0.00	0.46	Open	-17.94	437.20	437.42	0.21	0.31	false
P-41	453.00	4.0	130.0	0.00	0.46	Open	-18.14	437.27	437.42	0.14	0.32	false
P-42	402.00	4.0	130.0	0.00	0.32	Open	-12.70	437.21	437.27	0.07	0.16	false
P-43	567.00	4.0	130.0	0.00	1.13	Open	44.24	438.36	437.42	0.94	1.66	false
P-44	213.00	4.0	130.0	0.00	1.27	Open	49.68	438.79	438.36	0.44	2.06	false
P-45	162.00	6.0	130.0	0.00	2.19	Open	-192.60	438.79	439.36	0.57	3.51	false
P-46	889.00	4.0	130.0	0.00	1.13	Open	44.25	438.08	436.60	1.48	1.66	false
P-47	572.00	6.0	130.0	0.00	2.27	Open	-200.08	439.36	441.52	2.16	3.77	false
P-48	2,203.00	4.0	130.0	0.00	0.75	Open	29.29	436.60	434.90	1.70	0.77	false
P-49	258.00	6.0	130.0	0.00	2.41	Open	-212.32	441.52	442.60	1.09	4.21	false
P-50	232.00	4.0	130.0	0.00	0.31	Open	-12.24	442.57	442.60	0.04	0.15	false
P-52	1.00	4.0	130.0	0.00	1.06	Open	-41.36	378.06	378.06	1.46e-3	1.46	true
P-53	1.00	6.0	130.0	0.00	0.72	Open	-63.47	378.61	378.61	4.58e-4	0.46	true
P-55	91.00	6.0	130.0	0.00	2.74	Open	241.57	449.03	448.55	0.49	5.34	false
P-56	953.00	4.0	130.0	0.00	0.59	Open	23.12	449.03	448.56	0.48	0.50	false
P-59	904.00	6.0	130.0	0.00	3.08	Open	271.49	455.03	449.03	5.99	6.63	false
P-60	540.00	6.0	130.0	0.00	3.21	Open	283.05	458.90	455.03	3.87	7.16	false
P-61	339.00	6.0	130.0	0.00	3.24	Open	285.77	461.37	458.90	2.47	7.29	false
P-62	1,476.00	4.0	130.0	0.00	1.46	Open	-57.20	461.37	465.31	3.94	2.67	false
P-64	837.00	4.0	130.0	0.00	2.14	Open	-83.72	465.31	469.83	4.53	5.41	false
P-70	450.00	6.0	130.0	0.00	1.78	Open	156.59	472.65	471.57	1.08	2.39	false
P-72	619.00	4.0	130.0	0.00	1.95	Open	-76.25	469.83	472.65	2.82	4.55	false
P-74	931.00	6.0	130.0	0.00	2.72	Open	-239.45	467.76	472.65	4.89	5.25	false
P-75	179.00	4.0	130.0	0.00	5.92	Open	-231.97	461.37	467.76	6.39	35.71	false
P-76	592.00	6.0	130.0	0.00	1.06	Open	93.31	471.57	471.03	0.54	0.92	false
P-77	366.00	6.0	130.0	0.00	0.97	Open	85.15	471.03	470.75	0.28	0.77	false

Scenario: Scenario 3
Steady State Analysis
- Pipe Report -

Label	Length (ft)	Dia. (in)	Hazen-Williams C	Minor Loss Coef.	Velocity (ft/s)	Control Status	Q (gpm)	HGL Up (ft)	HGL Dn (ft)	Head-loss (ft)	Headloss Gradient (ft/1000ft)	User Defined Length?
P-78	1,309.00	4.0	130.0	0.00	0.40	Open	-15.62	470.43	470.75	0.32	0.24	false
P-80	952.00	6.0	130.0	0.00	0.61	Open	53.89	470.75	470.43	0.32	0.33	false
P-82	417.00	6.0	130.0	0.00	0.60	Open	52.51	470.43	470.30	0.13	0.32	false
P-84	706.00	6.0	130.0	0.00	1.00	Open	-88.40	469.54	470.13	0.59	0.83	false
P-85	622.00	6.0	130.0	0.00	0.79	Open	70.04	469.54	469.21	0.34	0.54	false
P-86	515.00	4.0	130.0	0.00	0.47	Open	18.36	469.21	469.04	0.17	0.33	false
P-89	481.00	4.0	130.0	0.00	1.22	Open	47.60	469.21	468.29	0.91	1.90	false
P-90	1,354.00	4.0	130.0	0.00	0.20	Open	7.73	468.29	468.20	0.09	0.07	false
P-96	207.00	6.0	130.0	0.00	1.00	Open	88.40	470.30	470.13	0.17	0.83	false
P-97	264.00	6.0	130.0	0.00	0.44	Open	38.61	470.35	470.30	0.05	0.18	false
P-98	870.00	4.0	130.0	0.00	0.99	Open	-38.61	470.35	471.47	1.12	1.29	false
P-99	347.00	6.0	130.0	0.00	0.62	Open	54.28	471.59	471.47	0.12	0.34	false
P-101	287.00	6.0	130.0	0.00	0.65	Open	-57.68	471.59	471.69	0.11	0.38	false
P-107	858.00	6.0	130.0	0.00	0.39	Open	34.11	471.69	471.57	0.12	0.14	false
P-108	399.00	6.0	130.0	0.00	0.22	Open	-19.64	471.55	471.57	0.02	0.05	false
P-110	806.00	6.0	130.0	0.00	0.02	Open	-1.96	471.55	471.55	5.8e-4	7.19e-4	false
P-112	1,174.00	4.0	130.0	0.00	0.24	Open	9.49	471.55	471.44	0.11	0.10	false
P-114	367.00	4.0	130.0	0.00	0.23	Open	8.87	471.47	471.44	0.03	0.08	false
P-115	620.00	6.0	130.0	0.00	0.00	Closed	0.00	377.43	470.13	0.00	0.00	false
P-116	356.00	4.0	130.0	0.00	0.78	Open	30.60	377.43	377.13	0.30	0.84	false
P-117	856.00	4.0	130.0	0.00	0.56	Open	21.76	377.13	376.75	0.38	0.45	false
P-120	623.00	4.0	130.0	0.00	0.26	Open	10.20	376.75	376.68	0.07	0.11	false
P-123	183.00	4.0	130.0	0.00	0.36	Open	13.96	377.49	377.45	0.04	0.20	false
P-124	912.00	4.0	130.0	0.00	0.67	Open	-26.20	377.49	378.06	0.57	0.63	false
P-126	677.00	4.0	130.0	0.00	0.06	Open	2.23	378.06	378.06	4.46e-3	0.01	false
P-130	1,636.00	4.0	130.0	0.00	0.89	Open	34.96	379.82	378.06	1.76	1.07	false
P-132	526.00	4.0	130.0	0.00	0.88	Open	34.27	378.61	378.06	0.54	1.03	false
P-133	511.00	4.0	130.0	0.00	0.16	Open	6.29	378.63	378.61	0.02	0.04	false
P-134	578.00	4.0	130.0	0.00	0.84	Open	-32.76	378.06	378.61	0.55	0.95	false
P-135	417.00	4.0	130.0	0.00	0.70	Open	-27.51	377.77	378.06	0.29	0.69	false
P-136	736.00	4.0	130.0	0.00	0.55	Open	-21.39	377.45	377.77	0.32	0.43	false
P-139	456.00	4.0	130.0	0.00	0.86	Open	-33.67	437.23	437.69	0.46	1.00	false
P-140	548.00	6.0	130.0	0.00	0.20	Open	17.73	471.57	471.55	0.02	0.04	false
P-141	187.00	6.0	130.0	0.00	0.35	Open	30.60	377.45	377.43	0.02	0.12	false
P-142	362.00	6.0	130.0	0.00	1.61	Open	-141.57	438.08	438.79	0.72	1.99	false
P-BOOST1	123.00	6.0	130.0	0.00	0.00	Open	0.00	378.61	378.61	0.00	0.00	false
P-BOOST3AB	102.00	6.0	130.0	0.00	5.44	Open	479.77	474.59	472.65	1.94	19.03	false
P-BOOST4	151.00	6.0	130.0	0.00	2.04	Open	179.63	437.72	437.25	0.47	3.09	false
P-BOOST6	129.00	6.0	130.0	0.00	1.39	Open	122.88	471.89	471.69	0.20	1.53	false
P-PMP-W1	114.00	10.0	130.0	0.00	0.20	Open	-48.69	378.61	378.61	2.59e-3	0.02	true
P-PMP-W2	145.00	6.0	130.0	0.00	1.54e-5	Open	-1.35e-3	448.55	448.55	0.00	0.00	false
P-PMP-W5	125.00	6.0	130.0	0.00	1.32e-5	Open	-1.16e-3	458.90	458.90	0.00	0.00	false
P-T1	120.00	6.0	130.0	0.00	0.00	Open	0.00	335.00	335.00	0.00	0.00	false
P-T3AB	71.00	6.0	130.0	0.00	5.44	Open	479.77	344.00	342.65	1.35	19.03	false
P-T4	160.00	6.0	130.0	0.00	2.04	Open	179.63	304.00	303.51	0.49	3.09	false
P-T6	156.00	6.0	130.0	0.00	1.39	Open	122.88	307.50	307.26	0.24	1.53	false
P-W1	1.00	10.0	130.0	0.00	0.20	Open	-48.69	229.00	229.00	1.53e-5	0.02	true
P-W2	118.00	6.0	130.0	0.00	1.54e-5	Open	-1.35e-3	147.00	147.00	0.00	0.00	false
P-W5	119.00	6.0	130.0	0.00	1.32e-5	Open	-1.16e-3	200.00	200.00	0.00	0.00	false

Scenario: Scenario 3
Steady State Analysis
- Pump Report -

Label	Elev. (ft)	Q (gpm)	H in (ft)	H out (ft)	Pump Head (ft)	Press. In (psi)	Shutoff H (ft)	Shutoff Q (gpm)	Design H (ft)	Design Q (gpm)	Max. Op. H (ft)	Max. Op. Q (gpm)
PMP-BOOST-T1	310.00	0.00	335.00	378.61	0.00	10.84	130.00	0.00	107.00	130.00	65.00	175.00
PMP-BOOST-T3AB	320.00	479.77	342.65	474.59	131.94	9.82	164.00	0.00	144.00	408.00	97.00	618.00
PMP-BOOST-T4	280.00	179.63	303.51	437.72	134.21	10.19	170.00	0.00	160.00	120.00	104.00	218.00
PMP-BOOST-T6	280.00	122.88	307.26	471.89	164.63	11.82	165.00	0.00	155.00	200.00	10.00	300.00
PMP-W1	229.00	48.69	229.00	378.61	149.61	6.61e-6	170.00	0.00	145.00	52.00	75.00	80.00
PMP-W2	147.00	0.00	147.00	448.55	0.00	0.00	300.00	0.00	196.00	207.00	100.00	240.00
PMP-W5	200.00	0.00	200.00	458.90	0.00	0.00	232.00	0.00	176.00	130.00	16.00	290.00

Scenario: Scenario 3
Steady State Analysis
- Tank Report -

Label	Zone	Elevation (ft)	Minimum Elevation (ft)	Initial HGL (ft)	Maximum Elevation (ft)	Tank Dia. (ft)	Inflow (gpm)	Current Status	Calculated Hydraulic Grade (ft)	Calculated Percent Full (%)	Total Active Volume (gal)	Total Volume (gal)
T-1	Zone-1	310.00	310.00	335.00	340.00	30.00	0.00	Steady	335.00	83.3	158,630.0	158,630.0
T-3	Zone-1	320.00	320.00	344.00	350.00	30.00	-479.77	Draining	344.00	80.0	158,630.0	158,630.0
T-4	Zone-1	280.00	280.00	304.00	310.00	30.00	-179.63	Draining	304.00	80.0	158,630.0	158,630.0
T-6	Zone-1	300.00	280.00	307.50	310.00	30.00	-122.88	Draining	307.50	91.7	158,630.0	158,630.0

Scenario: Scenario 4
Steady State Analysis
- Junction Report -

Label	Elevation (ft)	Demand (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-101	300.00	5.44	452.76	66.22
J-102	300.00	6.12	452.29	66.02
J-103	275.00	21.76	452.01	76.74
J-105	275.00	6.80	451.29	76.42
J-106	275.00	12.92	450.84	76.23
J-108	275.00	26.52	450.79	76.21
J-111	270.00	39.44	451.43	78.65
J-115	275.00	29.92	451.93	76.70
J-119	275.00	14.96	452.06	76.76
J-121	275.00	6.12	452.48	76.94
J-122	275.00	4.76	452.42	76.91
J-124	277.00	15.64	452.41	76.05
J-125	275.00	14.28	452.48	76.94
J-126	275.00	21.76	452.17	76.81
J-128	275.00	13.60	452.02	76.74
J-130	275.00	12.92	452.02	76.74
J-131	275.00	2.72	452.11	76.78
J-133	275.00	12.24	451.81	76.65
J-135	280.00	4.08	451.78	74.47
J-137	300.00	19.72	451.73	65.78
J-138	300.00	8.16	451.85	65.83
J-139	300.00	5.44	451.79	65.81
J-140	300.00	5.44	452.37	66.06
J-141	300.00	1.36	452.64	66.17
J-142	300.00	7.48	452.81	66.25
J-144	260.00	12.24	453.52	83.89
J-145	300.00	12.24	453.87	66.70
J-146	300.00	11.56	453.90	66.72
J-151	280.00	5.44	456.32	76.44
J-152	270.00	6.80	456.52	80.86
J-153	275.00	23.12	456.05	78.49
J-156	275.00	11.56	459.34	79.92
J-157	290.00	2.72	461.23	74.23
J-158	300.00	3.40	462.45	70.43
J-160	305.00	26.52	463.75	68.82
J-162	325.00	12.92	466.03	61.14
J-165	300.00	14.96	466.02	71.97
J-166	300.00	10.20	466.22	72.06
J-167	310.00	7.48	468.65	68.78
J-170	310.00	7.48	465.93	67.60
J-171	300.00	8.16	463.89	71.05
J-172	300.00	15.64	462.55	70.47
J-174	280.00	17.00	460.69	78.33
J-176	270.00	0.00	458.37	81.66
J-178	275.00	18.36	457.78	79.24
J-179	275.00	4.08	457.45	79.09
J-180	275.00	18.36	457.28	79.02
J-183	300.00	13.60	456.45	67.82
J-188	275.00	34.00	456.53	78.70
J-189	265.00	2.72	459.60	84.36
J-190	275.00	0.00	459.85	80.14

Scenario: Scenario 4
Steady State Analysis
- Junction Report -

Label	Elevation (ft)	Demand (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-191	295.00	6.80	465.78	74.04
J-192	290.00	3.40	466.14	76.36
J-195	280.00	23.80	466.47	80.84
J-199	305.00	21.76	466.27	69.91
J-200	300.00	17.68	466.22	72.06
J-202	300.00	10.20	466.20	72.05
J-204	300.00	18.36	465.78	71.87
J-208	280.00	10.20	455.94	76.27
J-210	300.00	11.56	456.00	67.63
J-212	290.00	8.84	456.39	72.13
J-213	280.00	0.00	456.68	76.60
J-214	275.00	4.76	456.33	78.61
J-215	270.00	12.24	455.58	80.45
J-217	265.00	12.92	452.92	81.47
J-219	280.00	7.48	453.17	75.07
J-220	280.00	6.12	454.18	75.51
J-222	295.00	2.72	452.80	68.41
J-223	275.00	27.88	452.91	77.13
J-224	280.00	4.08	452.80	74.91

Scenario: Scenario 4
Steady State Analysis
- Pipe Report -

Label	Length (ft)	Dia. (in)	Hazen-Williams C	Minor Loss Coef.	Velocity (ft/s)	Control Status	Q (gpm)	HGL Up (ft)	HGL Dn (ft)	Head-loss (ft)	Headloss Gradient (ft/1000ft)	User Defined Length?
P-1	472.00	6.0	130.0	0.00	0.29	Open	25.97	452.80	452.76	0.04	0.09	false
P-2	609.00	4.0	130.0	0.00	0.74	Open	-29.10	452.29	452.76	0.47	0.76	false
P-3	578.00	4.0	130.0	0.00	0.59	Open	22.98	452.29	452.01	0.29	0.49	false
P-4	1,302.00	4.0	130.0	0.00	0.17	Open	-6.51	452.11	452.17	0.06	0.05	false
P-5	1,192.00	4.0	130.0	0.00	0.66	Open	-25.67	451.29	452.01	0.72	0.61	false
P-6	1,313.00	4.0	130.0	0.00	0.48	Open	-18.87	450.84	451.29	0.45	0.34	false
P-7	1,180.00	4.0	130.0	0.00	0.15	Open	-5.95	450.79	450.84	0.05	0.04	false
P-8	2,074.00	4.0	130.0	0.00	0.24	Open	9.40	466.47	466.27	0.20	0.09	false
P-9	2,250.00	4.0	130.0	0.00	0.15	Open	5.87	456.53	456.45	0.09	0.04	false
P-10	1,602.00	4.0	130.0	0.00	0.53	Open	-20.57	450.79	451.43	0.64	0.40	false
P-11	1,161.00	6.0	130.0	0.00	1.65	Open	-145.32	458.90	456.32	2.42	2.08	false
P-14	1,226.00	6.0	130.0	0.00	0.68	Open	60.01	451.93	451.43	0.50	0.41	false
P-22	442.00	6.0	130.0	0.00	0.39	Open	34.26	452.48	452.42	0.06	0.14	false
P-24	1,350.00	6.0	130.0	0.00	0.03	Open	2.43	452.42	452.41	1.46e-3	1.09e-3	false
P-25	210.00	6.0	130.0	0.00	0.62	Open	54.52	452.48	452.41	0.07	0.34	false
P-26	762.00	6.0	130.0	0.00	0.94	Open	-82.53	451.93	452.48	0.56	0.73	false
P-27	165.00	4.0	130.0	0.00	1.05	Open	-41.31	452.17	452.41	0.24	1.46	false
P-28	886.00	4.0	130.0	0.00	0.33	Open	13.03	452.17	452.02	0.15	0.17	false
P-30	861.00	4.0	130.0	0.00	0.01	Open	0.57	452.02	452.02	4.58e-4	5.32e-4	false
P-32	106.00	4.0	130.0	0.00	0.79	Open	-30.86	452.02	452.11	0.09	0.85	false
P-33	981.00	4.0	130.0	0.00	0.06	Open	2.52	466.03	466.02	0.01	0.01	false
P-34	1,233.00	4.0	130.0	0.00	0.32	Open	-12.44	466.02	466.22	0.20	0.16	false
P-35	700.00	4.0	130.0	0.00	0.44	Open	17.38	452.02	451.81	0.21	0.29	false
P-36	1,122.00	4.0	130.0	0.00	0.13	Open	5.14	451.81	451.78	0.03	0.03	false
P-38	1,026.00	4.0	130.0	0.00	0.17	Open	-6.57	451.73	451.78	0.05	0.05	false
P-40	688.00	4.0	130.0	0.00	0.34	Open	-13.15	451.73	451.85	0.12	0.18	false
P-41	453.00	4.0	130.0	0.00	0.28	Open	-10.96	451.79	451.85	0.06	0.13	false
P-42	402.00	4.0	130.0	0.00	0.14	Open	-5.52	451.78	451.79	0.01	0.04	false
P-43	567.00	4.0	130.0	0.00	0.82	Open	32.26	452.37	451.85	0.52	0.92	false
P-44	213.00	4.0	130.0	0.00	0.96	Open	37.70	452.64	452.37	0.26	1.23	false
P-45	162.00	6.0	130.0	0.00	1.16	Open	-101.80	452.64	452.81	0.17	1.08	false
P-46	889.00	4.0	130.0	0.00	0.57	Open	22.36	452.48	452.06	0.42	0.47	false
P-47	572.00	6.0	130.0	0.00	1.24	Open	-109.28	452.81	453.52	0.70	1.23	false
P-48	2,203.00	4.0	130.0	0.00	0.19	Open	7.40	452.06	451.93	0.13	0.06	false
P-49	258.00	6.0	130.0	0.00	1.38	Open	-121.52	453.52	453.90	0.39	1.50	false
P-50	232.00	4.0	130.0	0.00	0.31	Open	-12.24	453.87	453.90	0.04	0.15	false
P-52	1.00	4.0	130.0	0.00	1.71	Open	67.06	452.92	452.91	3.57e-3	3.57	true
P-53	1.00	6.0	130.0	0.00	0.34	Open	30.05	452.80	452.80	1.22e-4	0.12	true
P-55	91.00	6.0	130.0	0.00	1.71	Open	150.76	456.52	456.32	0.20	2.23	false
P-56	953.00	4.0	130.0	0.00	0.59	Open	23.12	456.52	456.05	0.48	0.50	false
P-59	904.00	6.0	130.0	0.00	2.05	Open	180.68	459.34	456.52	2.82	3.12	false
P-60	540.00	6.0	130.0	0.00	2.18	Open	192.24	461.23	459.34	1.89	3.50	false
P-61	339.00	6.0	130.0	0.00	2.21	Open	194.97	462.45	461.23	1.22	3.59	false
P-62	1,476.00	4.0	130.0	0.00	0.80	Open	-31.36	462.45	463.75	1.30	0.88	false
P-64	837.00	4.0	130.0	0.00	1.48	Open	-57.88	463.75	466.03	2.29	2.73	false
P-70	450.00	6.0	130.0	0.00	2.76	Open	243.11	468.65	466.22	2.43	5.40	false
P-72	619.00	4.0	130.0	0.00	1.87	Open	-73.33	466.03	468.65	2.62	4.23	false
P-74	931.00	6.0	130.0	0.00	1.98	Open	-174.48	465.93	468.65	2.72	2.92	false
P-75	179.00	4.0	130.0	0.00	4.26	Open	-167.00	462.45	465.93	3.48	19.43	false
P-76	592.00	6.0	130.0	0.00	2.32	Open	204.88	466.22	463.89	2.33	3.94	false
P-77	366.00	6.0	130.0	0.00	2.23	Open	196.72	463.89	462.55	1.34	3.65	false

Scenario: Scenario 4
Steady State Analysis
- Pipe Report -

Label	Length (ft)	Dia. (in)	Hazen-Williams C	Minor Loss Coef.	Velocity (ft/s)	Control Status	Q (gpm)	HGL Up (ft)	HGL Dn (ft)	Head-loss (ft)	Headloss Gradient (ft/1000ft)	User Defined Length?
P-78	1,309.00	4.0	130.0	0.00	1.04	Open	-40.69	460.69	462.55	1.86	1.42	false
P-80	952.00	6.0	130.0	0.00	1.59	Open	140.39	462.55	460.69	1.86	1.95	false
P-82	417.00	6.0	130.0	0.00	1.86	Open	164.08	460.69	459.60	1.09	2.61	false
P-84	706.00	6.0	130.0	0.00	1.00	Open	-88.40	457.78	458.37	0.59	0.83	false
P-85	622.00	6.0	130.0	0.00	0.79	Open	70.04	457.78	457.45	0.34	0.54	false
P-86	515.00	4.0	130.0	0.00	0.47	Open	18.36	457.45	457.28	0.17	0.33	false
P-89	481.00	4.0	130.0	0.00	1.22	Open	47.60	457.45	456.53	0.91	1.90	false
P-90	1,354.00	4.0	130.0	0.00	0.20	Open	7.73	456.53	456.45	0.09	0.07	false
P-96	207.00	6.0	130.0	0.00	2.91	Open	256.19	459.60	458.37	1.23	5.96	false
P-97	264.00	6.0	130.0	0.00	1.08	Open	94.83	459.85	459.60	0.25	0.95	false
P-98	870.00	4.0	130.0	0.00	2.42	Open	-94.83	459.85	465.78	5.93	6.81	false
P-99	347.00	6.0	130.0	0.00	1.14	Open	100.65	466.14	465.78	0.37	1.06	false
P-101	287.00	6.0	130.0	0.00	1.18	Open	-104.05	466.14	466.47	0.32	1.12	false
P-107	858.00	6.0	130.0	0.00	0.50	Open	43.99	466.47	466.27	0.20	0.23	false
P-108	399.00	6.0	130.0	0.00	0.36	Open	-31.64	466.22	466.27	0.05	0.12	false
P-110	806.00	6.0	130.0	0.00	0.16	Open	-13.96	466.20	466.22	0.02	0.03	false
P-112	1,174.00	4.0	130.0	0.00	0.49	Open	19.34	466.20	465.78	0.42	0.36	false
P-114	367.00	4.0	130.0	0.00	0.03	Open	-0.98	465.78	465.78	5.19e-4	1.41e-3	false
P-115	620.00	6.0	130.0	0.00	1.90	Open	-167.79	456.68	458.37	1.69	2.72	false
P-116	356.00	4.0	130.0	0.00	0.78	Open	30.60	456.68	456.39	0.30	0.84	false
P-117	856.00	4.0	130.0	0.00	0.56	Open	21.76	456.39	456.00	0.38	0.45	false
P-120	623.00	4.0	130.0	0.00	0.26	Open	10.20	456.00	455.94	0.07	0.11	false
P-123	183.00	4.0	130.0	0.00	1.85	Open	-72.27	455.58	456.33	0.75	4.12	false
P-124	912.00	4.0	130.0	0.00	1.53	Open	60.03	455.58	452.92	2.66	2.92	false
P-126	677.00	4.0	130.0	0.00	0.51	Open	-19.94	452.92	453.17	0.26	0.38	false
P-130	1,636.00	4.0	130.0	0.00	0.62	Open	-24.45	452.01	452.91	0.91	0.55	false
P-132	526.00	4.0	130.0	0.00	0.38	Open	-14.73	452.80	452.91	0.11	0.22	false
P-133	511.00	4.0	130.0	0.00	0.22	Open	-8.58	452.76	452.80	0.04	0.08	false
P-134	578.00	4.0	130.0	0.00	0.68	Open	26.62	453.17	452.80	0.37	0.65	false
P-135	417.00	4.0	130.0	0.00	1.38	Open	54.04	454.18	453.17	1.00	2.40	false
P-136	736.00	4.0	130.0	0.00	1.54	Open	60.16	456.33	454.18	2.16	2.93	false
P-139	456.00	4.0	130.0	0.00	0.69	Open	-27.07	452.11	452.42	0.30	0.67	false
P-140	548.00	6.0	130.0	0.00	0.18	Open	15.59	466.22	466.20	0.02	0.03	false
P-141	187.00	6.0	130.0	0.00	1.56	Open	-137.19	456.33	456.68	0.35	1.87	false
P-142	362.00	6.0	130.0	0.00	0.71	Open	-62.74	452.48	452.64	0.16	0.44	false
P-BOOST1	123.00	6.0	130.0	0.00	6.0e-6	Open	-5.29e-4	452.80	452.80	0.00	0.00	false
P-BOOST3AB	102.00	6.0	130.0	0.00	5.66	Open	498.39	470.73	468.65	2.08	20.42	false
P-BOOST4	151.00	6.0	130.0	0.00	1.72	Open	151.33	452.82	452.48	0.34	2.25	false
P-BOOST6	129.00	6.0	130.0	0.00	2.06	Open	181.24	466.87	466.47	0.40	3.14	false
P-PMP-W1	114.00	10.0	130.0	0.00	4.14e-6	Open	1.01e-3	452.80	452.80	0.00	0.00	true
P-PMP-W2	145.00	6.0	130.0	0.00	1.58e-5	Open	-1.39e-3	456.32	456.32	0.00	0.00	false
P-PMP-W5	125.00	6.0	130.0	0.00	1.33e-5	Open	-1.17e-3	461.23	461.23	0.00	0.00	false
P-T1	120.00	6.0	130.0	0.00	6.01e-6	Open	-5.3e-4	335.00	335.00	0.00	0.00	false
P-T3AB	71.00	6.0	130.0	0.00	5.66	Open	498.39	344.00	342.55	1.45	20.42	false
P-T4	160.00	6.0	130.0	0.00	1.72	Open	151.33	304.00	303.64	0.36	2.25	false
P-T6	156.00	6.0	130.0	0.00	2.06	Open	181.24	307.50	307.01	0.49	3.14	false
P-W1	1.00	10.0	130.0	0.00	3.66e-6	Open	8.96e-4	229.00	229.00	0.00	0.00	true
P-W2	118.00	6.0	130.0	0.00	1.58e-5	Open	-1.39e-3	147.00	147.00	0.00	0.00	false
P-W5	119.00	6.0	130.0	0.00	1.33e-5	Open	-1.17e-3	200.00	200.00	0.00	0.00	false

Scenario: Scenario 4
Steady State Analysis
- Pump Report -

Label	Elev. (ft)	Q (gpm)	H in (ft)	H out (ft)	Pump Head (ft)	Press. in (psi)	Shutoff H (ft)	Shutoff Q (gpm)	Design H (ft)	Design Q (gpm)	Max. Op. H (ft)	Max. Op. Q (gpm)
PMP-BOOST-T1	310.00	0.00	335.00	452.80	0.00	10.84	130.00	0.00	107.00	130.00	65.00	175.00
PMP-BOOST-T3AB	320.00	498.39	342.55	470.73	128.18	9.78	164.00	0.00	144.00	408.00	97.00	618.00
PMP-BOOST-T4	280.00	151.33	303.64	452.82	149.18	10.25	170.00	0.00	160.00	120.00	104.00	218.00
PMP-BOOST-T6	280.00	181.24	307.01	466.87	159.86	11.71	165.00	0.00	155.00	200.00	10.00	300.00
PMP-W1	229.00	0.00	229.00	452.80	0.00	0.00	170.00	0.00	145.00	52.00	75.00	80.00
PMP-W2	147.00	0.00	147.00	456.32	0.00	0.00	300.00	0.00	196.00	207.00	100.00	240.00
PMP-W5	200.00	0.00	200.00	461.23	0.00	0.00	232.00	0.00	176.00	130.00	16.00	290.00

Scenario: Scenario 4
Steady State Analysis
- Tank Report -

Label	Zone	Elevation (ft)	Minimum Elevation (ft)	Initial HGL (ft)	Maximum Elevation (ft)	Tank Dia. (ft)	Inflow (gpm)	Current Status	Calculated Hydraulic Grade (ft)	Calculated Percent Full (%)	Total Active Volume (gal)	Total Volume (gal)
T-1	Zone-1	310.00	310.00	335.00	340.00	30.00	5.3e-4	Steady	335.00	83.3	158,630.0	158,630.0
T-3	Zone-1	320.00	320.00	344.00	350.00	30.00	-498.39	Draining	344.00	80.0	158,630.0	158,630.0
T-4	Zone-1	280.00	280.00	304.00	310.00	30.00	-151.33	Draining	304.00	80.0	158,630.0	158,630.0
T-6	Zone-1	300.00	280.00	307.50	310.00	30.00	-181.24	Draining	307.50	91.7	158,630.0	158,630.0

Scenario: Scenario 5
Steady State Analysis
- Junction Report -

Label	Elevation (ft)	Demand (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-101	300.00	5.44	462.65	70.51
J-102	300.00	6.12	461.77	70.13
J-103	275.00	21.76	461.15	80.70
J-105	275.00	6.80	459.20	79.85
J-106	275.00	12.92	457.62	79.17
J-108	275.00	26.52	456.97	78.89
J-111	270.00	39.44	456.98	81.06
J-115	275.00	29.92	457.24	79.00
J-119	275.00	14.96	457.29	79.02
J-121	275.00	6.12	457.60	79.16
J-122	275.00	4.76	457.54	79.14
J-124	277.00	15.64	457.54	78.27
J-125	275.00	14.28	457.62	79.17
J-126	275.00	21.76	457.30	79.03
J-128	275.00	13.60	457.14	78.96
J-130	275.00	12.92	457.14	78.96
J-131	275.00	2.72	457.24	79.00
J-133	275.00	12.24	456.93	78.87
J-135	280.00	4.08	456.89	76.69
J-137	300.00	19.72	456.84	67.99
J-138	300.00	8.16	456.96	68.05
J-139	300.00	5.44	456.91	68.02
J-140	300.00	5.44	457.48	68.27
J-141	300.00	1.36	457.73	68.38
J-142	300.00	7.48	457.89	68.45
J-144	260.00	12.24	458.53	86.07
J-145	300.00	12.24	458.85	68.86
J-146	300.00	11.56	458.88	68.88
J-151	280.00	5.44	461.13	78.52
J-152	270.00	6.80	461.32	82.94
J-153	275.00	23.12	460.85	80.57
J-156	275.00	11.56	463.98	81.93
J-157	290.00	2.72	465.77	76.20
J-158	300.00	3.40	466.92	72.36
J-160	305.00	26.52	468.14	70.73
J-162	325.00	12.92	470.36	63.02
J-165	300.00	14.96	470.36	73.85
J-166	300.00	10.20	470.60	73.96
J-167	310.00	7.48	472.81	70.58
J-170	310.00	7.48	470.22	69.46
J-171	300.00	8.16	468.88	73.21
J-172	300.00	15.64	467.90	72.79
J-174	280.00	17.00	466.58	80.89
J-176	270.00	0.00	465.00	84.54
J-178	275.00	18.36	464.42	82.12
J-179	275.00	4.08	464.08	81.97
J-180	275.00	18.36	463.91	81.90
J-183	300.00	13.60	463.08	70.70
J-188	275.00	34.00	463.17	81.57
J-189	265.00	2.72	465.84	87.07
J-190	275.00	0.00	466.02	82.81

Scenario: Scenario 5
Steady State Analysis
- Junction Report -

Label	Elevation (ft)	Demand (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-191	295.00	6.80	470.13	75.92
J-192	290.00	3.40	470.40	78.20
J-195	280.00	23.80	470.63	82.64
J-199	305.00	21.76	470.54	71.76
J-200	300.00	17.68	470.53	73.93
J-202	300.00	10.20	470.53	73.93
J-204	300.00	18.36	470.13	73.76
J-208	280.00	10.20	463.35	79.48
J-210	300.00	11.56	463.42	70.84
J-212	290.00	8.84	463.80	75.34
J-213	280.00	0.00	464.10	79.81
J-214	275.00	4.76	463.94	81.91
J-215	270.00	12.24	463.58	83.92
J-217	265.00	12.92	462.55	85.64
J-219	280.00	7.48	462.74	79.22
J-220	280.00	6.12	463.09	79.37
J-222	295.00	2.72	462.72	72.71
J-223	275.00	27.88	462.55	81.31
J-224	280.00	4.08	462.72	79.21

Scenario: Scenario 5
Steady State Analysis
- Pipe Report -

Label	Length (ft)	Dia. (in)	Hazen-Williams C	Minor Loss Coef.	Velocity (ft/s)	Control Status	Q (gpm)	HGL Up (ft)	HGL Dn (ft)	Head-loss (ft)	Headloss Gradient (ft/1000ft)	User Defined Length?
P-1	472.00	6.0	130.0	0.00	0.40	Open	34.94	462.72	462.65	0.07	0.15	false
P-2	609.00	4.0	130.0	0.00	1.05	Open	-41.01	461.77	462.65	0.88	1.44	false
P-3	578.00	4.0	130.0	0.00	0.89	Open	34.89	461.77	461.15	0.62	1.07	false
P-4	1,302.00	4.0	130.0	0.00	0.17	Open	-6.60	457.24	457.30	0.06	0.05	false
P-5	1,192.00	4.0	130.0	0.00	1.12	Open	-43.98	459.20	461.15	1.96	1.64	false
P-6	1,313.00	4.0	130.0	0.00	0.95	Open	-37.18	457.62	459.20	1.58	1.20	false
P-7	1,180.00	4.0	130.0	0.00	0.62	Open	-24.26	456.97	457.62	0.64	0.55	false
P-8	2,074.00	4.0	130.0	0.00	0.16	Open	6.29	470.63	470.54	0.09	0.04	false
P-9	2,250.00	4.0	130.0	0.00	0.15	Open	5.87	463.17	463.08	0.09	0.04	false
P-10	1,602.00	4.0	130.0	0.00	0.06	Open	-2.26	456.97	456.98	0.01	0.01	false
P-11	1,161.00	6.0	130.0	0.00	1.59	Open	-139.69	458.88	461.13	2.25	1.94	false
P-14	1,226.00	6.0	130.0	0.00	0.47	Open	41.70	457.24	456.98	0.25	0.21	false
P-22	442.00	6.0	130.0	0.00	0.36	Open	32.12	457.60	457.54	0.06	0.13	false
P-24	1,350.00	6.0	130.0	0.00	1.94e-3	Open	0.17	457.54	457.54	3.05e-5	2.26e-5	false
P-25	210.00	6.0	130.0	0.00	0.65	Open	56.98	457.62	457.54	0.08	0.37	false
P-26	762.00	6.0	130.0	0.00	0.76	Open	-67.39	457.24	457.62	0.38	0.50	false
P-27	165.00	4.0	130.0	0.00	1.06	Open	-41.51	457.30	457.54	0.24	1.47	false
P-28	886.00	4.0	130.0	0.00	0.34	Open	13.15	457.30	457.14	0.16	0.18	false
P-30	861.00	4.0	130.0	0.00	0.01	Open	0.45	457.14	457.14	3.05e-4	3.54e-4	false
P-32	106.00	4.0	130.0	0.00	0.79	Open	-31.07	457.14	457.24	0.09	0.86	false
P-33	981.00	4.0	130.0	0.00	0.02	Open	0.95	470.36	470.36	1.34e-3	1.37e-3	false
P-34	1,233.00	4.0	130.0	0.00	0.36	Open	-14.01	470.36	470.60	0.24	0.20	false
P-35	700.00	4.0	130.0	0.00	0.45	Open	17.70	457.14	456.93	0.21	0.30	false
P-36	1,122.00	4.0	130.0	0.00	0.14	Open	5.46	456.93	456.89	0.04	0.03	false
P-38	1,026.00	4.0	130.0	0.00	0.17	Open	-6.67	456.84	456.89	0.05	0.05	false
P-40	688.00	4.0	130.0	0.00	0.33	Open	-13.05	456.84	456.96	0.12	0.17	false
P-41	453.00	4.0	130.0	0.00	0.27	Open	-10.74	456.91	456.96	0.05	0.12	false
P-42	402.00	4.0	130.0	0.00	0.14	Open	-5.30	456.89	456.91	0.01	0.03	false
P-43	567.00	4.0	130.0	0.00	0.82	Open	31.94	457.48	456.96	0.51	0.91	false
P-44	213.00	4.0	130.0	0.00	0.95	Open	37.38	457.73	457.48	0.26	1.22	false
P-45	162.00	6.0	130.0	0.00	1.09	Open	-96.17	457.73	457.89	0.16	0.97	false
P-46	889.00	4.0	130.0	0.00	0.49	Open	19.19	457.60	457.29	0.31	0.35	false
P-47	572.00	6.0	130.0	0.00	1.18	Open	-103.65	457.89	458.53	0.64	1.11	false
P-48	2,203.00	4.0	130.0	0.00	0.11	Open	4.23	457.29	457.24	0.05	0.02	false
P-49	258.00	6.0	130.0	0.00	1.32	Open	-115.89	458.53	458.88	0.35	1.37	false
P-50	232.00	4.0	130.0	0.00	0.31	Open	-12.24	458.85	458.88	0.04	0.15	false
P-52	1.00	4.0	130.0	0.00	1.03	Open	40.21	462.55	462.55	1.4e-3	1.40	true
P-53	1.00	6.0	130.0	0.00	0.31	Open	-27.06	462.72	462.72	9.16e-5	0.09	true
P-55	91.00	6.0	130.0	0.00	1.65	Open	145.13	461.32	461.13	0.19	2.08	false
P-56	953.00	4.0	130.0	0.00	0.59	Open	23.12	461.32	460.85	0.48	0.50	false
P-59	904.00	6.0	130.0	0.00	1.99	Open	175.05	463.98	461.32	2.66	2.94	false
P-60	540.00	6.0	130.0	0.00	2.12	Open	186.61	465.77	463.98	1.79	3.31	false
P-61	339.00	6.0	130.0	0.00	2.15	Open	189.34	466.92	465.77	1.15	3.40	false
P-62	1,476.00	4.0	130.0	0.00	0.78	Open	-30.39	466.92	468.14	1.22	0.83	false
P-64	837.00	4.0	130.0	0.00	1.45	Open	-56.91	468.14	470.36	2.21	2.65	false
P-70	450.00	6.0	130.0	0.00	2.62	Open	230.91	472.81	470.60	2.21	4.91	false
P-72	619.00	4.0	130.0	0.00	1.81	Open	-70.78	470.36	472.81	2.45	3.96	false
P-74	931.00	6.0	130.0	0.00	1.93	Open	-169.83	470.22	472.81	2.59	2.78	false
P-75	179.00	4.0	130.0	0.00	4.14	Open	-162.35	466.92	470.22	3.30	18.44	false
P-76	592.00	6.0	130.0	0.00	1.98	Open	174.07	470.60	468.88	1.72	2.91	false
P-77	366.00	6.0	130.0	0.00	1.88	Open	165.91	468.88	467.90	0.97	2.66	false

Scenario: Scenario 5
Steady State Analysis
- Pipe Report -

Label	Length (ft)	Dia. (in)	Hazen-Williams C	Minor Loss Coef.	Velocity (ft/s)	Control Status	Q (gpm)	HGL Up (ft)	HGL Dn (ft)	Head-loss (ft)	Headloss Gradient (ft/1000ft)	User Defined Length?
P-78	1,309.00	4.0	130.0	0.00	0.86	Open	-33.77	466.58	467.90	1.32	1.01	false
P-80	952.00	6.0	130.0	0.00	1.32	Open	116.50	467.90	466.58	1.32	1.38	false
P-82	417.00	6.0	130.0	0.00	1.51	Open	133.27	466.58	465.84	0.74	1.76	false
P-84	706.00	6.0	130.0	0.00	1.00	Open	-88.40	464.42	465.00	0.59	0.83	false
P-85	622.00	6.0	130.0	0.00	0.79	Open	70.04	464.42	464.08	0.34	0.54	false
P-86	515.00	4.0	130.0	0.00	0.47	Open	18.36	464.08	463.91	0.17	0.33	false
P-89	481.00	4.0	130.0	0.00	1.22	Open	47.60	464.08	463.17	0.91	1.90	false
P-90	1,354.00	4.0	130.0	0.00	0.20	Open	7.73	463.17	463.08	0.09	0.07	false
P-96	207.00	6.0	130.0	0.00	2.36	Open	208.42	465.84	465.00	0.84	4.06	false
P-97	264.00	6.0	130.0	0.00	0.88	Open	77.87	466.02	465.84	0.17	0.66	false
P-98	870.00	4.0	130.0	0.00	1.99	Open	-77.87	466.02	470.13	4.11	4.73	false
P-99	347.00	6.0	130.0	0.00	0.96	Open	84.30	470.40	470.13	0.26	0.76	false
P-101	287.00	6.0	130.0	0.00	1.00	Open	-87.70	470.40	470.63	0.23	0.82	false
P-107	858.00	6.0	130.0	0.00	0.33	Open	29.44	470.63	470.54	0.09	0.11	false
P-108	399.00	6.0	130.0	0.00	0.16	Open	-13.98	470.53	470.54	0.01	0.03	false
P-110	806.00	6.0	130.0	0.00	0.04	Open	3.70	470.53	470.53	1.86e-3	2.31e-3	false
P-112	1,174.00	4.0	130.0	0.00	0.48	Open	18.73	470.53	470.13	0.40	0.34	false
P-114	367.00	4.0	130.0	0.00	0.01	Open	-0.37	470.13	470.13	9.16e-5	2.49e-4	false
P-115	620.00	6.0	130.0	0.00	1.36	Open	-120.02	464.10	465.00	0.91	1.46	false
P-116	356.00	4.0	130.0	0.00	0.78	Open	30.60	464.10	463.80	0.30	0.84	false
P-117	856.00	4.0	130.0	0.00	0.56	Open	21.76	463.80	463.42	0.38	0.45	false
P-120	623.00	4.0	130.0	0.00	0.26	Open	10.20	463.42	463.35	0.07	0.11	false
P-123	183.00	4.0	130.0	0.00	1.23	Open	-48.24	463.58	463.94	0.36	1.95	false
P-124	912.00	4.0	130.0	0.00	0.92	Open	36.00	463.58	462.55	1.03	1.13	false
P-126	677.00	4.0	130.0	0.00	0.44	Open	-17.14	462.55	462.74	0.19	0.29	false
P-130	1,636.00	4.0	130.0	0.00	0.79	Open	-30.85	461.15	462.55	1.39	0.85	false
P-132	526.00	4.0	130.0	0.00	0.47	Open	18.52	462.72	462.55	0.17	0.33	false
P-133	511.00	4.0	130.0	0.00	0.29	Open	-11.51	462.65	462.72	0.07	0.14	false
P-134	578.00	4.0	130.0	0.00	0.15	Open	5.68	462.74	462.72	0.02	0.04	false
P-135	417.00	4.0	130.0	0.00	0.77	Open	30.30	463.09	462.74	0.34	0.82	false
P-136	736.00	4.0	130.0	0.00	0.93	Open	36.42	463.94	463.09	0.85	1.16	false
P-139	456.00	4.0	130.0	0.00	0.69	Open	-27.19	457.24	457.54	0.31	0.67	false
P-140	548.00	6.0	130.0	0.00	0.37	Open	32.63	470.60	470.53	0.07	0.13	false
P-141	187.00	6.0	130.0	0.00	1.01	Open	-89.42	463.94	464.10	0.16	0.85	false
P-142	362.00	6.0	130.0	0.00	0.65	Open	-57.43	457.60	457.73	0.14	0.37	false
P-BOOST1	123.00	6.0	130.0	0.00	0.75	Open	66.08	462.78	462.72	0.06	0.48	false
P-BOOST3AB	102.00	6.0	130.0	0.00	5.44	Open	478.99	474.75	472.81	1.94	18.98	false
P-BOOST4	151.00	6.0	130.0	0.00	1.57	Open	138.64	457.91	457.62	0.29	1.91	false
P-BOOST6	129.00	6.0	130.0	0.00	1.67	Open	147.24	470.91	470.63	0.28	2.14	false
P-PMP-W1	114.00	10.0	130.0	0.00	4.3e-6	Open	1.05e-3	462.72	462.72	0.00	0.00	true
P-PMP-W2	145.00	6.0	130.0	0.00	1.6e-5	Open	-1.41e-3	461.13	461.13	0.00	0.00	false
P-PMP-W5	125.00	6.0	130.0	0.00	1.35e-5	Open	-1.19e-3	465.77	465.77	0.00	0.00	false
P-T1	120.00	6.0	130.0	0.00	0.75	Open	66.08	335.00	334.94	0.06	0.48	false
P-T3AB	71.00	6.0	130.0	0.00	5.44	Open	478.99	344.00	342.65	1.35	18.98	false
P-T4	160.00	6.0	130.0	0.00	1.57	Open	138.64	304.00	303.69	0.31	1.91	false
P-T6	156.00	6.0	130.0	0.00	1.67	Open	147.24	307.50	307.17	0.33	2.14	false
P-W1	1.00	10.0	130.0	0.00	5.18e-6	Open	1.27e-3	229.00	229.00	0.00	0.00	true
P-W2	118.00	6.0	130.0	0.00	1.6e-5	Open	-1.41e-3	147.00	147.00	0.00	0.00	false
P-W5	119.00	6.0	130.0	0.00	1.35e-5	Open	-1.19e-3	200.00	200.00	0.00	0.00	false

Scenario: Scenario 5
Steady State Analysis
- Pump Report -

Label	Elev. (ft)	Q (gpm)	H in (ft)	H out (ft)	Pump Head (ft)	Press. in (psi)	Shutoff H (ft)	Shutoff Q (gpm)	Design H (ft)	Design Q (gpm)	Max. Op. H (ft)	Max. Op. Q (gpm)
PMP-BOOST-T1	310.00	66.08	334.94	462.78	127.84	10.81	130.00	0.00	107.00	130.00	65.00	175.00
PMP-BOOST-T3AB	320.00	478.99	342.65	474.75	132.09	9.82	164.00	0.00	144.00	408.00	97.00	618.00
PMP-BOOST-T4	280.00	138.64	303.69	457.91	154.21	10.27	170.00	0.00	160.00	120.00	104.00	218.00
PMP-BOOST-T6	280.00	147.24	307.17	470.91	163.74	11.78	165.00	0.00	155.00	200.00	10.00	300.00
PMP-W1	229.00	0.00	229.00	462.72	0.00	0.00	170.00	0.00	145.00	52.00	75.00	80.00
PMP-W2	147.00	0.00	147.00	461.13	0.00	0.00	300.00	0.00	196.00	207.00	100.00	240.00
PMP-W5	200.00	0.00	200.00	465.77	0.00	0.00	232.00	0.00	176.00	130.00	16.00	290.00

Scenario: Scenario 5
Steady State Analysis
- Tank Report -

Label	Zone	Elevation (ft)	Minimum Elevation (ft)	Initial HGL (ft)	Maximum Elevation (ft)	Tank Dia. (ft)	Inflow (gpm)	Current Status	Calculated Hydraulic Grade (ft)	Calculated Percent Full (%)	Total Active Volume (gal)	Total Volume (gal)
T-1	Zone-1	310.00	310.00	335.00	340.00	30.00	-66.08	Draining	335.00	83.3	158,630.0	158,630.0
T-3	Zone-1	320.00	320.00	344.00	350.00	30.00	-478.99	Draining	344.00	80.0	158,630.0	158,630.0
T-4	Zone-1	280.00	280.00	304.00	310.00	30.00	-138.64	Draining	304.00	80.0	158,630.0	158,630.0
T-6	Zone-1	300.00	280.00	307.50	310.00	30.00	-147.24	Draining	307.50	91.7	158,630.0	158,630.0

Appendix H: Recommended Notification of Wellhead Protection Program

Recommended Letter of Notification of Wellhead Protection:

Dear (Agency):

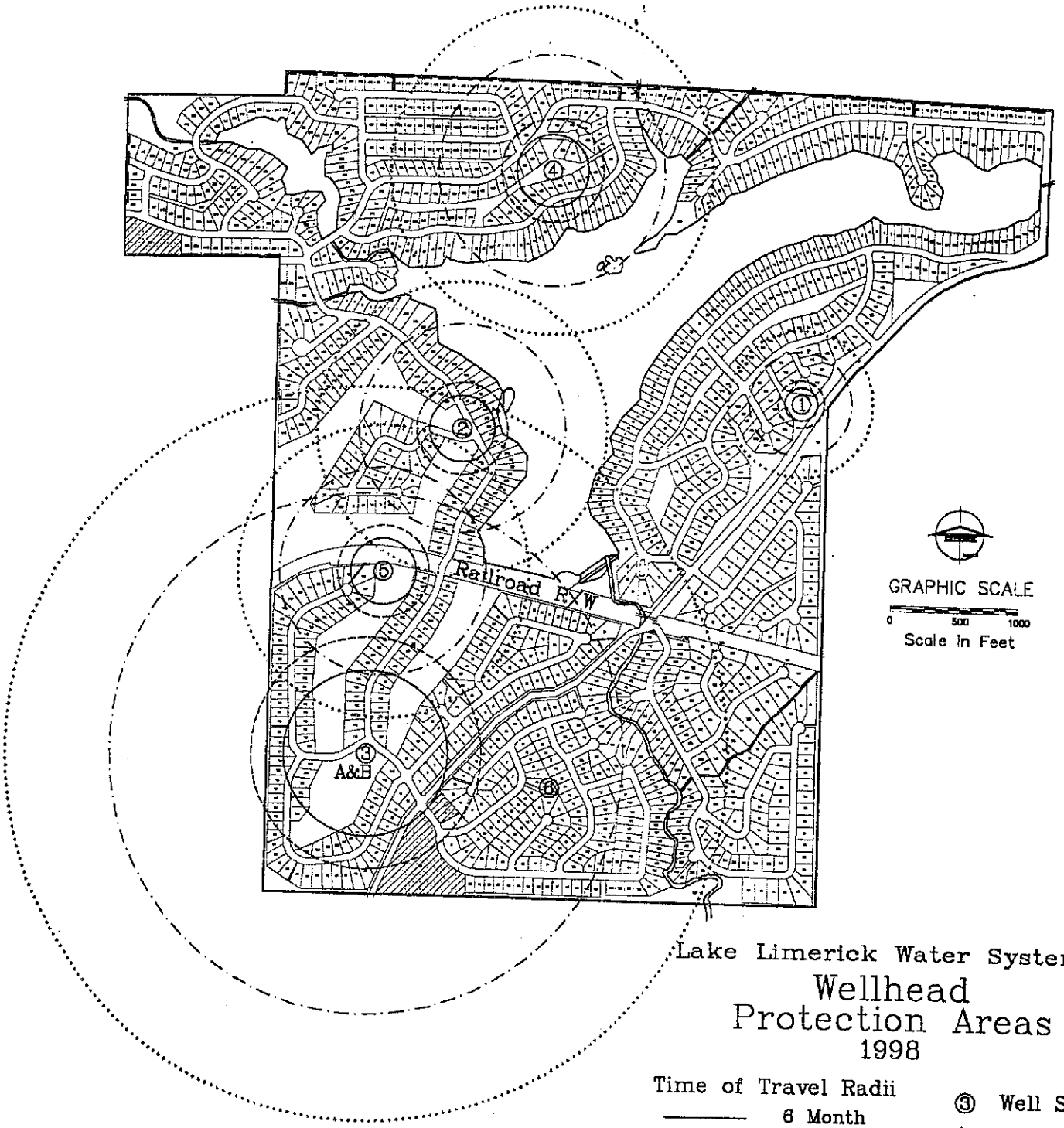
As part of the wellhead program for Lake Limerick Water System, we are hereby informing you of the findings of our wellhead protection area delineation. This is in accordance with State regulations (WAC 246-290-135).

Our water system is approved to serve 1250 residential lots. The State Department of Health has given our wells ratings of low to moderate vulnerability to contamination.

Enclosed is a map showing the 6-month, 1-year, 5-year, and 10-year time of travel boundaries for our wellhead protection area. Any ground water contamination that occurs with this wellhead protection area has the potential to reach our well. No action is required on your part, but please be aware that it is important to us that all reasonable steps be taken to ensure that land use activities with this area do not contaminate our drinking water supplies.

Thank you, in advance, for your support and cooperation in this matter.

Sincerely,



Lake Limerick Water System

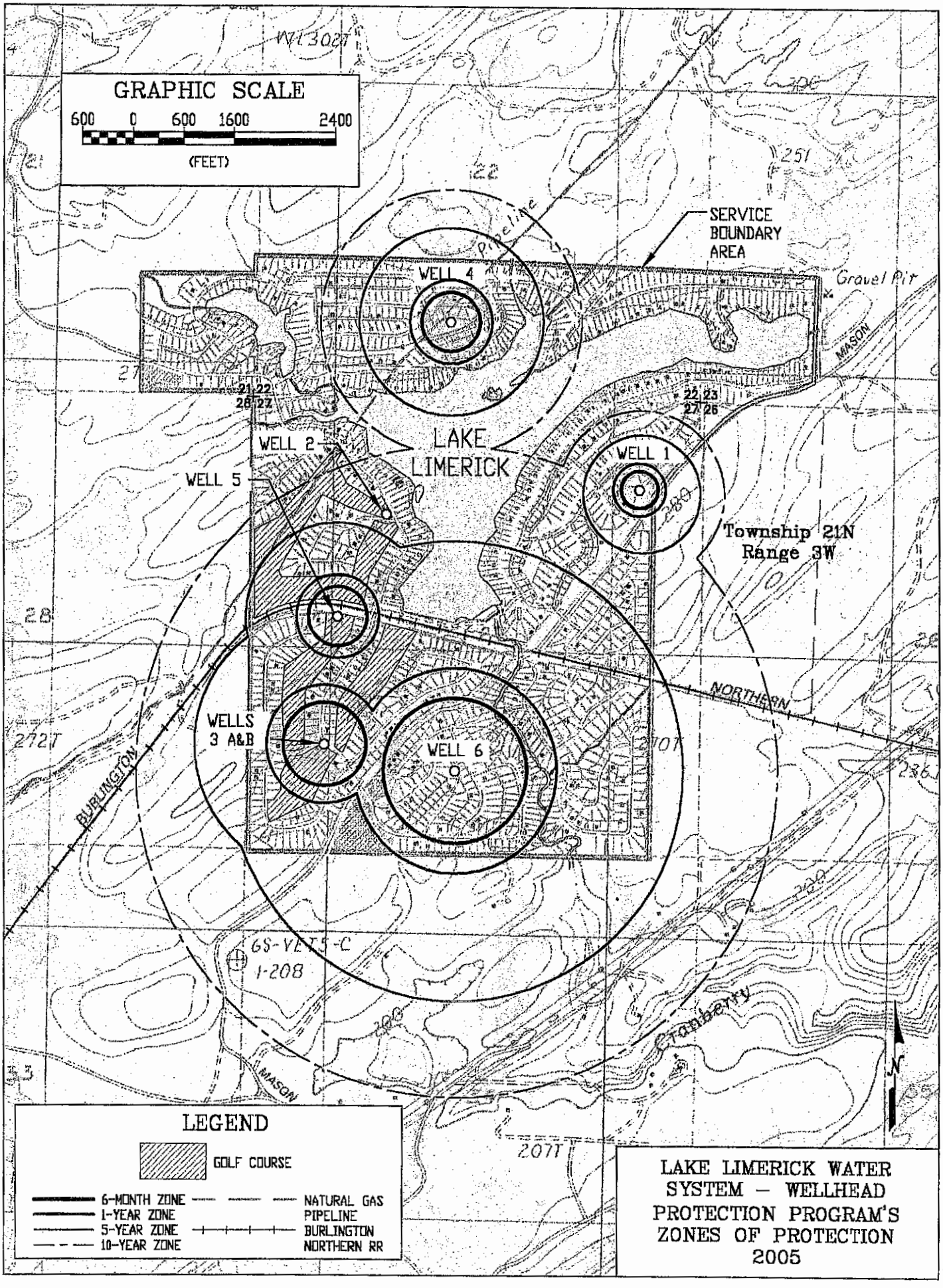
Wellhead Protection Areas 1998

Time of Travel Radii

- 6 Month
- 1 Year
- 5 Year
- 10 Year

③ Well Site

Commercial Lot


GRAPHIC SCALE
600 0 600 1600 2400
(FEET)
SERVICE BOUNDARY AREA
WELL 4
WELL 2
WELL 5
WELL 1
LAKE LIMERICK
WELLS 3 A&B
WELL 6
Township 21N
Range 3W
Gravel Pit
Pipeline
MASON
NORTHERN
BURLINGTON
Cranberry
LEGEND
GOLF COURSE
6-MONTH ZONE
1-YEAR ZONE
5-YEAR ZONE
10-YEAR ZONE
NATURAL GAS PIPELINE
BURLINGTON NORTHERN RR
LAKE LIMERICK WATER SYSTEM – WELLHEAD PROTECTION PROGRAM'S ZONES OF PROTECTION 2005

Appendix I: Well 6 Ground Water Contamination Susceptibility Survey

Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.2

IMPORTANT! Please complete one form for each ground water source, (well, wellfield, spring) used in your water system. Photocopy as necessary.

PART 1: System Information

Well owner/manager : Lake Limerick Country Club, Inc.

Water system name : Lake Limerick Water System

County: Mason County

Water system number: 44150 T Source number: S08

Well depth: 434 ft (ft.) *(From WFI form)*

Source name: Well 6

WA well identification tag number: ___ ___ ___ - ___ ___ ___

x well not tagged

Number of connections: 1,250 Population served: 2,500 (estimated)

Township: 21N Range: 3W

Section: 27 ¼ ¼ Section: SE ¼ of SW ¼

Latitude/longitude (if available): not available /

How was lat./long. Determined?

☐ global positioning device ☐ survey ☐ topographic map
☐ other:

* Please refer to Assistance Packet for details and explanations of all questions in parts II through V.

PART II: Well Construction and Source Information

1) Date well originally constructed: 10 / 05 / 88 month/day/year

last reconstruction: NA / ____ / ____ month/day/year

☐ information unavailable

2) Well driller: Arcadia Drilling

☐ well driller unknown

3) Type of well:

☐ **Drilled:** ☒ rotary ☐ bored ☐ cable (percussion) ☐ Dug

☐ **Other:** ☐ spring(s) ☐ lateral collector (Ranney)

☐ driven ☐ jetted ☐ other: _____

Additional comments: _____

4) Well report available? ☒ YES (attach copy to form) ☐ NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs.

5) Average pumping rate: 200 gpm

Source of information: flow rate was measured at source

If not documented, how was pumping rate determined? _____

☐ Pumping rate unknown

6) Is this source treated? ☐ YES ☒ NO

If so, what type of treatment:

☐ disinfection ☐ filtration ☐ carbon filter ☐ air stripper ☐ other

Purpose of treatment (describe materials to be removed or controlled by treatment):

7) If source is chlorinated, is a chlorine residual maintained: ☐ YES ☐ NO

Residual level: mg/l *(At the point closest to the source.)*

2

PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one]

☐ (less than) 20 ft. ☐ 20-50 ft. ☐ 50-100 ft. ☐ 100-200 ft. ☒ (greater than) 200 ft.

☐ information unavailable

2) Depth to ground water (static water level)

☐ (less than) 20 ft. ☐ 20-50 ft. ☐ 50-100 ft. ☒ (greater than) 100 ft.

☐ flowing well/spring (artesian)

How was water level determined?

☒ well log ☐ other: _____

☐ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:

_____ psi (pounds per square inch)
or
_____ feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source: ☐ YES ☐ NO

5) Wellhead elevation (height above mean sea level) 300 (ft)

How was elevation determined? ☒ topographic map ☐ drilling/well log ☐ altimeter

☐ other: _____

☐ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic report describing subsurface conditions. Please refer to assistance package for example.)

☒ evidence of a confining layer in well log

☐ no evidence of a confining layer in well log

If there is evidence of a confining layer, is the depth to ground water more than 20 feet above the **bottom** of the **lowest confining layer**? ☒ YES ☐ NO

☐ information unavailable

7) Sanitary setback:

☐ (less than) 100 ft.* ☒ 100-120 ft. ☐ 120-200 ft. ☐ (greater than) 200 ft.
*if less than 100 ft., describe the site conditions:

_____

_____

_____

_____

8) Wellhead construction:

☐ wellhead enclosed in a wellhouse

☒ controlled access (describe): 8 ft chain link fence with gate

_____

☐ other uses for wellhouse (describe): _____

_____

☐ no wellhead control

9) Surface seal:

☒ 18 ft.

☐ (less than) 18 ft. (no Department of Ecology approval)

☐ (less than) 18 ft. (Approved by Department of Ecology, include documentation)

☐ (greater than) 18 ft.

☐ depth of seal unknown

☐ no surface seal

10) Annual rainfall (inches per year)

☐ (less than) 10 in./yr. ☐ 10-25 in./yr. ☒ (greater than) 25 in./yr.

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 37,000,000 (gallons)

How was this determined?

☐ meter

☐ estimated: ☐ pumping rate (_____)

☐ pump capacity (_____ gpm)

☒ other: 30% of water system's forecasted annual demand

2) "Calculated Fixed Radius" estimate of ground water movement:
(see Instruction Packet)

6 month ground water travel time:	845	(ft.)
1 year ground water travel time:	1,196	(ft.)
5 year ground water travel time:	2,674	(ft.)
10 year ground water travel time:	3,781	(ft.)

Information available on length of screened/open interval?

☒ YES ☐ NO

Length of screened/open interval: 5 (ft.)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? ☐ YES ☒ NO

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? ☐ YES ☒ NO (mark and identify on map)

Comments: _____

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

	6 month	1 year	5 year	unknown
likely pesticide application	☐	☐	☐	☐
stormwater injection wells	☐	☐	☐	☐
other injection wells	☐	☐	☐	☐
abandoned ground water well	☐	☐	☐	☐
landfills, dumps, disposal areas	☐	☐	☐	☐
known hazardous materials clean-up site	☐	☐	☐	☐
water system(s) with known quality problems	☐	☐	☐	☐
population density (greater than) 1 house/acre	☒	☒	☒	☐
residences commonly have septic tanks	☒	☒	☒	☐
wastewater treatment lagoons	☐	☐	☐	☐
sites used for land application of waste	☐	☐	☐	☐

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary. (*Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any or the following.*)

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed in assessment, MCL's are listed in assistance package.)

A. Nitrate: (Nitrate MCL = 10 mg/l)	YES	NO
Results greater than MCL	☐	☒
(less than) 2 mg/liter nitrate	☐	☒
2-5 mg/liter nitrate	☐	☒
(greater than) 5 mg/liter nitrate	☐	☒

☐ Nitrate records unavailable

B. VOCs: (VOC detection level 0.5 µg/l or 0.0005 mg/l)	YES	NO
Results greater than MCL or SAL	☐	☒
VOCs detected at least once	☐	☒
VOC test performed but not detected	☐	☒

☐ VOC sampling records unavailable

C. EDB/DBCP:	YES	NO
(EDB MCL = 0.05 mg/l or 0.00005 mg/l. DBCP MCL = 0.2 mg/l or 0.0002 mg/l.)		
EDB/DBCP detected below MCL at least once	☐	☒
EDB/DBCP detected above MCL at least once	☐	☒
EDB/DBCP never detected	☐	☒

☐ EDB/DBCP tests required but not yet completed

☐ EDB/DBCP tests not required

D. Other SOCs (pesticides and other synthetic organic chemicals):	YES	NO
Other SOCs detected	☐	☒

☐ Other SOC tests performed but none detected *

☐ Other SOC tests not performed

* If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list methods here: _____

_____

_____

E. Bacterial contamination:

	YES	NO
Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records).	☐	☐
Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source.	☐	☐

☒ Source sampling records for bacteria unavailable.

PART VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for these sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

☒ YES ☐ NO

Describe with references to map produced in Part IV:

Lake Limerick is within the 5-year travel time, and Cranberry Creek is within the 1-year travel time.

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

☐ YES ☒ NO

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

☐ YES ☒ NO

3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

☐ YES ☒ NO

4) Are there other high capacity wells (agricultural, municipal, and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within..

	YES	NO	unknown
6 month travel time	☐	☒	☐
6 month-1 year travel time	☐	☒	☐
1-5 year travel time	☐	☒	☐
5-10 year travel time	☐	☒	☐

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within.

	YES	NO	unknown
1 year travel time	☐	☒	☐
1-5 year travel time	☒	☐	☐
5-10 year travel time	☒	☐	☐

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.

The golf course is within the 1- to 10-years of travel times.

Suggestions and Comments

Did you attend one of the susceptibility workshops?	☐ YES	☒ NO
Did you find it useful?	☐ YES	☐ NO
Did you seek outside assistance to complete the assessment?	☐ YES	☐ NO

This form and instruction packet are still in the process of development. Your comments, suggestions, and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic, please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

Well 6
508
pg 1 of 2

Page 1

Start Card No. 019887

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Water Right Permit No. _____

(1) OWNER: Name Lake Limerick Country Club Address _____

(2) LOCATION OF WELL: County Mason SE ¼ SW ¼ Sec 27 T 21 N R 3W W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) _____

(3) PROPOSED USE: ☐ Domestic ☐ Industrial ☐ Municipal ☒ ☐ Irrigation ☐ Test Well ☐ Other ☐ ☐ DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) #6

Abandoned ☐ New well ☒ Method: Dug ☐ Bored ☐ Deepened ☐ Cable ☐ Driven ☐ Reconditioned ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches. Drilled 584 feet. Depth of completed well 584 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 10" Diam. from 0' ft. to 284' ft.
Welded ☒ 8" Diam. from +1' ft. to 539 ft.
Liner installed ☐
Threaded ☐ _____ Diam. from _____ ft. to _____ ft.

Perforations: Yes ☐ No ☒
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type _____ Model No. _____
Diam. 7" Slot size 80 from 529 ft. to 534 ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes ☐ No ☒ Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes ☒ No ☐ To what depth? 284 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? Yes ☒ No ☐
Type of water? HEAVY IRON / H_2S Depth of strata 175'
Method of excluding strata on CASED OFF

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 189 ft. below top of well Date _____
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? ARCADIA
Yield: 110 gal./min. with 57 ft. drawdown after 4 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
8:1 Am	189	8:05	232	9:01	189
9:25 Am	184	11:38	189	11:00	232
12:00		1:25	189		

Date of test 12/ 1988

Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Artesian _____ gal./min. with stem set at _____ ft. for _____ hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formations: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Fill	0'	1'
~~BROWN SAND~~	~~1'~~	~~5'~~
ROCKY SAND	1'	5'
BROWN HARDPAN	5'	16'
BROWN SANDY CLAY	16'	22'
BROWN ROCKY CLAY	22'	27'
BROWN HARDPAN	27'	45'
BROWN ROCKY CLAY	45'	50'
BROWN HARDPAN w/LARGE ROCK	50'	58'
BROWN ROCKY CLAY	58'	64'
BROWN SANDY CLAY	64'	71'
SANDY GRAVEL - H_2O	71'	72'
BROWN HARDPAN	72'	82'
BROWN ROCKY CLAY	82'	89'
BROWN HARDPAN	89'	108'
BROWN ROCKY CLAY	108'	120'
BROWN SANDY CLAY	120'	138'
GRAVELLY SAND H_2O	138'	140'
BROWN HARDPAN	140'	145'
BROWN ROCKY CLAY	145'	151'
BLUE CLAY	151'	161'
BLUE HARDPAN w/ORGANICS	161'	165'
GRAY CEMENTED GRAVEL H_2O	165'	166'
SANDY GRAVEL	166'	175'
BLUE SHALE	175'	178'
GRAY GRAVELLY CLAY	178'	189'
GRAY GUMMY CLAY	189'	196'
BLACK SILTY CLAY	196'	198'
BLACK ROCKY CLAY	198'	205'
BLACK HARDPAN	205'	218'
BLUE CLAY	218'	225'
BLACK SILTY CLAY	225'	232'
GRAY GRAVELLY CLAY	232'	239'
GRAY HARDPAN	239'	263'

Work started 10/01/88 19 Completed 10/03/88 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME ARCADIA Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address SE 171 WAIKER PK Shelton

(Signed) Jack Wathen (WELL DRILLER) License No. 1465

Contractor's Registration No. ARCADD*147K1 Date 10-5-88, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329-

Well 6
308
Pg 2 of 2

Page 2

Start Card

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. 18887

Water Right Permit No.

(1) OWNER: Name Talco Limerick Country Club Address

(2) LOCATION OF WELL: County Mason SE ¼ SW ¼ Sec. 27 T. 21 N., R. 3 W.W.M.

(2A) STREET ADDRESS OF WELL (or nearest address)

(3) PROPOSED USE: ☐ Domestic ☐ Industrial ☐ Municipal ☐ ☐ Irrigation ☐ Test Well ☐ Other ☐ ☐ DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) Abandoned ☐ New well ☐ Method: Dug ☐ Bored ☐ Deepened ☐ Cable ☐ Driven ☐ Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well inches. Drilled feet. Depth of completed well ft.

(6) CONSTRUCTION DETAILS:

Casing installed: ☐ " Diam. from ft. to ft.
Welded ☐ Liner installed ☐ " Diam. from ft. to ft.
Threaded ☐ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☐
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☐
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☐ Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes ☐ No ☐ To what depth? ft.
Material used in seal
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: HP

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level ft. below top of well Date
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Artesian gal./min. with stem set at ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
SANDY CLAY W/SOME GRAVEL - H₂O	263'	287'
BROWN CLAY	287'	298'
GRAY SANDY CLAY	298'	316'
BROWN HARDPAN	316'	319'
GRAVELLY SANDY CLAY	319'	312'
BROWN HARDPAN	312'	316'
BROWN SANDY CLAY	316'	320'
BROWN HARDPAN	320'	324'
BROWN GRAVELLY CLAY	324	340'
BROWN SANDY CLAY	340'	412'
BROWN HARDPAN	412'	420'
SANDY GRAVEL - H₂O	420'	434'
BROWN CLAY	434	

Work started 10/01/88 19 Completed 10/01/88 19

RECEIVED
OCT 17 1988
STATE OF WASHINGTON
DEPT. OF ECOLOGY

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME ARCADIA Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address SE 150 Walker Park Shelton

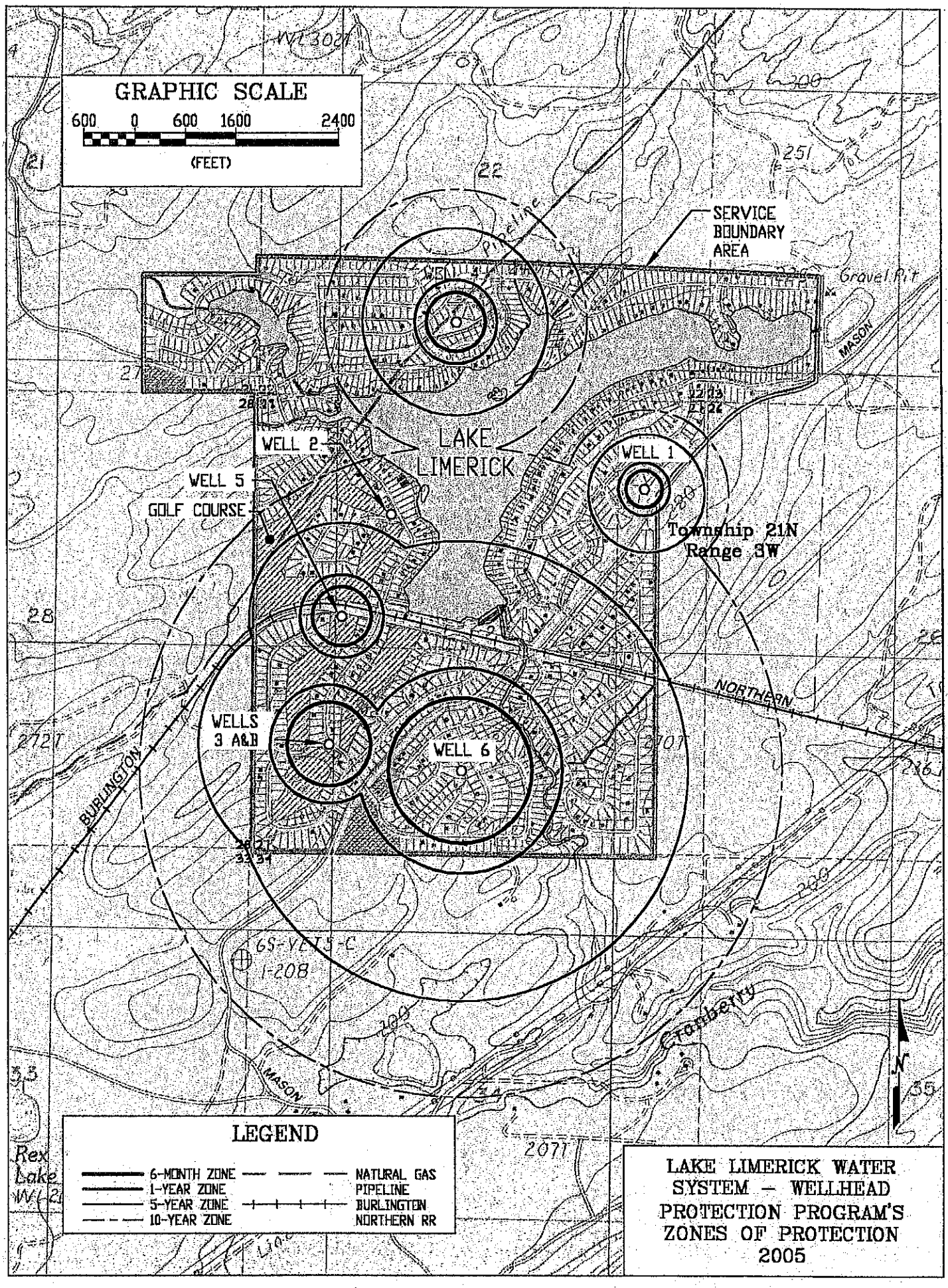
(Signed) (WELL DRILLER) License No. 1465

Contractor's Registration No. ARCADIDRI*MA Date 10/5/88 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329-

12


GRAPHIC SCALE
600 0 600 1600 2400
(FEET)
SERVICE BOUNDARY AREA
LAKE LIMERICK
WELL 1
WELL 2
WELL 5
GOLF COURSE
WELLS 3 A&B
WELL 6
Township 21N
Range 3W
NORTHERN
BURLINGTON
MASON
Cranberry
Gravel Pit
LEGEND
6-MONTH ZONE
1-YEAR ZONE
5-YEAR ZONE
10-YEAR ZONE
NATURAL GAS PIPELINE
BURLINGTON NORTHERN RR
LAKE LIMERICK WATER SYSTEM – WELLHEAD PROTECTION PROGRAM'S ZONES OF PROTECTION 2005

Appendix J: Coliform Violation Notifications

IMPORTANT NOTICE ABOUT YOUR WATER SYSTEM

Coliform Maximum Contaminant Level (MCL) Exceeded: Non-Acute MCL

The _____ water system, ID# _____ in _____ County routinely monitors for the presence of total coliform bacteria and in _____ this type of bacteria was detected. Although this incident was not an emergency, as our customer, you have a right to know what happened and what we did or are doing to correct the situation.

Coliforms are bacteria which are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems. The samples that showed the presence of coliform were further tested to see if other bacteria of greater concern, such as fecal coliform or E.coli were present. **None of these bacteria were found.**

You do not need to boil your water. People with severely compromised immune systems, infants, and some elderly may at be an increased risk and may want to contact their health care provider for additional guidance.

What happened? What is the suspected or known source of contamination?

At this time:

☐ The problem is resolved. Additional samples collected were found to be free of coliform bacteria.
☐ We anticipate resolving the problem by ____ / ____ / ____.
☐ Other _____.

For more information, contact _____ at ( )____-_____ or at _____.
(owner or operator) (phone number) (address)

Please share this notice with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is sent to you by _____ Date Distributed ____ / ____ / ____.

(This section must be completed by the water system.
Signature below indicates notice contained all required elements.)

Complete the following items (check all that apply):

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

☐ Notice mailed to all water customers on ____ / ____ / ____.

☐ Notice hand delivered to all water customers on ____ / ____ / ____.

☐ Notice published in newspaper (attach copy)

☐ Notice posted at _____ on ____ / ____ / ____. (***By Department Approval Only***)

_____ _____ _____
Signature of owner or operator Position Date

Send copy of completed notification and certification to:
Eastern Drinking Water Operations, 1500 West Fourth Ave - Suite 305, Spokane WA 99204 or fax to (509) 456-2997
Northwest Drinking Water Operations, 20435 72nd Ave South - Suite 200, Kent WA 98032 or fax to (253) 395-6760
Southwest Drinking Water Operations, PO Box 47823, Olympia WA 98504 or fax to (360) 664-8058

DOH 331-263

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

PUBLIC NOTICE CERTIFICATION
Acute Coliform MCL

Within 10 days of notifying your customers, you must send a copy of each type of notice you distribute (hand-delivered notices, press releases, newspaper articles, etc.) to your Regional Office of Drinking Water. Also complete and send this form, which certifies that you have met all the public notification requirements. If the boil water advisory remains in effect more than three months, you must notify your water users again and provide another Public Notice Certification to the Department of Health. *With this certification, you are also stating that you will meet future requirements for notifying new billing units of the violation or situation.*

Water System:_____ ID #_____ County:_____

Violation Date:_____ / _____ / _____ Violation Type:_____

This public water system certifies that public notice has been given to water users, following state and federal requirements for delivery, content, and deadlines.

Complete the following items:

Yes No

☐ ☐ Distribution was completed on ___ / ___ /____. Check all that apply:
- ☐ Hand delivery,
- ☐ Press release (TV, radio, newspaper, etc.),
- ☐ Posting at_____ (by DOH approval only),
- ☐ Other _____ (by DOH approval only).

☐ ☐ Were the water users notified within 24 hours?

_____ _____ _____
Signature of owner or operator | Position | Date

Northwest Regional Office:
20435 72nd Ave. S., Suite 200
Kent WA 98032
Jennifer Prodzinski and
Carol Stuckey:
(253) 395-6775
Fax: (253) 395-6760

Southwest Regional Office:
2411 Pacific Ave.
PO Box 47823
Olympia WA 98504
Sandy Brentlinger:
(360) 753-5090
Fax (360) 664-8058

Eastern Regional Office:
1500 West Fourth Ave.
Suite 305
Spokane WA 99204
Pat McCaffery:
(509) 456-2788
Fax: (509) 456-2997

DOH 331-264

Your logo or
company name here.

News Release

For Immediate Release: <DATE>
Contact: Water purveyor/system contact name and telephone number

<Water System> announces boil water advisory for all customers in <area>

CITY NAME — The <SYSTEM NAME> is advising all water customers to boil their drinking water after recent samples showed the presence of <fecal coliform, E. coli, total coliform>. The Washington State Department of Health (DOH) has been notified and <SYSTEM NAME> is working closely with the Office of Drinking Water to find the source of contamination and fix the problem, which may include disinfecting the system. The boil water advisory will remain in effect until further notice.

<System spokesperson quote> (e.g. "We are doing all we can to eliminate the bacteria from the water system. Safe and reliable drinking water is critical to good health and responding to this kind of emergency is our highest priority," said system spokesperson.)

<NUMBER or NO> illnesses related to the community's drinking water have been reported. To correct the problem <WHAT IS BEING DONE> (e.g. Chlorine was applied to the entire system on DATE.)

The boil water advisory includes several precautionary steps that customers should take. These include using purchased treated bottled water or boiled water for any water that might be consumed: drinking, brushing teeth, dishwashing, preparing food and making ice. Water should be boiled for 3-5 minutes, then allowed to cool before using.

The advisory will remain in effect until <SYSTEM NAME> and DOH are confident there is no longer a threat of illness to their customers. Once satisfactory results are reported, customers will be notified that the advisory has been lifted.

If you have any questions, please call us at <TELEPHONE NUMBER>.

###

DRINKING WATER WARNING

The _____ Water System, ID_____, located in _____County is contaminated with fecal coliform/ *E. coli* bacteria.

Fecal coliform/ *E. coli* bacteria were detected/confirmed in the water supply on _____. These bacteria can make you sick and are a particular concern for people with weakened immune systems.

DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST. Bring all water to a boil, let it boil 3 – 5 minutes, and let it cool before using. Boiled or purchased bottled water should be used for drinking, making ice, brushing teeth, washing dishes, and food preparation until *further notice*. Boiling kills bacteria and other organisms in the water.

Fecal coliforms and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems. The symptoms above are not caused only by organisms in drinking water. If you experience any of these symptoms and they persist, you may want to seek medical advice. People at increased risk should seek advice about drinking water from their health care provider.

What happened? What is the suspected or known source of contamination?

The following is being done to correct the problem:

We have consulted with the Washington State Department of Health about this incident. We will notify you when you no longer need to boil the water. We anticipate resolving the problem by _____.

For more information, please contact _____ at ( )___-_____ or at _____.
(owner or operator) (phone number) (address)

Please share this notice with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distribution copies by hand or mail.

This notice is sent to you by _____ Water System on ___/___/____

ADVERTENCIA:

¡No tome el agua de la llave sin antes hervirla!

☐ **Bacteria coliforme fecal**
☐ **Bacteria E. coli**
☐ **Otra:** _____

fueron encontradas en su sistema de agua:
(el día)_____.

Hervir el agua mata a las bacterias y otros organismos en el agua:

- **Haga hervir el agua**
- **Continúe hirviendo el agua durante 3 a 5 minutos**
- **Deje enfriar el agua antes de usarla**

Para evitar posibles enfermedades y hasta nuevo aviso: use agua hervida o agua potable embotellada para tomar, hacer hielo, limpiarse los dientes, lavar los platos y para preparar comidas.

Hable con su doctor si usted tiene uno o más de los siguientes síntomas: náusea, dolor estomacal, diarrea, ictericia, dolores de cabeza y/o cansancio. La gente con enfermedades crónicas, bebés y personas mayores de edad, pueden estar en situación de alto riesgo y deben consultar con su médico o proveedores de servicios médicos.

Sistema de agua: _____
I.D.: _____
Condado: _____
Contacto: _____
Teléfono:
Fecha de notificación:

¿Qué son las bacterias coliforme fecal y E. coli?
Coliformes fecales o E. coli son bacterias cuya presencia indica que el agua esta contaminada con desechos humanos o de animales. Microbios de esos desechos pueden causar diarrea, dolor estomacal, náusea, dolores de cabeza u otros síntomas. Pueden representar un peligro para la salud de bebés, niños y niñas de corta edad y personas con sistemas inmunológicos en alto riesgo.

¿Por cuánto tiempo va a estar en efecto esta advertencia?
Vamos a consultar con el Departamento de Salud del estado de Washington acerca de este incidente. Le vamos a notificar cuando ya no sea necesario hervir el agua.
See reverse side for English versión.

WARNING:

Do not drink tap water without boiling it first!

☐ **Fecal coliform**
☐ **E. coli bacteria**
☐ **Other:** _____

were detected in the water supply on:
(date)_____.

Boiling kills bacteria and other organisms in the water:

- **Bring water to a boil**
- **Continue boiling for 3-5 minutes**
- **Let water cool before using**

To avoid possible illness: use boiled or purchased bottled water for drinking, making ice, brushing teeth, washing dishes, and food preparation until further notice.

Contact your doctor, if you experience one or more of these symptoms: nausea, cramps, diarrhea, jaundice, headache and/or fatigue. People with chronic illnesses, infants and the elderly may be at higher risk and should seek medical advice.

Water System: _____
I.D.: _____
County: _____
Contact: _____
Telephone: _____
Date notice distributed: _____

What is fecal coliform and E. coli?

Fecal coliform and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these waters can cause short-term effects, such as diarrhea, cramps, nausea, headaches or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely comprised immune systems.

How long will this warning be in effect?

We will consult with the Washington State Department of Health about this incident. We will notify you when you no longer need to boil the water.
Vea al reverso para la versión en Español.

Your logo or
company name here

News Release

For Immediate Release: <DATE>

Contact: Water purveyor/system contact name and telephone number

<Water System Name> Boil Water Advisory Rescinded

CITY NAME – The <SYSTEM NAME> is advising all its water customers that it is no longer necessary to boil their drinking water. Recent test samples show the absence of <fecal coliform, E. coli, total coliform> bacteria.
<SYSTEM SPOKESPERSON QUOTE> (e.g. "Working with the Washington State Department of Health over the last <NUMBER OF > days, we have completed inspections, water quality sampling, disinfection, and flushing to resolve the contamination problem," stated <NAME OF WATER SYSTEM MANAGER>. "We're pleased to be able to lift the boil water advisory."
The inspection of the water system indicated <DESCRIPTION OF SOURCE OF CONTAMINATION, if known, and what will be done to maintain good water quality>
If you have shut off or not used fixtures, water fountains, ice machines, soda machines, and/or other equipment over the past several days, flush the fixture or equipment until there is a change in water temperature before putting it back into service.
. The <SYSTEM NAME> encourages customers with questions to call <TELEPHONE NUMBER>.

###

Appendix K: Cross Connection Control Progam

DRAFT

Resolution:
Cross-Connection Control Policy

Finding of Fact

Whereas it is the responsibility of a water purveyor to provide water to the customer at the meter that meets Washington state water quality standards;

Whereas it is the water purveyor's responsibility to prevent the contamination of the public water system from the source of supply to the customer's connection;

Whereas it is a requirement of the Washington State Department of Health (DOH) for the Purveyor to establish a cross connection-control program satisfactory to DOH;

Whereas cross-connections within the customer's plumbing system pose a potential source for the contamination of the public water supply system;

Whereas the Lake Limerick Water System adopted a Cross Connection Control Program, through the Board of Directors Resolution 98-01, June 20, 1998, which generally adopts the programs and initiatives set forth in the 1998 approved water system plan, however, no implementation schedule was established for the 1998 Cross Connection Control Program, and it has not been implemented;

Now be it resolved that the Lake Limerick Water System, hereinafter referred to as the Purveyor, establishes the following Cross Connection Control Program as a service policy to protect the purveyor-owned water system from the risk of contamination. This Cross Connection Control Program replaces and supercedes the Program adopted by Resolution 98-01. For public health and safety, this policy shall apply equally to all new and existing customers.

Definitions

Unless otherwise defined, all terms used in this resolution pertaining to cross-connection control have the same definitions as those contained in WAC 246-290-010 of the Washington State Drinking Water Regulations.

Prevention of Contamination

The customer's plumbing system, starting from the termination of the Purveyor's water service pipe, shall be considered a potential health hazard from back-pressure and/or back-siphonage, and shall require the isolation of the customer's premises by a Purveyor-approved, installed and maintained backflow assembly (BA), of double check valve (DCVA) design. The RBA shall be located at the end of the Purveyor's water service pipe (i.e., immediately downstream of the meter). Water shall only be supplied to the customer through a Purveyor-approved, installed and maintained BA.

Notwithstanding the aforesaid, the Purveyor, upon an assessment of the risk of contamination posed by the customer's plumbing system and in-premise use of water, may:

- Allow a single-family or duplex residential customer presenting minimal hazard to connect directly to the water service pipe, i.e., without a purveyor-approved BA.
- Require any customer be supplied through a BA, of such other design as determined to be commensurate with the actual or potential health hazard posed by the in-premise use of water.

Conditions for Providing Service

Water service is provided conditioned on the following terms and limitations:

1. The customer agrees to take all measures necessary to prevent the contamination of the plumbing system within his/her premises and the Purveyor's distribution system that may occur from backflow through a cross connection. These measures shall include the prevention of backflow under any backpressure or backsiphonage condition, including the disruption of the water supply from the Purveyor's system that may occur during routine system maintenance or during emergency conditions, such as a water main break.

2. The customer agrees to install, operate, and maintain at all times his plumbing system in compliance with the current edition of the Uniform Plumbing Code having jurisdiction as it pertains to the prevention of contamination and protection from thermal expansion due to a closed system, which could occur with the present or future installation of backflow preventers on the customer's service and/or at plumbing fixtures.

3. For cross-connection control or other public health-related surveys, the customer agrees to provide for the Purveyor's employees or agents free access to all parts of the premises upon reasonable notice during reasonable working hours of the day for installation, testing, maintenance of BAs, routine surveys -- and at all times during emergencies.

   Where permission for free access for the Purveyor is denied, the Purveyor may supply water service provided that premises isolation is provided through a reduced-pressure principle backflow assembly (RPBA).

4. The customer agrees to install all backflow prevention assemblies requested by the Purveyor and to maintain those assemblies in good working order. The assemblies shall be of a type, size, and make approved by the Purveyor. The assemblies shall be installed in

accordance with the recommendations given in the most recently published edition of the *Cross Connection Control Manual, Accepted Procedures and Practice,* published by the Pacific Northwest Section, American Water Works Association.

5. The customer agrees to grant permission and access for the Purveyor or its agent to test all assemblies (e.g., RPBAs and/or DCVAs) that the Purveyor relies upon to protect the public water distribution system. Such access will be required at least upon installation, annually thereafter, after repair, and after relocation;

6. The customer agrees to bear all costs for the aforementioned installation, testing, repair, maintenance and replacement of the RPBA, RPDA, DCVA or DCDA installed to protect the Purveyor's distribution system. [OPTIONAL LANGUAGE: *The Purveyor will bear all cost of installation, testing, maintenance and reporting of all BAs, and such costs will be included in the utility rates. Costs for clearing to provide access, or any other action by the Purveyor to enforce the customer's responsibility, as set forth herein, will be borne by the customer.*]

7. At the time of application for service, if required by the Purveyor, the customer agrees to submit to the Purveyor plumbing plans and/or a cross-connection control survey of the premises conducted by a purveyor-approved and State certified Cross Connection Control Specialist (CCS).

   The cross-connection control survey shall assess the cross-connection hazards and list the backflow preventers provided within the premises. The results of the survey shall be submitted prior to the Purveyor turning on water service to a new customer. The cost of the survey shall be borne by the customer.

8. For classes of customers other than single-family residential, when required by the Purveyor, the customer agrees to periodically submit a cross-connection control re-survey of the premises by a DOH-certified CCS acceptable to the Purveyor. The Purveyor may require the re-survey to be performed in response to changes in the customer's plumbing or water use, or performed periodically (annually or less frequently) where the Purveyor considers the customer's plumbing system to be complex or subject to frequent changes in water use. The cost of the re-survey shall be borne by the customer.

9. Within 30 days of a request by the Purveyor, a residential customer shall agree to complete and submit to the Purveyor a "Water Use Questionnaire" for the purpose of surveying the health hazard posed by the customer's plumbing system on the Purveyor's distribution system. Further, the residential customer agrees to provide within 30 days of a request by the Purveyor a cross-connection control survey of the premises by a DOH-certified CCS acceptable to the Purveyor.

10. The customer agrees to obtain the prior approval from the Purveyor for all changes in water use, and alterations and additions to the plumbing system, and shall comply with any additional requirements imposed by the Purveyor for cross-connection control.

11. The customer agrees to immediately notify the Purveyor and the local health jurisdiction of any backflow incident occurring within the customer's premises (i.e., entry of any contaminant/pollutant into the drinking water) and shall cooperate fully with the Purveyor to determine the reason for the backflow incident.

12. The customer acknowledges the right of the Purveyor to discontinue the water supply within 72 hours of giving notice to the customer, or a lesser period of time if required to protect public health, if the customer fails to cooperate with the Purveyor in the survey of premises, in the installation, maintenance, repair, inspection, or testing of backflow prevention assemblies or air gaps required by the Purveyor, or in the Purveyor's effort to contain a contaminant or pollutant that is detected in the customer's system.

    Without limiting the generality of the foregoing, in lieu of discontinuing water service, the Purveyor may install an RPBA on the service pipe to provide premises isolation, and recover all costs for the installation and subsequent maintenance and repair of the assembly, appurtenances, and enclosure from the customer as fees and charges for water. The failure of the customer to pay these fees and charges may result in termination of water service in accordance with the Purveyor's water billing policies.

13. Where the Purveyor imposes mandatory premises isolation in compliance with DOH regulations, or agrees to the customer's voluntary premises isolation through the installation of a RPBA immediately downstream of the Purveyor's water meter, the customer acknowledges his obligation to comply with the other cross-connection control regulations having jurisdiction (i.e., Uniform Plumbing Code). Although the Purveyor's requirements for installation, testing, and repair of backflow assemblies may be limited to the RPBAs used for premises isolation, the customer agrees to the other terms herein as a condition of allowing a direct connection to the Purveyor's service pipe.

14. The customer agrees to indemnify and hold harmless the Purveyor for all contamination of the customer's plumbing system or the Purveyor's distribution system that results from an unprotected or inadequately protected cross connection within the customer's premises. This indemnification shall pertain to all backflow conditions that may arise from the Purveyor's suspension of water supply or reduction of water pressure, recognizing that the air gap separation otherwise required

would require the customer to provide adequate facilities to collect, store, and pump water for his/her premises.

15. The customer agrees that, in the event legal action is required and commenced between the Purveyor and the customer to enforce the terms and conditions herein, the substantially prevailing party shall be entitled to reimbursement of all incurred costs and expenses including, but not limited to, reasonable attorney's fees as determined by the Court.

16. The customer acknowledges that the Purveyor's survey of a customer's premises is for the sole purpose of establishing the Purveyor's minimum requirements for the protection of the public water supply system, commensurate with the Purveyor's assessment of the degree of hazard.

    It shall not be assumed by the customer or any regulatory agency that the Purveyor's survey, requirements for the installation of backflow prevention assemblies, lack of requirements for the installation of backflow prevention assemblies, or other actions by the Purveyor's personnel constitute an approval of the customer's plumbing system or an assurance to the customer of the absence of cross connections therein.

17. The customer acknowledges the right of the Purveyor, in keeping with changes to Washington State regulations, industry standards, or the Purveyor's risk management policies, to impose retroactive requirements for additional cross-connection control measures.

18. The Purveyor will record the customer's agreement to the above terms for service on an "Application for Water Service," "Application for Change of Water Service," or other such form prepared by the Purveyor and signed by the customer.

Implementation of the Cross-Connection Control Policy

The Purveyor will engage the services of a DOH-certified CCS to develop, implement and be in responsible charge of the Lake Limerick Water System's cross-connection control program.

The Purveyor will provide a written cross-connection control program description, as an element of its DOH-approved water system plan, to implement the requirements of this resolution. The written program shall be consistent with this resolution and shall comply with the requirements of Chapter 246-290 WAC (Group A Drinking Water Regulations).

The Purveyor will use the most recently published editions of the following publications as references and technical aids:

1. *Cross-Connection Control Manual, Accepted Procedures and Practice,* published by the Pacific Northwest Section, American Water Works Association, or latest edition thereof.

2. *Manual of Cross-Connection Control,* published by the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California, or latest edition thereof.

3. *Cross-Connection Control Guidance Manual for Small Water Systems,* published by the DOH Office of Drinking Water.

The Purveyor, in consultation with a CCS, shall have the authority to make reasonable decisions related to cross connections in cases and situations not provided for in the resolution or written program.

If any provision in this resolution, or in the written cross-connection control program is found to be less stringent than or inconsistent with the Drinking Water Regulations (Chapter 246-290 WAC), or other Washington state statutes or rules, the more stringent state statute, rule, or regulation shall apply.

Resolution Passed: _____

Effective Date: _____

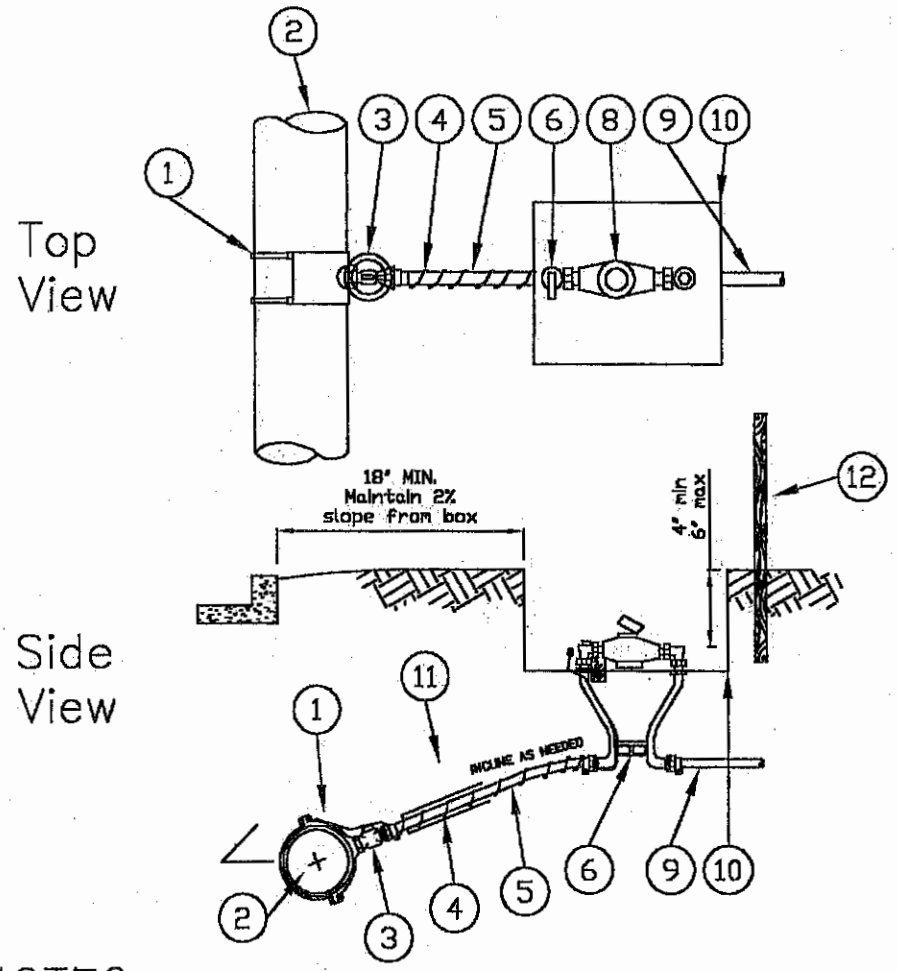
Signatures: _____

_____

_____

6/

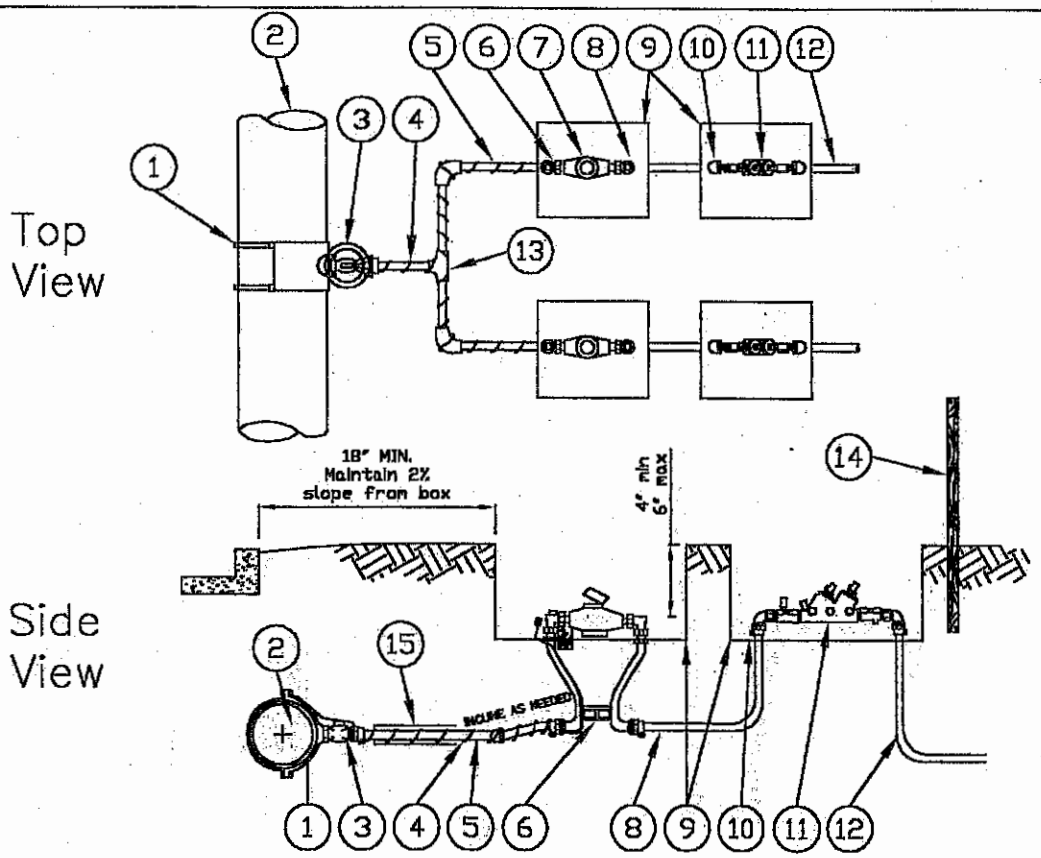
Appendix L: Standard Details



NOTES

1. DOUBLE STAINLESS STEEL STRAP SERVICE SADDLE. CONNECT TONING WIRE TO SADDLE. ANGLE OUTLET AT 45° TO 90° FROM VERTICAL.
2. EXISTING WATER MAIN
3. BRASS CORP STOP, FORD FIIOO-4 OR APPROVED EQUAL. USE TUBING STIFFENERS IN ALL PACK JOINTS.
4. 14 GA INSULATED SOLID COPPER TONING WIRE. WRAP WIRE AROUND SERVICE PIPE, LEAVE 2' MINIMUM LENGTH IN METER BOX.
5. 1" CTS HDPE CLASS 200 SERVICE PIPE.
6. FORD 90 SERIES VH72-12W-44-44 METER SETTER OR APPROVED EQUAL.
7. STIFFENERS IN ALL PACK JOINTS IS REQUIRED.
8. WATER METER, 5/8X3/4" HERMETICALLY SEALED, CUBIC FEET SCALE READING.
9. 1" CTS HDPE CLASS 200 SERVICE PIPE.
10. METER BOX, HDPE MID-STATES BCFI324-12 AND CBC-1324R DI COVER, OR APPROVED EQUAL.
11. ALL SERVICE STREET CROSSINGS SHALL BE ENCASED IN 2" SCH 40 PVC PIPE.
12. MARK METER BOX LOCATION WITH BLUE STAKE.

STANDARD DETAIL
SD-1
1 INCH SINGLE SERVICE CONNECTION

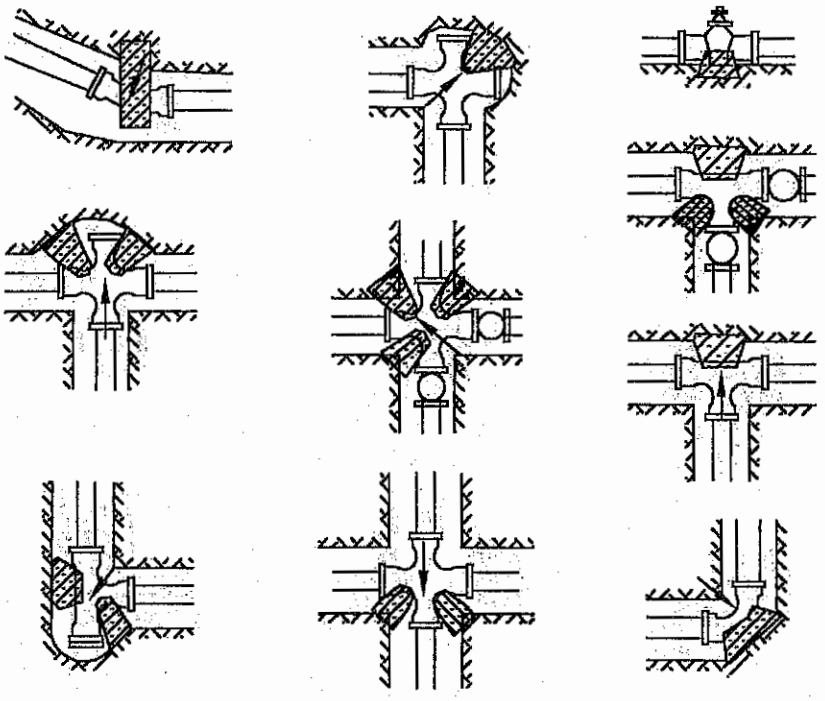


NOTES

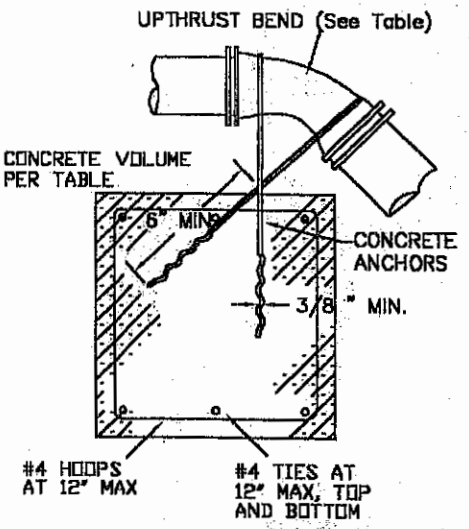
1. DOUBLE STAINLESS STEEL STRAP SERVICE SADDLE. CONNECT TONING WIRES TO SADDLE.
2. EXISTING WATER MAIN
3. BRASS CORP STOP, FORD FIIOO-4 OR APPROVED EQUAL. USE TUBING STIFFENERS IN ALL PACK JOINTS.
4. 12 GA SOLID COPPER TONING WIRE. WRAP WIRE AROUND SERVICE PIPE, LEAVE 2' MINIMUM LENGTH IN EACH METER BOX.
5. 1" CTS HDPE CLASS 200 SERVICE PIPE.
6. FORD 90 SERIES VH72-12W-44-44 METER SETTER OR APPROVED EQUAL.
7. WATER METER, 5/8X3/4" HERMETICALLY SEALED, CONTACT OWNER FOR METER AND INSTALLATION.
8. 1" CTS HDPE CLASS 200 SERVICE PIPE.
9. METER BOX, HDPE MID-STATES BCF1324-12 AND CBC-1324R DI COVER, OR APPROVED EQUAL. 2 EACH REQUIRED PER SERVICE.
10. 90° BRASS 1" MIP X 1" CTS PACK JOINT ADAPTER (FORD L84-44 OR EQUIV) 2 EA REQUIRED PER SERVICE. USE STIFFENERS IN ALL PACK JOINTS.
11. CONBRACO 40-105-T2 DOUBLE SPRING CHECK BACKFLOW PREVENTER, OR APPROVED EQUAL.
12. CONNECT SERVICE LINE TO BACKFLOW PREVENTER OUTLET OR PLUMB AS NECESSARY TO MAINTAIN MINIMUM COVER.
13. BRASS TEE AND ELBOWS, BRASS 1" MIP X 1" CTS PACK JOINT ADAPTERS (3 REQ). WRAP GALV. STEEL PIPE WITH 2 LAYERS OF 10-MIL PVC TAPE. NOTE: ONE FORD T444-444 FITTING MAY BE SUBSTITUTED IF SPACE ALLOWS.
14. MARK METER BOX LOCATION WITH BLUE 2X2 STAKE, 3' MIN LENGTH.
15. ALL SERVICE STREET CROSSINGS SHALL BE ENCASED IN 2" SCH 40 PVC PIPE WITH TONING WIRE WRAPPED AROUND SERVICE PIPE FOR ENTIRE LENGTH.

STANDARD DETAIL
SD-2
1 INCH DOUBLE SERVICE CONNECTION

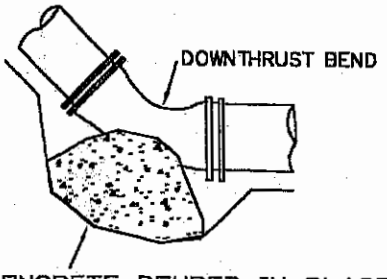
HORIZONTAL BENDS



VERTICAL BENDS



CONCRETE ANCHORS TO BE 3/8" MIN STEEL GALVANIZED. WRAP EXPOSED PARTS WITH POLYETHYLENE TAPE, HALF LAPPED



CONCRETE POURED IN PLACE SIZE TO SAFE BEARING LOAD PER HORIZONTAL BLOCK TABLE

THRUST AT FITTINGS DUE TO WATER PRESSURE

IN POUNDS

100 PSI	TEES DEAD ENDS	90° BEND	45° BEND
4"	1940	2750	1490
6"	3830	5420	2930
8"	6580	9310	5040
10"	9820	13900	7510

SAFE BEARING LOADS

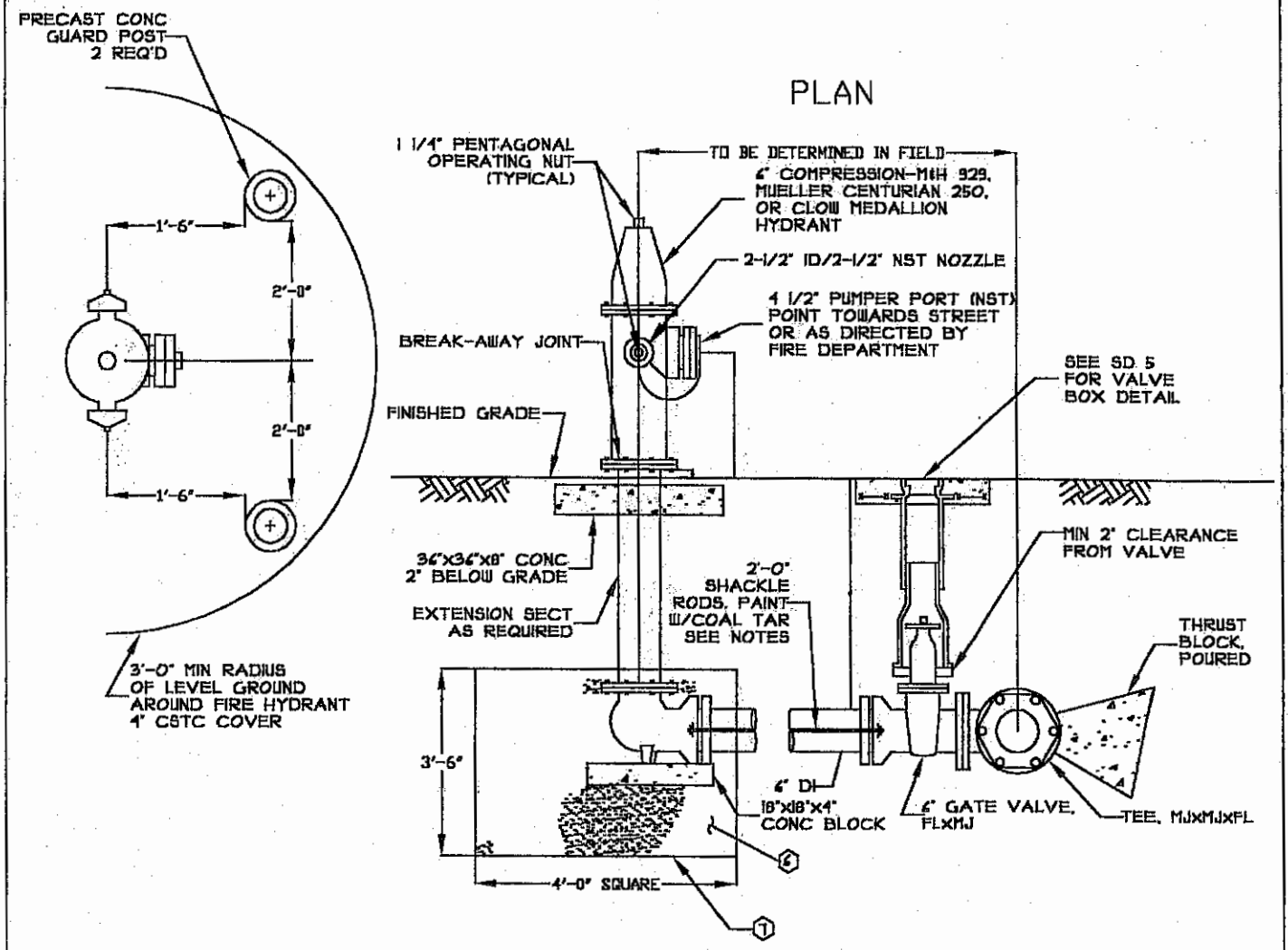
SOIL	SAFE BEARING LOAD PSF
MUCK, PEAT, ETC.*	0
SOFT CLAY	1,000
SAND	2,000
SAND AND GRAVEL	3,000
SAND AND GRAVEL, CEM W/ CLAY	4,000
HARD SHALE	10,000

* IN MUCK OR PEAT, ALL THRUSTS ARE TO BE RESISTED BY PILES OR TIE RODS TO SOLID FOUNDATIONS OR BY BALLAST PLACED, AFTER REMOVAL OF MUCK OR PEAT, TO PROVIDE SUFFICIENT STABILITY TO RESIST THRUST.

BLOCKING FOR VERTICAL BENDS 150 PSI WORKING PRESSURE

PIPE DIA IN.	REQUIRED CONCRETE VOLUME, CU FT		
	11 1/4°	22 1/2°	45°
6	10	18	36
8	15	30	59
10	23	46	90

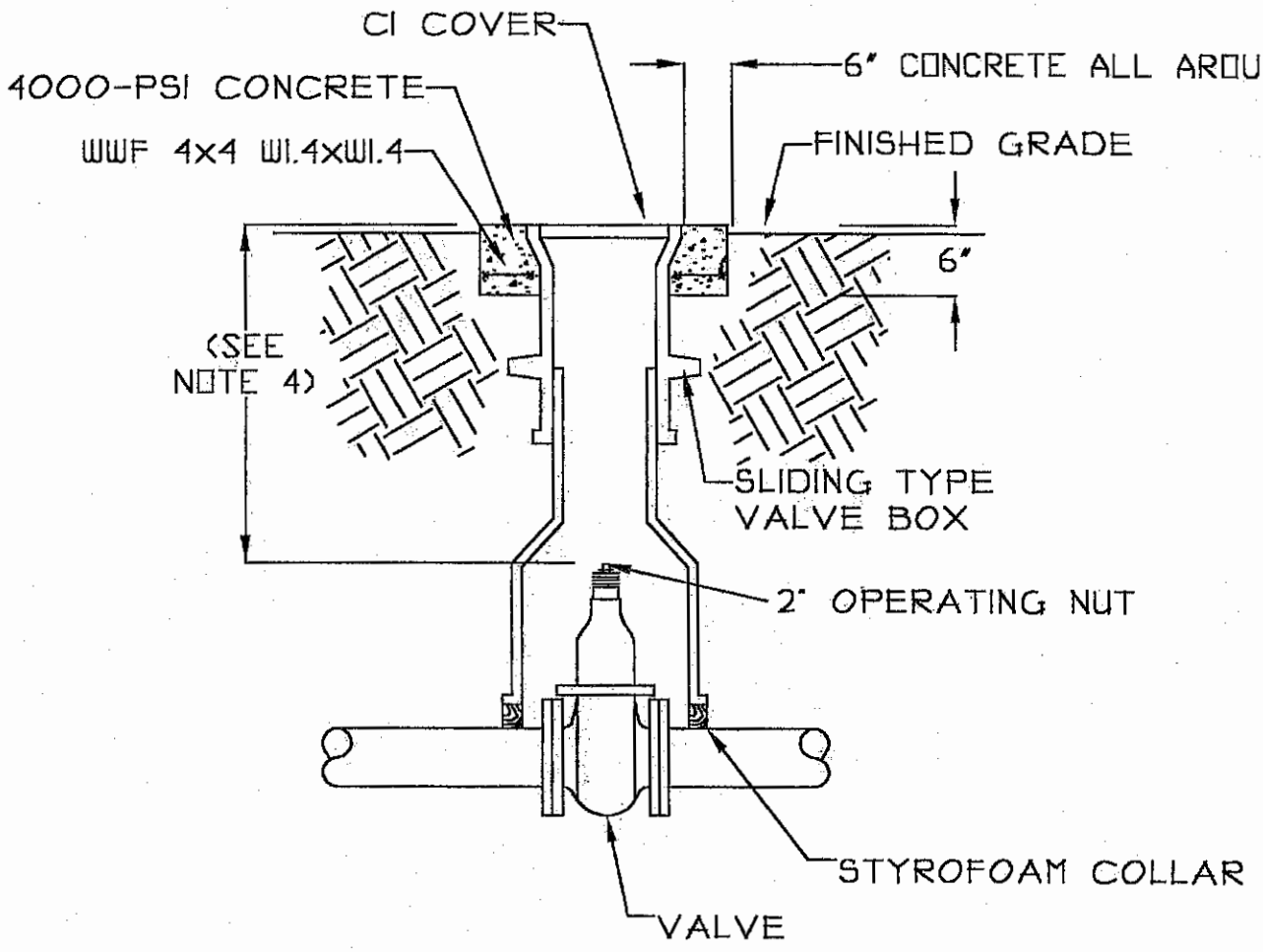
STANDARD DETAIL
SD-3
THRUST BLOCKING OF FITTINGS



NOTES

1. DEAD END MAIN EXTENSIONS OVER 50' SHALL BE 8" MINIMUM.
2. SHACKLE RODS SHALL BE CONNECTED TO MECHANICAL JOINTS WITH STAR BOLTS.
3. AN UNOBSTRUCTED THREE FOOT MINIMUM WORKING AREA RADIUS SHALL BE PROVIDED AROUND ALL HYDRANTS.
4. SHACKLE RODS SHALL BE CONSTRAINED AT ALL INTERMEDIATE JOINTS WITH PIPE CLAMPS. MEGALUG FITTINGS MAY BE SUBSTITUTED FOR SHACKLE RODS PROVIDED ALL JOINTS ARE RESTRAINED.
5. FIELD PAINT HYDRANTS WITH ONE COAT SHERWIN WILLIAMS ALKYD GLOSS INDUSTRIAL ENAMEL SAFETY YELLOW NO.554Y37.
6. EXCAVATE TO INDICATED DIMENSIONS & FILL WITH 2.0 CU YDS OF WASHED GRAVEL GRADING NO.4 PER WSDOT SPECIFICATION 9-03.12(4). PLACE FILTER FABRIC BLANKET OVER DRAIN GRAVEL.
7. PLACE FILTER FABRIC BLANKET ALL AROUND GRAVEL (MIRAFI 500X OR APPROVED EQUAL)

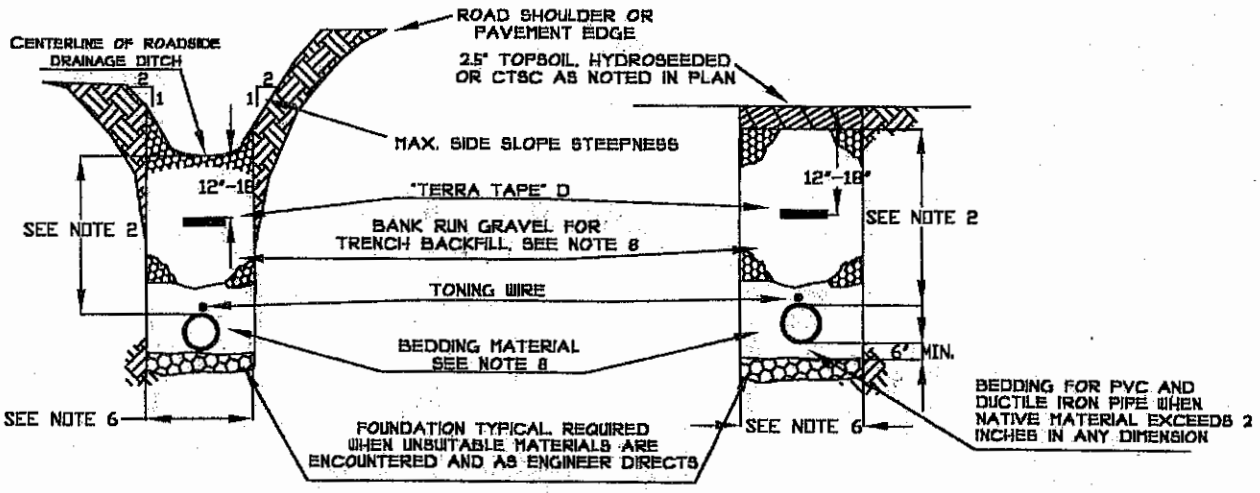
STANDARD DETAIL
SD-4
FIRE HYDRANT INSTALLATION DETAIL



NOTES

1. 2 PIECE TELESCOPING VALVE BOX SHALL CONFORM TO 9-30.3(4) OF STD. SPECS. OLYMPIC FOUNDRY 940 OR APPROVED EQUAL. ADD ADDITIONAL SECTIONS FOR BURY DEPTHS GREATER THAN 3'.
2. CAST IRON COVER SHALL BE MARKED "WATER" AND HAVE EARS THAT INDICATE THE PIPELINE RUN DIRECTION.
3. FOR VALVES 10" AND LARGER USE OVAL BASE VALVE BOX
4. FOR DEPTHS EXCEEDING 3'-0", INSTALL VALVE NUT EXTENSION TO WITHIN 1'-6" OF SURFACE
5. ALL VALVES SHALL BE RESILIENT WEDGE GATE VALVES, NON RISING STEM, WITH 2" OPERATING NUT.
6. SEAL OUTSIDE PERIMETER OF CONCRETE PAD WITH AR4000W WHEN PLACED IN PAVED AREAS.

STANDARD DETAIL
SD-5
VALVE BOX INSTALLATION DETAIL



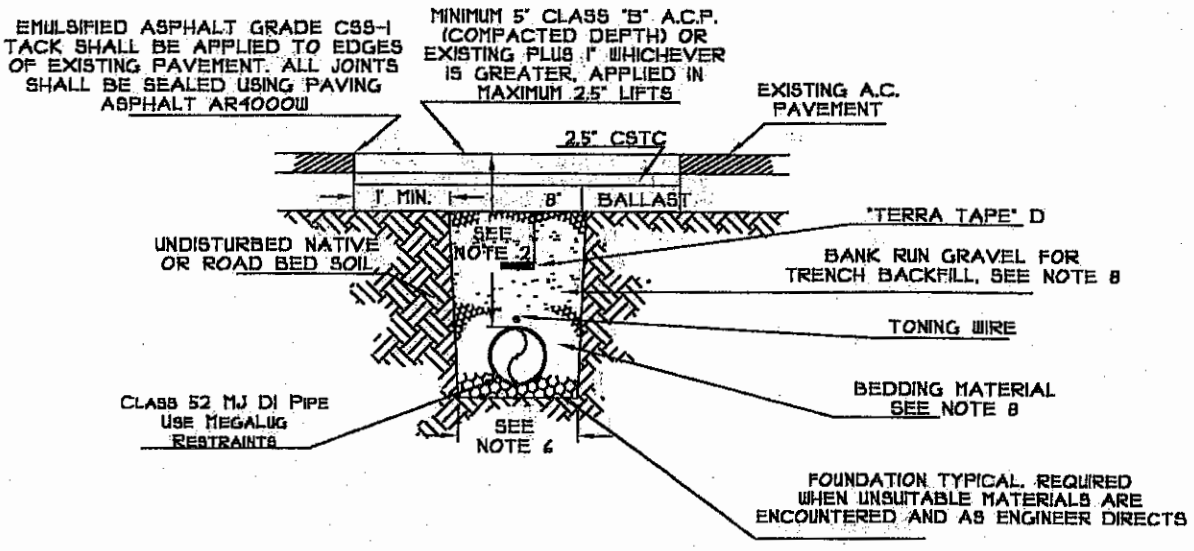
ROADSIDE PIPING TRENCH CROSS SECTION DETAIL

PIPING TRENCH CROSS SECTION DETAIL, TYPICAL

NOTES:

1. THE FOLLOWING NOTES REFER TO PIPING TRENCH CROSS SECTION DETAILS ABOVE.
2. 36" MINIMUM COVER IN ALL LOCATIONS.
3. ALL MATERIAL EXCEPT A.C.P., C.D.F. AND BEDDING MATERIAL SHALL BE COMPACTED IN 12-INCH MAXIMUM LIFTS TO 85% DENSITY.
4. BEDDING MATERIAL SHALL CONFORM TO SECTION 9-03.16 OR 9-03.21 OF THE STANDARD SPECIFICATIONS. FOUNDATION MATERIAL, IF REQUIRED, SHALL CONFORM TO SECTION 9-03.17 OF THE STANDARD SPECIFICATIONS. NATIVE MATERIALS MAY BE USED FOR TRENCH BACKFILL, PROVIDED MATERIAL CONFORMS TO SECTION 9-03.19 OF THE STANDARD SPECIFICATIONS.
5. BEDDING SHALL BE COMPACTED TO 95% MAX. AS DETERMINED BY ASTM D1557. BACKFILL SHALL BE COMPACTED TO 85% IN UNPAVED AREA, AND 95% IN PAVED OR SHOULDER AREAS AS DETERMINED BY ASTM D1557. CONTRACTOR SHALL PROVIDE WRITTEN PROOF OF COMPACTION TO OWNER PRIOR TO PROJECT ACCEPTANCE.
6. MAXIMUM TRENCH WIDTH SHALL BE THE LESSER OF 1.5 TIMES PIPE OUTSIDE DIAMETER PLUS 18", OR 2.5'.
7. TRENCH BOTTOM SHALL BE COMPACTED WITH UNIFORM GRADE PRIOR TO PIPE INSTALLATION. NO TEMPORARY SUPPORTS, I.E. BLOCKS, WILL BE ALLOWED TO SUPPORT PIPE. 36" MIN COVER, ALL LOCATIONS.
8. BEDDING MATERIAL SHALL COMFORM TO SECTION 9-03.16 OR 9-03.21 OF THE STANDARD SPECIFICATIONS. FOUNDATION MATERIAL, IF REQUIRED SHALL CONFORM TO SECTION 9-03.17 OF THE STANDARD SPECIFICATIONS. NATIVE MATERIALS MAY BE USED FOR TRENCH BACKFILL, PROVIDED MATERIAL CONFORMS TO SECTION 9-03.19 OF THE STANDARD SPECIFICATIONS.

STANDARD DETAIL
SD-6
PIPELINE CONSTRUCTION DETAIL

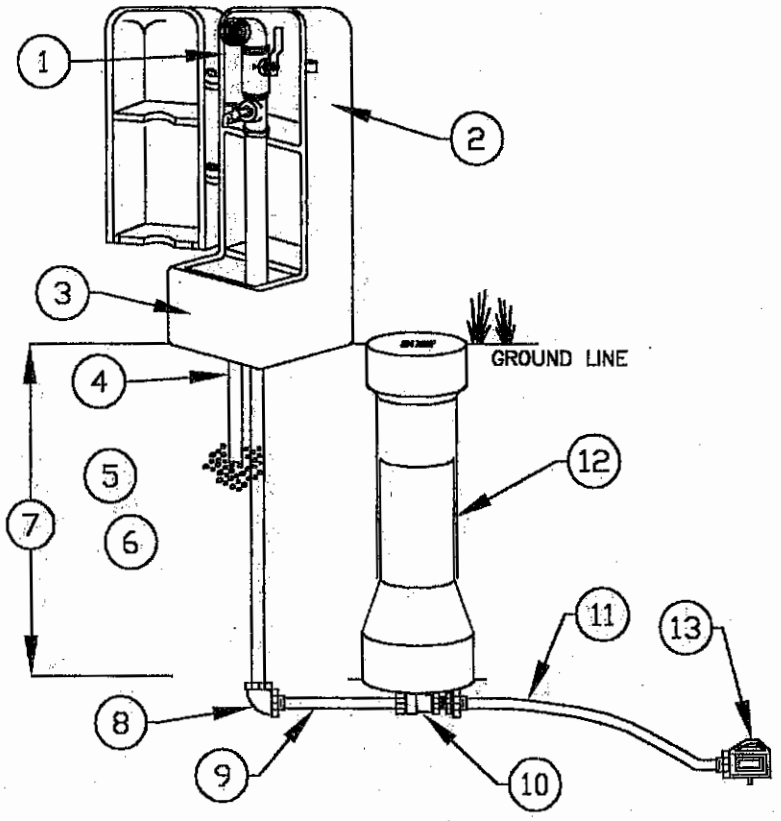


STREET CROSSING TRENCH CROSS SECTION DETAIL

NOTES:

1. THE FOLLOWING NOTES REFER TO PIPING TRENCH CROSS SECTION DETAIL ABOVE.
2. 36" MINIMUM COVER IN ALL LOCATIONS.
3. ALL MATERIAL EXCEPT A.C.P., C.D.F. AND BEDDING MATERIAL SHALL BE COMPACTED IN 12-INCH MAXIMUM LIFTS TO 85% DENSITY.
4. BEDDING MATERIAL SHALL CONFORM TO SECTION 9-03.16 OR 9-03.21 OF THE STANDARD SPECIFICATIONS. FOUNDATION MATERIAL, IF REQUIRED, SHALL CONFORM TO SECTION 9-03.17 OF THE STANDARD SPECIFICATIONS. NATIVE MATERIALS MAY BE USED FOR TRENCH BACKFILL, PROVIDED MATERIAL CONFORMS TO SECTION 9-03.19 OF THE STANDARD SPECIFICATIONS.
5. BEDDING SHALL BE COMPACTED TO 95% MAX. AS DETERMINED BY ASTM D1557. BACKFILL SHALL BE COMPACTED TO 85% IN UNPAVED AREA, AND 95% IN PAVED OR SHOULDER AREAS AS DETERMINED BY ASTM D1557. CONTRACTOR SHALL PROVIDE WRITTEN PROOF OF COMPACTION TO OWNER PRIOR TO PROJECT ACCEPTANCE.
6. MAXIMUM TRENCH WIDTH SHALL BE THE LESSER OF 1.5 TIMES PIPE OUTSIDE DIAMETER PLUS 18", OR 2.5'.
7. TRENCH BOTTOM SHALL BE COMPACTED WITH UNIFORM GRADE PRIOR TO PIPE INSTALLATION. NO TEMPORARY SUPPORTS, I.E. BLOCKS, WILL BE ALLOWED TO SUPPORT PIPE. 36" MIN COVER, ALL LOCATIONS.
8. BEDDING MATERIAL SHALL COMFORM TO SECTION 9-03.16 OR 9-03.21 OF THE STANDARD SPECIFICATIONS. FOUNDATION MATERIAL, IF REQUIRED SHALL CONFORM TO SECTION 9-03.17 OF THE STANDARD SPECIFICATIONS. CDF SHALL BE USED FOR TRENCH BACKFILL.

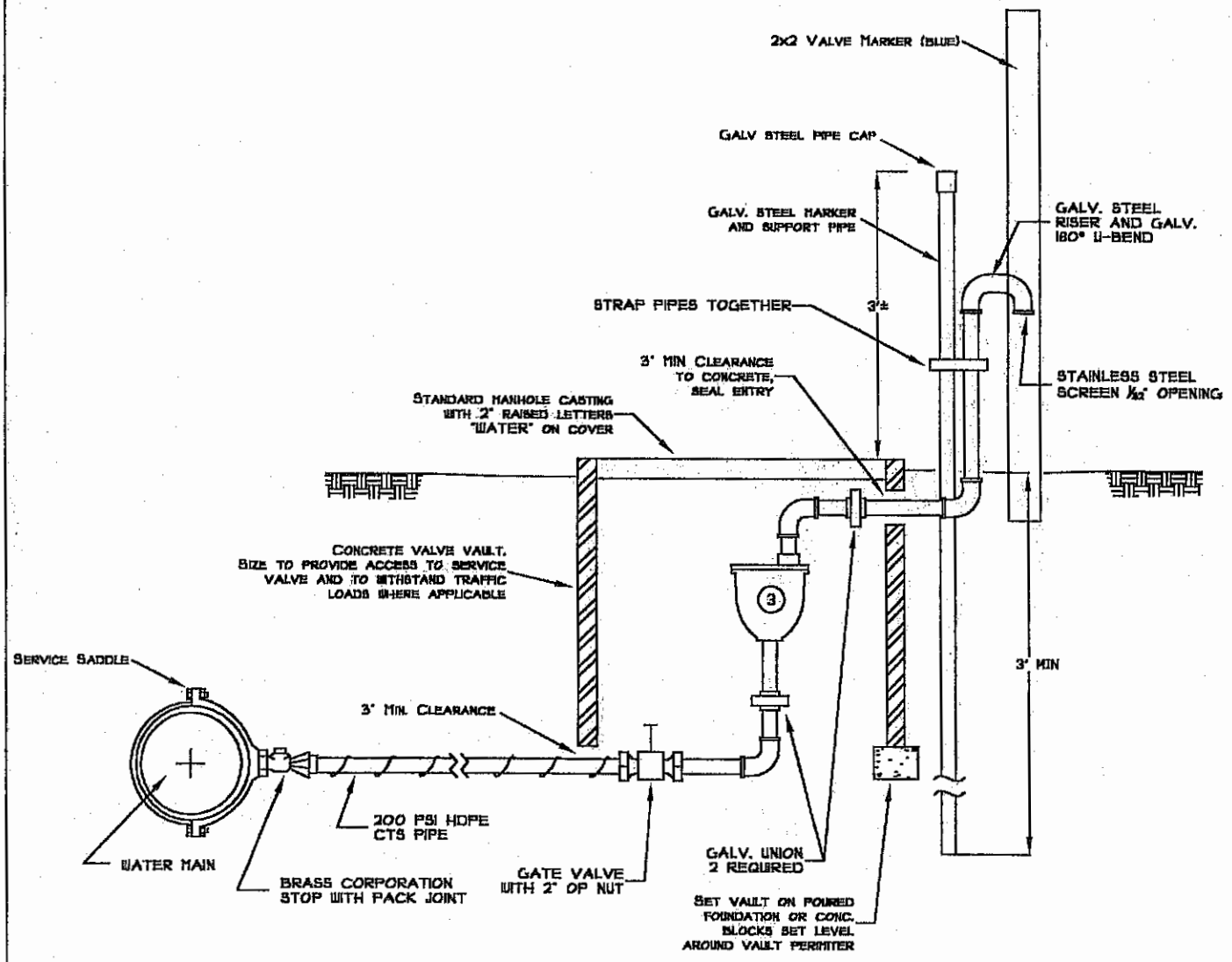
STANDARD DETAIL
SD-7
PIPELINE STREET CROSSING DETAIL



NOTES

1. ECLIPSE #88WC SAMPLING STATION OR APPROVED EQUAL, INSTALL AS SHOWN IN DETAIL, AT LOCATION STAKED BY OWNER.
2. ALUMINUM HOUSING.
3. ALUMINUM BASE.
4. ½" BRASS DRAIN PIPE.
5. WASHED 2" DRAIN ROCK. PLACE ASPHALTIC FELT OVER AND AROUND DRAIN ROCK.
6. 1" BRASS SUPPLY PIPE.
7. 36" MINIMUM DEPTH OF BURY.
8. 1" BRASS ELBOW.
9. 1"X12" BRASS PIPE NIPPLE.
10. CURBSTOP BALL VALVE, FORD B41-666M
11. 1½" CTS CLASS 200 HDPE PIPE, NSF APPROVED.
12. CURBSTOP VALVE BOX, FORD EM2-30-47-18R OR APPROVED EQUAL.
13. 1½" BRASS CORP STOP, FORD FB1100-6 OR APPROVED EQUAL.

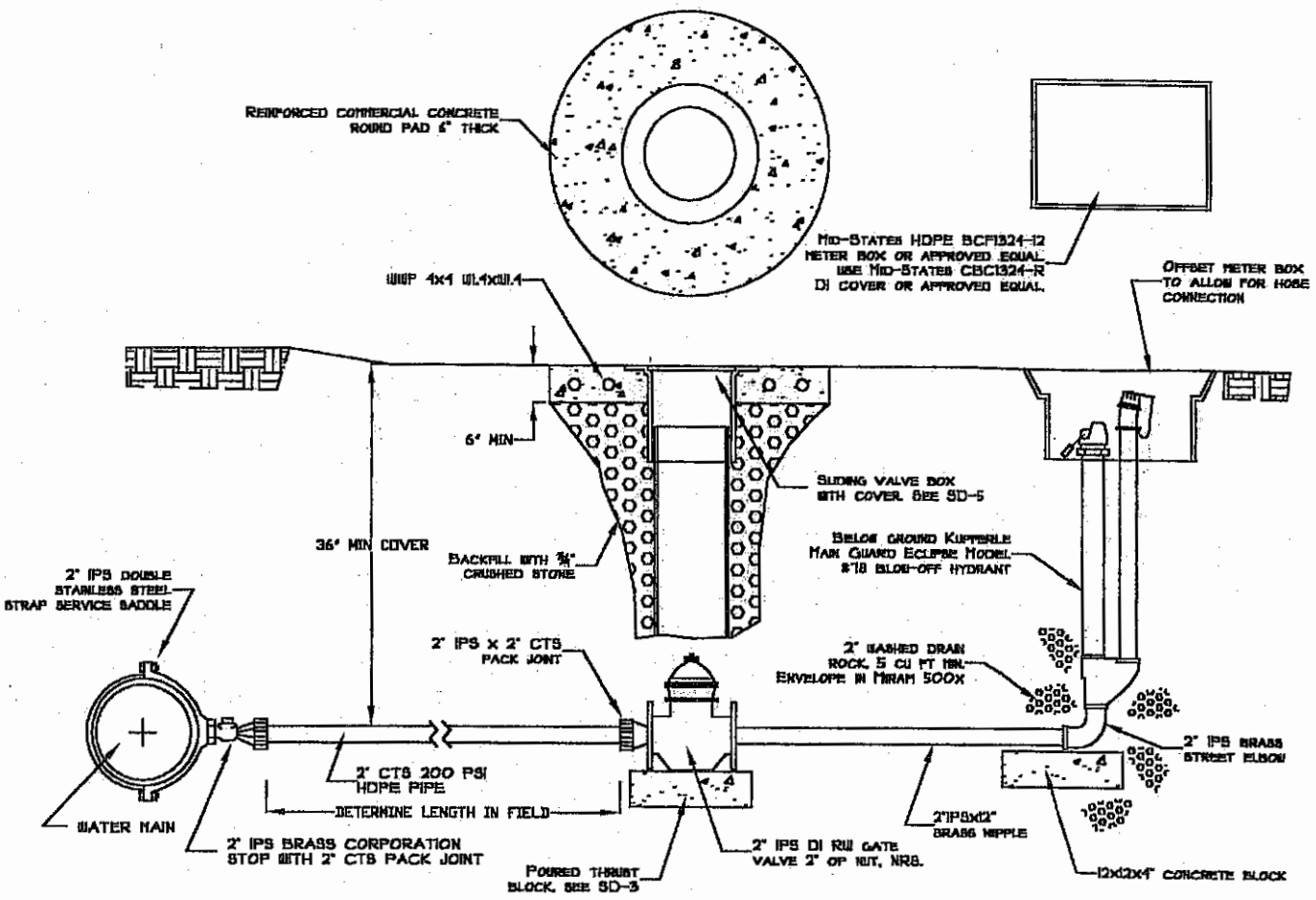
STANDARD DETAIL
SD-8
SAMPLE STATION
INSTALLATION DETAIL



NOTES

1. SIZE SERVICE SADDLE, CORP STOP, ALL PIPE AND FITTINGS, AND GATE VALVE TO AIR/VACUUM RELEASE VALVE INLET.
2. SERVICE SADDLE SHALL HAVE DOUBLE STAINLESS STEEL STRAPS, FIP THREADS SIZED FOR AIR/VAC RELEASE VALVE.
3. AIR/VACUUM RELEASE VALVE SHALL BE THAT SPECIFIED BY OWNER'S ENGINEER FOR EACH INSTALLATION.

STANDARD DETAIL
SD-9
AIR/VAC RELEASE VALVE INSTALLATION DETAIL



NOTES

1. VALVE BOX AND COVER SHALL BE PER SD-5.
2. LOCATE BLOW-OFF HYDRANT OUTSIDE OF ROADWAY.
3. VALVE MAY BE WITHIN ROADWAY IF NECESSARY.

STANDARD DETAIL
SD-10
2 INCH BLOW OFF ASSEMBLY