WATER SYSTEM PLAN

Lake Limerick Water System

ID# 44150T

Mason County

Final

2007

Prepared by:

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Approved From August 25, 2005 Review Draft

☑ Engineering ☑ Information Technology ☑ Planning ☑ Management

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OWD Project #06-0802

CERTIFICATE OF ENGINEER

The technical material and data contained in this report were prepared under the supervision and direction of a professional engineer licensed in the State of Washington, whose seal and signature are affixed below.

John Segerson, P.E.
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Expires 06/24/2007

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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
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
ODW	Office of Drinking Water
PHD	Peak hourly demand for the system in gpm
SEPA	State Environmental Policy Act
SRL	State reporting level, as defined by WAC 246-290
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
SOC	Synthetic organic chemicals
/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 located in Township 21N, Range 3W. The water system's system 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 prepared by SEMCON, Inc. of Olympia on September 8, 1998, and approved on October 19, 1998. Amendments to the 1998 plan were approved. See Section I.D.1 below. The purpose of this document is to evaluate the water system's current and forecasted needs through the year 2011, and to develop a plan to meet those needs.

2. Executive Summary

(--- To be provided by SEMCON, Inc. for final approval draft. ---)

B. Ownership and Management

The water system is owned and operated by Lake Limerick County Club, Inc., 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.

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 surface water rights certificate number 10160. The water system is not required to support fire flow, and, as a matter of policy, has chosen not to provide this level of service.

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. Although the distribution network, which surrounds the lake, does not currently have fire flow capability, the Water Committee has determined that, as water pipes are installed or replaced, they will be sized such that the fire hydrants are supplied with a minimum of 6-inch looped or 8-inch mains. 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 connections, $5 unmetered, inactive connections) 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 connection and $8 for unmetered, inactive connection will take effect October 1, 2006.

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 meets.

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;

(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."

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

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, the Underground Utilities Section (RCW 19.122)[1] 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 1-800-424-5555).
- 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.

[1] Effective date, 2000.

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.

e. SEPA

The environmental checklist define in WAC 197-11-960 has been filled out for this water system plan and is provide 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 required 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." An informational meeting with customers was held on _____.

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] Based on phone conservations with Mason County's permit assistance center.

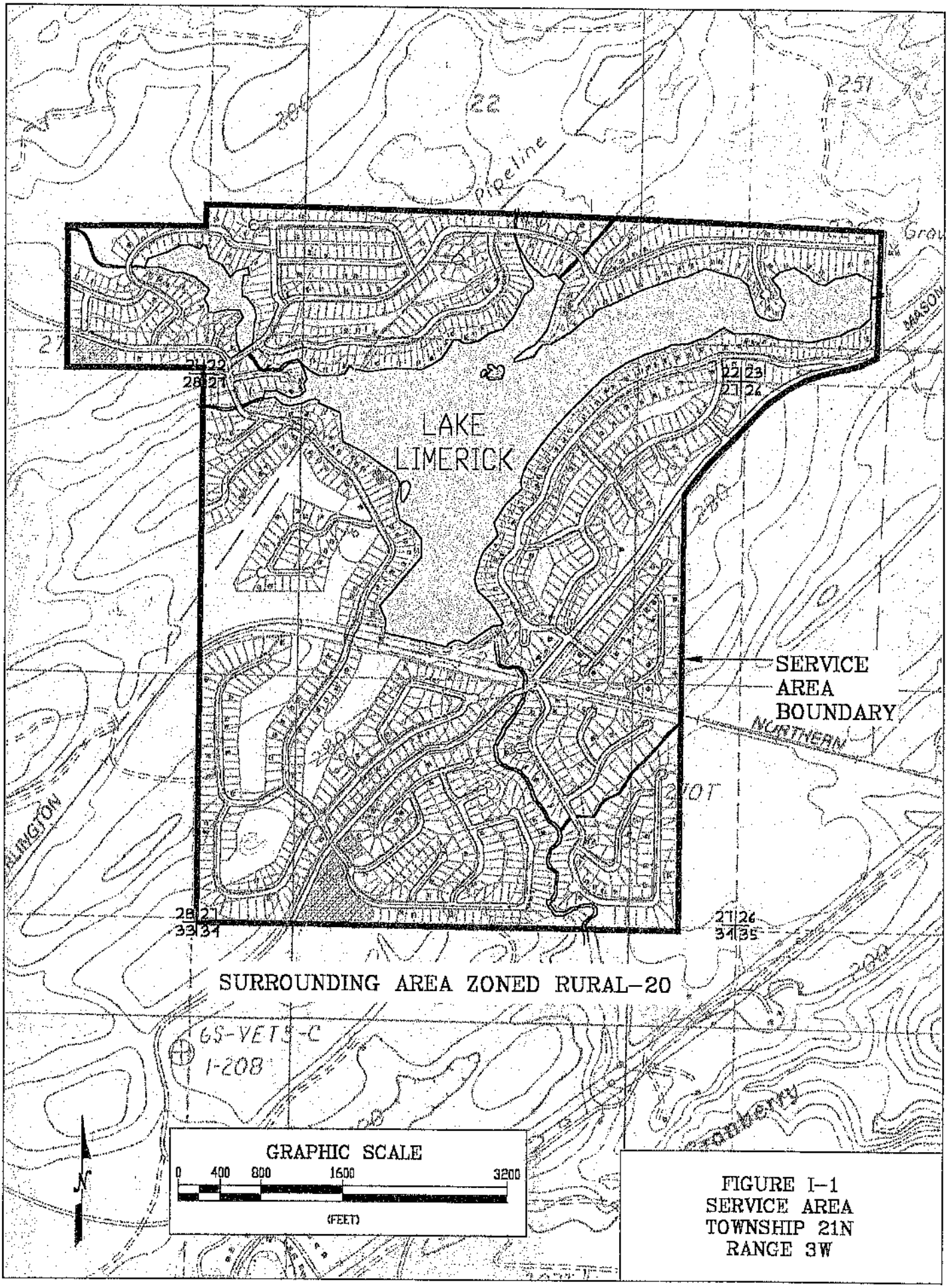


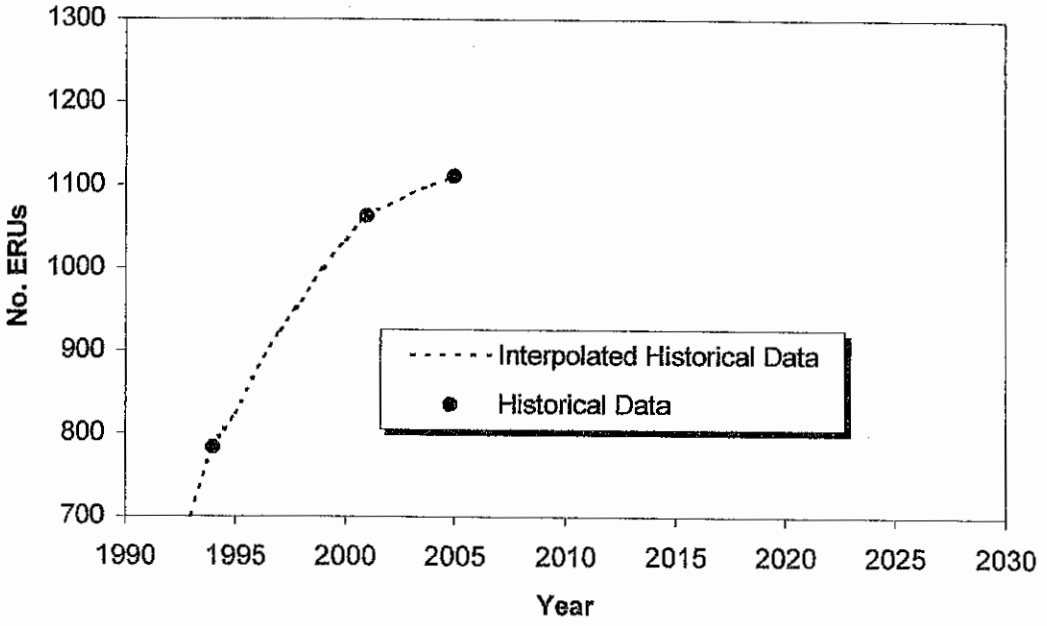
FIGURE I-1
SERVICE AREA
TOWNSHIP 21N
RANGE 3W

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 1111 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 average characteristic water use of a single-family residence.

B. Historical and Current Water Use Data Reporting

Table II-1 shows the historical annual production from 1999 through 2004, along with the average daily demand (ADD) per connection for each year. The yearly ADD averaged over the last six years is 213 gpd/ERU. In the most recent plan amendment[1] an ADD of 270 gpd/ERU was used, and will also be used for this water system plan as it is reasonably close to historical, measured values, and is "conservative" by about 25%. Figure II-2 below shows the ADDs calculated on a monthly basis for the last six years. The highest monthly ADD in the last six years was in July of 2002. During that month, the ADD was 425 gpd/ERU. For planning purposes, an MDD of 540 gpd/ERU will be used, which was calculated using Equation 5-2 of the Water System Design Manual.[2]

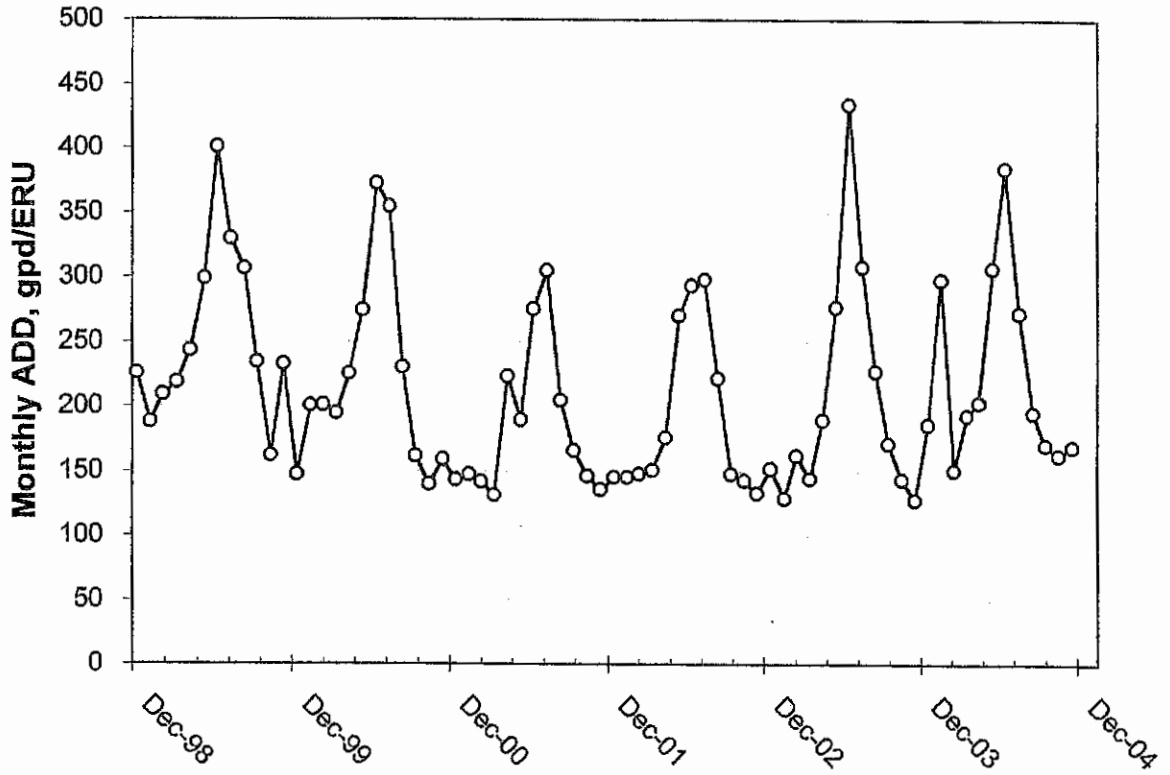
Table II-1: Historical Annual Production and ADD

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	1,090	80.1	220
2004	1,100	88.2	220
		Average:	213

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

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

Figure II-2: Monthly Average Daily Demand



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, and a clubhouse with food service associated with the golf course. 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.

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[1] 1998 Water System Plan, pg 15

Figure II-3: Forecasted Number of ERUs

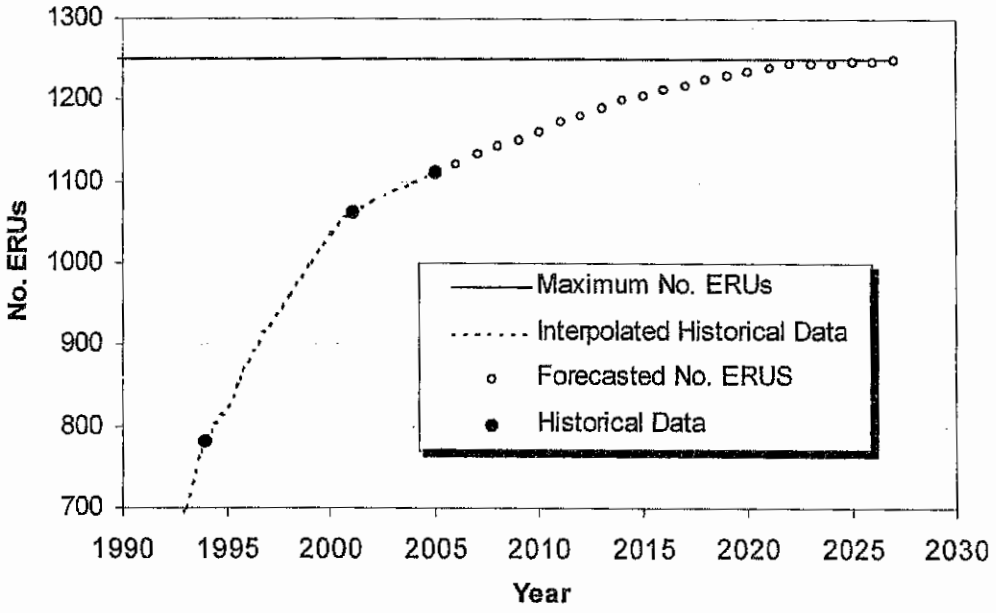

Table II-2: Forecasted Number of ERUs

Year	No. ERUs	Year	No. ERUs
2006	1,123	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, a 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 136.9 million gallons of water per year. This equates to 429 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	1,111	599,940	109.5	344
2011	1,173	633,420	115.6	363
2015	1,205	650,700	118.8	373
Maximum Build-out	1,250	675,000	123.2	387

III. System Analysis

A. Water Quality Analysis

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

1. Asbestos

The 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 distributions 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 for 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 exceed in Well 2 on February 16, 2000. The trigger level for turbidity was exceed 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 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	0.56mg/L	SRL
"	"	Well 3B	0.53mg/L	SRL
"	"	Well 4	0.45 mg/L	-
"	"	Well 5	0.59mg/L	SRL
Tot. Nitrate/Nitrites	2/16/00	Well 1	0.64mg/L	SRL
"	"	Well 2	0.43 mg/L	-
"	"	Well 3A	0.56mg/L	SRL
"	"	Well 3B	0.53mg/L	SRL
"	"	Well 4	0.45 mg/L	-
"	"	Well 5	0.59mg/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	0.11mg/L	SRL
"	"	Well 5	0.29mg/L	SRL
Manganese	2/16/00	Well 2	0.07 mg/L	MCL
Silver	2/16/00	Well 3A	0.02mg/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	0.22mg/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	56 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 was taken on March 27, 2001. A combined sample was taken from Wells 1, 2 & 4 was taken on March 29, 2001. Individual samples were taken from Wells 2, 3A & 4 on March 26, 2003. 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 sample 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 of the water system. Storage tanks, booster pumps, and backup generators are located at some of these sites. Table III-3 summaries 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	Generator 1[1]
2	Well 2	None	None	None
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 1 is not currently hooked up, but can be hooked up in a matter of hours if needed.

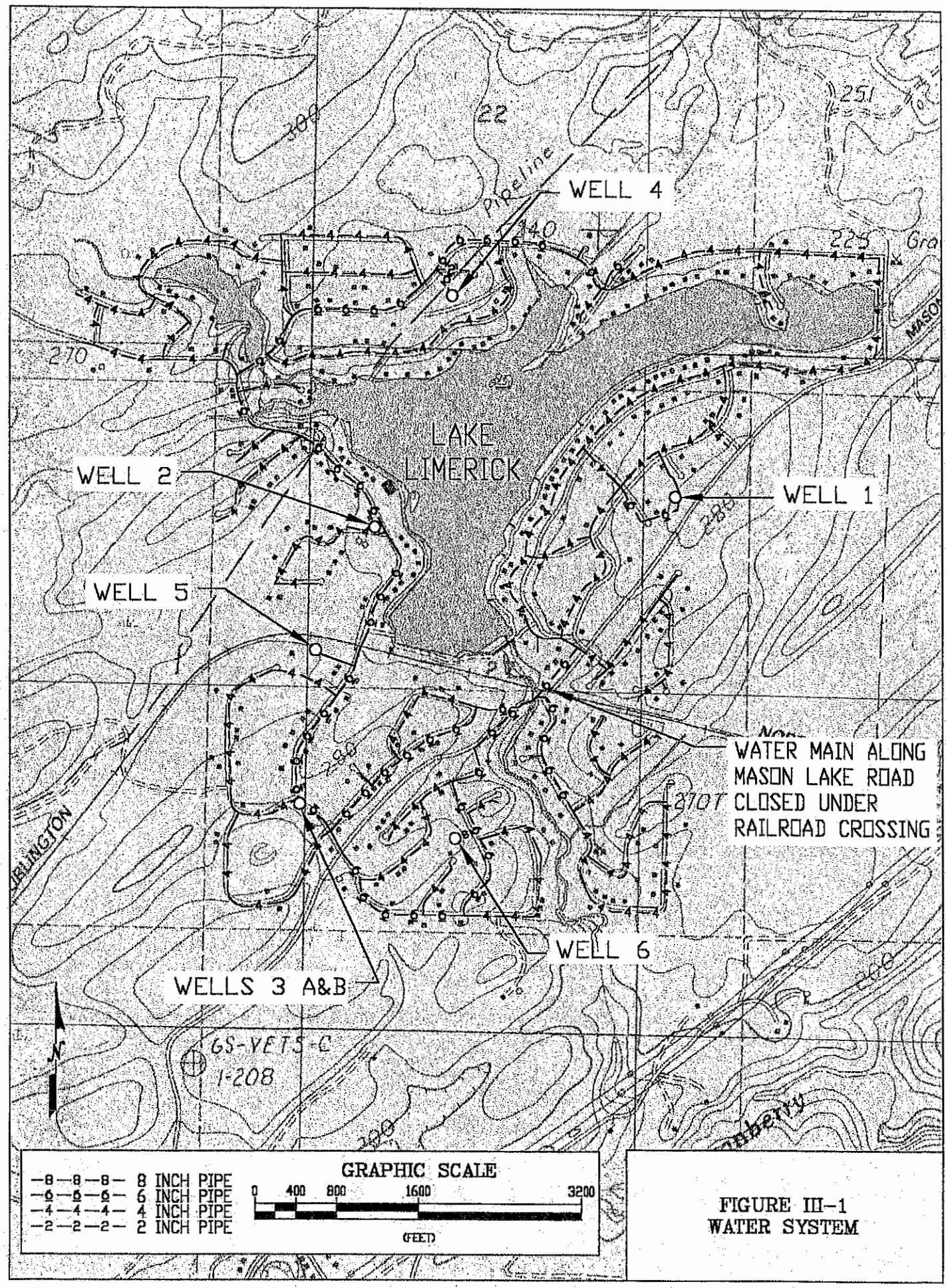

FIGURE III–1
WATER SYSTEM

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. Water right self-assessment tables and copies 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 446 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[4]	49.6	200
		Total	890	446	-	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 Wells 5 & 6 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 (gal)
Tank 1	24	25	84.6	30.6	322
Tank 3	30	30	158.6	95.2	567
Tank 4	30	21	77.0	51.3	275
Tank 6	30	30	158.6	158.6	236
		Total	478.8	335.7	1,400

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 set such that they will turn on if the hydraulic grade drops to 617', and will turn off when the hydraulic grade reaches 664'. Boosters 1, 4 & 5 are on timers and 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 a closed system; that is, its pressure is maintained entirely by the booster pumps, and by the pumps at Wells 2 and 5.

The Lake Limerick Water System was modeled in WaterCAD®. Five scenarios were analyzed. 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.

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[1] Usable Storage ≡ Total Storage – Dead Storage

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 flow sufficient for fire suppression 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. A copy of the letter from the fire marshal is included in Appendix B.

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.

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 minute 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 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.

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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 ≡ Water used for flushing, hydrant testing, etc.
- Unaccounted-For Water ≡ 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. It is calculated that the percent of unaccounted-for water has averaged 3% over this period. The percent of unaccounted-for is 33% lower that the goal established in the 1998 water system plan.

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[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	No. ERUs	Production Data (Mgpy)	Consumption Data (Mgpy)	Non-Revenue Water Production (Mgpy)	Estimated Non-Revenues Water Usage (Mgpy)	Unaccounted-For (Mgpy)	% Unaccounted-For
1999	999	97.9	94.3	3.6	0.1	3.5	3
2000	1,034	85.4	82.5	3.0	0.1	2.9	3
2001	1,063	71.3	69.2	2.1	0.1	2.0	3
2002	1,076	73.4	70.8	2.6	0.1	2.5	3
2003	1,090	80.1	76.6	3.5	0.1	3.4	4
2004	1,100	88.2	84.4	3.8	0.1	3.7	4
			Average:	3.1	0.1	3.0	3

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

They 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 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 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 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

8. Reclaimed Water Use

It would be impractical for the Lake Limerick Water System to use reclaimed water. The only likely uses of reclaimed water would be for toilets in the residences and the clubhouse, residential landscapes, and fire suppression. Using reclaimed water in this way would require replumbing the houses and development of a whole new infrastructure. Because there is no sewer system, it would be difficult to reclaim wastewater. Although the system does not currently use reclaimed water, it does use surface water from the lake to water the golf course.

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 annual production of well, cubic feet

t = travel time to well, years

n = aquifer porosity, defaults to 0.22

H = height of screened interval of the well, feet

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		Screened Interval (ft)	Calculated Radius for Given Interval (ft)			
		(Mgpy)	(cu-ft/yr)		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 in the 5- and 10-year zones of the wells. These rural areas are zoned "Rural-20", which allows one house per 20 acres.

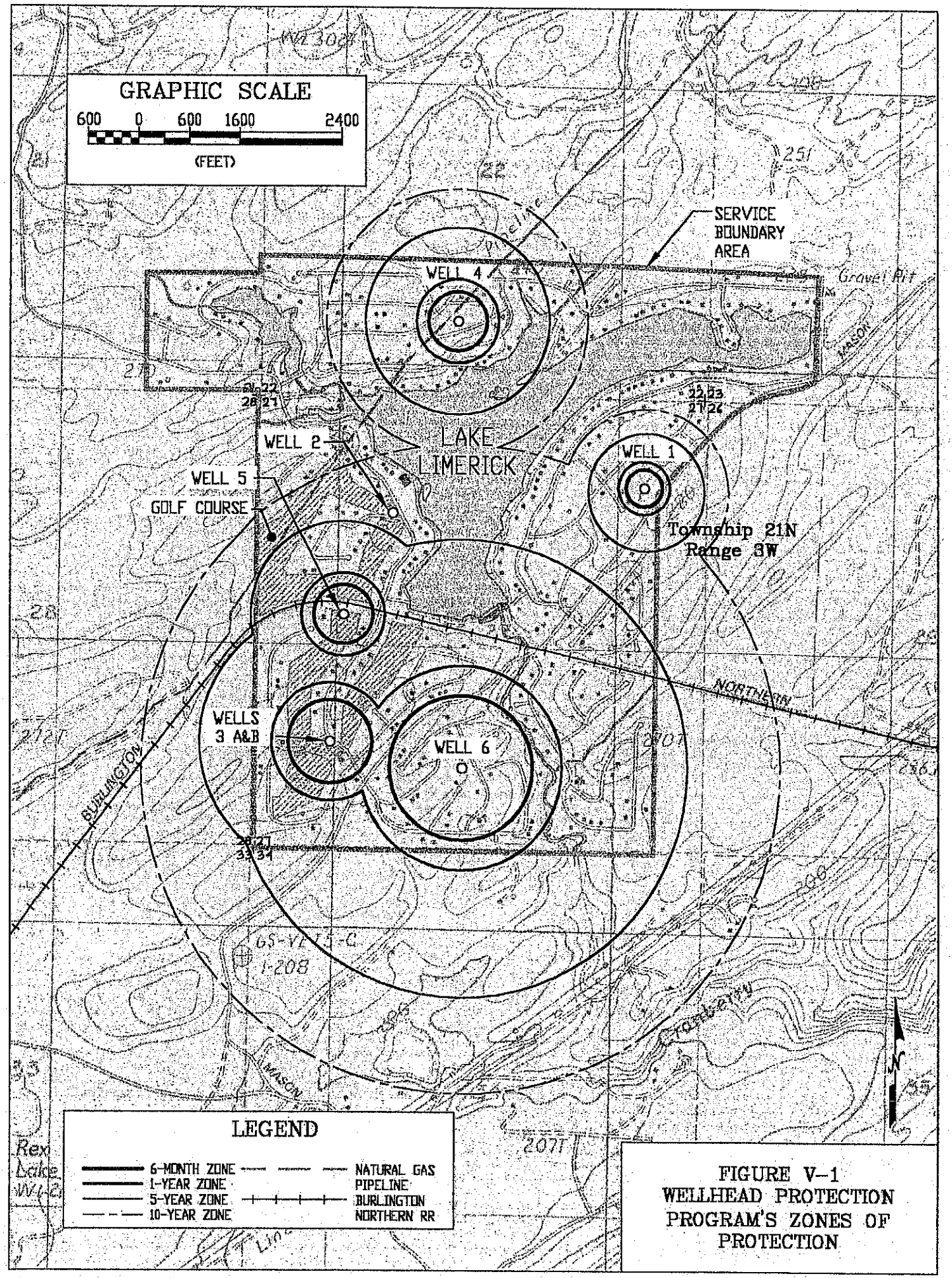

FIGURE V–1
WELLHEAD PROTECTION PROGRAM'S ZONES OF PROTECTION

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. This is the most likely source of contamination.

The second most likely source of contamination is golf course. The golf course personnel should be encouraged to use minimal amounts of fertilizer, pesticides, and herbicides on the golf course.

Although Lake Limerick and its associated streams are not a potential "source" of contamination, contaminants in these waters may reach the well water sooner than contaminants on the ground.

Spills or defoliation treatments along the roads and highways is another source of contamination 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, it would evaporate. The likelihood of a railroad accident is small.

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 F.

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

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 Trustees. One trustee is elected as president of the Board and a water committee is formed. The Board entrusts the day-to-day operations of the water system to a certified water distribution manager.

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
Trustees	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 commissioners 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:	Frank Meriwether 360-236-3030
Department of Health Coliform Program:	Sandy Brentlinger 360-236-3044
Drinking Water Program Coordinator Mason County Department of Health	Arlene Hyatt (360) 427-9670 ext.293 FAX: 427-8442
Mason County Fire Marshall:	Craig Haugen (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, as established by the Department of Health. 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 Sample/ 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 sample 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 Sample	Upstream Sample	Downstream Sample
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	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

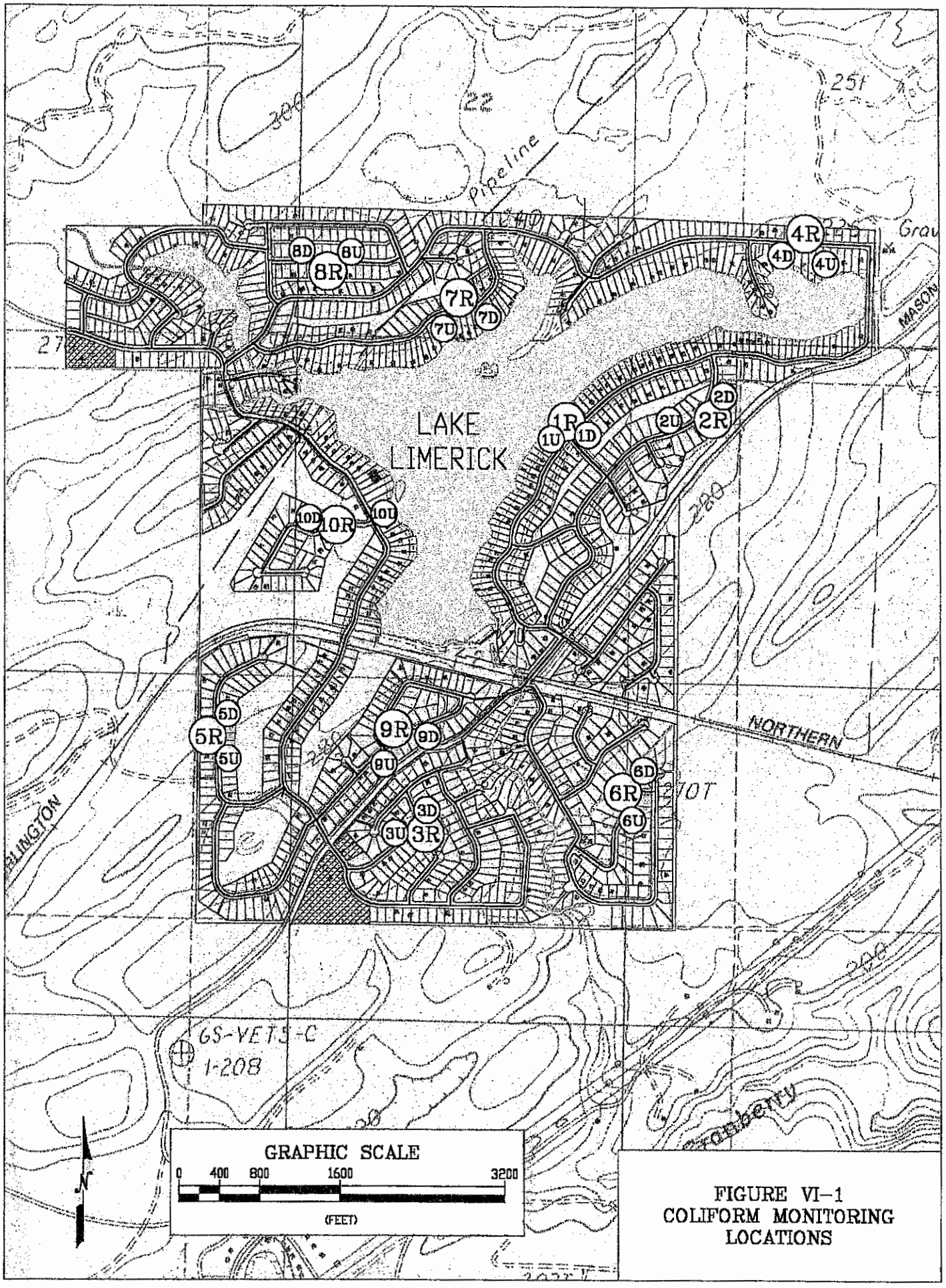

FIGURE VI–1
COLIFORM MONITORING
LOCATIONS

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 preformed 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.

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, Iliad 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 it is therefore not expected that trench wall shoring would be required for repair of the underground facilities. In the unlikely event that a main break were to cause enough erosion of the trench that trench wall shoring would be required, the repair personnel will import crushed stone to backfill the eroded portion of the trench before performing repairs.

G. Cross-Connection Control Program

On June 20, 1998, the Lake Limerick Country Club Board of 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. It is recommended that a CCCS be on staff to carry out the day-to-day activities which among other things will include daily field work, hazard assessments, inventory management, public contacts, and recordkeeping.

The CCCP is then to be implemented as follows (assume water system plan is approved by 2/1/06):

Adoption of Enabling Ordinance:	(2/1/06)
Begin Training Local Manager	(2/1/06)
Begin Consumer Education	(3/1/06)
Obtain Contract CCC Specialist	(4/1/06)
Establish List of BA Testers	(4/1/06)
Begin Record-keeping	(4/1/06)
Establish Inspection Procedures	(6/1/06)
Begin Evaluation of New Connections	(6/1/06)
Begin Notices of Annual Inspections Due	(7/1/06)
Begin Procedure for Response To Incidents	(7/1/06)
Begin Inspection of Existing Connections	(9/1/06)
Inspect One Third of Existing Connections by	(9/1/07)
Inspect Two Thirds of Existing Connections by	(9/1/08)
Inspect All of Existing Connections by	(9/1/09)

Continue updating testing and hazard assessments

H. Service Reliability

The ability of the Lake Limerick Water System to provide service during certain adverse condition has been analyzed and is detailed below. As discussed below, the system should be able to maintain service during power fail or during the loss of any one well site. However, it is import 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 backup generators. Well Sites 3 & 6 have backup generators. A backup generator at Well Site 1 can be hooked up in a matter of hours. 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 1,125 gallons. Therefore, the system will need a minimum of 48,675[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, both of which produce 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 that 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. 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 without any one well site. 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] 41,550 + 1,125 = 48,675.

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 exceptions in accordance with WAC 246-290-125. The projects that exceptions 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 exception designated in WAC 246-290-125 in writing. Treatment improvements ineligible for exception, 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 exception. 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

itself, must provide means for preventing the backflow of water into the chlorine.

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

[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

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.

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.

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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)

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.

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

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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(23)

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.

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, there are no known specific deficiencies of a critical nature in the Lake Limerick Water System. However, some of the infrastructure may be nearing the end of its useful life. The Water Committee should initiate a program of regular renewal and replacement to be continued until all facilities have been serviced. The key elements of a system improvement program are recommended as follows:

A. Capital improvement program

1. Repair of booster pump at Well 1 site

The booster pump at the Well 1 site has failed and needs to be replaced. Water from Well 1 is currently being pumped direct to the distribution system, rather than to the tank.

Estimated cost: $3,500

2. 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

3. 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 three years. The testing and maintenance of the assemblies will be included in the operating and maintenance budget for the system.

Estimated cost: $ 108,000

4. 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

5. Mason Lake Road line replacement

The distribution main that is installed along Mason Lake Road between Ballantrae Drive and Olde Lyme Road shows evidence of leakage. Replacing this main is recommended to complete the distribution system loop around the lake.

Estimated cost: $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
Well 1 Booster	3,500							
Meter Calibration	5,200	5,200	5,200	5,200	5,200	5,200	5,200	5,200
Backflow Prevention		27,000	27,000	27,000	27,000			
Main Replacement			10,000	10,000	20,000	20,000	30,000	30,000
Mason Lake Rd. Pipe	30,000							
Total	38,700	32,200	42,200	42,200	52,200	52,200	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 of services. However, the financial records are generally kept a one set of accounts, and the water system is not covered by separately compiled financial statements. Only Income Statements are developed separately for the water system.

A. Rates and Charges

Charges for water service include an annual fee of $240 for a metered lot (residence). A non-metered lot (low-level use, e.g. "camping") is charged an annual fee 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 $2.00 per thousand gallons. A non-metered lot will be charged a fixed monthly rate of 5$. A full use connection incurs a one-time charge of $1,000 for general facilities.

The fixed allotment of 12,000 gallons per month is equivalent to 394 gal/day/ERU. 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 exceed the daily average rate 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 fixed rate of $17/mo, the customer senses that he is paying $1.42 per thousand. Above the allotment, the $2.00 per thousand rate represents an increase of 40% in the marginal cost of water. This should cause some price elasticity, or voluntary curtailment to avoid expected cost. A number of other charges for services provided to the members are assessed each year. These may contribute to some additional price sensitivity for water use.

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-1Income 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		473,477
Fixed Assets	2,573,542	2,656,487	2,837,916		3,849,414
Less Accumulated Depreciation	(1,380,731)	(1,422,096)	(1,604,001)		(1,706,825)
Net Book Value	1,192,811	1,234,391	1,233,915	-	2,142,589
Other Assets	46,013	54,888	63,318		79,386
Total Assets	1,512,776	1,648,482	1,658,954	-	2,695,452
Current Liabilities	72,254	117,712	75,468		169,596
Long Term Liabilities	76,178	36,732	3,193		494,817
Capital	1,364,343	1,494,038	1,580,293		2,031,039
Total Liabilities	1,512,775	1,648,482	1,658,954	-	2,695,452

The current assets are typically 3 of 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.

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
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	(38,700)	(32,200)	(42,200)	(42,200)	(52,200)	(25,200)	(35,200)	(35,200)
Net Funds Forward	(9,581)	162	(437)	(5,529)	(13,176)	11,554	(3,413)	(7,159)
Funds Accumulated	(9,581)	(9,419)	(9,856)	(15,385)	(28,561)	(17,007)	(20,420)	(27,579)

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 indicate that the financial conditions are almost in balance through the forecast period. A total accumulated shortfall of $27,000 is predicted for 2013. Assuming 1,150 customers, this shortfall would require rates to increase by about $2 per customer per month.

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

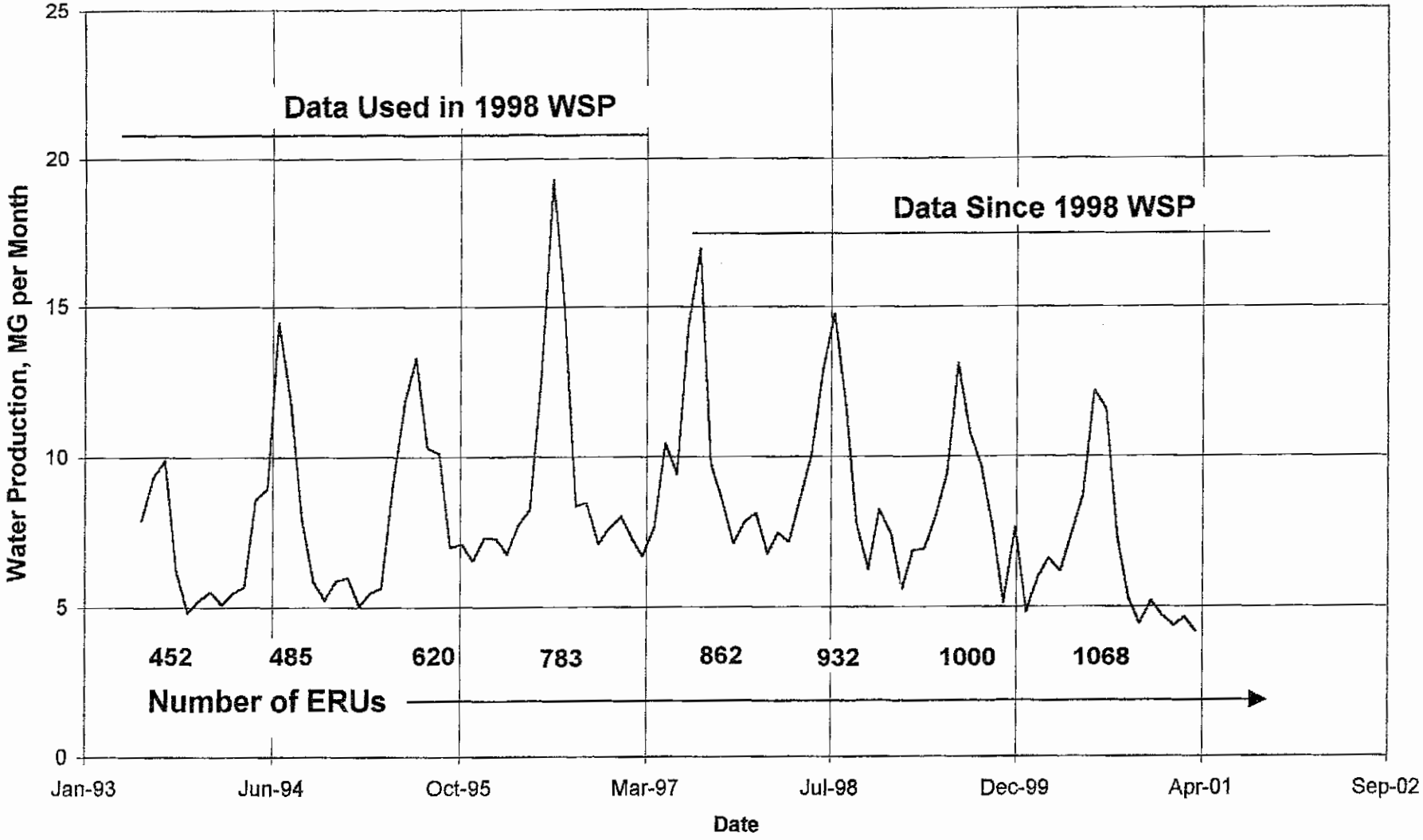
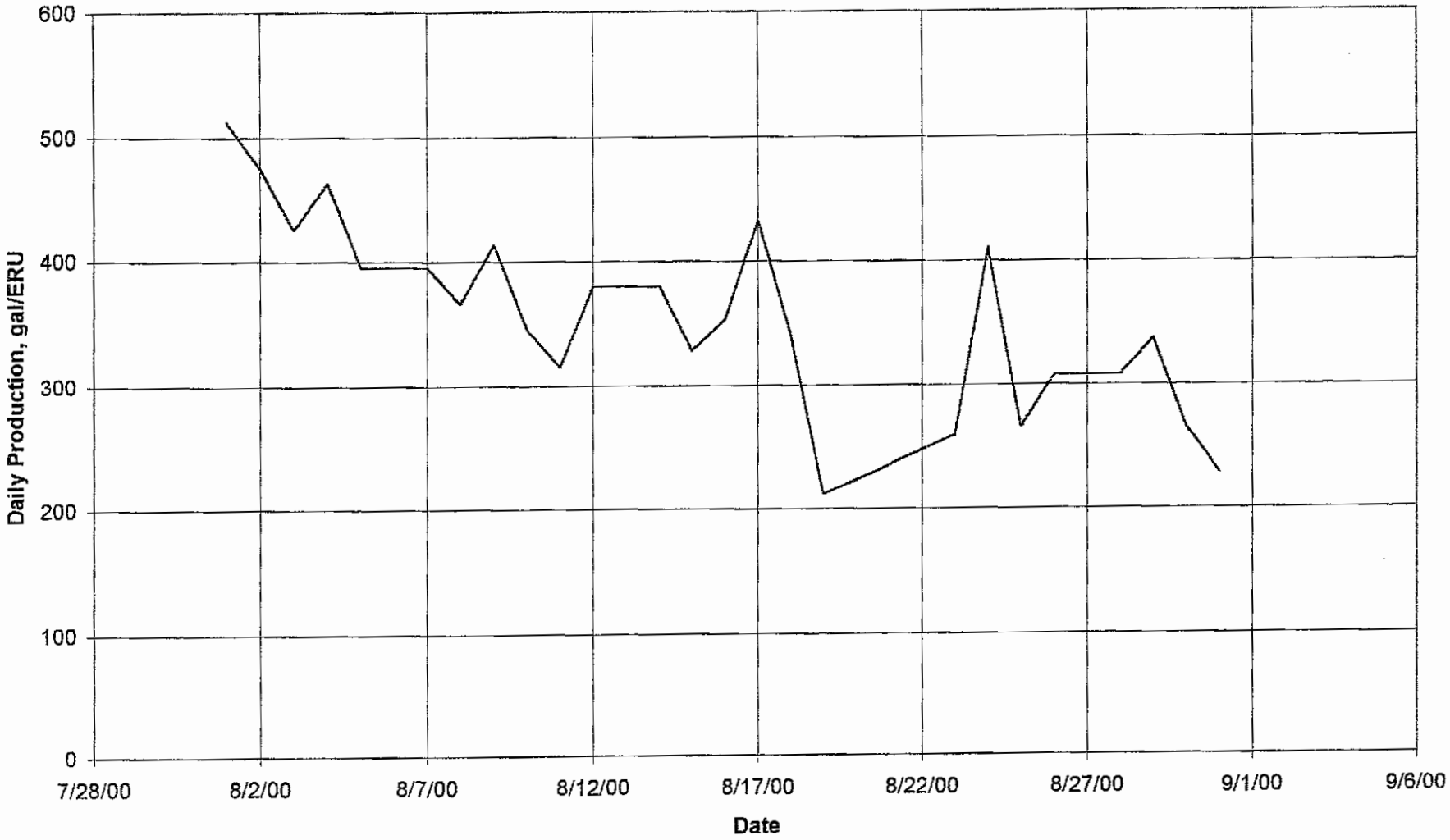


Figure 2
Daily Water Use, August, 2000



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

$$ERU(N) := \begin{cases} N \text{ if } \frac{(V_{AV})}{N} > 200 \\ \frac{(V_{AV})}{200} \text{ otherwise} \end{cases} \qquad \frac{(V_{AV})}{N} = 192 \qquad \frac{(V_{AV})}{200} = 1632$$

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

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

ALLOCATION OF STORAGE

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

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

$V_O = 8600$	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

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

$N = 1345$

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

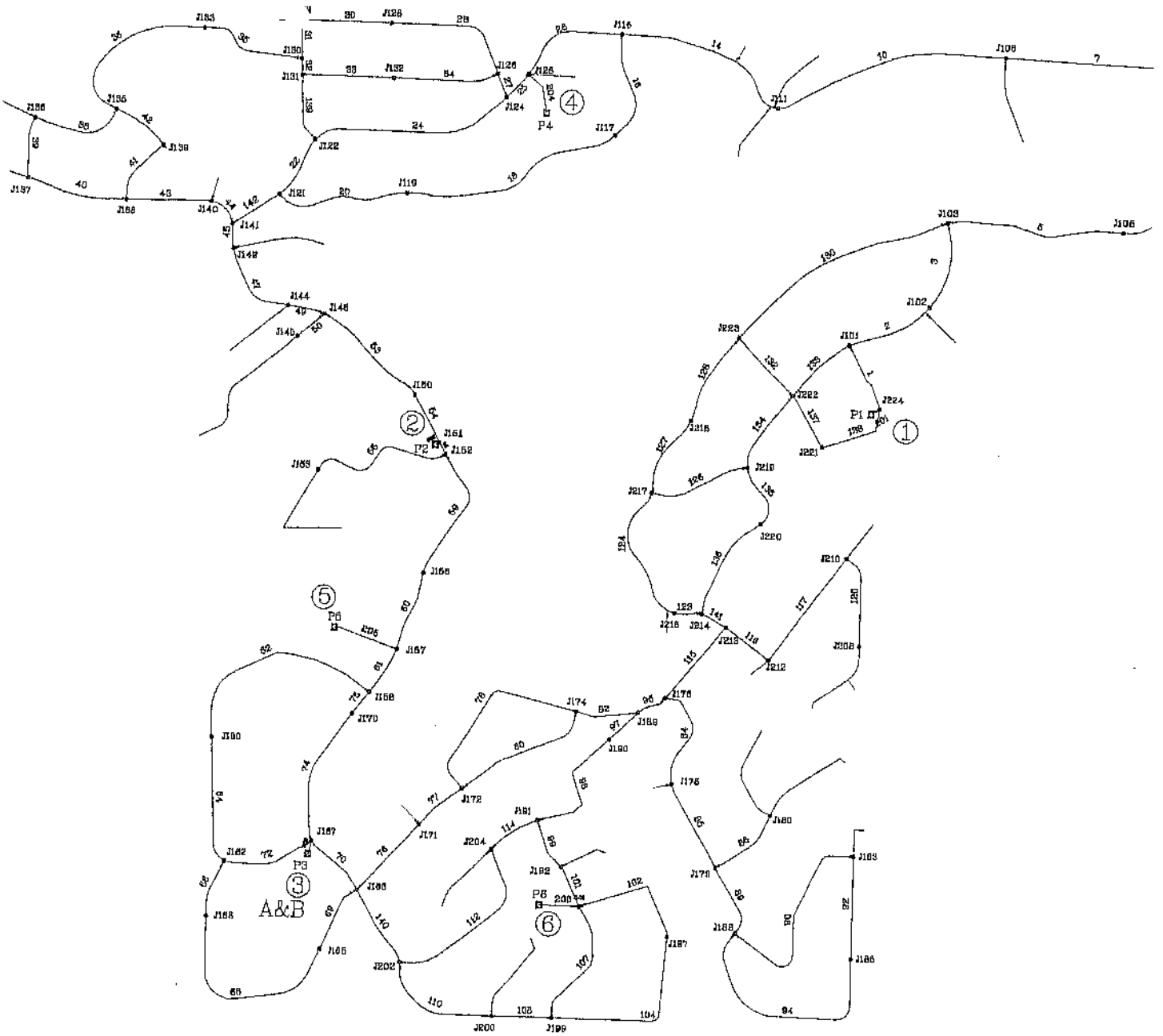
(+) INFLOWS INTO THE SYSTEM FROM BOUNDARY NODES
(-) OUTFLOWS FROM THE SYSTEM INTO BOUNDARY NODES

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


J103
J106
J102
J223
J101
J222
J224
P1
J221
J216
J217
J218
J220
J214
J215
J212
J210
J208
J176
J174
J189
J190
J178
J180
J179
J188
J186
J169
J172
J171
J204
J182
J202
J200
J199
J187
J167
J162
P3
A&B
J168
J166
J165
J158
J157
J170
J160
J161
P2
J152
J148
J144
J146
J142
J141
J140
J138
J136
J135
J137
J121
J122
J124
P4
J126
J128
J131
J130
J133
J116
J111
J117
J119
J106

Appendix B: Municipal Water Law and Required Attachments

MASON COUNTY FIRE MARSHAL

Mason County Bldg. III 426 W. Cedar
P.O. Box 186 Shelton, Washington 98584
(360) 427-9670 Ext. 273

CODE ENFORCEMENT | FIRE INSPECTIONS | FIRE INVESTIGATION | PUBLIC EDUCATION

February 22nd 2007

Lake Limerick Country Club
Water Committee
790 E St. Andrews Dr.
Shelton, WA 98584

Water Committee;

I am responding to your letter dated June 26, 1998, regarding the Lake Limerick Water System.

I have received a copy of a response letter from Mason County FD 5, which I feel accurately covers any response that I might have. As you can see by the letter, FD 5 is well aware of the capabilities of the Lake Limerick water system. One point I would make is relevant to the many water system plans that we review and approve.

The Washington State Health Department includes our review in the approval of water system plans and upgrades. My focus in those reviews is to address fire flow capabilities. Although some water systems in Mason County do have a level of fire flow capability, many do not.

When we review a water system plan, we address fire flow issues in relation to what is being done to the system. If an upgrade involves only increased storage, with no subsequent improvement in the distribution system, we require at minimum a drafting hydrant at the storage tank. If the improvements involve expansion of storage and the distribution system, we address a broader range of issues, including larger water mains and more fire hydrants.

For the record, the Lake Limerick Water System does not currently meet the minimum fire flow requirements in the International Fire Code. We would address this deficiency in several ways. In the case of a commercial building expansion or new construction, if the fire flow demand of the building exceeds the fire flow capabilities of the water system, we would require additional fire protection for the building, i.e., a sprinkler system and a fire alarm system. If we detected inadequate hydrant coverage in a particular area in the development, we would require additional fire hydrants.

MASON COUNTY FIRE MARSHAL

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CODE ENFORCEMENT | FIRE INSPECTIONS | FIRE INVESTIGATION | PUBLIC EDUCATION

Thank you for your interest in fire protection. If you have any question, please contact me.

Best Regards,

Craig Haugen
Mason County Fire Marshal

RECD SEP 09 2006

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: Aug 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	Yes
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	Yes
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	NA
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	NA
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.

Robert D Fink
Signature

Sept 6, 2006
Date

Robert D Fink, Planning Manager, Mason County
Printed Name, Title, & Jurisdiction

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

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

KENNETH DOUGLAS TITLE: WDM 1
F 790 ST ANDREWS DR
SHELTON WA 98584

STREET ADDRESS IF DIFFERENT FROM ABOVE
ATTN
ADDRESS
CITY STATE ZIP

7. OWNER NAME & MAILING ADDRESS **8. Owner Number** 003162

LAKE LIMERICK COUNTY CLUB INC
KENNETH DOUGLAS TITLE: MANAGER
F 790 ST ANDREWS DR
SHELTON, WA 98584

STREET ADDRESS IF DIFFERENT FROM ABOVE
ATTN
ADDRESS
CITY STATE ZIP

9. 24 HOUR PRIMARY CONTACT INFORMATION

Primary Contact Daytime Phone:	(360) 426-4563
Primary Contact Evening Phone:	(360) 426-0775
Primary Contact Mobile/Cell	
Fax: (360) 426-8922	E-mail: llws@hctc.com

10. OWNER CONTACT INFORMATION

Owner Daytime Phone:	(360) 426-4563
Owner Evening Phone:	
Owner Mobile/Cell Phone:	(360) 426-0775
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
- [ ] Managed Only
- [ ] Owned Only

SMA NAME: _____ SMA Number: _____

12. WATER SYSTEM CHARACTERISTICS (mark ALL that apply)

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

13. WATER SYSTEM OWNERSHIP (mark only one)

- [ ] Association
- [ ] City / Town
- [ ] County
- [ ] Federal
- [ ] Investor
- [x] Private
- [ ] Special District
- [ ] State

14. STORAGE CAPACITY (gallons)

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 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 WELL FIELD	SPRING	SPRING FIELD	SPRING IN SPRINGFIELD	SEA WATER	SURFACE WATER	RANNEY / INF. 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
A. How many visitors, attendees, travelers, campers, ients or customers have access to the water system ach 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 lhws@hctc.com	Fax 360-426-8922	E-Mail: lhws@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*)	1,150		
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	0		
B. Institutional, Commercial / Business, School, Day Care, Churches, Fire Stations, Industrial Services, etc.	4		
28. TOTAL SERVICE	1,154		

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: Kirk Osborne DATE: 1/10/2007

PRINT NAME: Kirk Osborne TITLE: Water Comm Sec.

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 King (Owner's number, if any) -
NE ¼ NE ¼ Section 27 T 25N. R 3 W.M.
Bearing and distance from section or subdivision corner

(3) TYPE OF WORK (check):
New Well ☒ 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 ☒ Jetted ☐
Dug ☐ Bor d ☐

(6) CASING INSTALLED: Threaded ☐ Welded ☒
10 " Diam. from 0 ft. to 115 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 ☒ Yes ☐ No
Manufacturer's Name Edward E. Johnson Inc.
Type Stainless steel Model No.
Diam. 10" Slot size .050 Set from 89' ft. to 99' 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 ☒ 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? ☒ 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? ☒ 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 Tyee Well Drilling Co.
(Person, firm, or corporation) (Type or print)
Address Division Tacoma Pump & Drilling Co. Inc
P.O. Box 3, Tyee WA

(Signed) [signature]
(Well Driller)

License No. Date 3/28/66, 19

USE ADDITIONAL SHEETS IF NECESSARY)

ck/wb

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
SOUTH & EAST OF
NW COR. SECTION 27
1405   1555

(3) TYPE OF WORK (check):
New Well ☒ 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 ☒ 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 ☒ 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 ☒ 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 ☒ 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 ☒ 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 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? ☒ 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 streaks of [illegible]	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. 7356—Rev. 9-62—8-62—5M. 75168.

8

503

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.
Shelton, 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
E. 240' ±

(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 [ ] Jetted [ ]
Dug [ ] Bored [ ]

(6) CASING INSTALLED: Threaded [ ] Welded [ ]
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 [ ] Yes [ ] No
Manufacturer's Name JOHNSON
Type STAINLESS STEEL Model No.
Diam. 10" Slot size 30 Set from 131 ft. to 145 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 17-67
Artesian pressure lbs. per square inch Date
Water is controlled by OK/PE
(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? 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
Com. Gr.	3	72
Gr. Sand (water)	72	77
Com. Gr.	77	79½
Sandy Gr. (water)	79½	80½
Gr. Sand	80½	92
Com. Gr.	92	110
Gr. & Sand	110	111
Com. Gr.	111	112
Gr. Sand	112	113
Com. Gr.	113	126
Com. 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)

S. F. No. 1336—Rev. 9-62—8-62—5M—7516

9

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 ..... 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 FEET 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. Dickinson 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

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. 7889
Permit No. 9218

(1) OWNER: Name Lake Limerick Address

(2) LOCATION OF WELL: County Mason E/2 SE ¼ SW ¼ 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 S.S. Steel Model No.
Diam. 10" Slot size 90 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
Bailer test 93 gal./min. with 8 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
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] William J. Russell
(Well Driller)

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

OK/WRR

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 1356-1 (Rev. 2-60)—2-60—5M. 4516.

11

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 82-2715

(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 ☒ Driven ☐
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 S.S. 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? 20 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	120

RECEIVED
NOV 10 1986
WASHINGTON STATE DEPARTMENT OF ECOLOGY

Work started 10-23 19 86 Completed 10-30 1986

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. Neil JR
(Well Driller)
License No. 1455 Date 11-3 1986

(USE ADDITIONAL SHEETS IF NECESSARY)

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Well 6
508
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 Cl. 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) #6
Abandoned ☐ New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Cable ☐ Rotary ☒ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 534 feet. Depth of completed well 534 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 24 " Diam. from 0 ft. to 284' ft.
Welded ☒ 8" Diam. from +1' ft. to 529 ft.
Liner installed ☐ ______ " Diam. from ______ ft. to ______ ft.
Threaded ☐

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 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 D.
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	199	2:05	131	9:01	189
9:25 Am	134	13:36	137	11:00	232
12:50	132	1:05	137		

Date of test 10/[illegible]/88

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

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
Fill	0'	1'
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~
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'	128'
BROWN SANDY CLAY	128'	138'
GRAVELLY SAND H_2O	138'	140'
BROWN HARDPAN	140'	145'
BROWN ROCKY CLAY	145'	151'
BLUE CLAY	151'	161'
BLUE HARDPAN W/VOLCANICS	161'	165'
GRAY CEMENTED GRAVEL W/ H_2O	165'	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	232'	263'

Work started 10/01/88, 19 ___ Completed 10/03/88, 19 ___

OCT 7 AM 11:27 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 Walker PK Shelton

(Signed) Jack Watkins (WELL DRILLER) License No. 1465

Contractor's Registration No. ARCADDI147K1 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 Yakima 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 ☐ Reconstructed ☐ 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 ☐ 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: 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.
Airlift 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 10/05/88 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 150 Washington Park Shelton

(Signed) (WELL DRILLER) License No. 1465

Constructor's Registration No. ARCADDR*MA Date 10/5/88 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1820

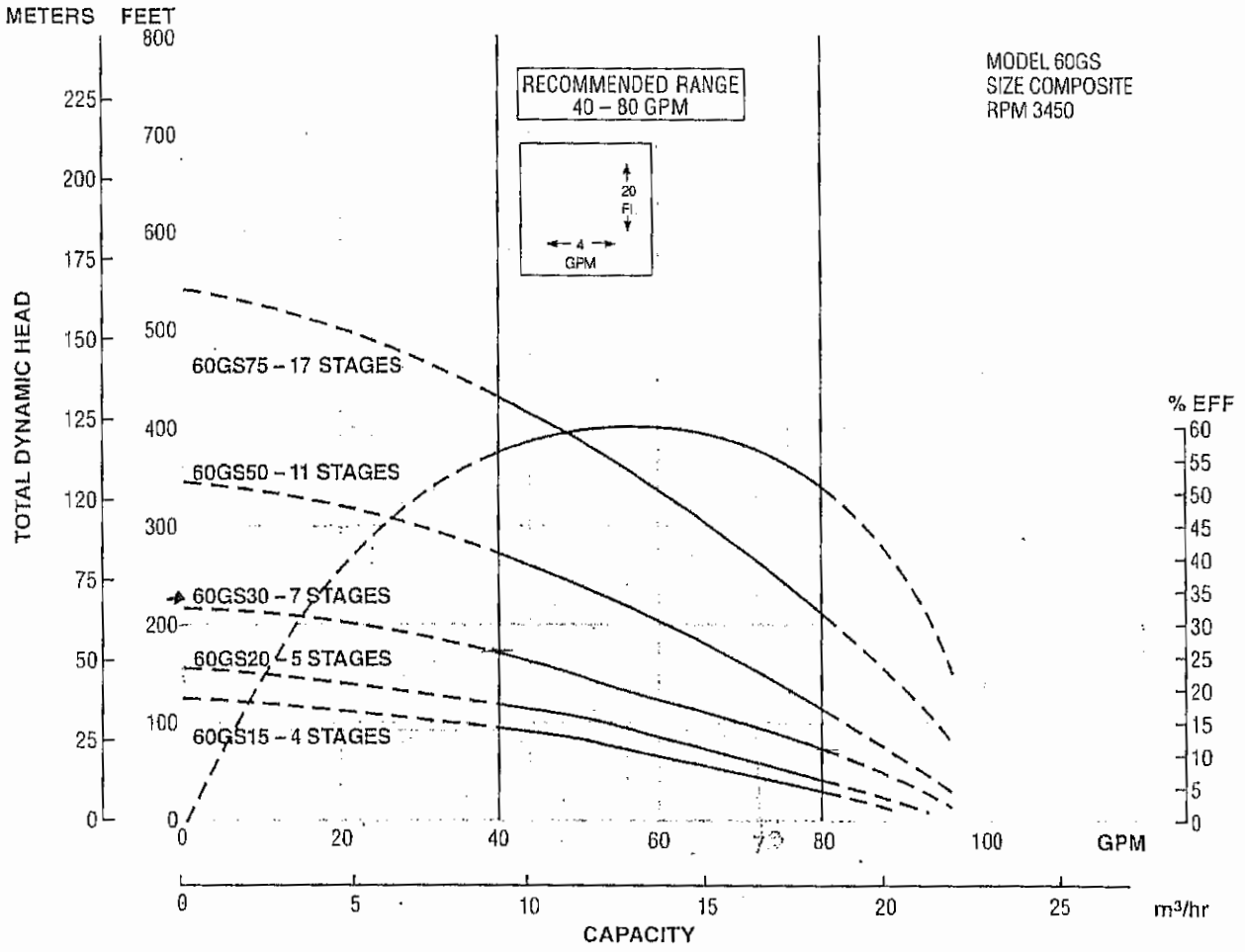
14

Well 1

Model 60GS

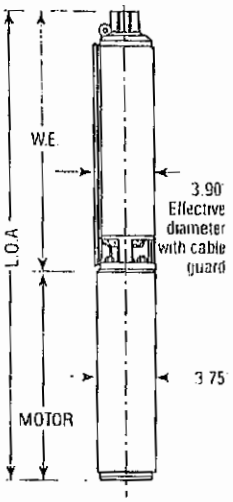
Well #1

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				



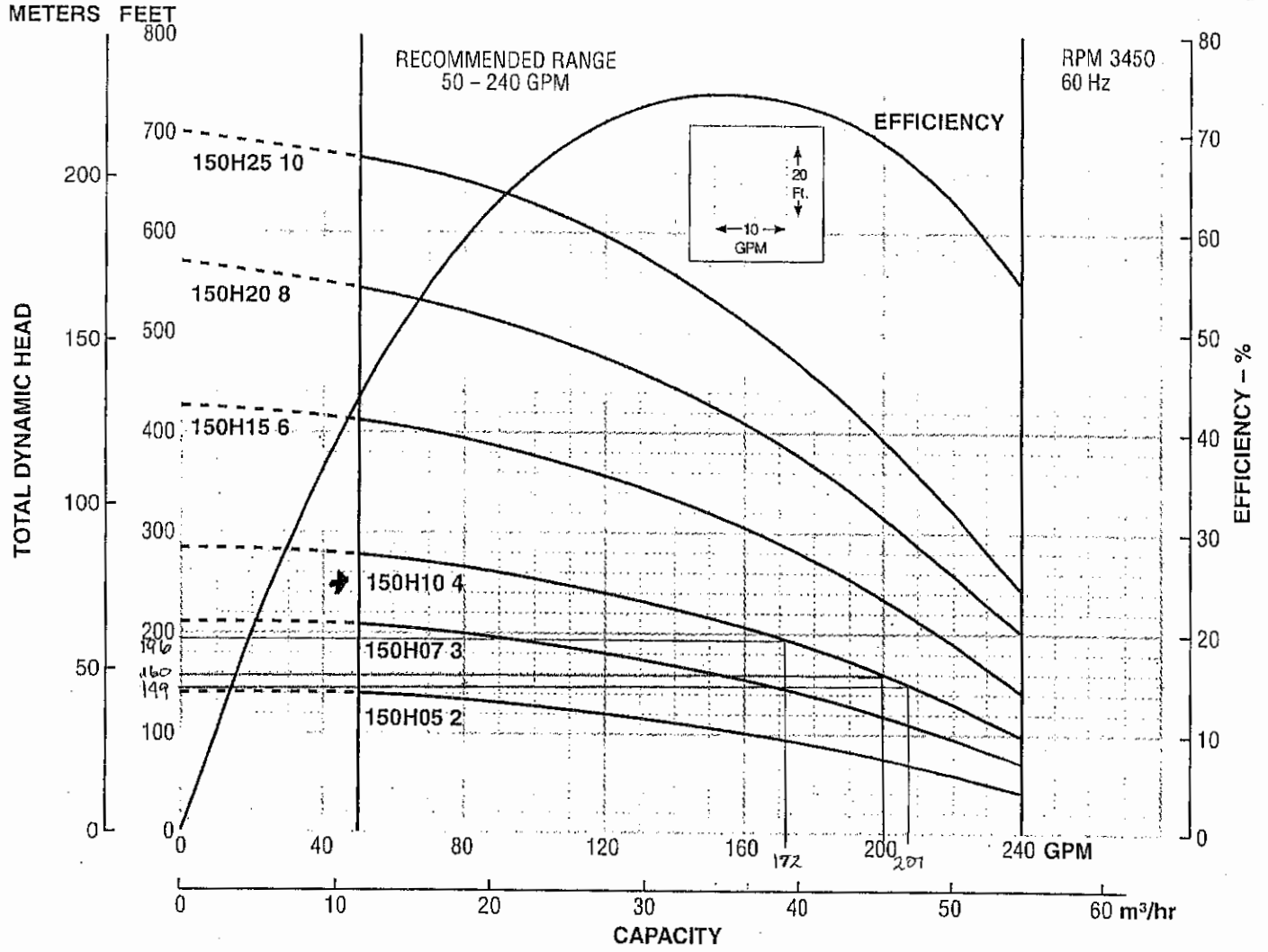
NOTES:
For complete pump, order water end and motor.
(1) W.E. = water end or pump without motor.
(2) L.O.A. = length of assembly – complete pump – water end and motor.
* Non-stock motors have a 6 week lead time.

Well 2

Model 150H

Well #2

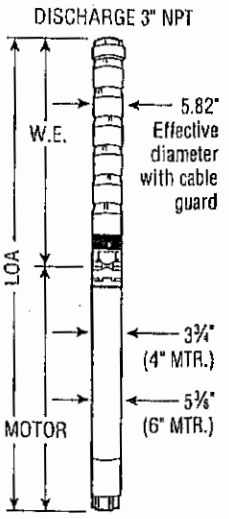
GOULDS PUMPS



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.

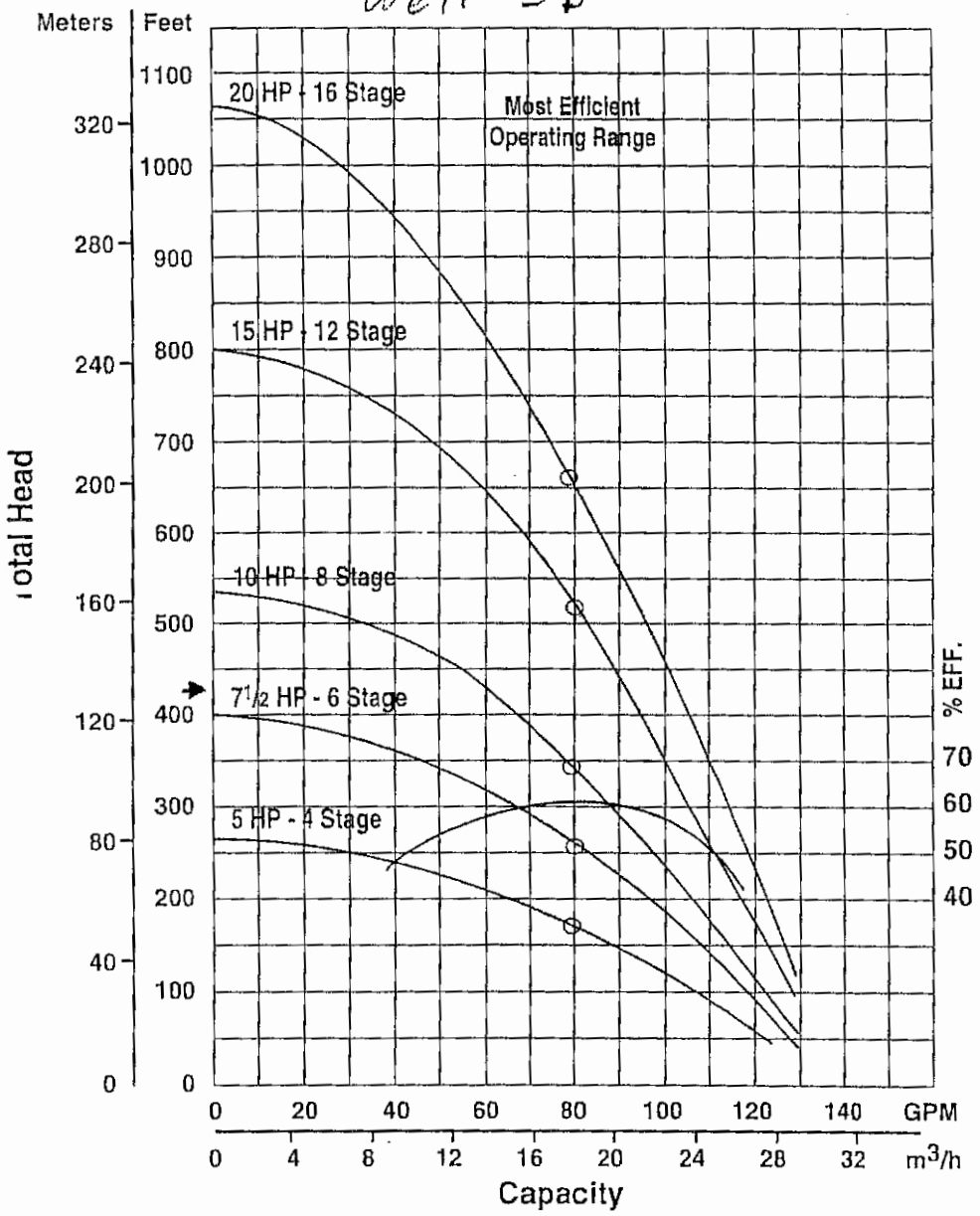
16

Well 3B

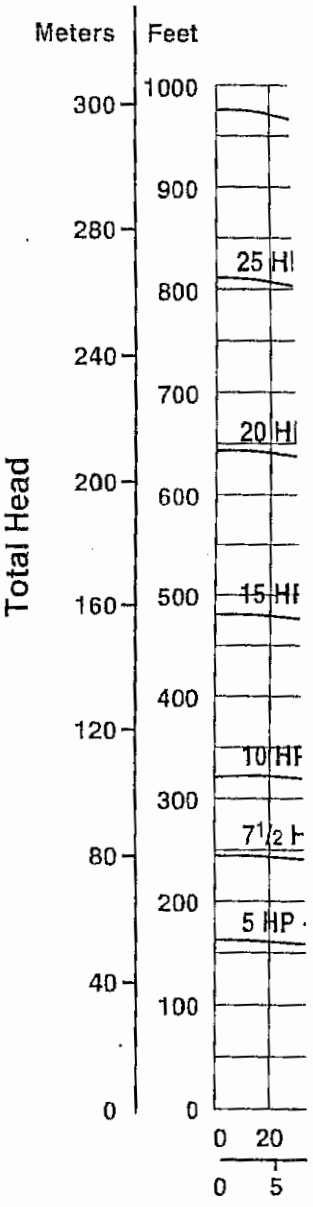
Composite Performance Curves
Minimum Well Size 6″ ID

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

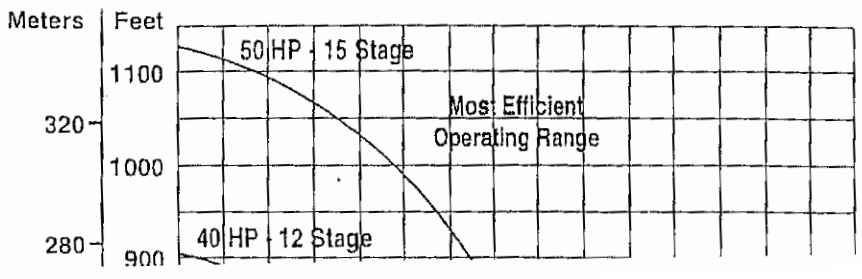
Well 3b



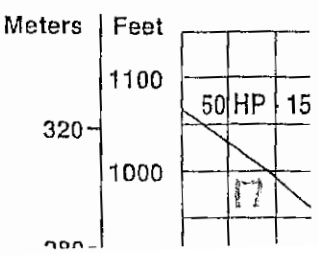
120 GPM • 5 thru



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



250 GPM • 5 thru

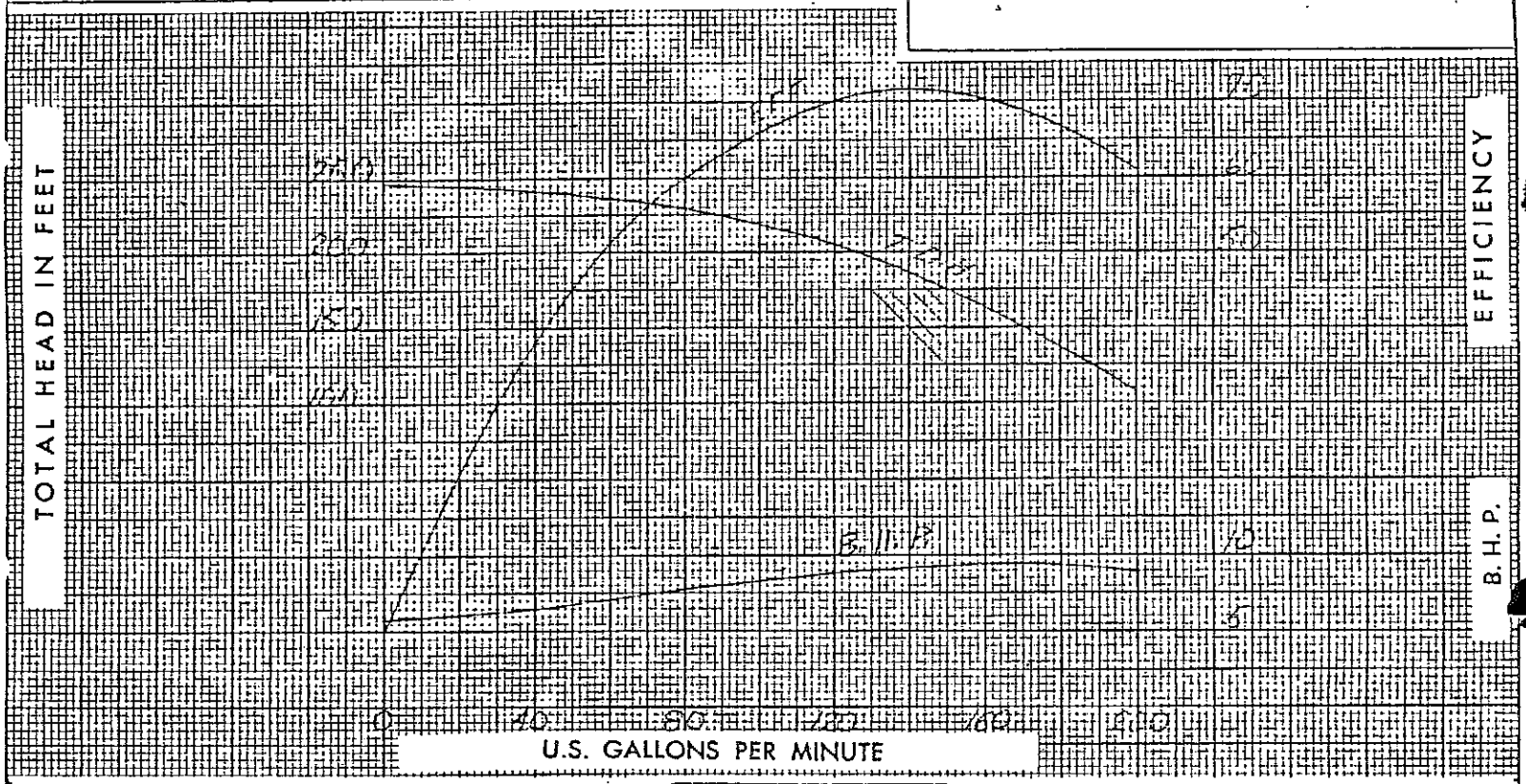


Well 4

18

85' SETTING

10 HP DEEP WELL TURBINE PUMP



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

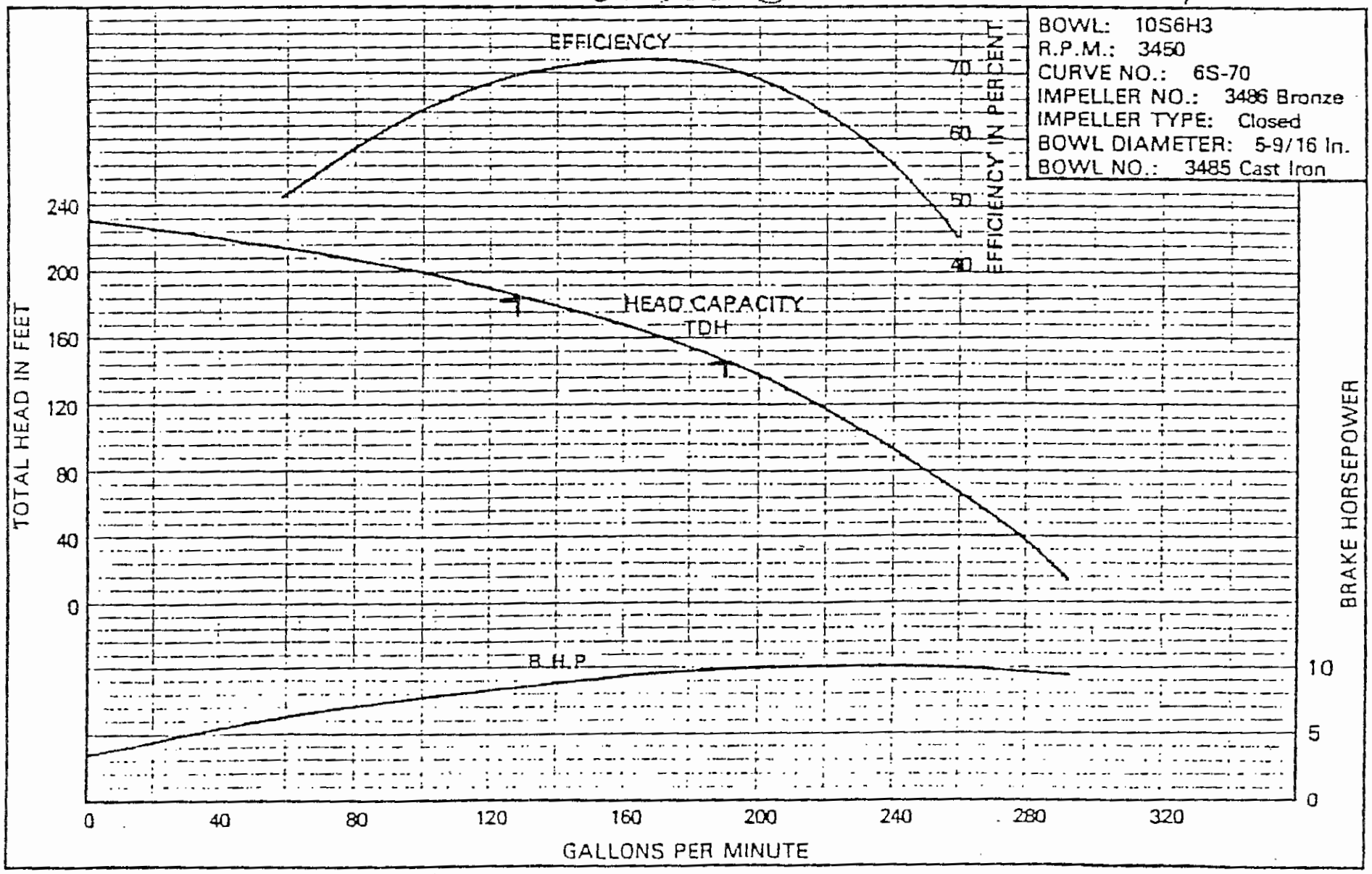
FLOWAY PUMPS, INC., FRESNO, CALIF.

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

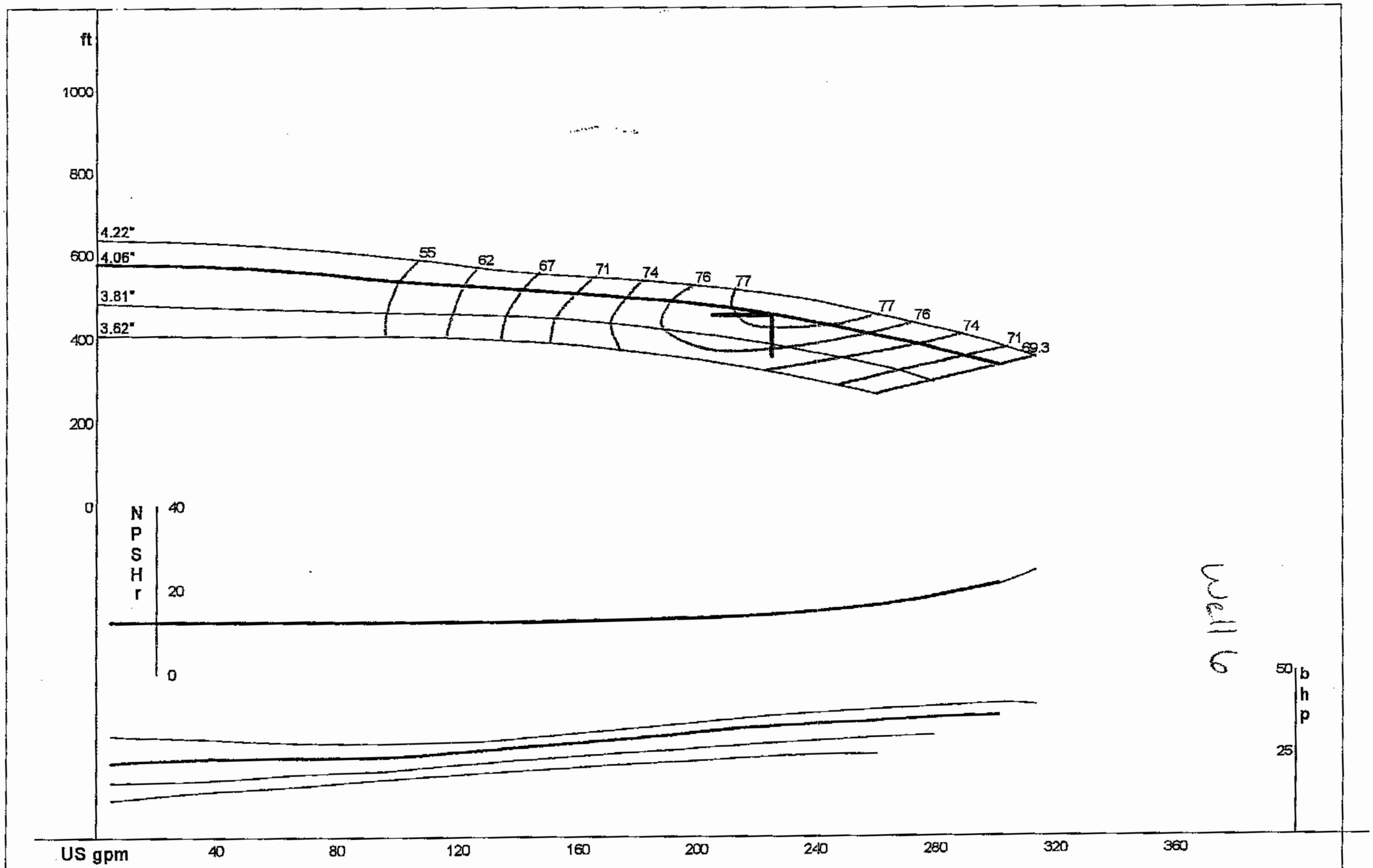
WELL NO. 4

DWN. BY D. Z. DATE 1-11-23

Jacuzzi



Well 5



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

20

Appendix D: Water Rights Self-Assessment, Available Water Rights Certificates, and Application for Water Rights for Well 3B

Table 3 Existing Water Right(s) Status

	Permit Certificate or Claim #	Name of Right- holder or Claimant	Priority Date	Source Name/ Number	Primary or Supple-mental	Existing Water Rights		Existing Consumption		Current Water Rights Status (Exess/Deficiency)	
						Max. Instant. Flow Rate (Qi)	Max. Annual Volume (Qa)	Max. Instant. Flow Rate (Qi)	Max. Annual Volume (Qa)	Max. Instant. Flow Rate (Qi)	Max. Annual Volume (Qa)
Permit/Claim											
1	5566	Lake Limerick Corp. & Osberg Constuction Co.	4/19/66	S05	P	100 gpm	117 ac-ft	45 gpm	5 ac-ft	55 gpm	112 ac-ft
2	5887	Lake Limerick Country Club, Inc	6/30/67	S02	P	200 gpm	166 ac-ft	200 gpm	0 ac-ft	0 gpm	166 ac-ft
3	5888	Lake Limerick Country Club, Inc	6/30/67	S03	P	100 gpm	84 ac-ft	100 gpm	8 ac-ft	0 gpm	76 ac-ft
4	7012	Lake Limerick Country Club Estates	11/19/68	S04	P	100 gpm	79 ac-ft	75 gpm	13 ac-ft	25 gpm	66 ac-ft
5	G2-27215C	Lake Limerick Community	11/17/87	S07	S	190 gpm	0** ac-ft	190 gpm	21 ac-ft	0 gpm	-21*** ac-ft
6	G2-27443C	Lake Limerick Country Club	10/26/88	S08	S	200 gpm	0** ac-ft	200 gpm	7 ac-ft	0 gpm	-7*** ac-ft
7											
Total						890 gpm	446 ac-ft	810 gpm	54 ac-ft	80 gpm	392 ac-ft

	Intertie Name/Identifier	Name of Purveyor Providing Water	Existing Limits on Intertie Water Use		Existing Consumption Through Intertie		Current Intertie Supply Status (Exess/Deficiency)	
			Max. Instant. Flow Rate (Qi)	Max. Annual Volume (Qa)	Max. Instant. Flow Rate (Qi)	Max. Annual Volume (Qa)	Max. Instant. Flow Rate (Qi)	Max. Annual Volume (Qa)
1								
2								
3								
4								
Total								

	Pending Water Right Application	Name on Permit	Date Submitted	Source Name/ Number	Primary or Supple-mental	Pending Water Rights	
						Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa) Requested
1	G2-29483	Lake Limerick County Club	04/24/97	Well 3B	S	210 ac-ft	254 gpm
2							
3							
4							
Total						210 ac-ft	254 gpm

**** 0 ac-ft primary water rights, supplementary water rights vary**
***** exceeds *primary* water rights, but is within supplementary water rights**

Table 4 Forecasted Water Right(s) Status

	Permit Certificate or Claim #	Name of Right- holder or Claimant	Priority Date	Source Name/ Number	Primary or Supple-mental	Existing Water Rights		Forecasted Consumption		Current Water Rights Status (Deficiency/Deficiency)	
						Max. Instant. Flow Rate (Qi)	Max. Annual Volume (Qa)	Max. Instant. Flow Rate (Qi)	Max. Annual Volume (Qa)	Max. Instant. Flow Rate (Qi)	Max. Annual Volume (Qa)
Permit/Claim											
1	5566	Lake Limerick Corp. & Osberg Constuction Co.	4/19/66	S05	P	100 gpm	117 ac-ft	100 gpm	38 ac-ft	0 gpm	79 ac-ft
2	5887	Lake Limerick Country Club, Inc	6/30/67	S02	P	200 gpm	166 ac-ft	200 gpm	2 ac-ft	0 gpm	164 ac-ft
3	5888	Lake Limerick Country Club, Inc	6/30/67	S03	P	100 gpm	84 ac-ft	100 gpm	75 ac-ft	0 gpm	9 ac-ft
4	7012	Lake Limerick Country Club Estates	11/19/68	S04	P	100 gpm	79 ac-ft	100 gpm	75 ac-ft	0 gpm	4 ac-ft
5	G2-27215C	Lake Limerick Community	11/17/87	S07	S	190 gpm	0** ac-ft	190 gpm	75 ac-ft	0 gpm	-75*** ac-ft
6	G2-27443C	Lake Limerick Country Club	10/26/88	S08	S	200 gpm	0** ac-ft	200 gpm	113 ac-ft	0 gpm	-113*** ac-ft
7											
Total						890 gpm	446 ac-ft	890 gpm	378 ac-ft	0 gpm	68 ac-ft

	Intertie Name/Identifier	Name of Purveyor Providing Water	Existing Limits on Intertie Water Use		Existing Consumption Through Intertie		Current Intertie Supply Status (Excess/Deficiency)	
			Max. Instant. Flow Rate (Qi)	Max. Annual Volume (Qa)	Max. Instant. Flow Rate (Qi)	Max. Annual Volume (Qa)	Max. Instant. Flow Rate (Qi)	Max. Annual Volume (Qa)
1								
2								
3								
4								
Total								

	Pending Water Right Application	Name on Permit	Date Submitted	Source Name/ Number	Primary or Supple-mental	Pending Water Rights	
						Maximum Instantaneous Flow Rate (Qi)	Maximum Annual Volume (Qa) Requested
1	G2-29483	Lake Limerick County Club	04/24/97	Well 3B	S	210 ac-ft	254 gpm
2							
3							
4							
Total						210 ac-ft	254 gpm

**** 0 ac-ft primary water rights, supplementary water rights vary**

***** exceeds *primary* water rights, but is within supplementary water rights**

505
Well# 1

CERTIFICATE RECORD No. 12 PAGE No. 5566-A

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.

33 127

Special provisions required by the Supervisor of Water Resources: Keith E. Boysen

A description of the lands to which such ground water right is appurtenant:

Plat of Lake Limerick, Division No. 1, within Secs. 22 & 27, T. 21 N., R. 3 W.W.M.

Mail to: Lake Limerick Corp. ... Seattle, Wash.

State of Washington, Dept. of Conservation, 335 General Adm. Bldg., Olympia, Wn.

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WN. REAL ESTATE EXCISE TAX
PAID
NOV 1 8 1966
JOHN B. COLE
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.

Well No. 2 (Div 2) REEL 961R. 001

522
Well #2

CERTIFICATE RECORD NO. 12 PAGE NO. 5887-A

STATE OF WASHINGTON, COUNTY OF Mason

230984

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.

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RECORDED 2 FILED
REEL 12 FRAME 601
AUDITOR MASON COUNTY
Ruth E. Boyer
'67 DEC 7 AM 9:44
REQUEST OF [illegible]

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

Mail to:
Lake Limerick Country Club Inc.
5125 - 25th Ave NE
Seattle, Wn. 98105

[signature]
Assistant Director
Division of Water Management
Department of Water Resources

2

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.

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RECORDED FILED
REEL 42 FRAME 602
AUDITOR MASON COUNTY
'67 DEC 7 AM 9:48
REQUEST OF Dept. of Water Resources

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

Mail: Lake Limerick Country Club, ... Seattle, Wn.

Assistant Director
Division of Water Management
Department of Water Resources

2542772

CERTIFICATE RECORD NO. 15 PAGE NO. 7012-A

STATE OF WASHINGTON, COUNTY OF Mason

S04
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
REEL 72 FRAME 26
AUD. FOR MASON COUNTY
RUTH E. BOYSEN

'70 SEP 30 AM 10:32

REQUEST OF
Dept of Ecology

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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

Mail to:
Manning - Kors
901 Tacoma Ave S.
Tacoma WA 98402

by Glen H. Fiedler

Engineering Data
OK.

560615

DEPARTMENT OF ECOLOGY

I-27 Well #5

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
November 17, 1987	G2-27215	G2-27215 P	G2-27215 C

NAME
Lake Limerick Community

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
REEL 557 FRAME 025-026
AUDITOR MASON COUNTY

S

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 VW

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 .?	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 90.14.180.

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

SR 1 W

by

FOR COUNTY USE ONLY

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.

Q_S = 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 = 130,217,400 gal/yr See page 6.

Then: **Na = 1,321 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 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.

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

PAGE 01

Booster Pump 1

Case: Material C.I. Part. No. L01018 Mach. No. L01018

Impeller: Material C.I. Part. No. M07298 (7/8U) Mach. No. See below Dia. 6-9/16"
S32401 (1½ U)

MODEL

Nominal

Based on Fresh Water
Maximum Working Pr

IMPELLER MACH	
HP	7/8 "U"
5	M07637
7½	M07638
10	M07298

NPSHR

HEAD

6-9/16" (10 HP)

6" Dia. (7½ HP)

5½" Dia. (5 HP)

60% 65% 70% 73% 74% EFFICIENCY 75% 74% 73% 70% 65% 60%

3 BHP 5 BHP 7½ BHP 10 BHP 15 BHP

TOTAL DYNAMIC HEAD IN FEET

225 200 175 150 125 107 100 75 50 25 0

0 50 100 130 150 200 250

CAPACITY IN U.S. GALLONS PER MINUTE

C-8888 Based on T-3957, -1, -2 Supersedes C-8888 Dated 12-7-83

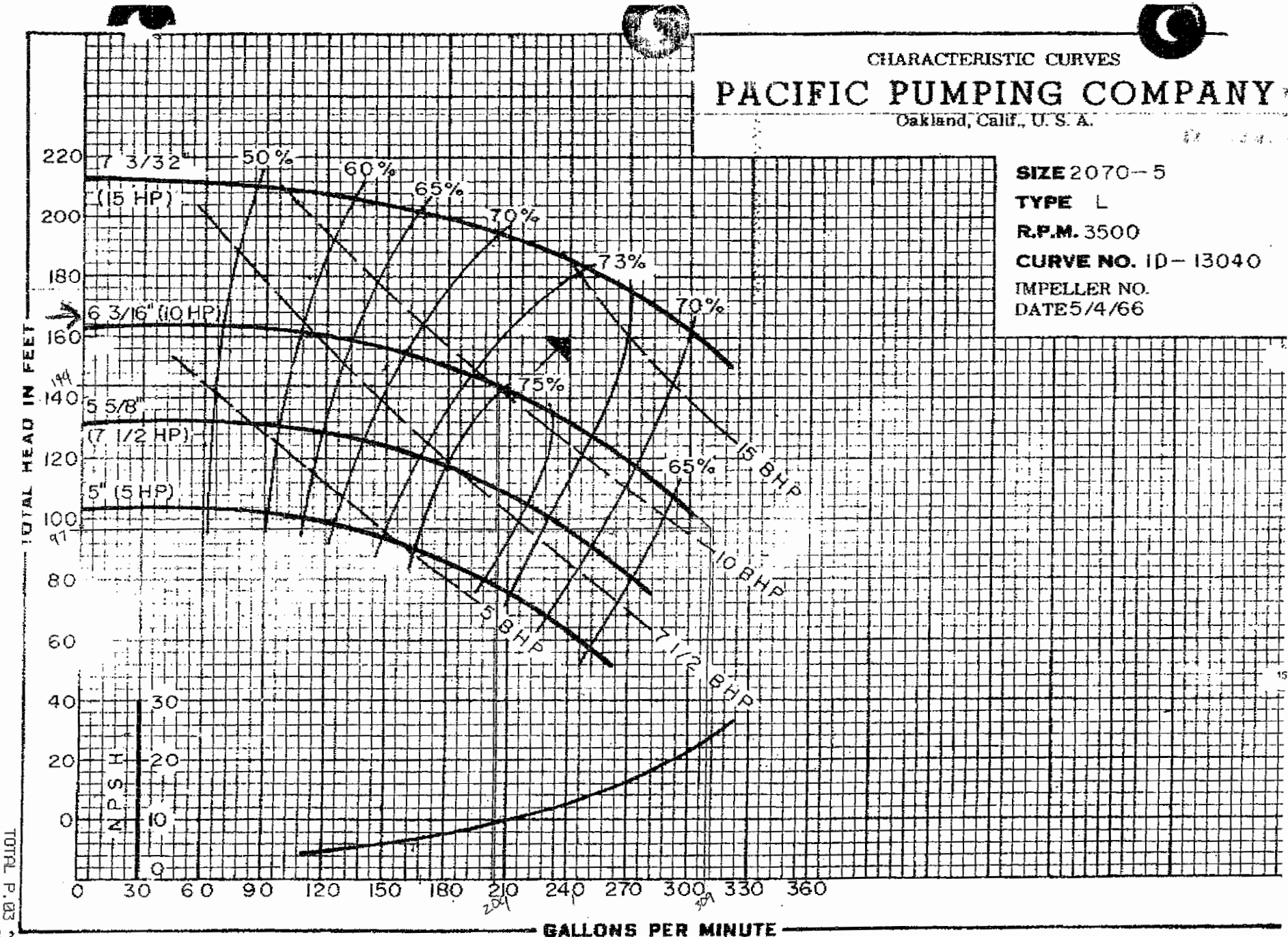
Date 7-30-85 MODEL B1½TP

CHARACTERISTIC CURVES

PACIFIC PUMPING COMPANY

Oakland, Calif., U. S. A.

SIZE 2070–5
TYPE L
R.P.M. 3500
CURVE NO. ID–13040
IMPELLER NO.
DATE 5/4/66



-08-2001 16:34 FROM PACO PUMPS/SEATTLE BRANCH TO 13607535636 P.03

Booster Pumps 3A & 3B

TOTAL P.03

Form RB448 2/54

240 @ 162'

Main Pumps

CHARACTERISTIC CURVES

PACIFIC PUMPING COMPANY

Oakland, Calif., U. S. A.

SIZE 1570 — 1   4

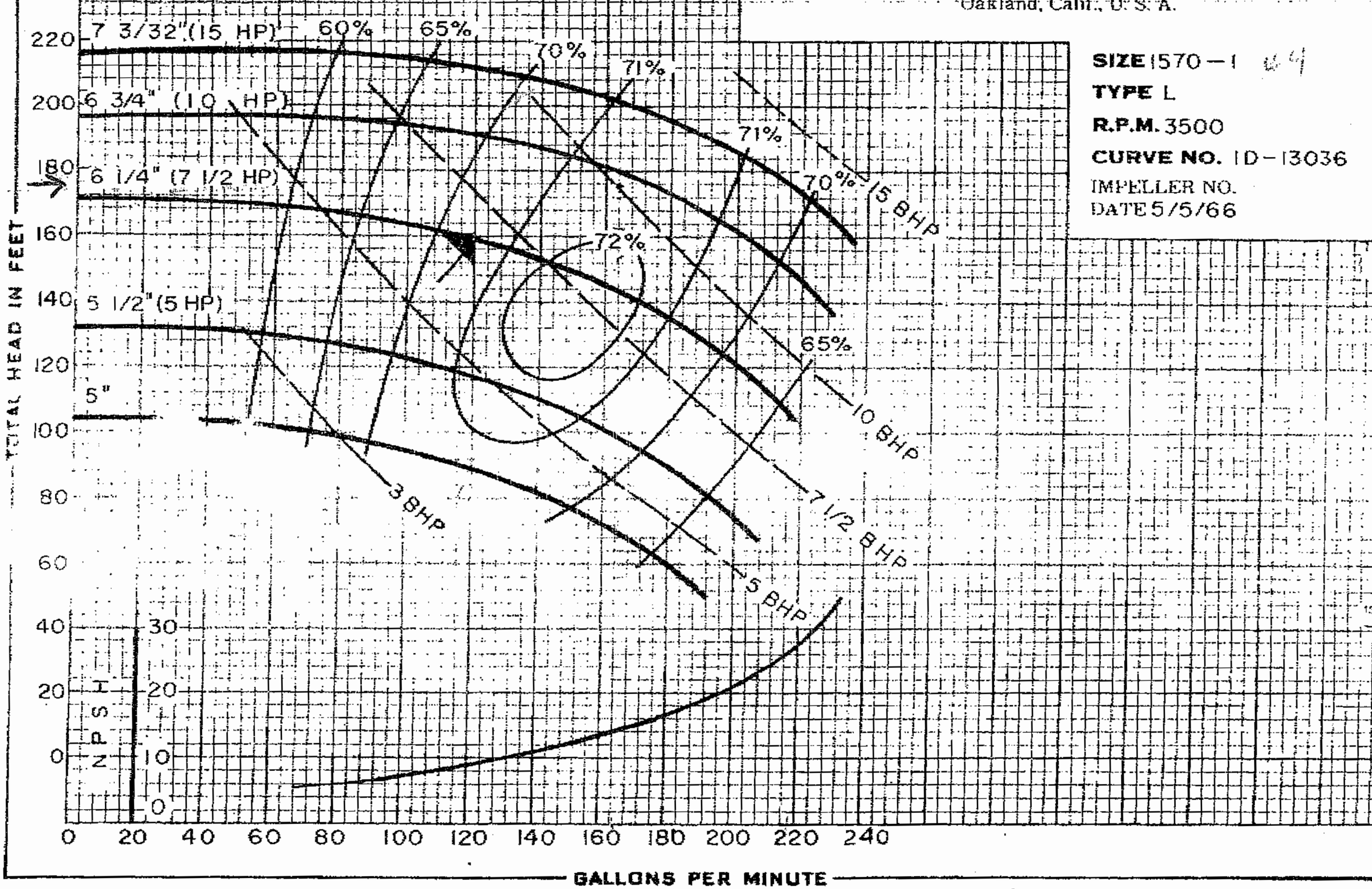
TYPE L

R.P.M. 3500

CURVE NO. ID – 13036

IMPELLER NO.

DATE 5/5/66



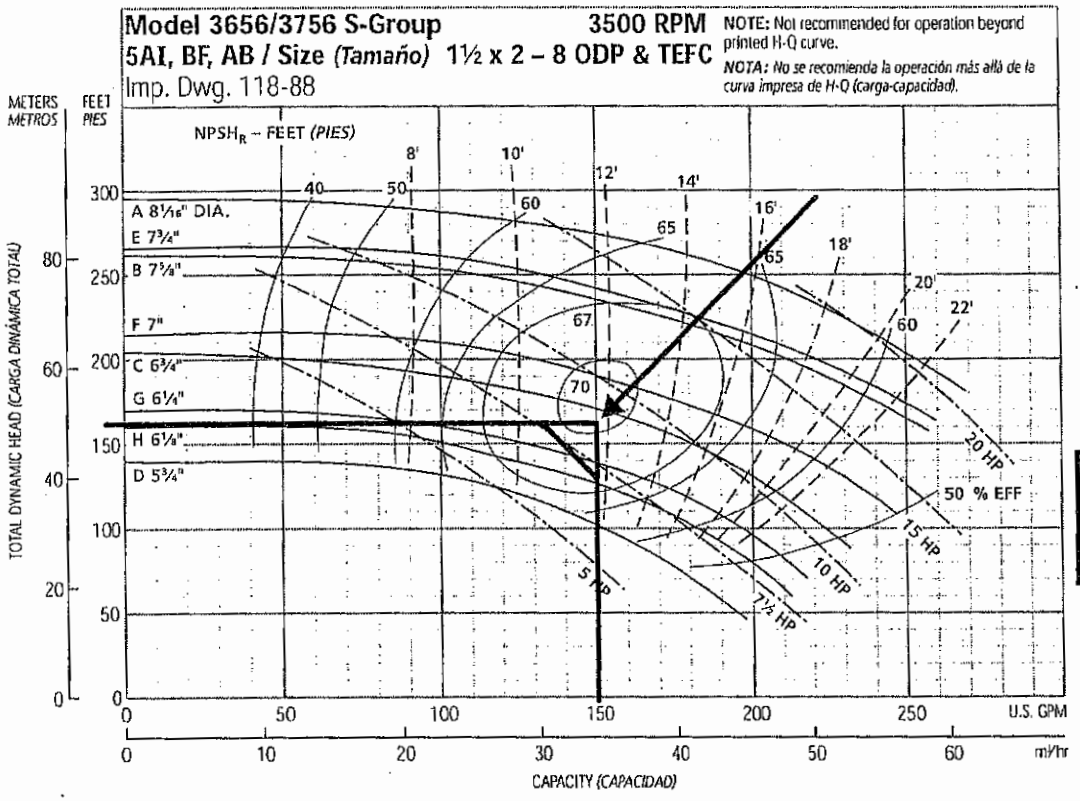
Form R844B 2/54

120@162' LEAD Pump

Booster Pump 4

Booster 6

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	7¾"
B	7⅝
F	7
C	6¾
G	6¼
H	6⅛
D	5¾

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 Make 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 2, along with the junction and pipes in which these conditions occur.

Table 2: 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	P-T3AB & P-BOOST3AB	5.97
2	60.92	J-210	P-T3AB & P-BOOST3AB	5.36
3	33.27	J-210	P-75	5.92
4	61.14	J-162	P-T3AB & P-BOOST3AB	5.66
5	63.02	J-162	P-T3AB & P-BOOST3AB	5.44

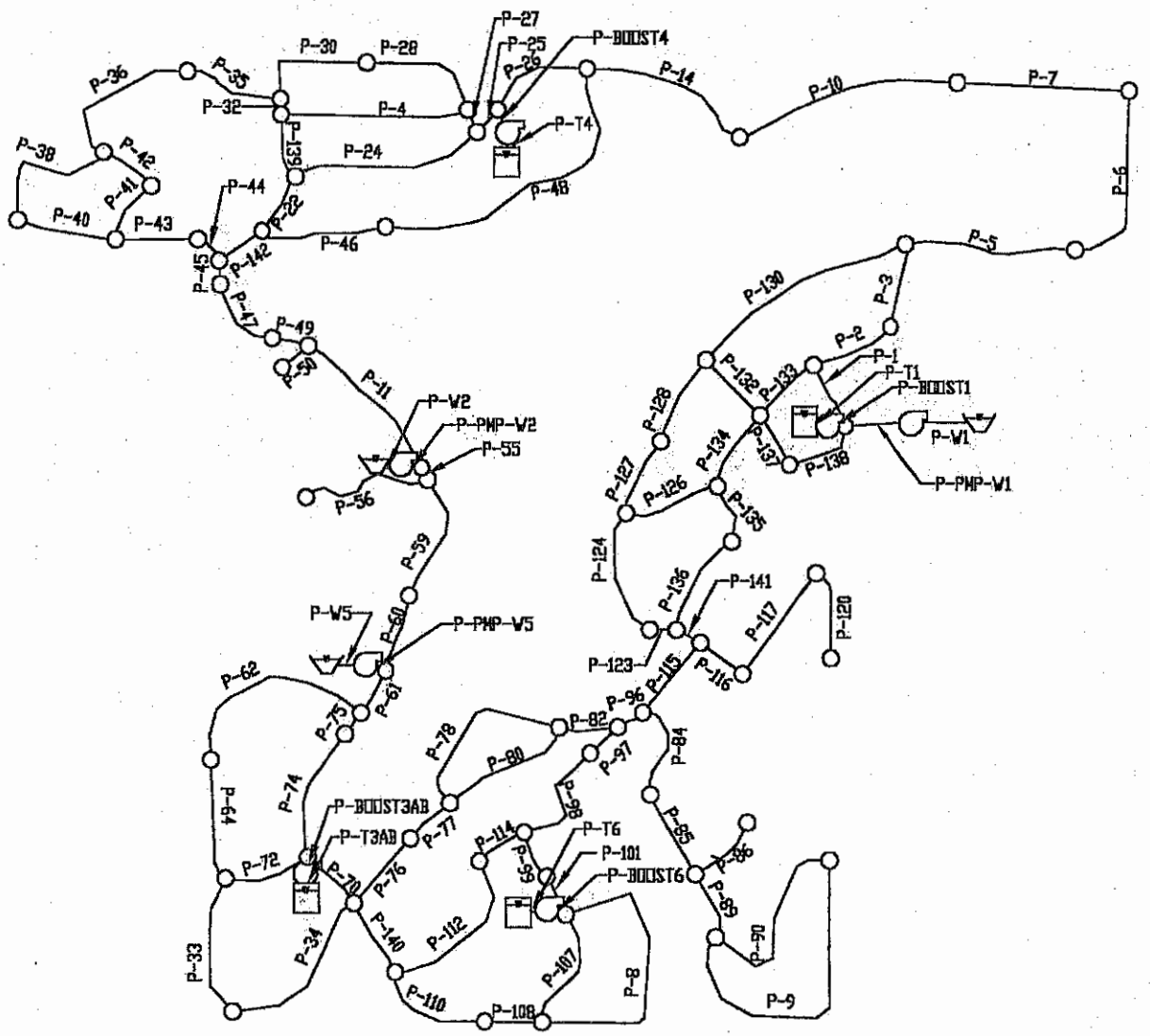


FIGURE 1
MODEL SCHEMATIC SHOWING
PIPE LOCATIONS AND
DESIGNATORS

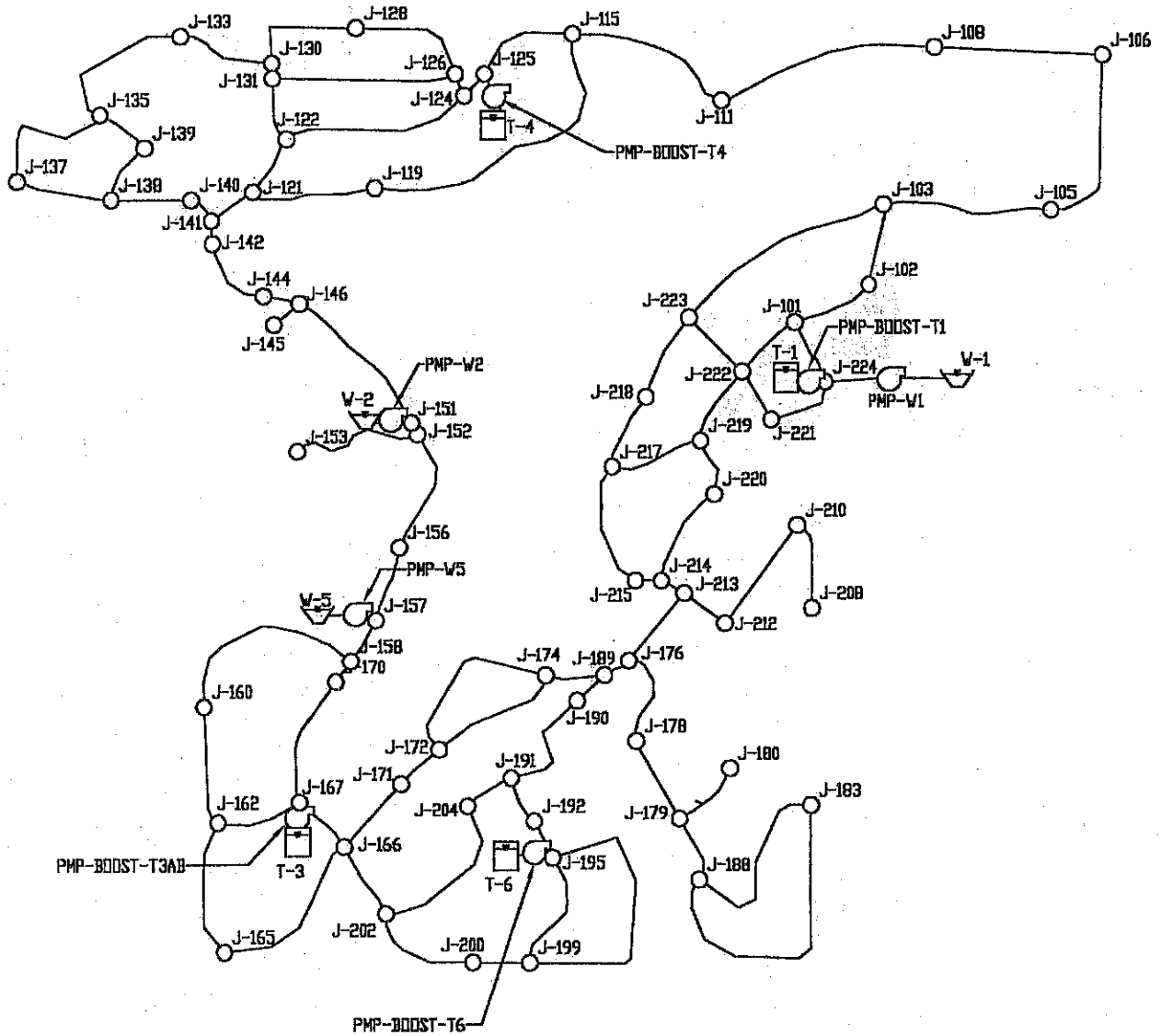


FIGURE 2
MODEL SCHEMATIC SHOWING JUNCTION AND EQUIPMENT LOCATIONS AND DESTIGNATORS

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

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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

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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	268.00	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	453.90	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

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37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

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	1.78	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):

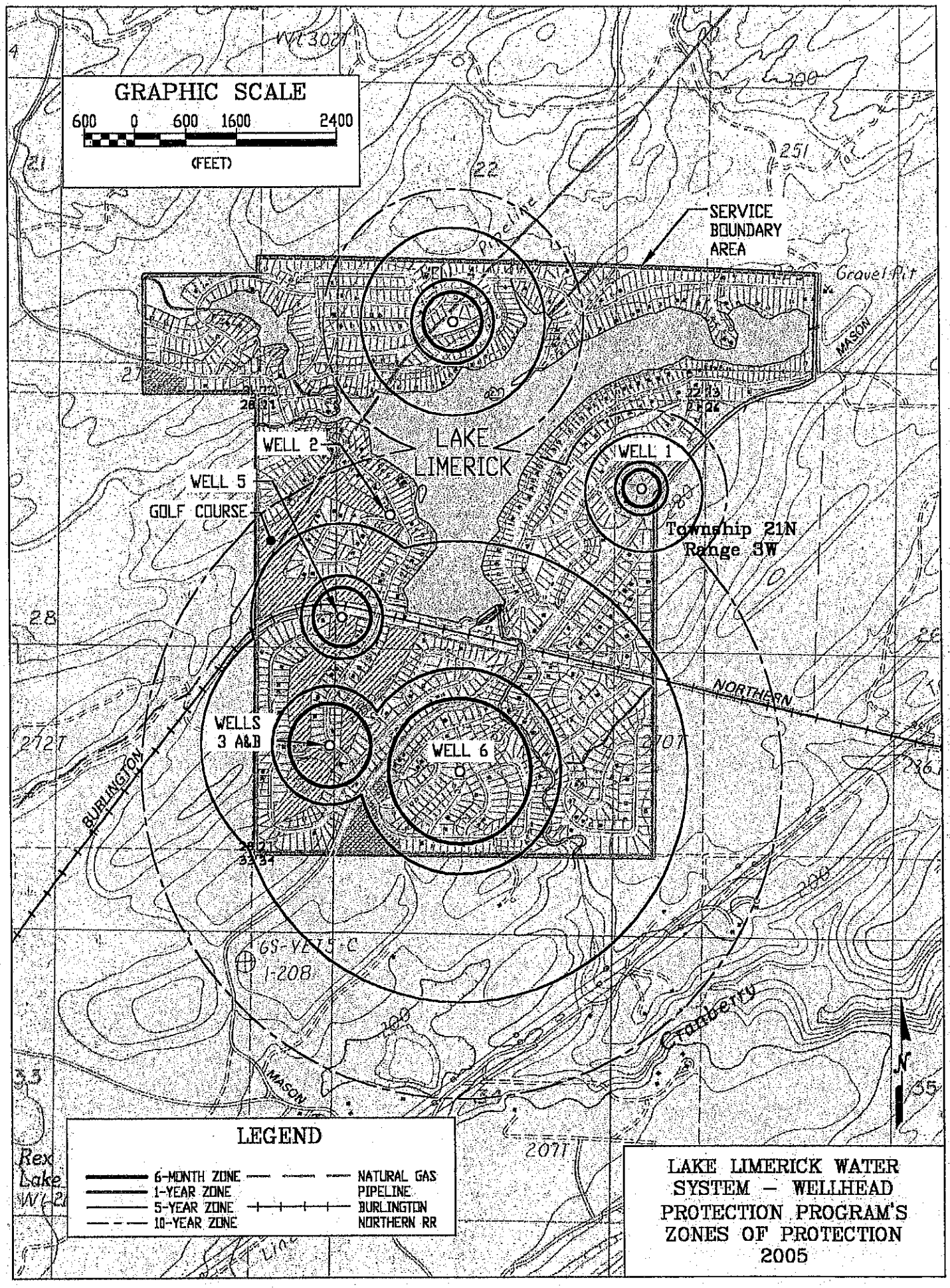
As part of the wellhead program for Lake Limerick Water System, we are hereby informing you of the findings of our wellhead protection area delineation. This is in accordance with State regulations (WAC 246-290-135).

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,


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
Gravel Pit
Pipeline
Tranberry
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 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.*)

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: _____

5

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. 018887

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 539 feet. Depth of completed well 539 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 16" 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 STAINLESS
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 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 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' AM	189	9:05	132	9:11	189
9:25 AM	189	10:36	189	11:00	232
10:50	189	11:05	189		

Date of test 10/1 198

Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Airlift _____ gal./min. with steam 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 CLAY~~	~~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'	183'
GRAY GUMMY CLAY	183'	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 19 88 Completed 10/05 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 170 WAIKER PK Shelton
(Signed) _____ (WELL DRILLER) License No. 1463
Contractor's Registration No. ARCADD*147K1 Date 10-5-88

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329-

Well 6
308
Pg 2 of 2

Page 2

Stpr4 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 Lake Limerick Country Club Address _____

(2) LOCATION OF WELL: County Mason SE ¼ SW ¼ Sec. 27 T. 21 N., R. 3 E.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 ☐ _____ " Diam. from _____ ft. to _____ 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 _____
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.
Airlift _____ gal./min. with _____ ft. drawdown 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
SANDY CLAY W/SOME GRAVEL - H₂O	263'	287'
BROWN CLAY	287'	298'
GRAY SANDY CLAY	298'	306'
BROWN HARDPAN	306'	309'
GRAVELLY SANDY CLAY	309'	312'
BROWN HARDPAN	312'	318'
BROWN SANDY CLAY	318'	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 10/03/88 19

RECEIVED
NOV 7 1988
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 170 Walker Park Shelton

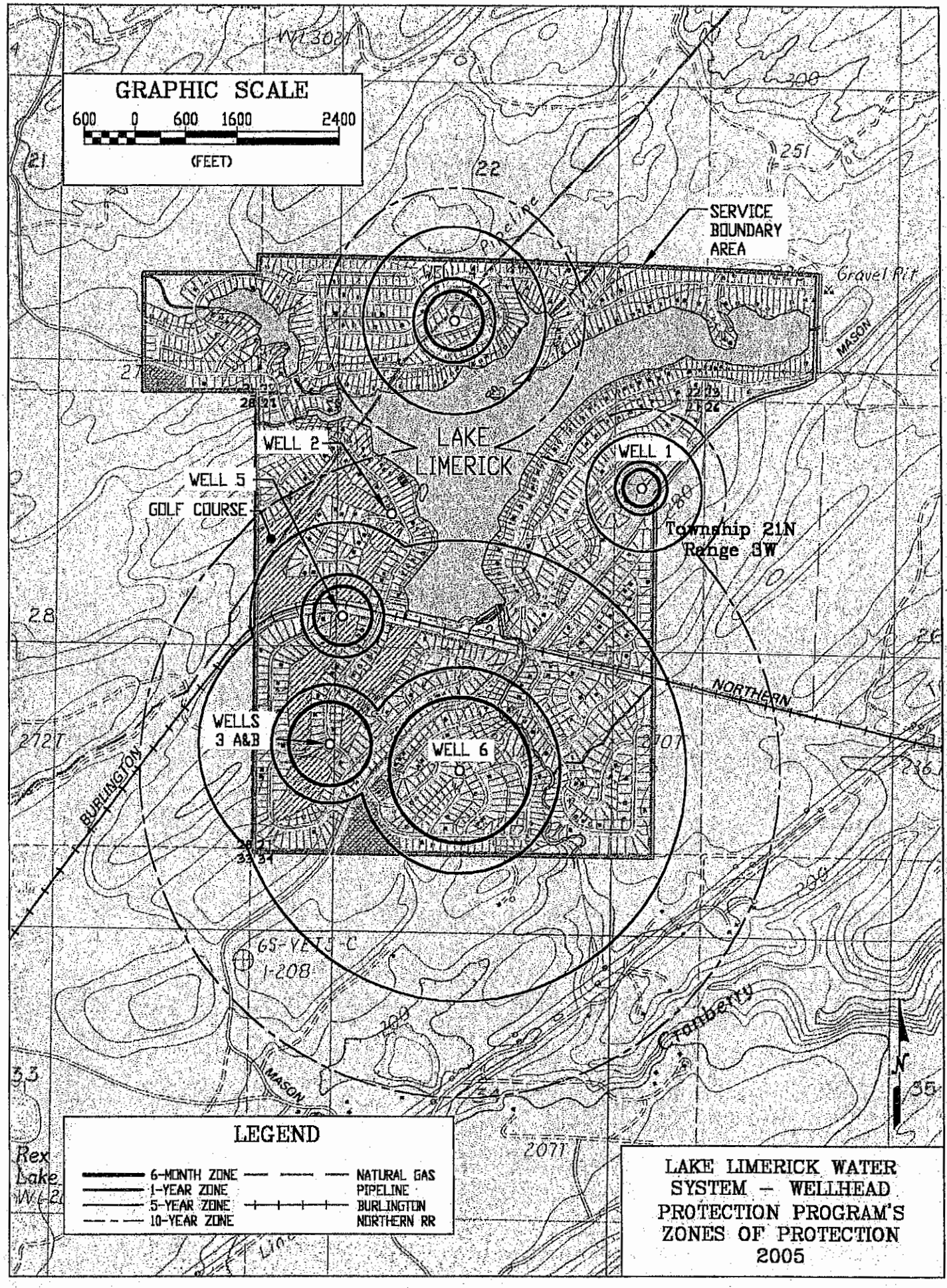
(Signed) _____ (WELL DRILLER) License No. 1465

Contractor's Registration No. ARCADDRI*MA Date 10/5/88 19

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1320-

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: _____

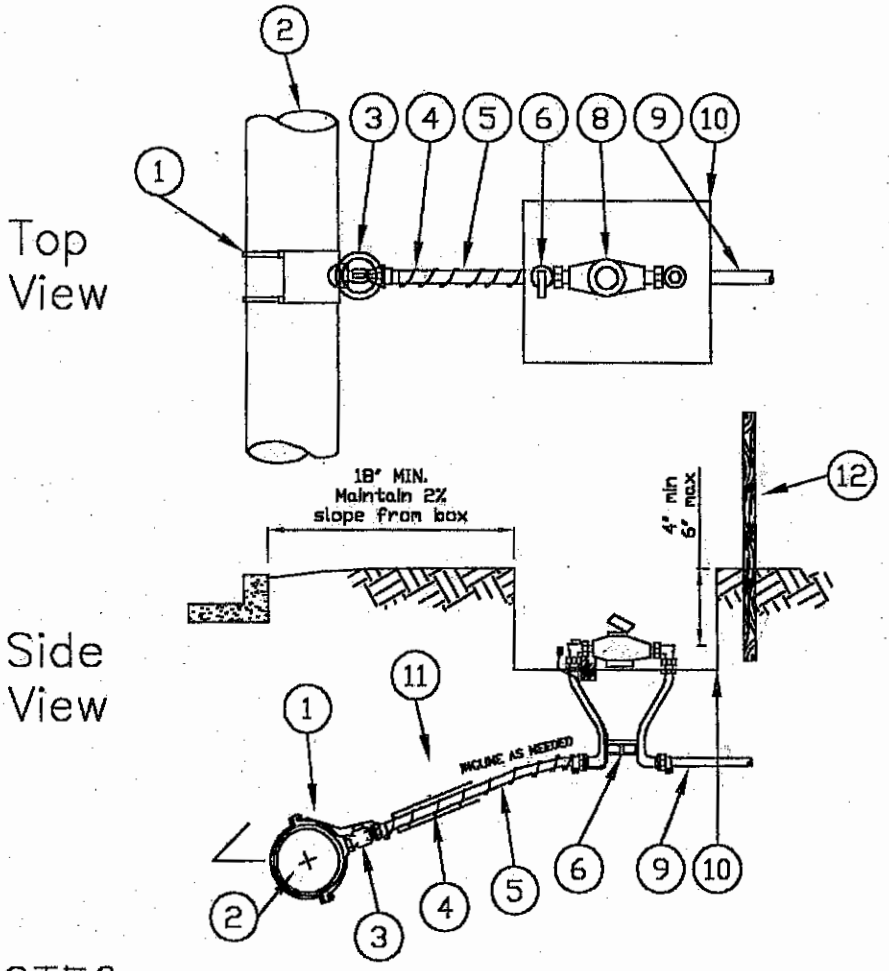
Signatures: _____

_____

_____

6/

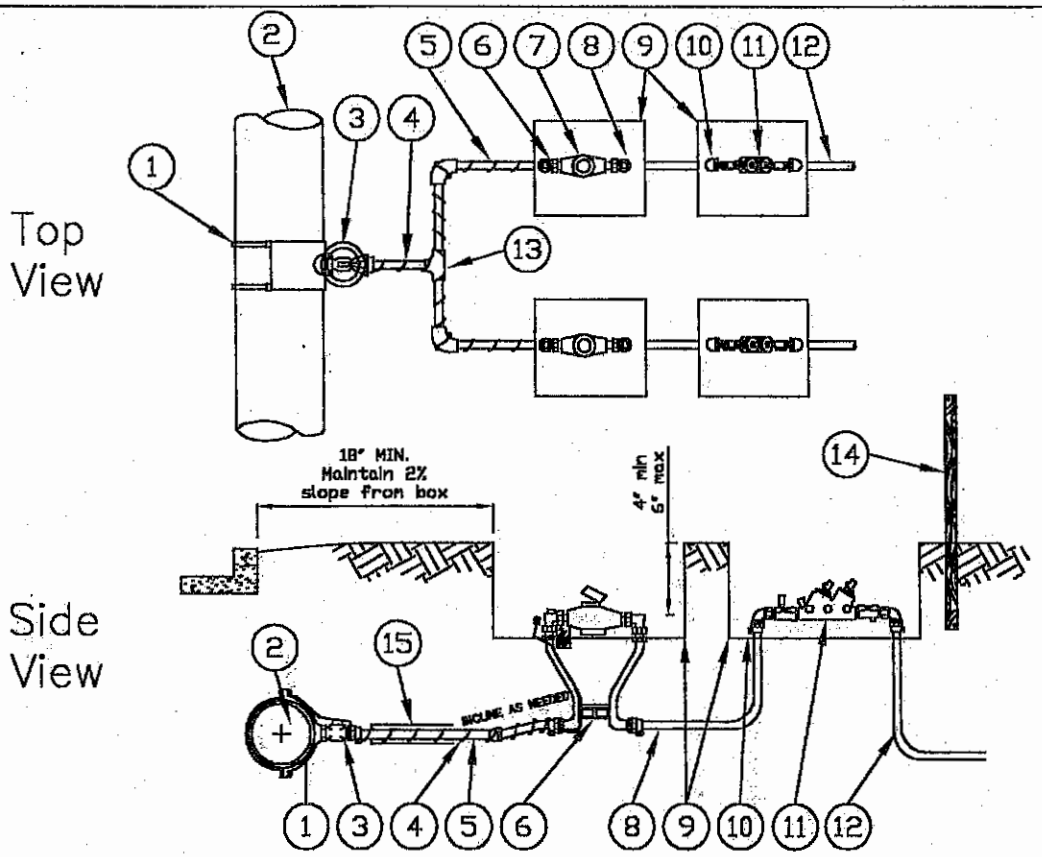
Appendix L: Standard Details



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 BCF1324-12 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

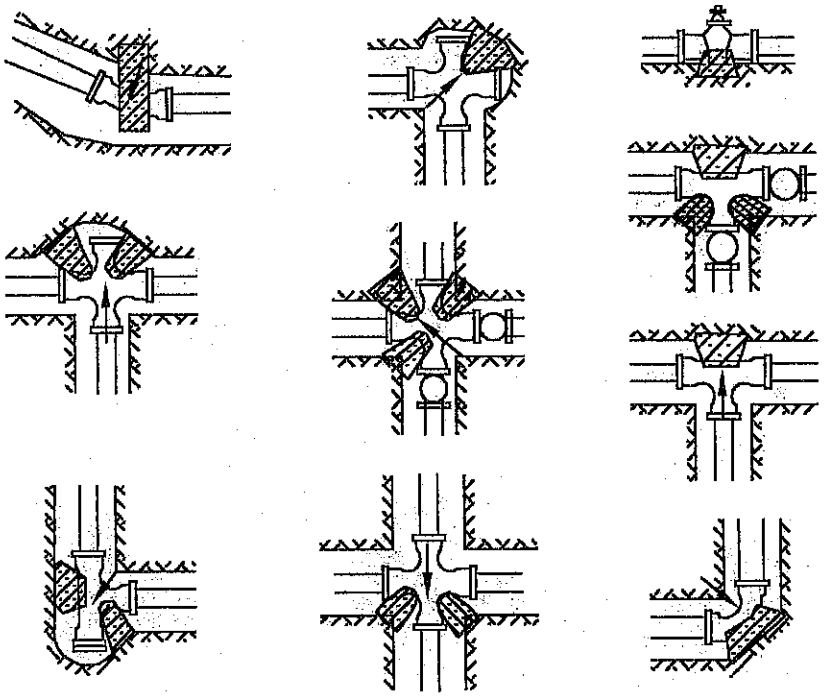


NOTES

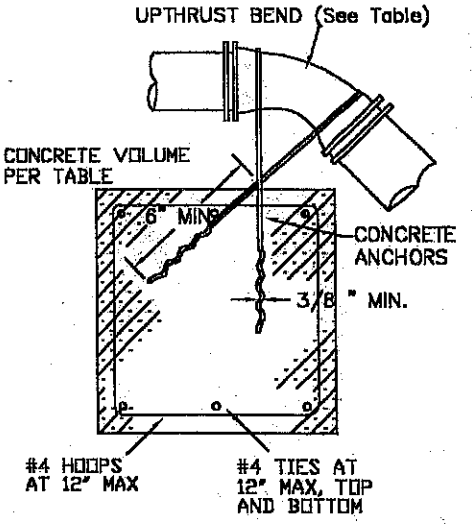
1. DOUBLE STAINLESS STEEL STRAP SERVICE SADDLE. CONNECT TONING WIRES TO SADDLE.
2. EXISTING WATER MAIN
3. BRASS CORP STOP, FORD F1100-4 OR APPROVED EQUAL. USE TUBING STIFFENERS IN ALL PACK JOINTS.
4. 12 GA SOLID COPPER TONING WIRE. WRAP WIRE AROUND SERVICE PIPE, LEAVE 2' MINIMUM LENGTH IN EACH METER 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

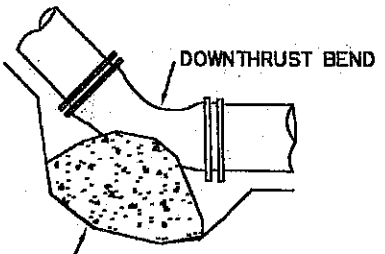
HORIZONTAL BENDS



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

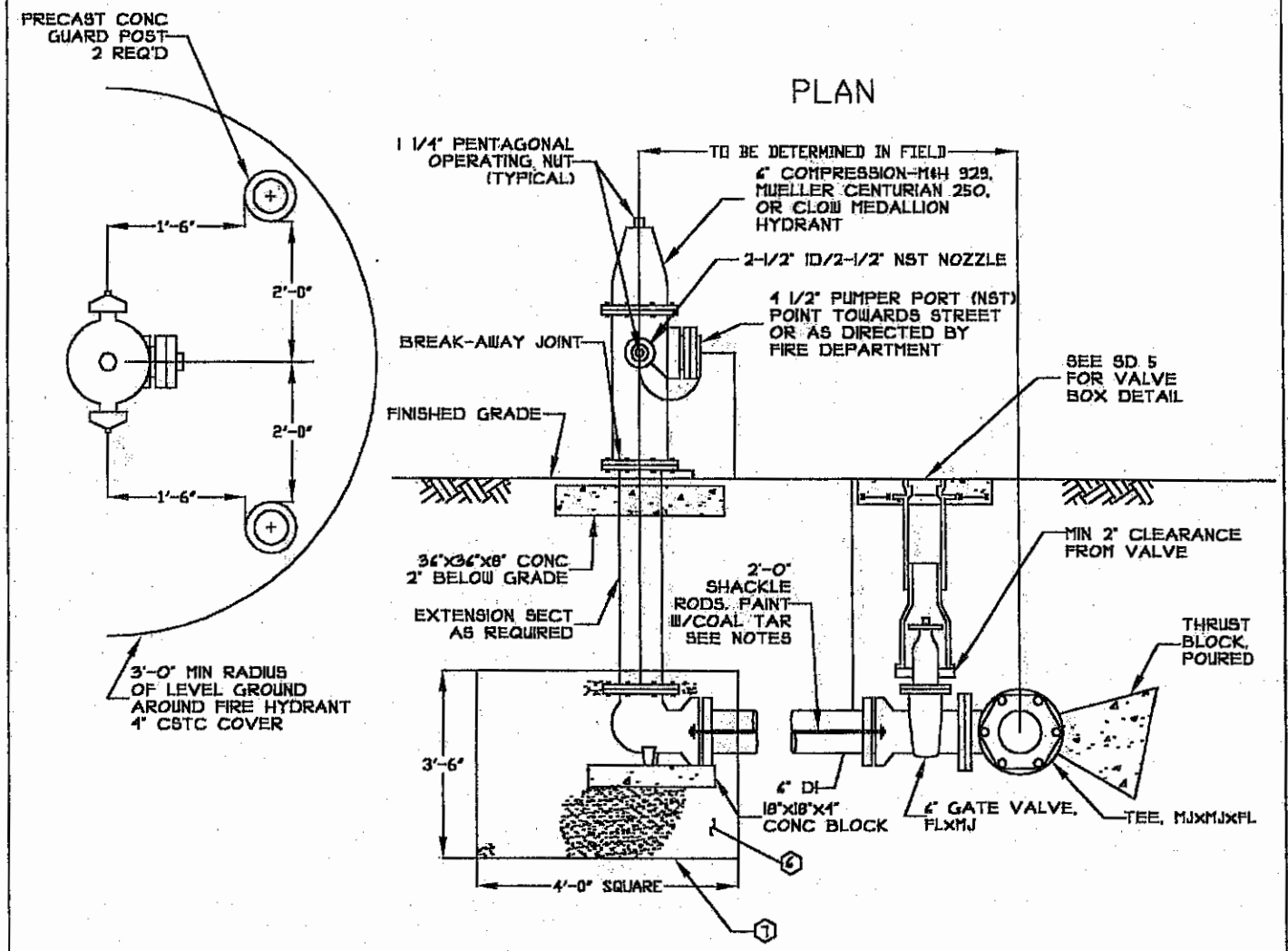
SOIL	SAFE BEARING LOAD PSF
MUCK, PEAT, ETC.*	0
SOFT CLAY	1,000
SAND	2,000
SAND AND GRAVEL	3,000
SAND AND GRAVEL, CEM W/ CLAY	4,000
HARD SHALE	10,000

* 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

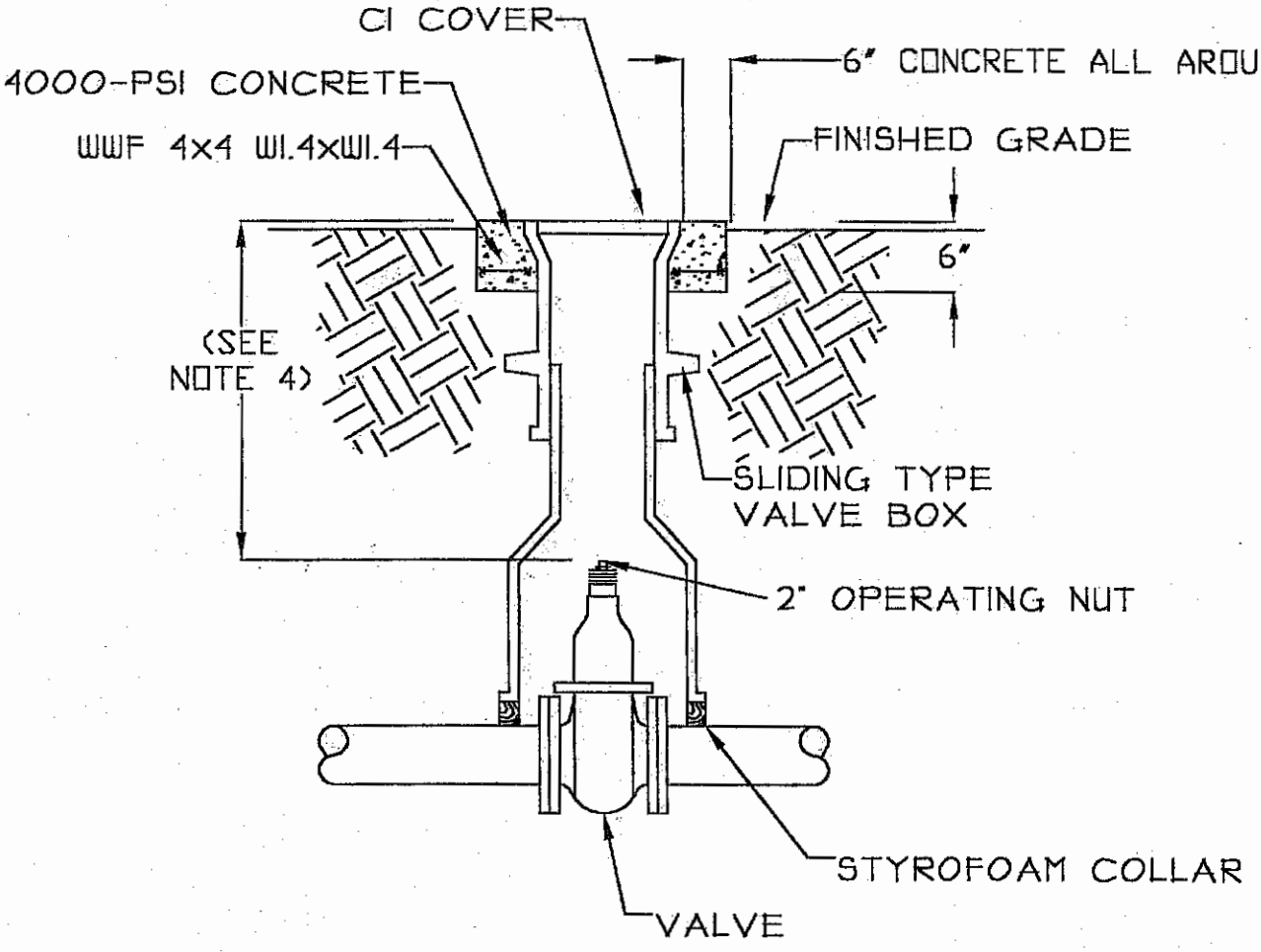
STANDARD DETAIL
SD-3
THRUST BLOCKING OF FITTINGS



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)

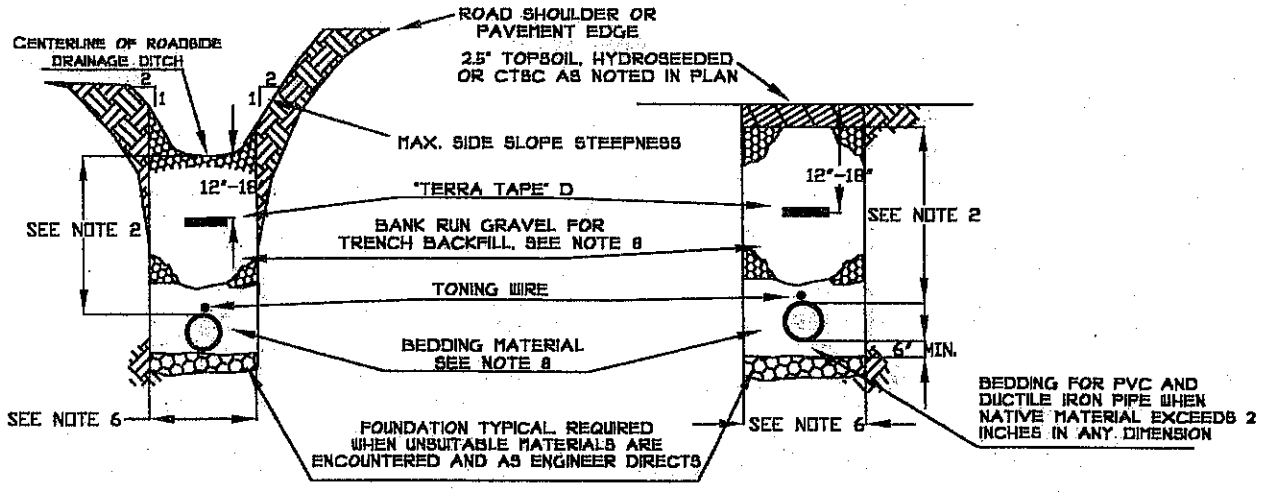
STANDARD DETAIL
SD-4
FIRE HYDRANT INSTALLATION DETAIL



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



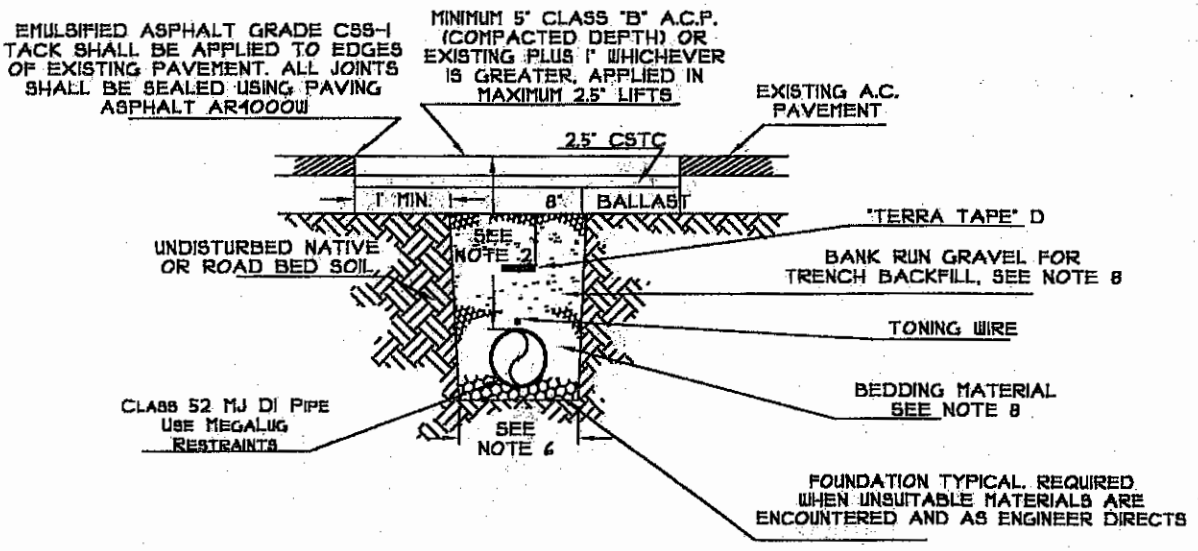
ROADSIDE PIPING TRENCH CROSS SECTION DETAIL

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

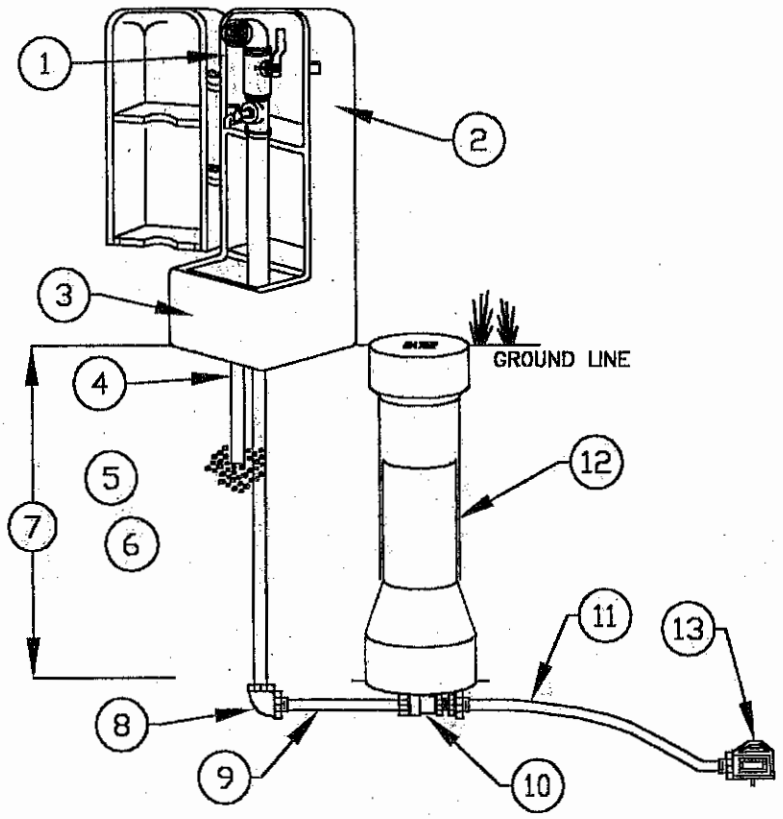


STREET CROSSING TRENCH CROSS SECTION DETAIL

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.

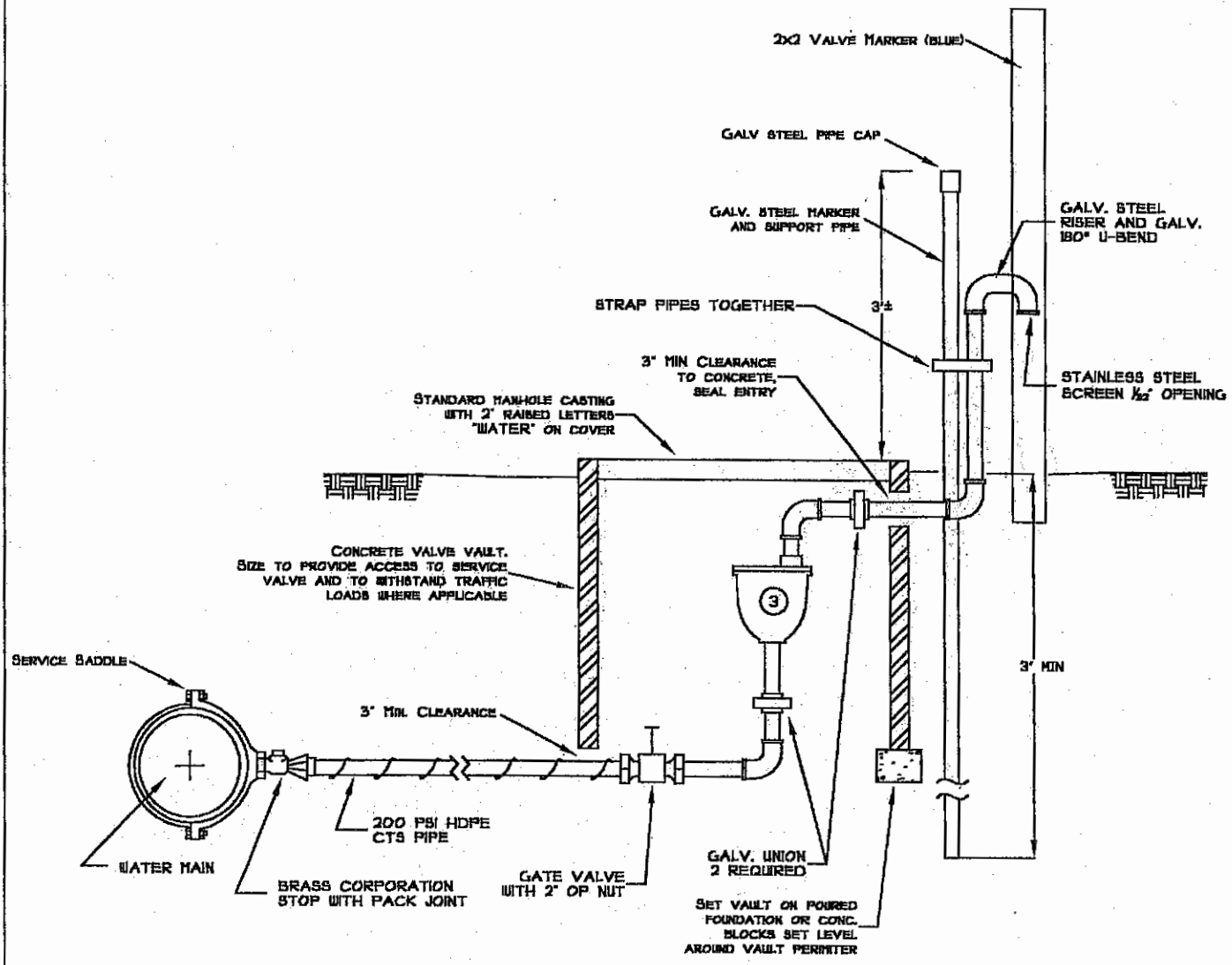
STANDARD DETAIL
SD-7
PIPELINE STREET CROSSING DETAIL



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. ½" CTS CLASS 200 HDPE PIPE, NSF APPROVED.
12. CURBSTOP VALVE BOX, FORD EM2-30-47-18R OR APPROVED EQUAL.
13. ½" BRASS CORP STOP, FORD FB1100-6 OR APPROVED EQUAL.

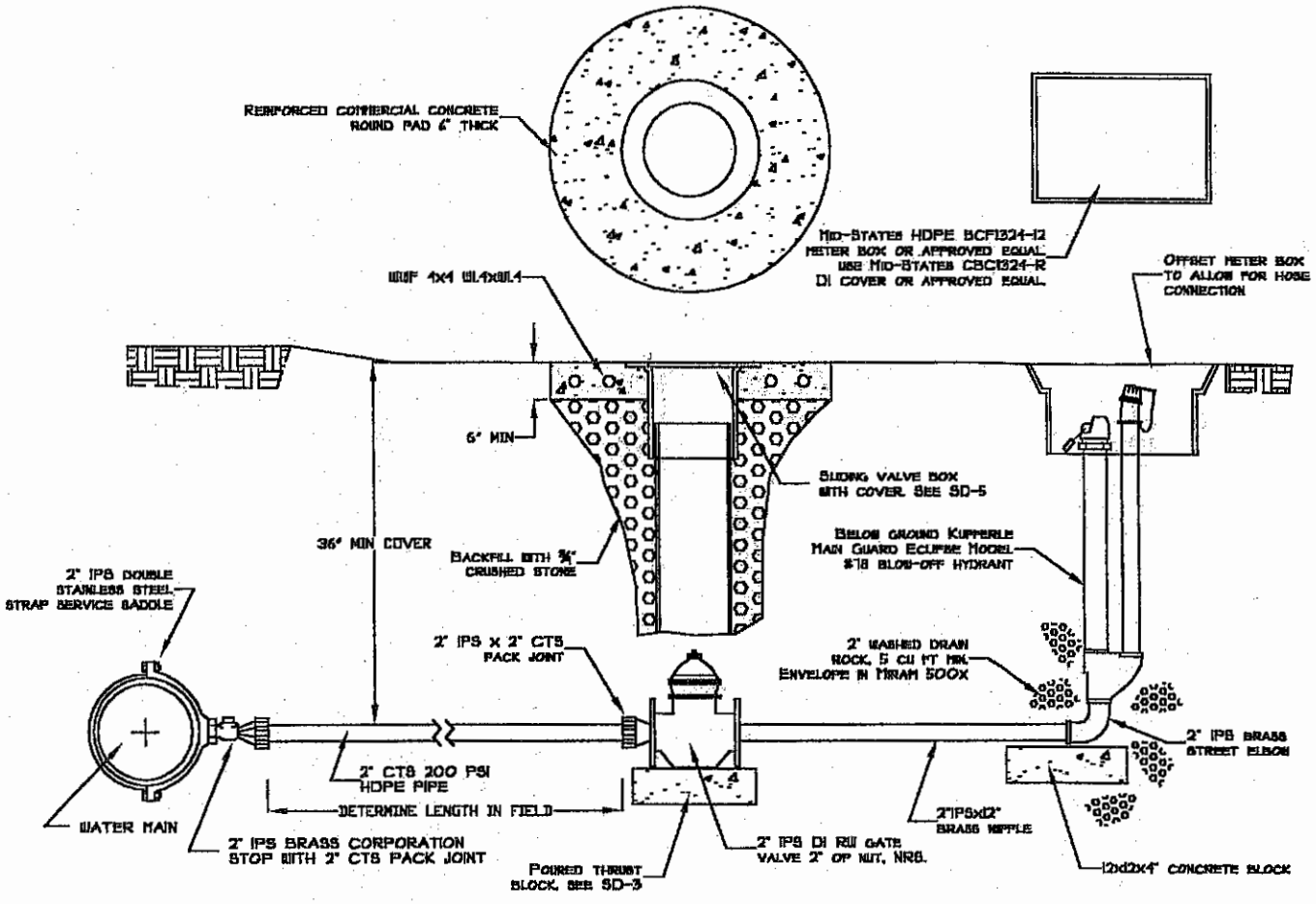
STANDARD DETAIL
SD-8
SAMPLE STATION
INSTALLATION DETAIL



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

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

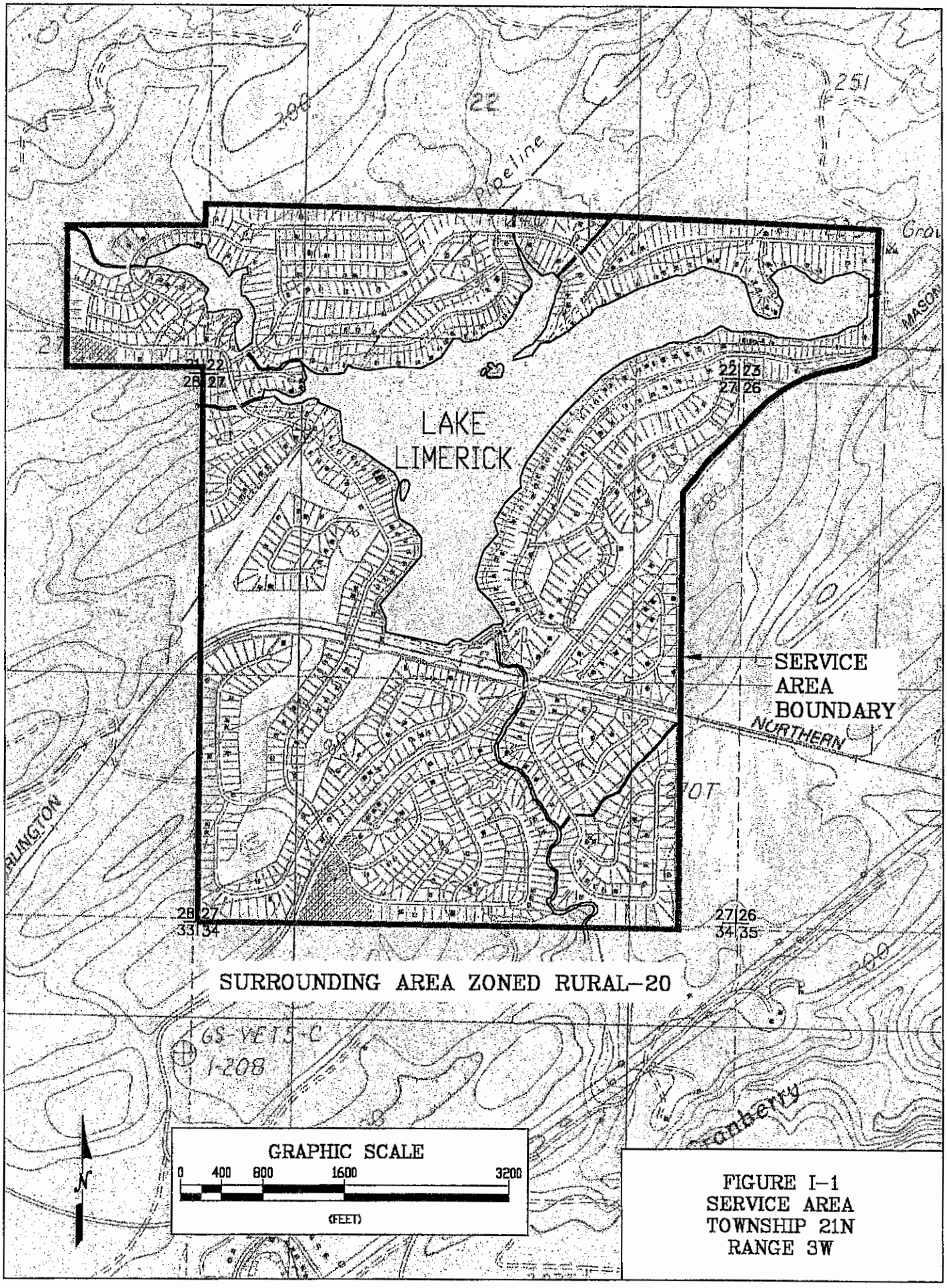


FIGURE I–1
SERVICE AREA
TOWNSHIP 21N
RANGE 3W

Permit status and inspection results can now be checked on the web - www.co.mason.wa.us/permits
Building Dept. inspections requests can be made via the web - www.co.mason.wa.us/community_dev

Receipt #: S2200600000000002778

Date: 08/22/2006

Line Items:

Case No	Tran Code	Description	Revenue Account No	Amount Paid
DDR2006-00286		Planning Water System Review	001.125.145.345.89.01.0000	105.00
PRIMARY APPLICANT FOR DDR2006-00286: OSBORNE, KIRK				
			Line Item Total:	**$105.00**

Payments:

Method	Payer	Bank No	Account No / Check No	Confirm No	How Received	Amount Paid
Check	LAKE LIMERICK WATER SYSTEM	key	4064		In Person	105.00
					Payment Total:	**$105.00**

MASON COUNTY
DEPARTMENT OF COMMUNITY DEVELOPMENT
Planning
Mason County Bldg. I 411 N. 5th
P.O. Box 279 Shelton, WA 98584

Shelton (360) 427-9670
Belfair (360) 275-4467
Elma (360) 482-5269

September 6, 2006

Mr. Kirk Osborne
E 790 St. Andrews Dr.
Shelton, WA 98584

Re: Lake Limerick Water System, WSDOH ID # 44150T

Dear Mr. Osborne,

Please find enclosed a signed Attachment 5, Consistency Statement Checklist, for the above water system (DDR2006-00286). The consistency determination is based on the draft materials provided by you for the review.

If you have additional questions or concerns regarding this matter, please contact me at (360) 427-9670 ext. 366.

Sincerely,

Robert D Fink

Robert D. Fink, AICP
Planning Manager

Attachment

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: Aug 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	Yes
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	Yes
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	NA
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	NA
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.

Robert D Fiske
Signature

Sept 6, 2006
Date

Robert D Fiske, Planning Manager, Mason County
Printed Name, Title, & Jurisdiction

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

COPY

MASON COUNTY
DEPARTMENT OF COMMUNITY DEVELOPMENT
PLANNING

P.O. BOX 279 SHELTON, WASHINGTON 98584 • (360) 427-9670

APPLICATION FOR A WATER SYSTEM PLAN REVIEW FOR CONSISTENCY WITH THE MASON COUNTY COMPREHENSIVE PLAN

The purpose of this application is to provide a means for review of a public water system plan for consistency with the county comprehensive plan as provided in Section 90.03.386 and Chapter 43.20 RCW.

APPLICANT INFORMATION

Name: Kirk Osborne Signature: Kirk Osborne

Mailing Address: E 790 St. Andrews Dr
Shelton, WA 98584

Phone Number(s): (360) 426-4563

PERMIT INFORMATION

Water System Name: Lake Limerick Water System PWS ID: 44150 T

Tax Parcel Number(s) for location of wells:

321275000203	321225000506
321275100001	321275100003
321275100005	321275100003

(Attach additional parcel numbers if necessary)

Please submit a draft water system plan or an abstract of the plan with sufficient information for evaluation of consistency, a map of the service area, and a "Attachment 5: Water System Plan and Small Water System Management Program Consistency Statement Checklist."
Application Fee: $105.00

Submit to the Mason County Permit Assistance Center by mail to P.O. Box 186 or in person at 426 W Cedar St., Shelton, WA

COPY

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: Aug 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. ****

SEMCON, Inc.

1211 Fourth Avenue East, Suite 101, Olympia, WA 98506-4211
Phone: 360-753-5269 ☎ Fax: 360-753-5636 💻 e-mail: mary@semcon.us
☑ Engineering ☑ Planning ☑ Management ☑ Information Technology

August 9, 2006

Kirk Osborne
Lake Limerick Water System
E 790 St. Andrew Dr.
Shelton, WA 98584

Subject: Water System Plan Submittal

Dear Kirk,

With the exception of the changes to the cover, the most recent changes requested by the Lake Limerick staff have been incorporated into the latest revision of the water system plan, which has been designated Rev A.1. The cover will be updated just before we submit the plan to the Department of Health for final review. Enclosed, please find four packets for upgrading your four copies of the water system plan to Rev A.1 and a "redline" packet showing the most recent changes, for your reference.

As part of the review process, the "Municipal Water Law" requires that the local planning agency (e.g. Mason County Department of Community Development) review the water system plan and sign a "Water System Plan and Small Water System Management Program Consistency Statement Checklist." At your request, we would be happy to make the submittal for you. If you would like to make the submittal yourself, please sign the enclosed "Application for a Water System Plan Review for Consistency with the Mason County Comprehensive Plan", and submit the following to the Mason County Department of Community Development Planning:

Signed Application for a Water System Plan Review ✓
Consistency Statement Checklist ✓
Copy of the Water System Plan, Rev A.1 ✓
Check for $105, made payable to Mason County

Submittals can be hand delivered to 426 W Cedar St., Shelton, or mailed to:

Mason County
Department of Community Development Planning
P.O Box 186
Shelton, WA 98584-0186

If after 60 days and a reasonable effort on your part, the planning department has not responded, the Department of Health will waive this requirement. However, you must provide documentation of your attempts to get the checklist signed by the planning department in order get this waiver.

We will be submitting the required copies and documentation to the Department of Health shortly. After we receive the Department of Heath's comments and have revised the water system plan accordingly, the plan must be presented at an informational meeting per the Municipal Water Law, as discussed in Section I.D.9.f of the enclosed review copy. We will be in contact with you to help you make arrangements for the meeting as the time approaches. After the meeting, the plan will be submitted to the Department of Health, with new covers and John's signed engineer seal, for final approval.

If you have any comments or questions, please feel free to call either John or myself.

Sincerely,

Mary Wilkes

Mary Wilkes, E.I.T.
Engineering Technician
SEMCON, Inc.

cc: (without enclosures) John Segerson, P.E.

Enclosures:
4 Upgrade packets
1 "Redline" packet
1 Consistency Statement Checklist
1 Application for a Water System Plan Review for Consistency with the Mason County Comprehensive Plan

LAKE LIMERICK WATER SYSTEM
WATER COMMITTEE
Minutes January 11, 2006
2:00 P.M.

Acting Chairperson Bill McDonald called meeting to order @ 2:00

Roll call: Treasurer Nan Stricklin, Secretary William McDonald, Don Nichols, Vern Hadsall and Tom Taylor were present. Chairman Kirk Osborne was excused.

Guest: none

Employees: Ken Douglas (waters system supervisor) is excused due to illness, Marianne Koch, (clerk), and Austin Douglas were present.

Approval of Minutes

a. Additions to agenda; none
b. December 2005 minutes

A motion was made by Tom Taylor and seconded by Don Nichols and passed with 0 nays.
To accept the December 8th minutes.

Financial Report –Nan Stricklin

Clarification of the Statement of Income & Expenses report was requested by Don Nichols. Nan Stricklin reviewed the financial reports. Items discussed were the budgeted excess water charges, which are non existent in the winter and the payment to Zepher for the Mason Lake road project, 10% of which is being held pending final approval.

A motion was made by Vern Hadsall and seconded by Tom Taylor and passed with 0 nays.
To accept the Financials as presented.

Capital and Long Range Planning

Action Item review

a) **#5 Water System Plan update:** Bill McDonald will check on
b) **b) #15 Mason Lake Road line project:** Ron of Zephyr Excavation has been paid with the exception of 10%. Per Austin there is one small leak which they need to repair. All other work is complete.
c) **Resolution for Board of Directors:** Discuss held on what the resolution was for and how this effects the existing by-laws of the water committee. The committee will send back to the board for clarification.

Correspondence:

Old Business- none

New Business:

The water committee will request of the board for some clarification on how additional sick leave can be handled for Ken Douglas, you is out with a heart attack.

Announcements:

Next meeting will be Feb. 8th 2006 at 2:00 PM

Motion to adjourn was made by Nan Stricklin, seconded by Don Nichols and passed with no Nays at 3:00 pm.

Minutes have not been approved by the Water committee
Respectfully submitted by Marianne Koch

LAKE LIMERICK COUNTRY CLUB

RESOLUTION NO. 2005 –

WATER COMMITTEE

This resolution sets out the purposes, authority, makeup and operating procedures of the Lake Limerick Country Club Water Committee.

1. Purposes. The Water Committee has the following primary purposes, all centered on providing potable water to the members of the Association:
    a. To provide guidance and direction to the Water Manager on the operation and maintenance required for the Lake Limerick Water System.
    b. To direct and review the work of the various consultants who will be developing plans and procedures for the continued operation of the water system.
    c. To determine and recommend to the Board of Directors an appropriate rate structure providing for the continued operation of the system and the acquisition of adequate reserves to provide for emergency repairs to the system when needed.
    d. To recommend to the Board of Directors and the Association needed repairs to the system.
    e. To oversee the operation of the Water System in compliance with the Water Committee Covenants, the Water System Plan and any additional governmental regulations.

2. Authority. The Water Committee does not have the authority to act for the Board of Directors with respect to any final decisions; rather, it recommends to the Board based on its investigations, experience and deliberations. The Board may or may not accept such recommendations in whole or in part. The Water Committee does have the authority to make such investigations and recommendations to the Board.

3. Makeup. The Water Committee shall consist of six members, elected by the Association membership to a three year term, with two positions being filled every year. The officer positions of the Water Committee will be filled as directed in the Water Committee Covenants.

4. Operating Procedures. The Water Committee shall operate pursuant to procedures that are fair and reasonable. It shall create and make a readily-accessible record of systems for its operation, which shall include processes, timelines, and assignment of responsibilities, accountability and forms, as well as other procedures that are

beneficial to the work of the committee. The guidelines that are contained in the Water Committee Covenants and the Water System Plan will be utilized for the operation of the Committee.

Lake Limerick Water System

Statement of Income and Expenses - Fiscal Year Oct 2005 through Sept 2006

Status of 2/7/06

Checking Balance	$ 30,344.51
Savings	$ 8,629.00
Simpson C.U. Savings Account	$ 68,559.96
Past Due Accounts Receivable	$ 39,001.77
	$ 146,535.24

please note: no statements were received as of 2/7/06

Capital Improvements	Budget	2005-2006	Budget Balance	Date Paid
Well #6 Loan Payment	$ 20,000.00	$ -	$ -	
Water System Plan	$ 15,000.00	$ 8,827.56	$ 6,172.44	01/19/06
Mason Lake Road Line	$ 35,000.00	$ 28,557.74	$ 6,442.26	12/20 partial
Trash Pump	$ 1,500.00	$ -	$ -	
Totals:	$ 71,500.00	$ 37,385.30	$ 12,614.70	

Water System Plan Expenses	2003-2004	2004-2005	2005-2006	Actual Paid
Semcon Inv#1774	$ 1,330.00			$ 1,330.00
Semcon Inv#1785	$ 1,250.00			$ 1,250.00
Semcon Inv#1792		$ 820.00		$ 820.00
Semcon Inv#1801		$ 967.50		$ 967.50
Semcon Inv#1811		$ 867.50		$ 867.50
Semcon Inv#1826		$ 465.00		$ 465.00
Semcon Inv#1839		$ 795.00		$ 795.00
Semcon Inv# 1854		$ 1,700.00		$ 1,700.00
Semcon Inv#1872		$ 1,360.00		$ 1,360.00
Semcon Inv#1881		$ 1,520.00		$ 1,520.00
Semcon Inv#1892		$ 815.00		$ 815.00
Semcon Inv#		$ 1,902.50		$ 1,902.50
Semcon Inv#1918			$ 1,620.00	$ 1,620.00
Semcon Inv#1939			$ 6,487.56	$ 6,487.56
Semcon Inv#1951			$ 720.00	$ 720.00
total To Date	**$ 2,580.00**	**$ 11,212.50**	**$ 8,827.56**	**$ 22,620.06**

State of Washington Dept of Public Works Loan Well #6	Available Loan Amount	Voucher Requests/ Payments	Principle Paid	Date Paid
Loan Amount Available	$ 343,941.00			
Voucher Request Sent 6/17/04 {includes Loan Fee @ $3405}	$ 332,871.00	$ 11,070.00		07/08/04
Voucher Request #2	$ 329,787.05	$ 3,083.95		07/31/04
Voucher Request #3	$ 323,907.05	$ 5,880.00		09/03/04
Voucher Request #4	$ 272,688.85	$ 51,218.20		11/03/04
Voucher Request #5	$ 266,589.18	$ 6,099.67		11/03/04
Voucher Request #6	$ 206,651.42	$ 59,937.76		11/17/04
Voucher Request #7	$ 25,237.57	$ 181,413.85		12/02/04
Voucher Request #8	$ -	$ 25,237.57		01/06/05
October Loan Payment #1 $4467.75 Interest Only			$ -	09/20/05

STATUS OF LAKE LIMERICK WATER SYSTEM FUNDS AND EXPENSES

	Funds available as of 2/7/06		Current & Upcoming Payables
Checking Account	$ 30,344.51	Zephyr's	$ 3,173.08
Savings Account	$ 8,629.00		$ -
Simpson C.U. {CD} Savings	$ 68,559.96		$ -
Current A/R	$ 39,001.77		$ -
	$ 146,535.24		$ -
			$ -
			$ -
			$ -
			$ -
			$ 3,173.08

		Estimated Future Monthly Expenses	
		Salaries	$ 6,650.00
		taxes	$ 900.00
		L&I	$ 20.00
		Health Insurance	$ 340.00
		Accounting	$ 74.00
		Bank Fees	$ 90.00
		Insurance	$ 500.00
		Legal Fees	$ 1,000.00
		Postage	$ 300.00
		Professional Services	$ 10.00
		Utilities	$ 2,000.00
		Vehicle Expenses	$ 200.00
		Semcon (Estimated)	$ 800.00
Estimated Pymts rec'd monthly	**$ 25,000.00**		**$ 12,884.00**

CURRENT SUMMARY		FUTURE SUMMARY	
Current Funds	$ 146,535.24	Estimated pymts rec'd monthly	$ 25,000.00
Less Current Payables	$ 3,173.08	Estimated expenses monthly	$ 12,884.00
	$ 143,362.16		**$ 12,116.00**
Less Monthly Expenses	$ 12,884.00		
	$ 130,478.16		
	$ -		
	$ 130,478.16		

Lake Limerick Country Club Inc

Income Statement

(Department Number 950: Water Committee)

	1 Month Ended Jan/06	1 Month Ended Jan/06 Budget	Variance Fav/<Unf>	% Var
Income				
Gross Revenue Sales				
Water Dept Revenue Metered 04	$18,683.00	$18,377.00	$306.00	1.7%
Water Revenue No Meter 04	1,467.00	1,855.00	(388.00)	-20.9%
Water Meter Excess Rate	189.00	3,333.33	(3,144.33)	-94.3%
Water Meter Lockout/Disconnect	60.00	25.00	35.00	140.0%
Water Meter Hook Up Fee	3,000.00	833.33	2,166.67	260.0%
TOTAL Gross Rev Sales	23,399.00	24,423.66	(1,024.66)	-4.2%
TOTAL Income	23,399.00	24,423.66	(1,024.66)	-4.2%
NET INCOME	23,399.00	24,423.66	(1,024.66)	-4.2%
GROSS PROFIT	23,399.00	24,423.66	(1,024.66)	-4.2%
Expenses				
Salaries Water	6,654.00	5,552.78	(1,101.22)	-19.8%
Payroll Tax Water	902.44	583.10	(319.34)	-54.8%
L&I Ins Water	6.14	66.72	60.58	90.8%
Health Insurance-Water	771.86	416.50	(355.36)	-85.3%
Education of Employees-Water	0.00	83.30	83.30	100.0%
Accounting Review-Water	0.00	83.30	83.30	100.0%
Advertising-Water	0.00	8.34	8.34	100.0%
Bank Service Charges-Water	0.00	99.96	99.96	100.0%
Depreciation - Water	4,408.75	4,406.99	(1.76)	0.0%
Dues & Subscriptions-Water	175.00	41.67	(133.33)	-320.0%
Engineering Services-Water	720.00	833.33	113.33	13.6%
Equipment Rent-Water	0.00	66.67	66.67	100.0%
Insurance-Water	0.00	500.00	500.00	100.0%
Legal Fees Water Dept	106.45	1,000.00	893.55	89.4%
Licenses & Permits-Water	0.00	166.60	166.60	100.0%
Newsletter Expense-Water	0.00	250.00	250.00	100.0%
Postage-Water	518.54	583.10	64.56	11.1%
Professional Services-Water	1.15	124.95	123.80	99.1%
Repair & Maintenance-Water	0.00	458.15	458.15	100.0%
Repair & Maint Equip-Water	180.66	541.45	360.79	66.6%
R & M Extraordinary-Water	0.00	166.60	166.60	100.0%
Security Contract-Water	1,557.57	625.00	(932.57)	-149.2%
Supplies - Water	44.65	433.16	388.51	89.7%
Telephone -Water	54.10	166.60	112.50	67.5%
Utilities-Water	1,202.64	1,666.67	464.03	27.8%
Vehicle Expenses-Water	0.00	166.60	166.60	100.0%
Water Test	78.00	249.90	171.90	68.8%
TOTAL Expenses	17,381.95	19,341.44	1,959.49	10.1%
OPERATING PROFIT	6,017.05	5,082.22	934.83	18.4%

Lake Limerick Country Club Inc

Income Statement

(Department Number 950: Water Committee)

	1 Month Ended Jan/06	1 Month Ended Jan/06 Budget	Variance Fav/<Unf>	% Var
Other Income & Expenses				
Service Charges Water	265.12	100.00	165.12	165.1%
Interest Income Water	0.00	83.30	(83.30)	-100.0%
Miscellaneous Inc. Water	0.00	41.67	(41.67)	-100.0%
Reserves - Water 2005-2006	0.00	(1,250.00)	1,250.00	100.0%
TOTAL Other Income & Expenses	265.12	(1,025.03)	1,290.15	125.9%
PROFIT BEFORE TAXES	6,282.17	4,057.19	2,224.98	54.8%
NET PROFIT	$6,282.17	$4,057.19	$2,224.98	54.8%

Lake Limerick Country Club Inc

Income Statement

(Department Number 950: Water Committee)

	4 Months Ended Jan/06	4 Months Ended Jan/06 Budget	Variance Fav/<Unf>	% Var
Income				
Gross Revenue Sales				
Water Dept Revenue Metered 04	$74,223.15	$73,508.00	$715.15	1.0%
Water Revenue No Meter 04	5,935.00	7,420.00	(1,485.00)	-20.0%
Water Meter Excess Rate	394.24	13,333.32	(12,939.08)	-97.0%
Water Meter Lockout/Disconnect	0.00	100.00	(100.00)	-100.0%
Water Meter Hook Up Fee	6,000.00	3,333.32	2,666.68	80.0%
TOTAL Gross Rev Sales	86,552.39	97,694.64	(11,142.25)	-11.4%
TOTAL Income	86,552.39	97,694.64	(11,142.25)	-11.4%
NET INCOME	86,552.39	97,694.64	(11,142.25)	-11.4%
GROSS PROFIT	86,552.39	97,694.64	(11,142.25)	-11.4%
Expenses				
Salaries Water	21,275.76	22,211.12	935.36	4.2%
Payroll Tax Water	2,160.78	2,332.40	171.62	7.4%
L&I Ins Water	194.60	266.72	72.12	27.0%
Health Insurance-Water	1,398.67	1,666.00	267.33	16.0%
Education of Employees-Water	730.59	333.20	(397.39)	-119.3%
Accrued Vaca/Sick- Water	(624.00)	0.00	624.00	
Property Taxes-Water	39.75	500.00	460.25	92.1%
Accounting Review-Water	1,329.25	333.60	(995.65)	-298.5%
Advertising-Water	0.00	33.34	33.34	100.0%
Bank Service Charges-Water	217.97	399.84	181.87	45.5%
Depreciation - Water	17,635.00	17,627.96	(7.04)	0.0%
Dues & Subscriptions-Water	175.00	166.68	(8.32)	-5.0%
Engineering Services-Water	8,827.56	3,333.32	(5,494.24)	-164.8%
Equipment Rent-Water	50.51	266.68	216.17	81.1%
Insurance-Water	2,299.47	2,000.00	(299.47)	-15.0%
Legal Fees Water Dept	2,332.95	4,000.00	1,667.05	41.7%
Licenses & Permits-Water	338.50	666.40	327.90	49.2%
Newsletter Expense-Water	532.59	500.00	(32.59)	-6.5%
Office Expense Water	790.61	0.00	(790.61)	
Postage-Water	1,910.04	2,332.40	422.36	18.1%
Professional Services-Water	39.10	499.80	460.70	92.2%
Repair & Maintenance-Water	537.83	1,832.60	1,294.77	70.7%
Repair & Maint Equip-Water	317.93	2,165.80	1,847.87	85.3%
R & M Extraordinary-Water	0.00	666.40	666.40	100.0%
Security Contract-Water	1,557.57	2,500.00	942.43	37.7%
Service Contract-Water	153.45	0.00	(153.45)	
Supplies - Water	1,487.49	1,732.64	245.15	14.1%
Telephone -Water	251.81	666.40	414.59	62.2%
Utilities-Water	4,210.72	6,666.68	2,455.96	36.8%
Vehicle Expenses-Water	953.44	666.40	(287.04)	-43.1%
Water Test	544.00	999.60	455.60	45.6%

Lake Limerick Country Club Inc

Income Statement

(Department Number 950: Water Committee)

	4 Months Ended Jan/06	4 Months Ended Jan/06 Budget	Variance Fav/<Unf>	% Var
TOTAL Expenses	71,668.94	77,365.98	5,697.04	7.4%
OPERATING PROFIT	14,883.45	20,328.66	(5,445.21)	-26.8%
Other Income & Expenses				
Service Charges Water	834.08	400.00	434.08	108.5%
Interest Income Water	187.34	333.20	(145.86)	-43.8%
Miscellaneous Inc. Water	198.00	166.68	31.32	18.8%
Reserves - Water 2005-2006	0.00	(5,000.00)	5,000.00	100.0%
TOTAL Other Income & Expenses	1,219.42	(4,100.12)	5,319.54	129.7%
PROFIT BEFORE TAXES	16,102.87	16,228.54	(125.67)	-0.8%
NET PROFIT	$16,102.87	$16,228.54	($125.67)	-0.8%

Lake Limerick Country Club Inc

Trial Balance

Department 950
(For the month of January 2006)

Account # / Reference No. / Description		Date	Debits	Credits	Balance
5110.950	Salaries Water				14621.76
P/R DOUGLASA	Check: 24405	01/15	108.00		
P/R DOUGLASA	Check: 24405	01/15	195.75		
P/R DOUGLASA	Check: 24405	01/15	776.25		
P/R DOUGLASK	Check: 24406	01/15	1404.00		
P/R DOUGLASK	Check: 24406	01/15	156.00		
P/R HEDLUNDS	Check: 24409	01/15	690.00		
P/R KOCH	Check: 24412	01/15	480.00		
P/R DOUGLASA	Check: 24456	01/31	972.00		
P/R DOUGLASA	Check: 24456	01/31	972.00		
P/R DOUGLASK	Check: 24457	01/31	936.00		
P/R DOUGLASK	Check: 24457	01/31	780.00		
P/R DOUGLASK	Check: 24457	01/31	156.00		
P/R DOUGLASK	Check: 24457	01/31	936.00		
P/R DOUGLASK	Check: 24457	01/31	780.00		
P/R DOUGLASK	Check: 24457	01/31	156.00		
P/R DOUGLASA	Void Check: 24456	01/31		972.00	
P/R DOUGLASK	Void Check: 24457	01/31		936.00	
P/R DOUGLASK	Void Check: 24457	01/31		780.00	
P/R DOUGLASK	Void Check: 24457	01/31		156.00	
	**** Ending Balance		9498.00	2844.00	21275.76
5121.950	Payroll Tax Water				1258.34
P/R DOUGLASA	Check: 24405	01/15	14.62		
P/R DOUGLASA	Check: 24405	01/15	26.50		
P/R DOUGLASA	Check: 24405	01/15	105.10		
P/R DOUGLASK	Check: 24406	01/15	191.19		
P/R DOUGLASK	Check: 24406	01/15	21.24		
P/R HEDLUNDS	Check: 24409	01/15	93.02		
P/R KOCH	Check: 24412	01/15	63.56		
P/R DOUGLASA	Check: 24456	01/31	131.73		
P/R DOUGLASA	Check: 24456	01/31	131.73		
P/R DOUGLASK	Check: 24457	01/31	127.74		
P/R DOUGLASK	Check: 24457	01/31	106.45		
P/R DOUGLASK	Check: 24457	01/31	21.29		
P/R DOUGLASK	Check: 24457	01/31	127.74		
P/R DOUGLASK	Check: 24457	01/31	106.45		
P/R DOUGLASK	Check: 24457	01/31	21.29		
P/R DOUGLASA	Void Check: 24456	01/31		131.73	
P/R DOUGLASK	Void Check: 24457	01/31		127.74	
P/R DOUGLASK	Void Check: 24457	01/31		106.45	
P/R DOUGLASK	Void Check: 24457	01/31		21.29	
	**** Ending Balance		1289.65	387.21	2160.78
5122.950	L&I Ins Water				188.46
P/R DOUGLASK	Check: 24406	01/15	4.09		
P/R DOUGLASK	Check: 24406	01/15		1.02	
P/R DOUGLASK	Check: 24457	01/31	4.09		

Lake Limerick Country Club Inc

Trial Balance

Department 950

(For the month of January 2006)

Account # / Reference No. / Description		Date	Debits	Credits	Balance
P/R DOUGLASK	Check: 24457	01/31		1.02	
P/R DOUGLASK	Check: 24457	01/31	4.09		
P/R DOUGLASK	Check: 24457	01/31		1.02	
P/R DOUGLASK	Void Check: 24457	01/31		4.09	
P/R DOUGLASK	Void Check: 24457	01/31	1.02		
	**** Ending Balance		13.29	7.15	194.60
5141.950	Health Insurance-Water				626.81
A/P REGENCE	Invoice: DOUGLASK JAN06 / water	01/20	416.85		
A/P REGENCE	Invoice: DOUGLASK FEB06 / water	01/27	416.85		
A/P ASSURANT	Invoice: DOUGLASK JAN06 / water	01/27	65.56		
P/R DOUGLASK	Check: 24406	01/15		33.77	
P/R DOUGLASK	Check: 24406	01/15		29.93	
P/R DOUGLASK	Check: 24457	01/31		29.93	
P/R DOUGLASK	Check: 24457	01/31		33.77	
P/R DOUGLASK	Check: 24457	01/31		33.77	
P/R DOUGLASK	Check: 24457	01/31		29.93	
P/R DOUGLASK	Void Check: 24457	01/31	33.77		
P/R DOUGLASK	Void Check: 24457	01/31	29.93		
	**** Ending Balance		962.96	191.10	1398.67
5150.950	Education of Employees-Water				730.59
5151.950	Accrued Vaca/Sick- Water				-624.00
5240.950	Property Taxes-Water				39.75
5550.950	Accounting Review-Water				1329.25
5700.950	Bank Service Charges-Water				217.97
5850.950	Depreciation - Water				13226.25
GEN DEPRCATN	EOM Distribution of Depreciation	01/31	4408.75		
	**** Ending Balance		4408.75	0.00	17635.00
5900.950	Dues & Subscriptions-Water				0.00
A/P FIT	Invoice: 16045 / Water	01/19	175.00		
	**** Ending Balance		175.00	0.00	175.00
5950.950	Engineering Services-Water				8107.56
A/P SEMCON	Invoice: 1951 / WSP	01/19	720.00		

Lake Limerick Country Club Inc

Trial Balance

Department 950
(For the month of January 2006)

Account # / Reference No. / Description		Date	Debits	Credits	Balance
	**** Ending Balance		720.00	0.00	8827.56
6050.950	Equipment Rent-Water				50.51
6100.950	Insurance-Water				2299.47
6250.950	Legal Fees Water Dept				2226.50
A/P HOSSWILS	Invoice: 2582 / Lot Sale 4-88	01/12	76.45		
A/P HOSSWILS	Invoice: 2631 / By Laws	01/12	30.00		
	**** Ending Balance		106.45	0.00	2332.95
6350.950	Licenses & Permits-Water				338.50
6450.950	Newsletter Expense-Water				532.59
6500.950	Office Expense Water				790.61
6550.950	Postage-Water				1391.50
A/P UPSSTORE	Invoice: PO#22783 / Water	01/19	25.20		
A/P PITNEYBO	Invoice: 1054619 / postage maching rent	01/20	228.83		
A/P PITNEYBO	Invoice: JAN06 / postage/ newsletter	01/20	264.51		
	**** Ending Balance		518.54	0.00	1910.04
6561.950	Professional Services-Water				37.95
A/P UTILITIE	Invoice: 5129376 / water	01/19	1.15		
	**** Ending Balance		1.15	0.00	39.10
6750.950	Repair & Maintenance-Water				537.83
6800.950	Repair & Maint Equip-Water				137.27
A/P HARBORFR	Invoice: 02-135610 / maint/water/golf	01/27	180.66		
	**** Ending Balance		180.66	0.00	317.93
6900.950	Security Contract-Water				0.00
A/P MASONSHE	Invoice: OCTNOVDEC05 / security	01/27	449.40		
A/P MASONSHE	Invoice: SUMMER05 / security	01/27	1108.17		
	**** Ending Balance		1557.57	0.00	1557.57

Lake Limerick Country Club Inc

Trial Balance

Department 950
(For the month of January 2006)

Account # / Reference No. / Description		Date	Debits	Credits	Balance
7000.950	Service Contract-Water				153.45
7050.950	Supplies - Water				1442.84
A/P VIKINGOF	Invoice: 321883977-001 / off supplies	01/20	31.66		
A/P VIKINGOF	Invoice: 321885056 / adm	01/27	12.99		
	**** Ending Balance		44.65	0.00	1487.49
7100.950	Telephone -Water				197.71
A/P NEXTEL	Invoice: JAN06 / GOLF/MAINT/WATER	01/31	54.10		
	**** Ending Balance		54.10	0.00	251.81
7200.950	Utilities-Water				3008.08
A/P PUD	Invoice: 31862 JAN 06 / Water	01/31	75.23		
A/P PUD	Invoice: 32178 JAN 06 / Water	01/31	277.99		
A/P PUD	Invoice: 32244 JAN 06 / Water	01/31	283.16		
A/P PUD	Invoice: 32306 JAN 06 / Water	01/31	85.33		
A/P PUD	Invoice: 32732 JAN 06 / Water	01/31	225.02		
A/P PUD	Invoice: 66110 JAN 06 / Water	01/31	255.91		
	**** Ending Balance		1202.64	0.00	4210.72
7250.950	Vehicle Expenses-Water				953.44
7300.950	Water Test				466.00
A/P WASTDOH	Invoice: 0007628 / Radiation 228 Test	01/31	78.00		
	**** Ending Balance		78.00	0.00	544.00

LAKE LIMERICK COUNTRY CLUB
Water Committee
Special Meeting – November 30, 2005

Meeting Minutes

The meeting was called to order at 2:00pm. Members in attendance were Kirk Osborne, Nan Stricklin, Tom Taylor, Don Nichols, Vern Hadsall and Bill McDonald. Employees present were Jerry Thompson and Ken Douglas.

The first hour of the meeting was spent reviewing the duties of the Water System Manager. Members had reviewed the duties as presented in an hourly breakdown that was first developed in 2003 and revised in 2005. Various questions concerning the operations of the water system, the methods used to maintain the system including the computer operations, the requirements of the various governmental agencies and the needs of the Lake Limerick community.

Ken was questioned concerning how he performed various duties involving the system, the maintenance of records, and the number of hours required to accomplish his duties.

At the conclusion of this hour, Jerry Thompson and Ken Douglas were excused.

The committee then discussed the need for a full time Water Manager based upon our understanding of the requirements. It was decided to develop a task listing involving those duties that the committee felt needed to be accomplished by the Water System Manager and estimate the number of annual hours required to perform these duties. This listing is attached.

The committee felt that the Lake Limerick community required a full time Water System Manager. Not only did the committee feel that there are sufficient duties and requirements to justify a full time employee, they also felt that the health and well being of the community required the employment of a full time manager. The need to positively insure that the water system is maintained to the highest standard is something that cannot be put in jeopardy. The committee felt that any reduction in the number of hours worked by the Water System Manager places undue exposure to this community and could result in an unhealthy situation that would be far more expensive than the small savings in employee costs.

The Water Committee as a whole recommends that the Water System Manager be maintained as a full time position.

The meeting was adjourned at 3:25pm.

Respectfully submitted by Bill McDonald.

Preliminary minutes until approved by the Water Committee.

WATER SYSTEM SUPERVISOR (MANAGER)

The Lake Limerick Water System is operated by a certified water distribution manager. The manager is responsible for the day-to-day operation of the system as well as the maintenance and repairs made to the system. Listed under water system requirements are those duties that should be performed by the manager in order to maintain the integrity and safe operation of the entire system. The other duties can be performed by a general maintenance person.

WATER SYSTEM REQUIREMENTS

Well site physical checks
Routine water tests
Perform special tests as required by Department of Health
Maintain computerized system operation
Meter reading
Water tank inspection
Water tank cleaning and sanitization
Maintain water usage records
Attend water committee meetings
Maintain interior and exterior well sites
Inspect and flush water hydrants
Inspect and flush standpipes
Perform water meter installation
Develop Consumer Confidence Report
Respond to customer calls
Maintain generators at well sites
Perform water meter maintenance
Replace Dialog Modules when required
Accomplish general system and service line repairs
Exercise main line valves
Perform well draw down and exercise well valves
Maintain water system map
Maintain required documentation

OTHER DUTIES

Maintain water department vehicle
Parts and supplies pickup
Remove brush at hydrants and standpipes
Paint hydrants
Remove weeds and brush at well sites
Perform general facility maintenance at well sites

WATER SYSTEM REQUIREMENTS

	Annual Yearly Required Hours
Well site physical checks	104
Routine water tests	96
Perform special tests as required by Department of Health	40
Maintain computerized system operation	500
Meter reading	288
Water tank inspection	24
Water tank cleaning and sanitization	120
Maintain water usage records	24
Attend water committee meetings	24
Maintain interior and exterior well sites	400
Inspect and flush water hydrants	120
Inspect and flush standpipes	96
Perform water meter installation	100
Develop Consumer Confidence Report	8
Respond to customer calls	36
Maintain generators at well sites	72
Perform water meter maintenance	40
Replace Dialog Modules when required	24
Accomplish general system and service line repairs	40
Exercise main line valves	24
Perform well draw down and exercise well valves	72
Maintain water system map	20
Maintain required documentation	50
ESTIMATED YEARLY REQUIRED HOURS	**2322**

OTHER DUTIES

	Annual Yearly Required Hours
Maintain water department vehicle	24
Parts and supplies pickup	50
Remove brush at hydrants and standpipes	100
Paint hydrants	10
Remove weeds and brush at well sites	200
Perform general facility maintenance at well sites	20
ESTIMATED YEARLY REQUIRED HOURS	**404**

Data Package for Water Committee

1. Memo from Executive Committee
2. Current Water System Supervisor (Manager) job description
3. Water Supervisor credentials
4. Water Chairmans estimate of work load
5. Water Supervisors estimate of work load
6. Water Distribution Manager Responsibilities (DOH Document)

WC - FYI
Meeting Wed 30th @ 2:00

Jule

MEMO

Date: 11-10-05

To: Water Committee Members

Cc: Executive Committee

From: Scott Carey

RE: Water Master Position

After much consideration and discussion the Executive Committee is requesting that your committee put together documentation to the Board of Trustees to convince them to continue to fund the Water Master Position as a 40 hour per week job.

What we would like to see are facts and hard dollar costs. In light of Ken's current situation and the actual time he spends away from his office, we are not convinced that we need to continue spending the membership's money to fund this position full time.

We are charged to look at costs in every department at LLCC, and this is one area that has been overlooked for some time.

Yes I know it is "your" budget, but it is the membership's money.

Please have this prepared for the Executive Committee meeting 12-10-05.

Thanks for your cooperation

Scott

LAKE LIMERICK COUNTRY CLUB, INC.
E 790 St Andrews Dr
Shelton WA 98584
(360) 426-3581 FAX (360) 426-8922
E-mail lakelim@hctc.com

WATER SYSTEM SUPERVISOR (MANAGER) - JOB DESCRIPTION

WHERE ? WHAT

- The Water System Supervisor must, by Federal and State laws hold Certified Water Systems Manager (WDM) credentials. The Safe Drinking Water Regulations must be followed to insure system compliance.

- The Water System Supervisor is responsible for the Lake Limerick Country Club potable water facility and is the authority for and is required to carry out the policies of the Board of Trustees, the Water Committee, and the Water System Plan (See Policy I, page 7 WSP).

- All water personnel will report to the Water System Supervisor. In the event of need, arrangements may be made to acquire general maintenance personnel and golf personnel to assist with water projects.

- Any purchase of supplies etc. must be made in strict compliance with budget limitations for this department, and proper purchase orders initiated.

DUTIES:

1. Operate and maintain Lake Limerick Water System
2. Schedule water projects
3. Direct water personnel
4. Assist , if requested, with maintenance and golf projects
5. Hold regular employee safety meetings
6. Be available for Board of Trustees, Executive, and Maintenance Committee meetings if requested. Be obligated to attend all Water Committee Meetings.

OTHER GUIDELINES:

- The Water Committee will authorize all water Capital projects with the concurrence of the Board of Trustees.

- Comments and suggestions received by the Water Systems Supervisor from any LLCC staff or members will be referred to the Water Committee for discussion of merit and/or approval.

- Water committee chairperson must authorize overtime, and approve vacation.

Certification:
Water Distribution Manager
Cross-connection Specialist
Asbestos Certified

Training:
Water Works Basics
Asbestos cement pipe work practice procedures
Automatic Control Valves
Water Sampling Basics
Wellhead Protection Planning
Chlorination Basics
Sanitary Survey
Pumps and Pumping
Cross Connection Control
Basics in Ladder Logic
Human Relations in the Workplace
Backflow Assembly Tester (class Feb. 6-9 2006) — LET'S SEE THE ANALYSIS

This certification allows for in-house testing of all backflow assemblies at a substantial savings.

Computer and Programing:
Computer Basic
Process Control and Instrumentation
PLC (Programable Controller) Training
(at present) Lookout Basics (SCADA Programing)

I presented the Lake Limerick Case Study at the 2001 Drinking Water Seminar, before 250 Water Workers and State DOH Officials. I spoke for approx. 45 minutes on the water conservation program implemented at LL with an emphasis on the meter installation and leak identification. HOW ABOUT LEAK REPAIRS

Employed by Lake Limerick Country Club since March 1992 Water Manager since 1995

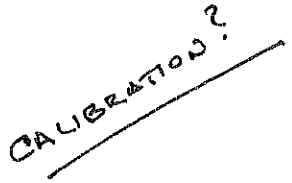
Schedule Water Projects

I have begun with the installation of 10 new sampling stations throughout Lake Limerick community. Instead of installing them when repairing service leaks, I have chosen 10 location as well as the sites up and down stream for re-sampling in the event of an unsatisfactory sample, I met with Mary Wilks of Semcon and changed the information in the new Water System Plan. All the materials have been previously purchased.

I have also purchased 10 double check valves to be installed at the same time, I purpose to continue installing the approved backflow assemblies throughout the next year beginning with the known higher risk homes, irrigation and drip line systems ponds and hot tubs. I have met with Mark Herr of H. D. Fowler Co. and procured a bid for 600 double check valve assemblies and all necessary parts the bid also included the price that a home owner would be required to pay if they had to install the check valve themselves.

Meter Calibration

Municipal water Law guideline requirement meters are to be calibrated every 5 years. This is new and something that was not schedule into day to day operations. However we need to start a program to satisfy this law, checking meters beginning now and replacing any that are defective. This will entail calibration equipment and extra meters to switch-out during the process.



LLCC Water Employee's Work Load:

Update 11/28/2005,October, 2003

	Job hours required per			
	8 hr/day	40 hr/week	174 hr/Mo.	2080 hr/Yr.
	Daily	Weekly	Monthly	Yearly
Routine Water System Requirements				
1. Well site physical check		2 hrs.		
2. Water Tests, (routine) Trip time to Lab – Special Tests as required by DOH			8 hrs.	40 hrs.
3. Meter Reading			24 hrs.	
4. System operation with computerized control program	2 hrs.			
5. Water tank (s) 4 a) Inspection b) Clean out and sanitization	ONE PERSON –		2 hrs.	40 hrs.
6. Meetings a) Water b) Other			2 hrs. 2 hrs.	
Maintenance as Required.				
1. Well Site buildings a) Interior upkeep, sweeping etc.	2 hrs.			
Painting				8 hrs.
Housekeeping, other cleaning		2 hrs.		
b) Exterior upkeep				40 hrs.
Building exterior painting, roof				
Grass and weeds			24 hrs.	
other		1 hrs.		
2. ~~Fire~~ Hydrants, Brush removal, paint,			20 hrs.	
3. Standpipes & vacuum breakers. Brush removal, paint, exercise valve.			8 hrs.	
4. Flush lines at standpipe locations			8 hrs.	
Other work required.				
Water meter maintenance				
Meter installation (4-6 year) –				40 hrs.
Dialog Modules Replace (Meter collars)		2 hrs.		
Clear brush at meter boxes		2 hrs.		
Consumer Confidence Report (CCR)				8 hrs.
Parts and supply pickup(Shelton/Tacoma/Olympia)			8 hrs.	
Service line repairs			8 hrs.	
General system repairs				80 +
Main line valve exercise (90 + valves)			2 hrs.	
Well draw down, exercise valves			6 hrs.	
Water system map (update locations)			4 hrs.	
Locates. Answering and responding to customer calls.		3 hrs.		
Paper work Meeting reports, test reporting forms, other documentation.			6 hrs.	
Equipment maintenance				
Truck			2 hrs.	
Generator at #3, #2, #6.			6 hrs.	
Estimated work load	4 hr. day	12 hr. wk.	140 hr. mo.	
Approximate hours per year	528 hr. yr.	480 hr. yr.	1680 hr. yr.	256 hr. yr.

Hours available per year = 2080 Est. yearly work hours = 2940

Salary for Water Supervisor (1) + 1/8 Maintenance employee per year: = 1 year full time WS = 2080 hrs. + 1/8 Maintenance = 260 = 2340 hrs. Estimated work load time of 2420 hours per year. This does not include any contingencies for emergency call out or unscheduled overtime to respond to emergencies.

Kirk Osborne Water Committee Chair

LLCC Water Employee Work Load

May 2005

	Hours Available / per			
	8/day Daily	40/week Weekly	174/month Monthly	2080/year Yearly
Routine Water System Requirements				
1. Well site physical inspection	1 hr	5 hrs		
2. Water Tests (routine) Lab drop off. DOC Required Organic, Inorganic, Volatile, etc			4 hrs	40+ hrs
3. Meter Reading data entre			24+ hrs	
4. System operation with computerized Control program	2 hrs			
5. Water tanks 4				
a) Inspection			2+ hrs	
b) Clean out sanitization				40+ hrs
6. Meetings				
a) Water	3 HR		2 hrs	
b) Other			2 hrs	
Maintenance as Required				
1. Well site buildings				
a) Interior upkeep sweeping etc	1 hr			
Painting				40+ hrs
Housekeeping, computer control support		2+ hrs		
b) Exterior upkeep				
Building painting roof repair				40+ hrs
grounds maintenance			16 hrs	
surge tank		2 hrs		
2. Fire Hydrants, brush removal, paint Valve exercise			20 hrs	
3. Stand pipes & vacuum breakers brush removal, paint, exercise			8 hrs	
4. Hydrant & standpipe system flush				120+ hrs
Growth and system Maintenance				
Residential meter maintenance meter installation (12 + per year)				40+ hrs
dialog modules (meter collars) replaced		3+ hrs		
clear brush around box		3+ hrs		
Consumer Confidence Report CCR				10+ hrs
Parts and Supplies purchase & pickup			8+ hrs	
Service line repairs			10+ hrs	

	Daily	Weekly	Monthly	Yearly
General system repairs				40-80+
Main line valve clean and exercise (90+)			4+ hrs	
Well draw down			6+hrs	
Water system map update			2 hrs	
Locates, answering & responding to customers		4+ hrs		
Paper work Meeting reports, test reporting forms Other documentation			6+ hrs	
Equipment maintenance Truck			3+ hrs	
Generators #3 #6			4+ hrs	
Communicate & correspond with DOH, contractors, Road maintenance, PUD etc.			4+ hrs	
Base Computer system programing				80+ hrs
Classes, seminars etc.				60+ hrs

intangibles **Unknown**

I am available for assistance in the Maintenance department whenever needed, including Lake Dam and or Golf departments
I assist in the maintenance department 120 + hours yearly including picking up any tools or supplies when I am in Shelton or Olympia.

I report to the Water Committee Chair person directly (Kirk Osborne) as will as the committee in general.

Submitted by;

Ken Douglas Water Distribution Manager

Water Distribution Manager Responsibilities

The Department of Health (DOH) requires that a certified operator be responsible for the daily operational activities of all Group A water systems. As WDM I am the water facility authority and am required to adhere to the water system plan and carry out the policies of the Water committee and Board of Trustees.

First and foremost the duty and responsibilities of the WDM is to protect public health through the assurance and provision of safe potable water.

Typical duties:

As per Federal State Drinking Water Act.

Ensure that all daily operation and maintenance activities of the water system are completed in accordance with acceptable public health practices and water industry standards.

- **Well operation and maintenance; perform static level draw down and recovery tests, keep well houses clean & paint when needed, keep all system pipes free of rust and painted repair leaks, monitor repair or replace (when necessary) electrical & computer components, keep starter switches clean replace when needed, exercise all gate and ball valves, monitor booster pumps for any problems, inspect and replace check valves if necessary. Maintain records. Keep well house exterior clean and paint when necessary, keep roof free of debris and patch leaks, weed around tanks and well houses, winterize exposed water pipes**
- **Well head protection; monitor area within 100 foot radius around the well head. Use only chemicals certified by the Department of health including all chemicals used by the Golf Dept.**
- **Storage tanks; perform routine maintenance, inspect tank walls daily for soundness including surrounding area for moisture. Inspect tank entrance and air vents for screening monthly, visually inspect inside of tank monthly, drain inspect and disinfect storage tank yearly. Replace floats when necessary.**
- **Surge tanks; flush every 6 months, pressure wash outside and paint when needed repair leaks**
- **Emergency Generators; Routine maintenance and operations, monitor start-up tests.**
- **Base and field computers; monitor communications daily, update base programing when necessary, analyze and review recording instrument readings change or reinstall I/O data of Well PLC as needed, spend time weekly studying developing new SCADA program as well as the Flotronex booster pump station at #6 Well**
- **Perform water quality monitoring; maintain adequate record, be prepared to take follow-up action if necessary to comply with state and federal drinking water regulations. Perform monthly coliform tests perform VOCs SOCs IOCs Nitrates,**

lead & copper. Review all test results

- System and Residential meters; Read all meters monthly, field programing when necessary, replace meter collars (on going as failure rate is approx 1% per month) new meter installations and lock outs, keep records on reading.
- Meter boxes; replace when necessary, clear debris from around boxes to assure accessibility.
- Hydrants and stand pipes; Exercise hydrants twice a year stand pipes once a year, blow off system via hydrants and stand pipes yearly, pressure wash and paint as needed (on-going).
- Street valves; exercise all valves 3 times a year, add risers as needed.
- Leaks; monitor suspect areas, repair all known leaks in main lines as well as service lines (there's approx. 5-6 service flair at main being replaced yearly and several service line failures.) Main line repairs 4 this past year.
- Line replacement; This summer I will be replacing approx 120" of main line and installing 2 valves at cranberry creek crossing. CONTRACTOR
- Locates; mark water lines and monitor utility work around main and service lines. Including phone, gas, PUD, and road maintenance.
- Meetings; attend water committee meeting, meet with committee chair twice a week, attend meetings with DOH Southwest Drinking water, WRIA, SEMCON engineering etc.
- Attend state or state certified classes and maintain the continuing education unit as required by state regulations. Attend classes and seminars relevant to the needs and growth of Lake Limerick water system and community.
- Cross-Connection control; check CC assemblies (primary check valves) work on program with SEMCON and the DOH
- Truck and equipment preventative maintenance;
- Supplies and maintenance; Make purchases for routine maintenance, growth and on-going improvements to the water system.
- Reports; Write monthly committee reports, file DOH reports, yearly consumer confidence report, word with SEMCON on water system plan. Communicate with government agencies, and varies utilities.
- Interact with customers; respond to meter concerns and complaints, residential service and home owner leaks, contractor issues, as well as monitoring any installations with possible cross connections.
- Be available for all water related emergencies 24 hours a day including any time response to unsatisfactory Bacteriological samples.
- Assist the Maintenance and Golf departments when needed.

The time spent daily on the above varies each day, week and month, according to the greater need and on-going projects.

Respectfully submitted

Ken Douglas WDM CCS

Sheila Hedlund

From: "Mary Wilkes" <mary@semcon.us>
To: "Kirk Osborne" <llccbk@hctc.com>
Cc: "John Segerson" <john@semcon.us>
Sent: Thursday, October 12, 2006 10:12 AM
Subject: Update on WSP approval

Kirk,

Just to give you a quick update, we recently receive a letter from Department of Ecology with some comments regarding the draft of the Water System Plan. I have already incorporated some minor changes into the draft to address Ecology's comments.

We should be receiving comments from Department of Health shortly. After we have made changes to address DOH's comments, we will submit the revised Water System Plan to you for your review.

Please call if you have any questions.

-Mary
360-753-5269 x103

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

November 8, 2006

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;

Thank you for submitting the Water System Plan (WSP) for the Lake Limerick Water System. The Office of Drinking Water (ODW) is encouraged by the accomplishments of the water system in producing this WSP. Prior to approval, the following specific comments must be addressed. **Response to these comments should be received by this office prior to February 7. 2007.**

GENERAL COMMENTS (response required)

1. Pages, I-2, I-4, III-12, and III-13. On page I-2, it is indicated that fire flow considerations will not be included as a design parameter for the piping network. On page III-12 (Item 8), it is intimated that the system is not required to provide fire flow and the Mason County Fire Marshall has agreed to not draw water from existing hydrants. Also in this paragraph is a sentence that suggests the system "may not be able to deliver the "required" fire flow. Further language here and on page I-4 says the system, as a matter of policy, has decided to not to develop fire flow. On page III-13 there is a paragraph (Item 4) that indicates fire flow might, or might not be a possible deficiency.

   The aspect of fire suppression capability is unclear. A letter from the Mason County Fire Marshall that shows agreement with the position of the Lake Limerick system is needed to establish that fire suppression capacity is not needed, especially now that the county had adopted interim fire protection standards. **Please include the letter in your revised WSP.**

2. Page I-3. Although not clearly stated in the plan, it seems that the unmetered lots must be assessed a fee but not provided water service (they are assessed a minimum fee until they

request service and are then metered). Otherwise, the conservation program would most likely suffer greatly if the unmetered lots were provided service with only a set monthly/annual fee. **Please explain why the cost for unmetered services is so much lower than for metered services in your revised WSP.**

3. Page I-5. **Please explain if there is anything in the Mason County Comprehensive Plan that addresses fire flow requirements in your revised WSP.**
4. Page VI-2. Several telephone numbers and contacts are incorrect. The DOH Regional Engineer is currently Frank Meriwether (not Sheri Miller). The front desk telephone number for Frank is (360) 236-3030. Sandy Brentlinger telephone number is (360) 236-3044. The Mason County Fire Marshall is Craig Haugen. **Please revise the telephone contact page and resubmit with your revised WSP.**
5. Page II-1. Project submittal exemption" should read "project submittal exception". We need to be sure to acknowledge that conditions of WAC 246-290-125 are met with the approval of this plan.
6. Appendix B. The Municipal Water Law Consistency Statement Checklist was not signed or dated by the Mason County Planner.
7. Appendix C. The most recent WFI update information shows the number of active services as 1250. On page II-1, it is indicated that there are 1103 active service connections. **This information needs to be revised/clarified in your revised WSP.**
8. Appendix D. Tables 3 and 4, the Existing and Forecasted Water Rights Status, were not included in your WSP. **Please submit these tables in your revised WSP.**

COMMENT (no response required)

9. Page III-1. *This is for information only.* SRLs are not standards. They are used for laboratory data reporting purposes only.

The Department of Ecology (Ecology) sent a comment letter (enclosed) dated October 2, 2006, regarding the Lake Limerick's water rights. Please work with Ecology to resolve any discrepancies. Ecology has chosen not to take action against the water system for these discrepancies. 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 of this WSP 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.

Thank you for submitting your WSP for review. WAC 246-290-990 (July 2004 revision) established the schedule of fees for review of planning, engineering, and construction documents. In accordance to this fee schedule, an itemized bill for $2,408 is enclosed.

If you have any questions, please contact Regional Planner Karen Klocke at (360) 236-3031 or Regional Engineer Jim Hudson, P.E. at (360) 236-3131.

Sincerely,

KAREN KLOCKE
Office of Drinking Water Regional Planner

JIM HUDSON, P.E.
Office of Drinking Water Regional Engineer

Enclosures

cc: John Segerson, P.E., SEMCON, Inc.
Mason County Health Department
Mason County Planning Department
Deb Hunemuller, Department of Ecology SWRO
Frank Meriwether, ODW
Bonnie Waybright, ODW

Lake

SEMCON, Inc.

1211 Fourth Avenue East Suite 101, Olympia, WA 98506-4279
Phone: 360-753-5269 ☎ Fax/Data:360-753-5636 🖷 e-mail: semcon@olywa.net
☑ Engineering ☑ Planning ☑ Management ☑ Information Technology

February 22, 2007

Nan Strickland
Lake Limerick Country Club, Inc.
East 790 St. Andrews Dr.
Shelton, WA 98584

Dear Nan,

Enclosed, please find four packets to upgrade to Rev A.2 from Rev A.1, for the Water System Plan.

Please send the fourth packet to Mr.* Robert Fink, Planning Manager, Mason County, (360-427-9670 ext.366), so that he may upgrade his copy of the Water System Plan that Kirk submitted for review.

Copies have been sent to Karen Klocke of the Department of Health for final review.

Please call Mary Wilkes at 360-753-5269-ext. 103 if you have any comments or questions

Sincerely,

Bill Miller

William H. Miller, Engineering Technician

enc

* Robert Fink,
Planning Manager
M.C. O.C.D.
P.O. Box 279
Shelton

Mailed 2/27/07 PAM

SEMCON, Inc.

1211 Fourth Avenue East Suite 101, Olympia, WA 98506-4279
Phone: 360-753-5269 ☎ Fax/Data:360-753-5636 🖷 e-mail: semcon@olywa.net
☑ Engineering ☑ Planning ☑ Management ☑ Information Technology

February 22, 2007

Nan Strickland
Lake Limerick Country Club, Inc.
East 790 St. Andrews Dr.
Shelton, WA 98584

Dear Nan,

Enclosed, please find four packets to upgrade to Rev A.2 from Rev A.1, for the Water System Plan.

Please send the fourth packet to Mr. Robert Fink, Planning Manager, Mason County, (360-427-9670 ext.366), so that he may upgrade his copy of the Water System Plan that Kirk submitted for review.

Copies have been sent to Karen Klocke of the Department of Health for final review.

Please call Mary Wilkes at 360-753-5269-ext. 103 if you have any comments or questions

Sincerely,

Bill Miller

William H. Miller, Engineering Technician

enc

SEMCON, Inc.

1211 Fourth Avenue East, Suite 101, Olympia, WA 98506-4211

Phone: 360-753-5269 ☎ Fax: 360-753-5636 e-mail: semcon@olywa.net

☑ Engineering ☑ Planning ☑ Management ☑ Information Technology

February 22, 2007

Karen Klocke, Jim Hudson
Department of Health
P.O. Box 47823
Olympia, WA 98504-7823

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

Dear Karen and Jim,

Attached please find three upgrade packets to upgrade the three Lake Limerick Water System plans submitted last year. Also enclosed, please find a packet of "redlines" for your reference.

Thank you for reviewing the water system plan we submitted. Below are our responses to your comments in your letter to Kenneth Douglas dated November 8, 2006.

Comment 1)

You wrote, "*The aspect of fire suppression capacity is unclear. A letter from Mason County Fire Marshall that shows agreement with the position of the Lake Limerick system is needed to establish that fire suppression capacity is not needed... **Please include the letter in your revised WSP.***"

The letter is included in Appendix B. Section III.B.8 has been edited. It now states "[T]he system may not be able to deliver sufficient flow for fire suppression", rather than "[T]he system may not be able to deliver the required fire flow." Also, Section III.C.4 has been deleted.

Comment 2)

You wrote, "***Please explain why the cost for unmetered services is so much lower that for metered services in your revised WSP.***"

At essentially all buildable lots in the service area there is a meter box and a service line, whether there is a meter in the meter box or not. Only connections with meters are allowed to draw water from the distribution system. If the lot has a building and it is occupied, it is an active, metered connection. If the house is unoccupied, it is typically an inactive, metered connection. Lots with no houses typically have meter boxes, but no meters and are unmetered, inactive connections.

To clarify, "... current rates of $17 per unit per month (metered, $5 unmetered)..." has been replaced with "...current rates of $17 per unit per month (metered connections, $5 unmetered, inactive connections)..." in Section I.A.2 (Page I-3). The associated footnote was also changed.

Comment 3)

You wrote, "***Please explain if there is anything in the Mason County Comprehensive Plan that addresses fire flow requirements in your revised WSP.***"

I reviewed the Comprehensive Plan (available at http://www.co.mason.wa.us/code/comp_plan/index.php.) While it did address fireflow in urban areas, I could not find any reference to fireflow in rural areas.

Comment 4)

You wrote, "***Please revise the telephone contact page and resubmit with your revised WSP.***"

Done. See Section VI.A.2.

Comment 5)

You wrote, " "*Project submittal exemption" should read "project submittal exception".*"

Done. See Section VII.A.

Comment 6)

You wrote, "*The Municipal Water Law Consistency Statement was not signed or dated by the Mason County Planner.*"

Signed Statement is included in Appendix B.

Comment 7)

You wrote, "The most recent WFI update information shows the number of active services as 1250. On page II-1, it is indicated that there are 1103 active service connections. ***This information needs to be revised/clarified in your revised WSP.***"

The WFI update from has been revised. See Appendix C.

Comment 8)

You wrote, "Tables 3 and 4, Existing and Forecasted Water Rights Status, were not included in you WSP. ***Please submit these in your revised WSP.***"

Done. See Appendix D.

I have responded to the comments in Deb Hunemuller's letter to you dated October 2, 2006 via a letter to Deb. A copy of my response letter has also been sent to you. Please call if you have not received it. Also, please be aware that the capacity analysis has been revised base on Deb's comments. See Appendix E.

If you have any comments or questions, please feel free to call.

Thank you,

Mary Wilkes

Mary Wilkes, E.I.T.
Engineering Technician
SEMCON, Inc.

Enclosures: Redline Packet
3 Upgrade Packets

cc: Deb Hunemuller, Department of Ecology
Kirk Osborne, Lake Limerick
Nan Strickland, Lake Limerick
Kenneth Douglas, Lake Limerick

SEMCON, Inc.

1211 Fourth Avenue East, Suite 101, Olympia, WA 98506-4211

Phone: 360-753-5269 ☎ Fax: 360-753-5636 💻 e-mail: semcon@olywa.net

☑ Engineering ☑ Planning ☑ Management ☑ Information Technology

February 22, 2007

Deb Hunemuller
Department of Ecology
P.O. Box 47600
Olympia, WA 98504

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

Dear Deb,

Thank you for reviewing the water system plan we submitted. In your letter to Karen Klocke dated October 2, 2006, you requested that a Water Rights Self-Assessment Table be included in the Water System Plan. This has been done in Revision A.2 of the Water System Plan. See Appendix D of Revision A.2.

The water rights data has been updated to show that Qa of G2-27443C is non-additive. See section III.B.3.

Please feel free to call if you have any comments or questions

Thank you,

Mary Wilkes

Mary Wilkes, E.I.T.
Engineering Technician
SEMCON, Inc.

cc: Karen Klocke, Department of Health
Jim Hudson, Department of Health
Kirk Osborne, Lake Limerick
Nan Strickland, Lake Limerick
Kenneth Douglas, Lake Limerick

MASON COUNTY FIRE MARSHAL

Mason County Bldg. III 426 W. Cedar
P.O. Box 186 Shelton, Washington 98584
(360) 427-9670 Ext. 273

CODE ENFORCEMENT | FIRE INSPECTIONS | FIRE INVESTIGATION | PUBLIC EDUCATION

February 22nd 2007

Lake Limerick Country Club
Water Committee
790 E St. Andrews Dr.
Shelton, WA 98584

Water Committee;

I am responding to your letter dated June 26, 1998, regarding the Lake Limerick Water System.

I have received a copy of a response letter from Mason County FD 5, which I feel accurately covers any response that I might have. As you can see by the letter, FD 5 is well aware of the capabilities of the Lake Limerick water system. One point I would make is relevant to the many water system plans that we review and approve.

The Washington State Health Department includes our review in the approval of water system plans and upgrades. My focus in those reviews is to address fire flow capabilities. Although some water systems in Mason County do have a level of fire flow capability, many do not.

When we review a water system plan, we address fire flow issues in relation to what is being done to the system. If an upgrade involves only increased storage, with no subsequent improvement in the distribution system, we require at minimum a drafting hydrant at the storage tank. If the improvements involve expansion of storage and the distribution system, we address a broader range of issues, including larger water mains and more fire hydrants.

For the record, the Lake Limerick Water System does not currently meet the minimum fire flow requirements in the International Fire Code. We would address this deficiency in several ways. In the case of a commercial building expansion or new construction, if the fire flow demand of the building exceeds the fire flow capabilities of the water system, we would require additional fire protection for the building, i.e., a sprinkler system and a fire alarm system. If we detected inadequate hydrant coverage in a particular area in the development, we would require additional fire hydrants.

MASON COUNTY FIRE MARSHAL

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CODE ENFORCEMENT | FIRE INSPECTIONS | FIRE INVESTIGATION | PUBLIC EDUCATION

Thank you for your interest in fire protection. If you have any question, please contact me.

Best Regards,

Craig Haugen
Mason County Fire Marshal

1900151 MASON CO WA
07/02/2007 03:28 PM RESOL
LAKE LIMERICK COUNTRY CLUB #9498 Rec Fee: $34.00 Pages: 3

WASHINGTON STATE COUNTY AUDITOR/RECORDER'S
INDEXING FORM
(Cover Sheet)

Return Address:
Lake Limerick Country Club, Inc.
E 790 St Andrews Dr
Shelton WA 98584

Please print or type information

Document Title(s) (or transactions contained therein):
1. Lake Limerick Country Club Resolution 2007-01
2.

Reference Number(s) of Documents Amended:
Auditor # n/a

Claimant:
Lake Limerick Country Club, Inc.
Grantee

~~**Property Owner(s)**~~ (Last name first, than first name and initials) **n/a**
1. Public
2.
3. ☐ Additional names on page _____ of document.

Legal Description (abbreviated: i.e. lot, block, plat, or section, township, range) **n/a**

☐ Additional legal is on page ____ of document

Assessor's Property Tax Parcel/Account Number n/a

☐ Additional legal is on page ____ of document

LAKE LIMERICK COUNTRY CLUB
RESOLUTION
2007-01

WHEREAS the Board of Directors of Lake Limerick Country Club seeks to maintain a high standard of water service to the Lake Limerick Country Club Membership;

WHEREAS the Board of Directors of Lake Limerick Country Club in concert with the Lake Limerick Water Committee recognizes the need for a long term comprehensive water utility plan;

WHEREAS the Board of Directors of Lake Limerick Country Club seeks to conserve valuable water resources;

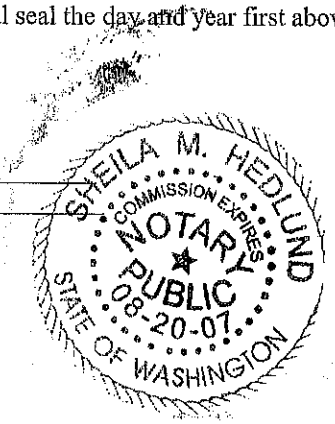
THEREFORE be it resolved that the Board of Directors of Lake Limerick Country Club hereby adopts the Lake Limerick Water System Plan and applicable policies and procedures included therein.

Adopted and dated this 19th day of May, 2007 by the Board of Directors of Lake Limerick Country Club.

Scott Carey
President, Board of Directors
Lake Limerick Country Club

STATE OF WASHINGTON)
County of Mason) ss.
ON THIS 19 day of May, 2007 personally appeared Scott Carey, President Lake Limerick Board of Directors personally known by me, that he/she executed the attached and foregoing document, and acknowledged that said instrument was his/her free and voluntary act and deed, and on oath stated that he/she is authorized to execute said instrument.
WITNESS my hand and official seal the day and year first above written.

Affiant Known ☑
Affiant produced ID ☐
Type of ID: _____



Sheila M. Hedlund
Sheila M. Hedlund
NOTARY PUBLIC in and for the State of Washington, residing at Shelton
My Commission expires 08-20-07