Comprehensive Water Plan

City of Andover, Minnesota

SEH No. A-ANDOV0703.00

January 2008

January 28, 2008

RE: Comprehensive Water System Plan
City of Andover, Minnesota
SEH No. A-ANDOV0703.00

Mr. Dave Berkowitz, PE
City Engineer
City of Andover
1685 Crosstown Blvd. NW
Andover, Minnesota 55304-2612

Dear Mr. Berkowitz:

Enclosed please find the Comprehensive Water System Plan report for Andover, Minnesota. The primary emphasis of this study was to evaluate the existing distribution system and to recommend improvements in supply, storage, and distribution facilities to address planned growth and expansion. A computer model of the system was created and used for the analysis. The system was evaluated with respect to pressure, flow, pipe friction, and fire flow availability. An extended period simulation was also used to analyze system operations. WaterCAD Version 7.0 was used for the distribution system modeling portion of this study.

We appreciate the assistance provided by you and Brian Kraabel. The City's experience and knowledge of the system was very helpful in completing the Comprehensive Water System Plan.

We will be available to review this report with you at your convenience.

Sincerely,

Greg F. Johnson, PE
Principal / Project Manager

c: Brian Kraabel – City of Andover
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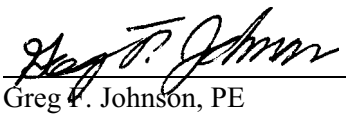
Comprehensive Water Plan
City of Andover, Minnesota

SEH No. A-ANDOV0703.00

January 2008

I hereby certify that this report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.



Greg F. Johnson, PE

Date: 01/28/2008 Lic. No.: 26430

Short Elliott Hendrickson Inc.
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St. Paul, MN 55110-5196
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Executive Summary

With continued growth in the City of Andover, the City will require additional infrastructure to meet future needs. This report looks at the water system capital improvements that will be needed to meet the level of growth and expansion currently projected for Andover. The water demands in the City are currently approaching the capacity of the existing water supply, treatment, distribution, and storage facilities.

Existing facilities include:

- eight water supply wells that are actively used for water supply
- one water treatment facility that removes iron, manganese, and arsenic from water supply wells
- two elevated water storage tanks and one underground storage clearwell
- a distribution network to provide potable water and fire protection services to the existing water service area

Based on the City's future land use plan and estimated densities for future developments, water demand projections were created to estimate future capacity requirements. In addition, a computer model of the City's distribution system was utilized in this study to determine the hydraulic capacity, fire flow availability, and system pressures throughout the water service area. Recommendations were made to maintain and improve the City's current high level of quality and reliability in water service.

The water demand projections considered in this report cover the time period from 2007 to 2047, based on planning data from the City. Maximum day water demands in this period are projected to increase from a current value of approximately 9 million gallons per day (MGD) to greater than 17 MGD in 2047. Recommended improvements for the 40-year planning period include supply, water treatment, storage, and distribution system components. These include:

- Eight water supply wells (depending on the realized capacity of the wells)
- Two water treatment plants
- One ground storage tank at the existing water treatment plant with a capacity of 2 million gallons
- Removal of the elevated tank and associated altitude valve in the low pressure zone
- Expansion of the backwash reclaim facilities at the existing water treatment plant
- Approximately 75,000 feet of trunk water mains

An analysis of the estimated costs for recommended water system facilities is also provided in this report, along with potential options for funding these improvements through water area charges and connection fees.

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Comprehensive Water Plan

Prepared for the City of Andover, Minnesota

1.0 Introduction

Current growth and development combined with future growth projections in Andover has created a need for improvements to the water system in order to meet increasing demands. The need for water system improvements can be anticipated by analyzing system demands, available supply capacity and storage, and available flow rates and pressures throughout the distribution system.

For this purpose, SEH has updated the existing computer model of Andover's water distribution system. In addition, regions of future development expected to create additional system demands were identified in conjunction with city staff, along with potential water system improvements that will allow the system to meet these expected demands. The proposed Rural Reserve development, along with several other proposed water expansion areas, will require significant planning and expansion of the City's water system. The improvements considered include increases in supply and treatment capacity, expansion of water storage facilities, and extending the distribution system through construction of new water mains.

The existing computer model was updated using WaterCAD Version 7.0 by Haestad Methods, Inc. The resultant product is a tool that can be used for hydraulic analysis of the water system and scenario planning. The model can also be built-upon in the future if so desired to analyze water quality throughout the distribution system. Some of the potential uses of this analysis include the following:

- Identify future locations of critical supply, treatment, and storage facilities so land can be purchased and/or set aside before development begins in the designated area.
- Provide a long range plan for water system upgrades/expansion so that proposed construction projects include properly sized water mains to allow for future development needs.
- Identify deficiencies in the water system and corresponding improvements to reduce or eliminate these deficiencies.
- Provide a document to support loan/grant applications for future needs of the water system.

2.0 Existing Facilities

The existing service area is illustrated in Figure 1. The Andover water system is composed of supply, treatment, storage, and distribution components as described below and illustrated in Figure 2. Supply and storage facilities are listed in Table 1.

Table 1
Existing Supply and Storage Facilities

Supply

Well Number	Aquifer Formation	Supply Capacity (gpm)	Supply Capacity (MGD)	Year Installed
1 (1)	Mt. Simon-Hinckley	600	0.86	1981
2 (2)	Mt. Simon-Hinckley	1,000	1.44	1985
3 (2)	Mt. Simon-Hinckley	850	1.22	1987
4	Ironton/Galesville	1,000	1.44	1993
5	Ironton/Galesville	1,500	2.16	1995
6	Ironton/Galesville	1,200	1.73	1997
7	Ironton/Galesville	1,500	2.16	1999
8	Ironton/Galesville	1,100	1.58	2002
9	Sand and Gravel Drift	2,300	3.31	2006
Total Capacity (Wells 2 – 9)		**10,450**	**15.04**	
Firm Capacity (3)		**8,150**	**11.73**	

Notes:
1. Well No. 1 to be abandoned.
2. Wells No. 2 and 3 currently used to meet peak demands only on a seasonal basis.
3. Firm capacity is defined as the pumping capacity that can be provided with the largest well (Well No. 9) out of service. Does not include capacity of Well No. 1.

Storage

Facility	Type of Structure	Overflow Elevation (ft)	Storage Capacity (MG)
Elevated Storage	Hydropillar Constructed in 1988	1055	1.00
Elevated Storage	Hydropillar Constructed in 1986	1010	0.50
Ground Storage	Water Treatment Plant Clearwell Constructed in 2003	NA	1.50
		Total Storage Capacity	**3.0**

2.1 Storage

Storage facilities on a water system allow a more constant supply during variable demand conditions. During high demands, when water customers are using a greater volume of water, part of that demand can be met by storage reserves in addition to direct pumping from wells. During low demand conditions, the well pumps can continue to operate, with excess supply going to fill storage for later withdrawal.

Legend

- Existing Service Area
- City Limits
- Water

Map Source: City of Andover, MN/DNR, and SEH.
Map By: dc, sh

0 1,250 2,500 Feet

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COMPREHENSIVE WATER SYSTEM PLAN

Andover, Minnesota

Existing Service Area

Figure 1

Map Document: (S:\AE\A\Andover\070300\GIS\Fig_01_Existing Service Area.mxd)
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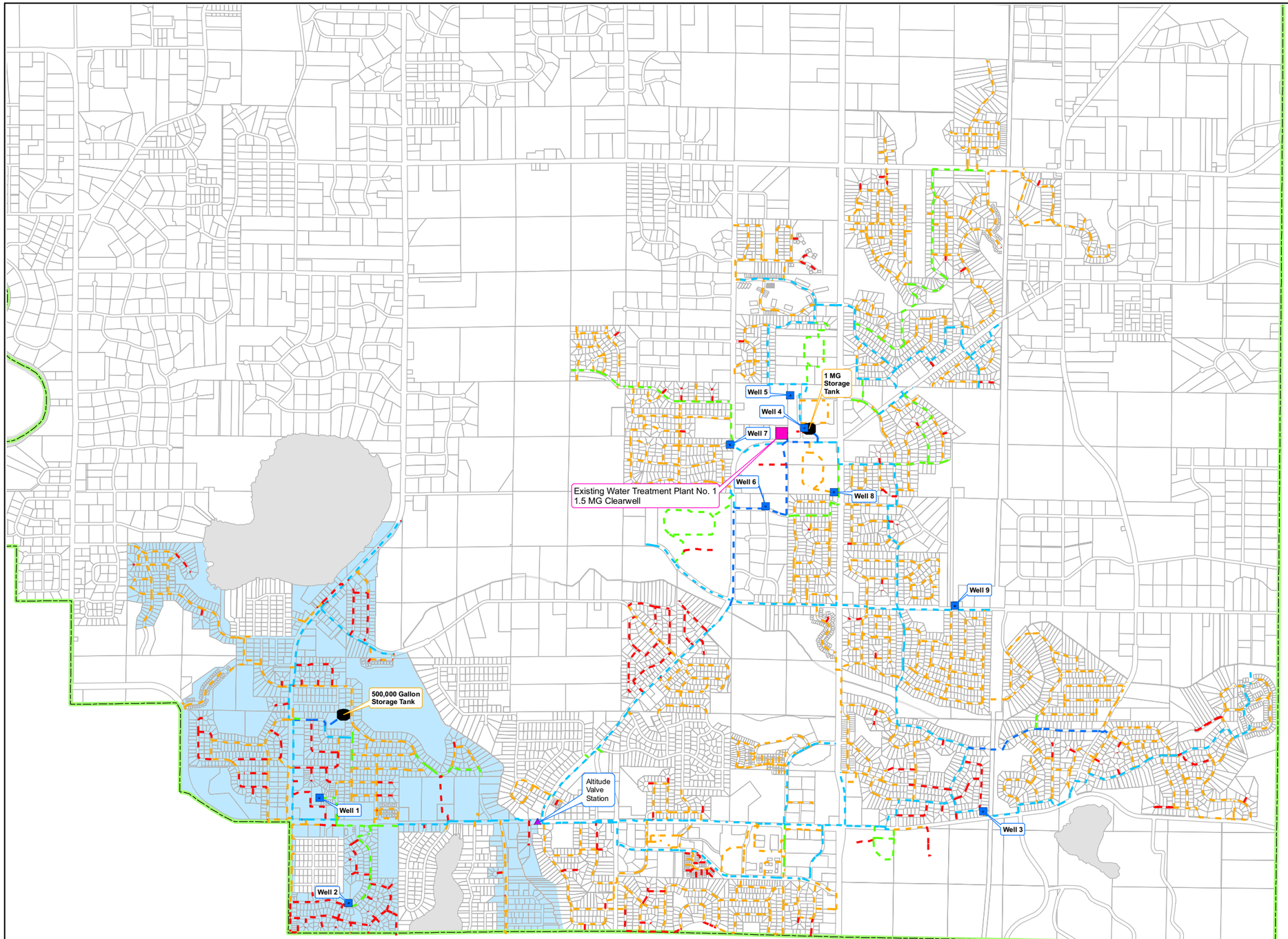

Legend

Existing Water Lines

- 6"
- 8"
- 10"
- 12"
- 16"
- Well
- Water Tanks
- Water Treatment Plant
- Altitude Valve Station
- Low Pressure Zone
- City Limits
- Water

Map Source: City of Andover, MN/DNR, and SEH.
Map By: dc, sh

0 1,250 2,500
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COMPREHENSIVE WATER SYSTEM PLAN

Andover, Minnesota

Existing Distribution System

Figure 2

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In addition to this operational function, storage tanks can serve as an emergency water source in the case of a supply failure (i.e. power outage, well maintenance, etc.). They also increase the amount of water available during a fire. An emergency generator at the water treatment plant provides back-up power for the high service pumps.

The distribution system is operated as a two-pressure zone system. The 1,000,000 gallon (1 MG) elevated water storage tank serves the high pressure zone. The 500,000 gallon (0.5 MG) elevated water storage tank serves the low pressure zone. The levels of these tanks control the hydraulic grade line (pressures) of the system. The hydraulic grade line of the overflow weirs in the 1 MG elevated water storage tank is 1055 feet above sea level. The hydraulic grade of the overflow weir in the 0.5 MG elevated water storage tank is 1010 feet above sea level. Ground storage is provided by the water treatment plant clearwell which has a capacity of 1,500,000 gallons (1.5 MG). High service pumps at the plant deliver the water stored in the clearwell to the distribution system and elevated water storage tanks.

2.2 Supply

Raw water from nine wells currently supplies the Andover water system. Wells 1, 2, and 3 draw water from the Mt. Simon Hinckley aquifer. Wells 4, 5, 6, 7, and 8 draw water from the Ironton-Galesville aquifer. Well 9 draws water from a sand and gravel glacial drift aquifer. The total supply capacity of the Andover system is approximately 10,450 gpm or 15.04 million gallons per day (MGD). The firm capacity is 8,150 gpm (11.73 MGD). Firm capacity is that which can be supplied reliably, even during maintenance activity or an emergency situation where the largest well pump (Well 9) might be out of service.

The total supply capacity and firm capacity do not include the capacity of Well 1 because there are plans to abandon this well. Wells 2 and 3 are used to meet seasonal peak demands only, and are limited to an annual withdrawal of 55 million gallons per year (MGY) per well by the Minnesota Department of Health due to radium in these wells.

2.3 Treatment

A water treatment plant constructed in 2003 treats iron, manganese, and arsenic from Wells 4, 5, 6, 7, 8, and 9. The capacity of the plant is 9 MGD. The treatment process consists of aeration, chlorination, permanganate and orthophosphate addition, and fluoridation. Well water is pumped to two forced draft aerators to oxidize the iron minerals. A concrete detention tank collects the aerated water and completes the oxidation of the iron. Sodium permanganate is added after the detention tank to oxidize the manganese minerals.

Water flowing from the detention tank is split equally to eight concrete gravity filter cells. Sand and anthracite filter media remove the oxidized iron and manganese minerals. The filters are backwashed with a simultaneous air/water backwash method. Backwash wastewater is collected in an underground holding tank where it is settled, reclaimed, and partially discharged to the sanitary sewer.

Filtered water flows into a 1.5 MG concrete clearwell located underground. The treated water is pumped from the clearwell to the distribution system by four vertical turbine high service pumps. Sodium hypochlorite (bleach) and fluoride are added at the plant effluent for disinfection and fluoridation. Orthophosphate is also added to the effluent for corrosion control. The existing plant has an emergency generator for back-up power supply as described previously.

2.4 Distribution System

The Andover water system is comprised of water mains ranging in size from 6 inches to 16 inches in diameter. The system serves an elevation range of approximately 865 to 912 feet above mean sea level (MSL). The existing distribution system is shown on Figure 2.

3.0 Existing Water Demands

The Andover water utility records indicate that in 2006, the average daily (AD) water demand for the complete system was 2,873,899 gallons (1,995 gpm). The maximum day (MD) demand for 2006 was 8,802,000 gallons (6,112 gpm) on July 12th. Figure 3 charts average day demands over the previous five years.

3.1 Peaking Demand Factors

Peaking factors are ratios to the average day demand rate which are used in analysis of water systems. They are representative of temporal variation in water demands.

A maximum day peaking factor for a water system is the ratio of the MD demand rate to the AD demand rate. It normally indicates the magnitude of seasonal differences in water demands. For example, if demands on a system increase substantially during the summer due to lawn irrigation, the peaking factors will also be large. Typical MD peaking factors range from 2.0 to 3.0. Larger systems generally have lower maximum day peaking factors. However, predominantly residential municipalities, especially in metropolitan areas, generally have a higher peaking factor due to sprinkling demands. Recent MD peaking factors for Andover are shown in Table 2. For future demand projections, a MD peaking factor of 3.7 was used, based on historical data.

The peak hour (PH) demand rate is also commonly used in water system analysis. PH demands occur during the hour of a given year in which the highest demand rates are experienced on the system. Typical PH peaking factors range from 3.2 to 5.0. The PH peaking factor for Andover was estimated to be 60 percent greater than the MD peaking factor. This is a typical estimate, following AWWA recommendations, and resulted in a PH peaking factor of 5.9.

Table 2
Recent Water Demands and Maximum Day Peaking Factors

Year	Annual Water Usage (gal)	AD Demand (gpd)	AD Demand (gpm)	MD Demand (gpd)	MD Demand (gpm)	MD Peaking Factor
2000	812,968,000	2,227,310	1,547	6,990,000	4,854	3.14
2001	793,821,000	2,174,852	1,510	7,940,000	5,514	3.65
2002	785,761,000	2,152,770	1,495	6,820,000	4,736	3.17
2003	943,311,000	2,584,414	1,795	7,610,000	5,285	2.94
2004	857,375,000	2,348,973	1,631	7,020,000	4,875	2.99
2005	864,664,000	2,368,942	1,645	8,660,000	6,014	3.66
2006	1,048,973,000	2,873,899	1,996	8,803,000	6,113	3.06
2007	1,116,622,000	3,059,238	2,124	8,489,000	5,895	2.77

3.2 Demand Distribution

Water demands are variable throughout the day and the year. On an annual basis, the heaviest demand conditions (maximum day demands) typically occur during the summer, when residential irrigation increases.

Water demands also vary over the course of a given day. Figure 4 represents a typical demand distribution graph for residential water use, as applied to Andover demands during the 2006 maximum day. Commercial and industrial water uses are *typically* more constrained and predictable.

The residential demand graph depicts low water demand during the early morning periods. It shows increasing demand during the day with a slight decrease in the late morning periods. By late afternoon, when lawns are being sprinkled the demand peaks at what is considered the PH demand rate. The demand lessens considerably into the late evening hours.

The firm supply capacity of a system should be at least equal to the MD demand rate. This is the recommendation of the Great Lakes - Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers in their “Recommended Standards for Water Works” (commonly referred to as the “Ten States Standards”). As discussed in Section 2.1, storage reservoirs are used to supplement the supply of treated water during the peak usage hours within each day. During the early morning periods when demand is low, the system is able to produce water in excess of the demand. This excess is available to fill the storage reservoirs.

When the demand rate exceeds the production rate, stored water in the reservoirs is used to make up for the deficit. The storage reservoirs will start to fill when the demand decreases below the total supply capacity.

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Figure 3 – Recent Water Demands

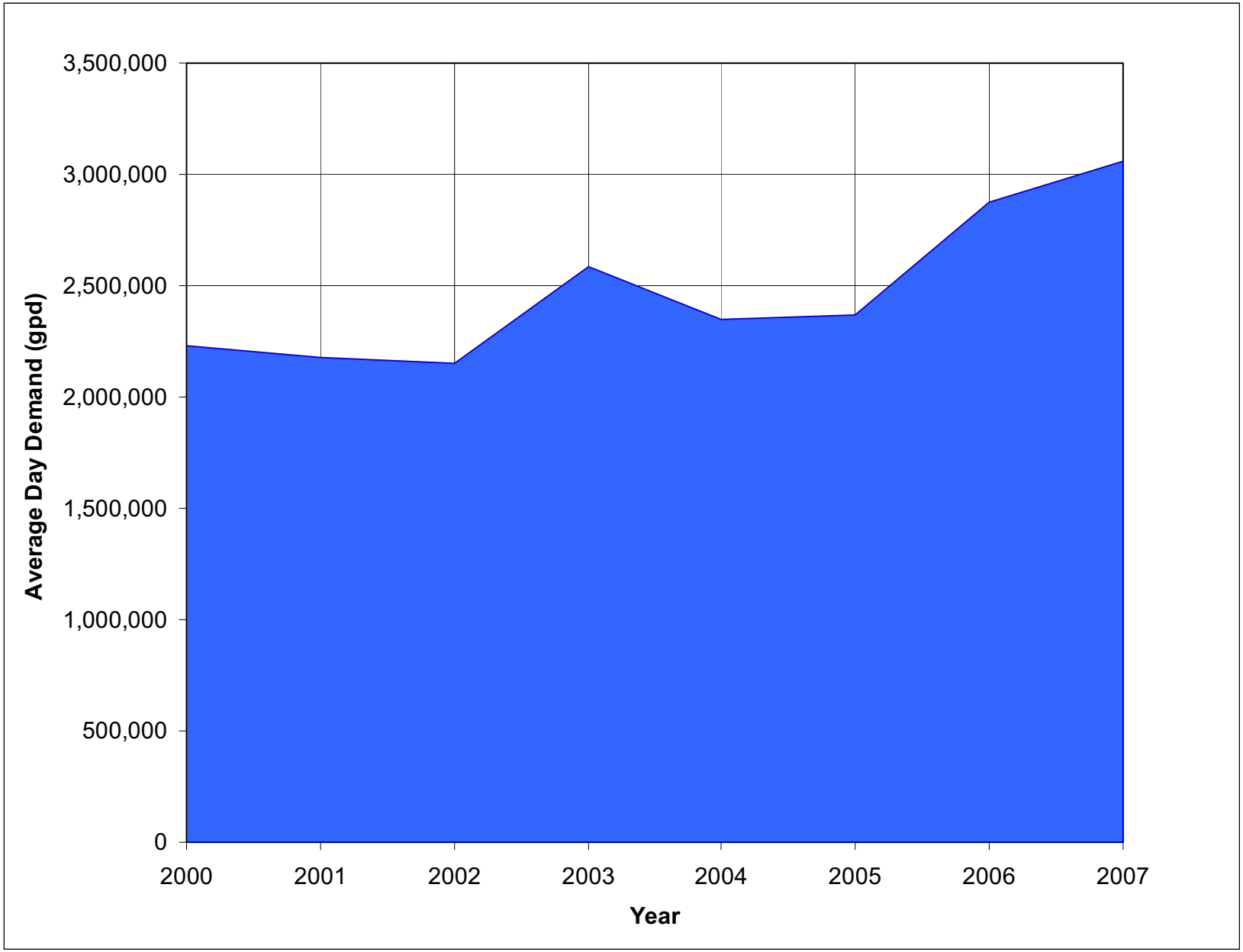
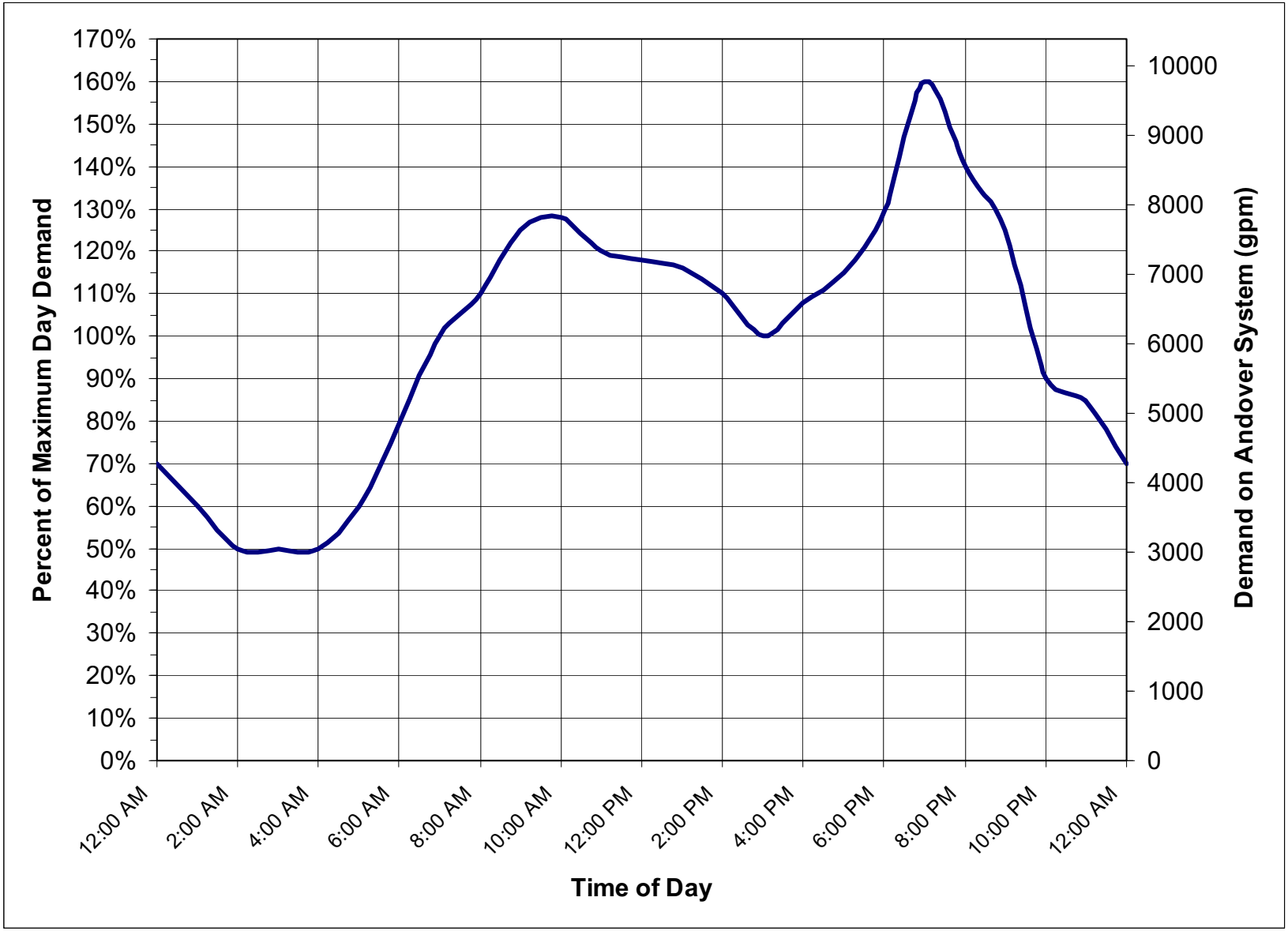


Figure 4 – 24 Hour Demand Distribution Curve



4.0 Hydraulic Analysis of the Existing Distribution System

4.1 Computer Model Setup and Calibration

All utility-owned pipes 6 inches in diameter and larger were included in the model. Water pumping records from 2006 were used to represent current demands on the system. Storage and supply facilities were modeled based on data supplied by City staff. Elevations were assigned to the model using USGS 10-foot contour data.

A low pressure zone was modeled by closing a pipe between the two zones during normal operating conditions. Therefore, pressures and fire flows in the low pressure zone in the western part of the system are controlled by the elevated tank in that zone.

4.2 Expected Pressure

Model results for average day (AD) static pressures on the distribution system are depicted with pressure contours in Figure 5. The existing system pressures for an AD demand scenario range from 54 psi at high elevations to approximately 77 psi in low-lying areas. The static pressures under peak hour (PH) demands are represented in Figure 6, and range from 48psi to 68 psi. In the "Recommended Standards for Water Works, 2003 Edition" published by the Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, it is recommended that the normal working pressure in the distribution system be approximately 60 to 80 psi, and not less than 35 psi in any location. During emergency conditions, such as high fire demands, pressures should remain above 20 psi.

The current system pressures stay within the margins of industry standard at most locations. There is a plan to eliminate the low pressure zone and serve the entire system from the high zone in the future. This will effectively increase pressures in the southwestern portion of the distribution system, where pressures are the lowest at the current time. This is discussed and analyzed later in this report.

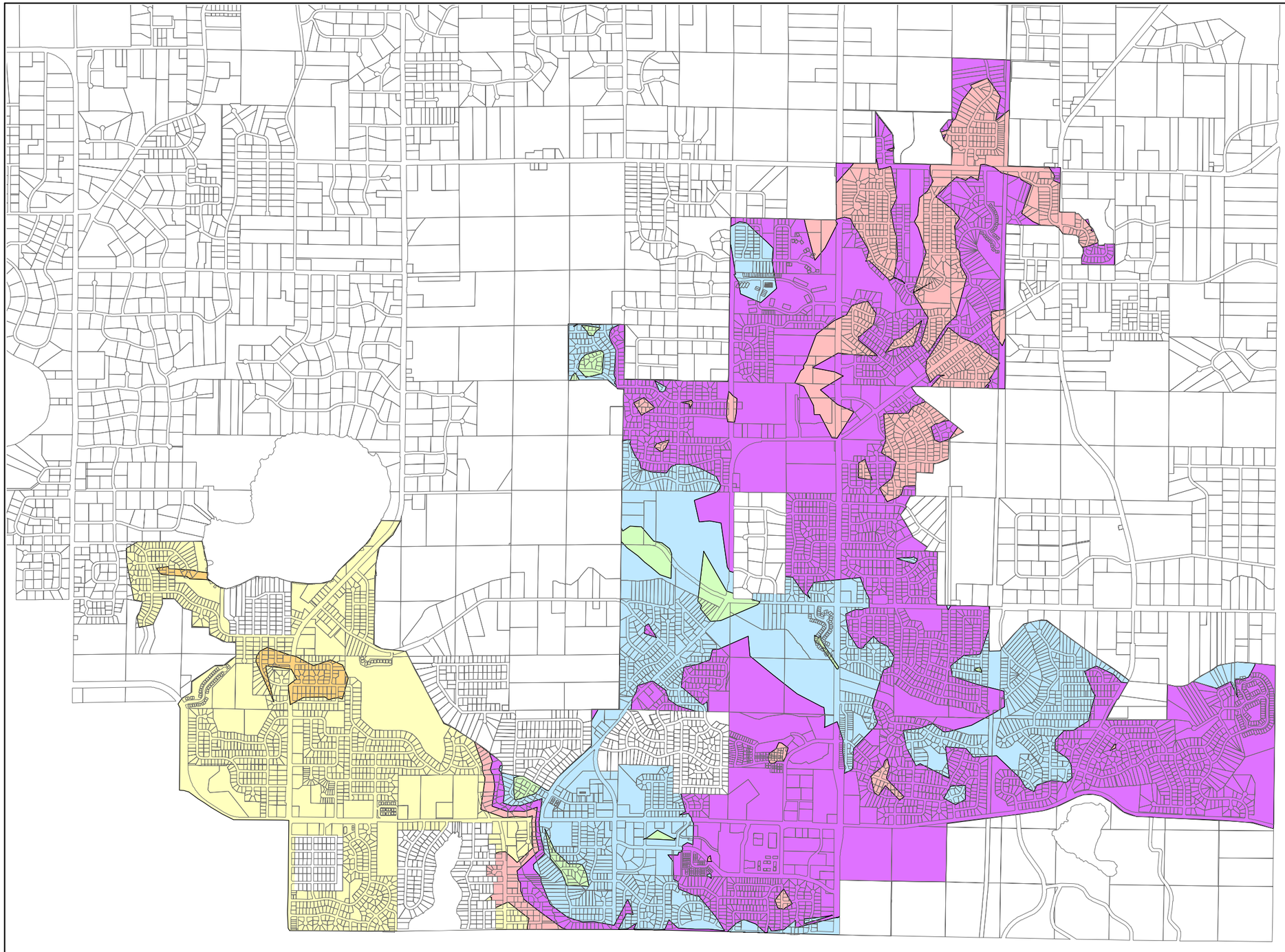
4.3 Pipe Velocities and Friction Loss

Pipe segments are considered by AWWA to be potentially deficient, or most-limiting, if they have the following conditions:

- Velocities greater than five feet per second (ft/s)
- Head losses greater than 10 ft/1000 ft.

Velocities in pipe segments are acceptable up to about 10 ft/s during emergency or extreme demand conditions of short duration. As velocities increase, pipe friction increases resulting in pressure loss in the system, and problems with water hammer can occur. This is especially true in systems with higher pressures.

The computer model does not detect any areas with excessive velocity and head loss in the Andover distribution system under normal operating conditions.



Legend

Existing Average Day Pressure

- 50-55 psi
- 55-60 psi
- 60-65 psi
- 65-70 psi
- 70-75 psi
- 75-80 psi

Map Source: City of Andover, MN/DNR, and SEH.
Map By: dc, sh

0 1,250 2,500 Feet

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COMPREHENSIVE WATER SYSTEM PLAN

Andover, Minnesota

Existing Average Day Pressure

Figure 5

Map Document: (S:\AE\A\Andover\070300\GIS\Fig_05_Existing_Average_Day_Pressure.mxd)
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Existing Peak Hour Pressure

- 40-45 psi
- 45-50 psi
- 50-55 psi
- 55-60 psi
- 60-65 psi
- 65-70 psi

Map Source: City of Andover, MN/DNR, and SEH.
Map By: dc, sh

0 1,250 2,500
Feet

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COMPREHENSIVE WATER SYSTEM PLAN

Andover, Minnesota

Existing Peak Hour Pressure

Figure 6

Map Document: (S:\AE\A\Andover\070300\GIS\Fig_06_Existing_Peak_Hour_Pressure.mxd)
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4.4 Extended Period Simulation

An extended period simulation (EPS) was conducted using the model to analyze system operations during several days of maximum day demands. The primary purpose of this simulation was to check for cumulative system imbalances that are not evident in standard simulations and to verify if system operations can be maintained under high demand conditions.

Tower and well placement, and the sizes of distribution system pipes, contribute to imbalances. Considerable distances between supply and storage locations and inadequately-sized water mains can contribute to a reduced storage-replenishment rate and the ability to refill the towers at night during low demand periods.

A 72-hour period was simulated with three consecutive maximum day (MD) demand conditions. This time period was chosen since most supply and distribution system deficiencies will be exposed in three days of operations with MD demands. For example, if tanks are unable to refill daily under high demand conditions, a trend will emerge in tank level data produced by the EPS.

Due to the fact that there is only one storage tank in each pressure zone currently, there are no imbalances between the two. Supply facilities appear to have no limitation in filling the elevated tanks under maximum day operating conditions.

With the future removal of the elevated tank in the low pressure zone, system balance will remain insignificant as a design consideration. The computer model could be used in the future to optimize pump controls through the use of extended period simulations by testing pump operating points under varying scenarios to minimize pump cycling.

4.5 Current Available Fire Flow

According to the American Water Works Association (AWWA), the minimum fire flow available at any given point in a system should not be less than 500 gpm at a residual pressure of 20 psi. This minimum criterion represents the amount of water required to provide for two standard hose streams on a fire in a typical residential area for residential dwellings with spacing greater than 100 feet. The distance between buildings and the corresponding recommended fire flow for residential areas is summarized in Table 3.

For commercial and industrial buildings, the needed fire flow rate varies considerably, and is based on several characteristics of individual buildings such as:

- Type of construction
- Type of business that is using the property (occupancy)
- Proximity and characteristics of nearby properties
- Presence or absence of a fire sprinkling system

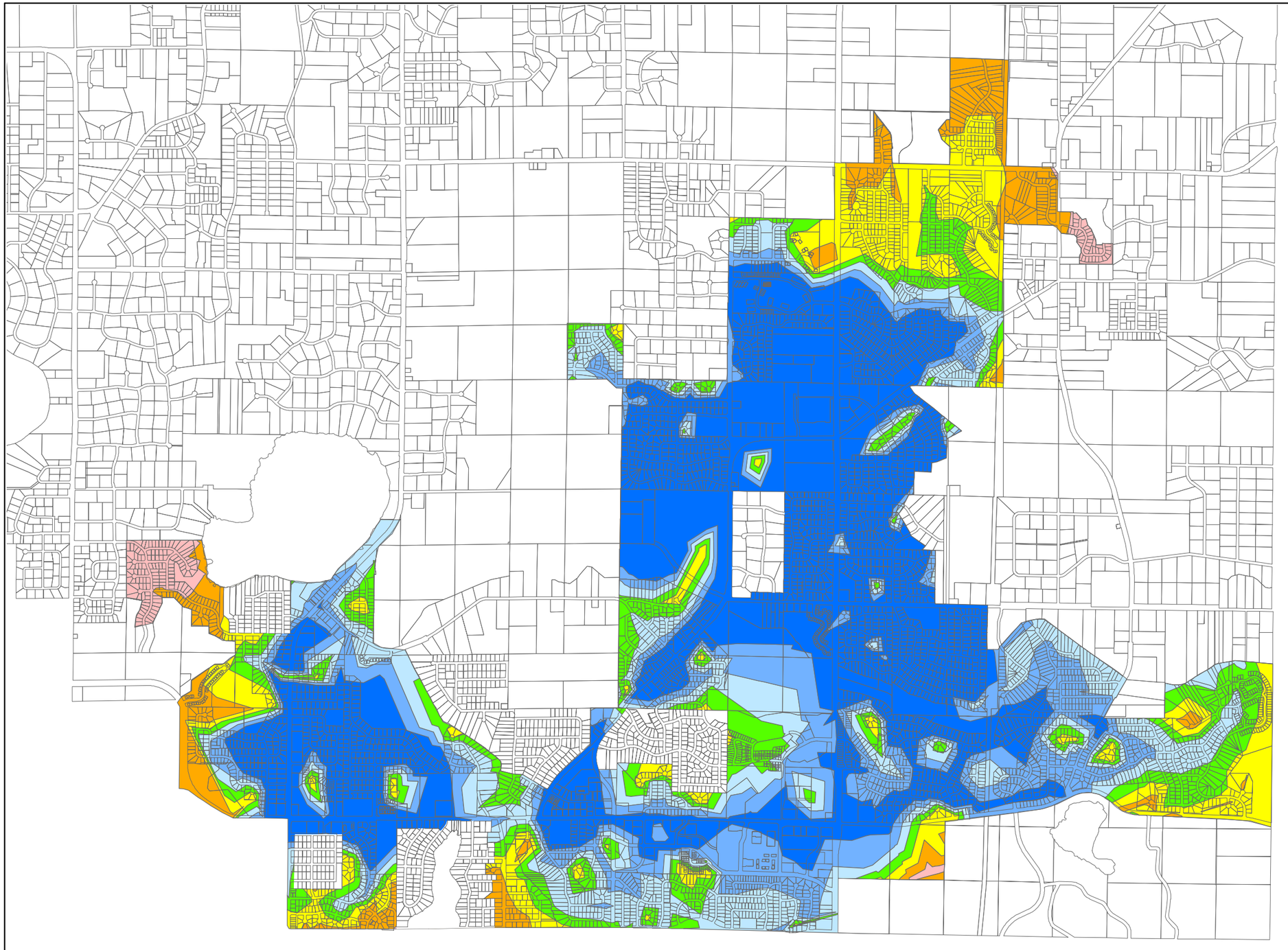
Table 3
Recommended Residential Fire Flows

Distance Between Buildings (ft)	Needed Fire Flow (gpm)
More than 100	500
31-100	750
11-30	1000
Less than 11	1500

The computed available fire flows for the current distribution system are represented in Figure 7. They are shown as fire flow districts in gallons per minute, and represent the available fire flow at a residual pressure of 20 psi during maximum day demands.

Available fire flow appears to meet the City's needs in most areas. It can be seen that the largest capacity of flow follows the larger trunk main network throughout the system. Where fire flow may be a concern, or the system may be unable to meet the needed fire flow, are areas near the edge of the system, on dead ends in the pipe network, or being served by smaller diameter mains.

The industry standard is to use no smaller than 6-inch diameter mains for fire protection if they are looped. Dead ends on the system should be constructed using mains of at least 8 inches in diameter. Upgrades in main size and additional looping wherever possible will improve these areas where fire flows are limited.



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Maximum Day Fire Flow

- 0-500 gpm
- 500-1000 gpm
- 1000-1500 gpm
- 1500-2000 gpm
- 2000-2500 gpm
- 2500-3000 gpm
- 3000-3500 gpm
- 3500+ gpm

Map Source: City of Andover, MN/DNR, and SEH.
Map By: dc, sh

0 1,250 2,500 Feet

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COMPREHENSIVE WATER SYSTEM PLAN

Andover, Minnesota

Existing Maximum Day Available Fire Flow

Figure 7

Map Document: (S:\AE\A\Andover\070300\GIS\Fig_07_Existing_Maximum_Day_Fire_Flow.mxd)
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5.0 Expansion Area

5.1 Projected Land Uses

SEH met with City staff to determine updated and realistic land uses for the City. City staff provided SEH information for the growth areas to be examined for this study. A total of 65 water system expansion areas were identified for the ultimate water distribution system. These expansion areas include 6,426 residential units, 146.5 acres of commercial development, a 500 student school, two 500 seat churches, a law enforcement center, and the Anoka County Parks Maintenance Facility.

The City also provided densities associated with the land uses in the growth area. Figure 8 shows the location of the 65 water system expansion areas evaluated for this study. Table 4 gives detailed information about the projected number of units, type of unit, gallons per unit or acre per day, and the projected average day demands from these areas. An estimate of 2.7 persons per residential household and an average day water usage of 125 gallons per capita per day were used to calculate the residential average day demands. An average day water usage of 1,000 gallon per acre was used to calculate the commercial average day demands. Other assumptions used include:

- Schools: 500 students per school, 1 SAC unit (274 gpd) per 18 students as per Metropolitan Council SAC determination
- Churches: 500 seats, 5 gpd per seat
- Law Enforcement Center: 130,000 sq ft, based on information from the City of Andover, 1 SAC Unit (274 gpd) per 2400 sq ft
- Anoka County Parks Maintenance: assumed 500 gpd

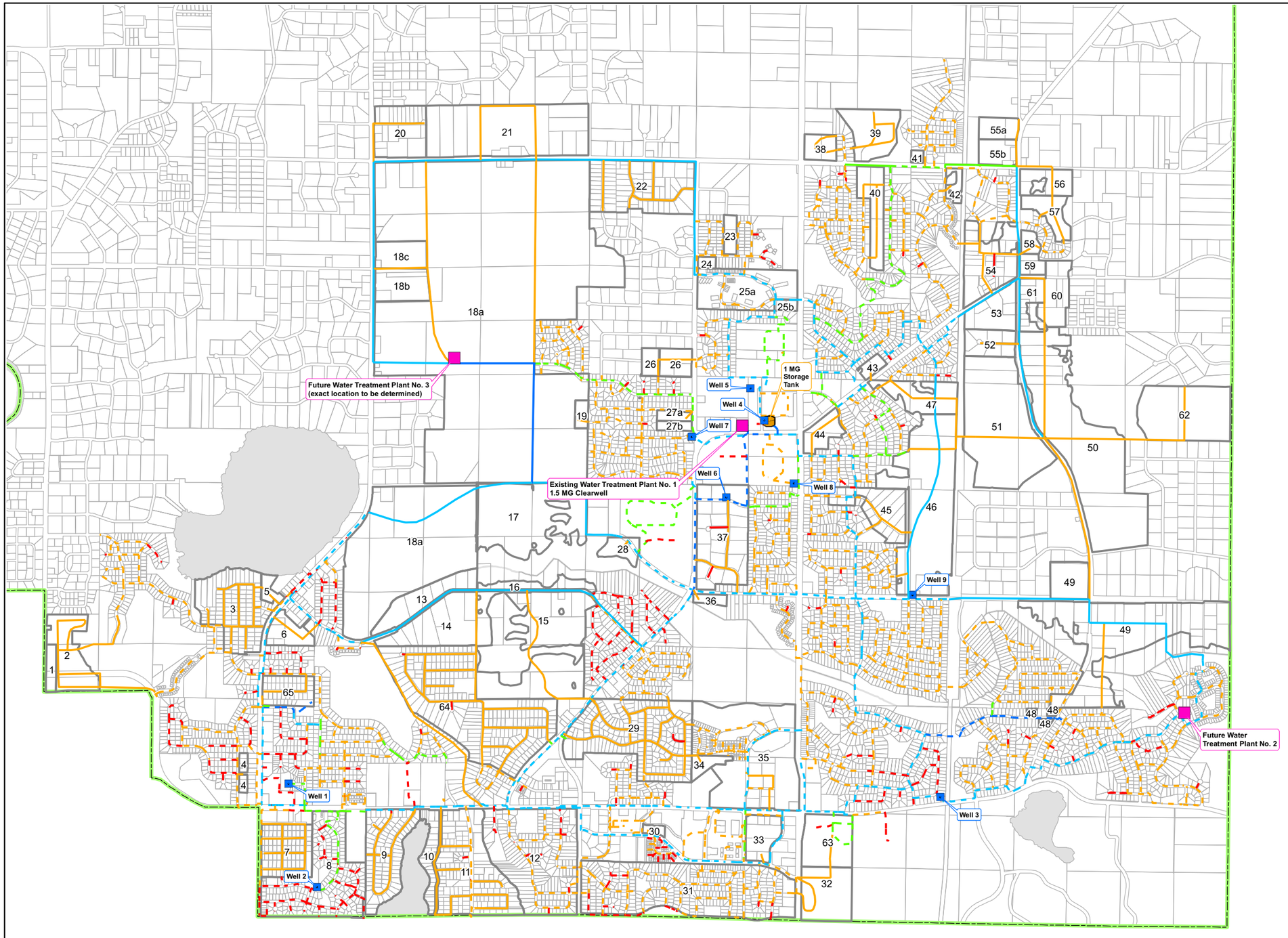
The residential rate of growth has been estimated by City staff to be an average of 160 new residential water hook-ups per year until ultimate build-out. The commercial rate of growth has been estimated by City staff to be an average of 10 acres per year until ultimate build-out. Ultimate build out is defined as ultimately how much development there will be in the future and could take 40 years or longer to reach depending on growth trends. Based on this information it is anticipated that Andover will have approximately 17,236 *new* residents served by the City's water system upon ultimate build-out. Combine that with the estimated 18,200 residents served with City water in 2006 and the ultimate water service population of Andover could be approximately 35,436 persons.

Table 4
Projected Land Use

Planning Area	Land Use	No. of Units	Type of Unit	Gallons per Unit or Acre per Day	Total Future Average Day Demand (gpd)
1	Commercial	5	Acre	1000.00	5,000
2	Residential	253	Dwelling Unit	337.50	85,388
3	Residential	111	Dwelling Unit	337.50	37,463
4	Residential	8	Dwelling Unit	337.50	2,700
5	Residential	12	Dwelling Unit	337.50	4,050
6	Residential	33	Dwelling Unit	337.50	11,138
7	Residential	76	Dwelling Unit	337.50	25,650
8	Residential	17	Dwelling Unit	337.50	5,738
9	Residential	91	Dwelling Unit	337.50	30,713
10	Residential	28	Dwelling Unit	337.50	9,450
11	Residential	130	Dwelling Unit	337.50	43,875
12	Residential	18	Dwelling Unit	337.50	6,075
13	Residential	14	Dwelling Unit	337.50	4,725
14	Residential	87	Dwelling Unit	337.50	29,363
15	Residential	274	Dwelling Unit	337.50	92,475
16	Residential	26	Dwelling Unit	337.50	8,775
17	Residential	196	Dwelling Unit	337.50	66,150
18a	Residential	1980	Dwelling Unit	337.50	668,250
18b	School	500	Student	15.22	7,611
18c	Commercial	20	Acre	1000.00	20,000
19	Residential	25	Dwelling Unit	337.50	8,438
20	Commercial - Light Industrial	20.6	Acre	1000.00	20,600
21	Residential	145	Dwelling Unit	337.50	48,938
22	Residential	68	Dwelling Unit	337.50	22,950
23	Residential	17	Dwelling Unit	337.50	5,738
24	Residential	5	Dwelling Unit	337.50	1,688
25a	Residential	300	Dwelling Unit	337.50	101,250
25b	Commercial	3	Acre	1000.00	3,000
26	Residential	50	Dwelling Unit	337.50	16,875
27a	Residential	22	Dwelling Unit	337.50	7,425
27b	Church	500	Seat	5.00	2,500
28	Residential	26	Dwelling Unit	337.50	8,775
29	Residential	199	Dwelling Unit	337.50	67,163
30	Commercial	2.65	Acre	1000.00	2,650
31	Residential	7	Dwelling Unit	337.50	2,363
32	Law Enforcement Center	130,000	Sq Ft	0.11	14,842
33	Commercial	18.8	Acre	1000.00	18,800
34	Residential	36	Dwelling Unit	337.50	12,150
35	Commercial	53.4	Acre	1000.00	53,400
36	Residential	6	Dwelling Unit	337.50	2,025
37	Residential	40	Dwelling Unit	337.50	13,500
38	Residential	15	Dwelling Unit	337.50	5,063
39	Residential	45	Dwelling Unit	337.50	15,188

Table 4
Projected Land Use

Planning Area	Land Use	No. of Units	Type of Unit	Gallons per Unit or Acre per Day	Total Future Average Day Demand (gpd)
40	Residential	52	Dwelling Unit	337.50	17,550
41	Residential	3	Dwelling Unit	337.50	1,013
42	Residential	12	Dwelling Unit	337.50	4,050
43	Residential	12	Dwelling Unit	337.50	4,050
44	Commercial	14.1	Acre	1000.00	14,100
45	Residential	26	Dwelling Unit	337.50	8,775
46	Residential	308	Dwelling Unit	337.50	103,950
47	Residential	55	Dwelling Unit	337.50	18,563
48	Residential	3	Dwelling Unit	337.50	1,013
49	Residential	348	Dwelling Unit	337.50	117,450
50	Residential	325	Dwelling Unit	337.50	109,688
51	Residential	221	Dwelling Unit	337.50	74,588
52	Residential	36	Dwelling Unit	337.50	12,150
53	Residential	58	Dwelling Unit	337.50	19,575
54	Residential	76	Dwelling Unit	337.50	25,650
55a	Commercial	9	Acre	1000.00	9,000
55b	Church	500	Seat	5.00	2,500
56	Residential	39	Dwelling Unit	337.50	13,163
57	Residential	37	Dwelling Unit	337.50	12,488
58	Residential	6	Dwelling Unit	337.50	2,025
59	Residential	15	Dwelling Unit	337.50	5,063
60	Residential	50	Dwelling Unit	337.50	16,875
61	Residential	30	Dwelling Unit	337.50	10,125
62	Residential	92	Dwelling Unit	337.50	31,050
63	Anoka County Parks Maintenance	1	Unit	500.00	500
64	Residential	220	Dwelling Unit	337.50	74,250
65	Residential	42	Dwelling Unit	337.50	14,175
Total					**2,343,278**



Legend

Proposed Water Lines

- 6"
- 8"
- 10"
- 12"
- 16"

Existing Water Lines

- 6"
- 8"
- 10"
- 12"
- 16"
- Well
- Water Tanks
- Water Treatment Plant
- Proposed Water Expansion Areas
- City Limits
- Water

Map Sources: City of Andover, MN/DNR, and SEH.
Map By: dc, sh

0 1,250 2,500 Feet

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COMPREHENSIVE WATER SYSTEM PLAN

Andover, Minnesota

Proposed Water Distribution Study

Figure 8

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5.2 Projected Demands

The projected average day demand from the water system expansion areas is summarized on Table 4. The total projected average day demand from the water expansion areas is 2,343,278 gallons.

For planning of water system capital improvements, the MD and AD demands are typically used in sizing future facilities. The MD demands were estimated from the AD demands using an assumed maximum day peaking factor. As discussed in Section 3.1, the MD peaking factor used for projection purposes was 3.7. The projected MD demand from the expansion areas is 8,670,000 gallons per day based on the MD peaking factor. Adding the existing MD demand (8,802,000 gallons) to the projected MD demand for the expansion areas equals a total build-out MD demand of approximately 17,472,000 gallons per day (17.47 MGD) estimated to occur around the year 2047.

6.0 Proposed Improvements

With growth in water system demands, infrastructure improvements are necessary to maintain the quality of water service. These improvements include supply, treatment, storage, and distribution facilities. Figure 8 shows a proposed layout for future facilities.

6.1 Supply

As discussed in Section 3.2, firm supply capacity, which is the amount of water that can be reliably supplied with the largest well out of service, should be greater than or equal to the maximum day demand. When projected MD demands reach firm capacity, it is an indication that additional water supply capacity is needed.

Supply and treatment facility improvements are shown in Table 5 and Figure 9 on a recommended schedule for implementation in order to meet projected maximum day demands through ultimate development. Supply capacity is increased as necessary to meet maximum day demands in 20 hours. The reason for this is that backwashing of water treatment plant filters limits the amount of supply water that can be processed. The 20 hour production time assumption accounts for this process limitation.

The addition of Well 10 is recommended in 2012. This well and the next well (Well 11) are planned as drift wells with an estimated capacity of 1500 gpm each. Wells 10 and 11 will likely produce water with high levels of iron and manganese. These two wells are proposed to supply water to future Water Treatment Plant Number 2 in the Shadowbrook Development, and utilize the glacial drift aquifer in that area as a source.

Future wells beyond Wells 10 and 11 are planned for the Rural Reserve area in the northwest corner of the water distribution system. As part of this study, a preliminary survey of available hydrogeologic data was conducted to determine if future wells are feasible in the Rural Reserve area. It was found that the Ironton-Galesville Aquifer is present in this area, but that its depth and quality appear to be variable. The City will need to conduct a well siting study and construct test wells prior to constructing production wells in this area.

Table 5
Estimated Supply Improvement Schedule

Year	MD Water Demands (MGD)	Firm Supply Capacity (MGD)	Supply Capacity in 20 Hours (MGD)	Water Treatment Capacity (MGD)	Recommended Improvements
2007	8.80	11.73	9.78	9.00	
2008	9.02	11.73	9.78	9.00	
2009	9.24	11.73	9.78	9.00	
2010	9.45	11.73	9.78	9.00	
2011	9.67	11.73	9.78	9.00	
2012	9.89	13.89	11.58	9.00	Construction of Well 10 (2.16 MGD)
2013	10.10	13.89	11.58	13.30	Construction of WTP No. 2 (4.3 MGD)
2014	10.32	13.89	11.58	13.30	
2015	10.54	16.05	13.38	13.30	Construction of Well 11 (2.16 MGD)
2016	10.75	18.93	15.78	13.30	Construction of Well 12 (1.44 MGD), Construction of Well 13 (1.44 MGD)
2017	10.97	16.27	13.56	19.30	Construction of WTP No. 3 (6 MGD), Reduction of use of Well 2 and Well 3 to emergency reserve (-2.66 MGD)
2018	11.19	16.27	13.56	19.30	
2019	11.40	16.27	13.56	19.30	
2020	11.62	16.27	13.56	19.30	
2021	11.84	16.27	13.56	19.30	
2022	12.05	16.27	13.56	19.30	
2023	12.27	16.27	13.56	19.30	
2024	12.49	16.27	13.56	19.30	
2025	12.70	16.27	13.56	19.30	
2026	12.92	16.27	13.56	19.30	
2027	13.14	16.27	13.56	19.30	
2028	13.35	17.71	14.76	19.30	Construction of Well 14 (1.44 MGD)
2029	13.57	17.71	14.76	19.30	
2030	13.79	17.71	14.76	19.30	
2031	14.00	17.71	14.76	19.30	
2032	14.22	17.71	14.76	19.30	
2033	14.44	17.71	14.76	19.30	
2034	14.65	19.15	15.96	19.30	Construction of Well 15 (1.44 MGD)
2035	14.87	19.15	15.96	19.30	
2036	15.09	19.15	15.96	19.30	
2037	15.30	19.15	15.96	19.30	
2038	15.52	19.15	15.96	19.30	
2039	15.74	20.59	17.16	19.30	Construction of Well 16 (1.44 MGD)
2040	15.95	20.59	17.16	22.30	WTP Expansion (3 MGD)
2041	16.17	20.59	17.16	22.30	
2042	16.39	20.59	17.16	22.30	
2043	16.61	20.59	17.16	22.30	
2044	16.82	20.59	17.16	22.30	
2045	17.04	22.03	18.36	22.30	Construction of Well 17 (1.44 MGD)
2046	17.26	22.03	18.36	22.30	
2047	17.47	22.03	18.36	22.30	

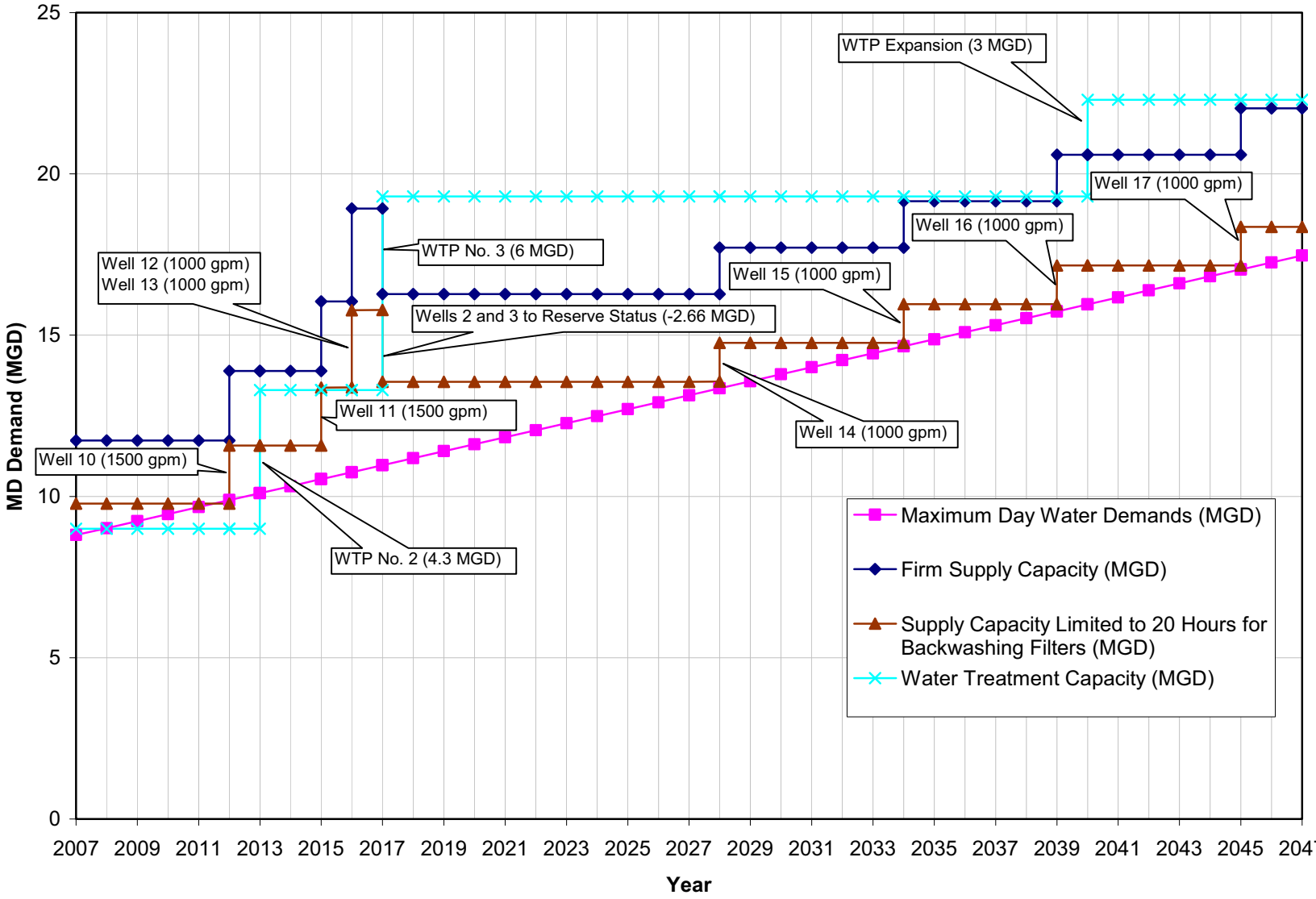

Figure 9 – Supply and Treatment Improvement Trigger Chart

For planning purposes, the capacities of future wells in the Rural Reserve area were assumed to average 1,000 gallons per minute. A third water treatment plant is also planned to treat the wells in this area. More detailed information about proposed water treatment facilities is available in Section 6.2.

6.2 Treatment

Water demand in Andover is currently approaching the capacity of the existing water treatment plant. Water treatment capacity improvements will be needed in the future to meet rising demands. The timing of these improvements are shown in Figure 9 with an estimated schedule for construction based on water demand projections.

Based on the assumptions used to project growth, two future water treatment plants are required. It is anticipated that both plants will be designed to remove iron and manganese from the groundwater, similar to the existing plant. The existing plant uses aeration, chlorination, and sodium permanganate addition followed by a gravity filtration process.

The first future water treatment plant (WTP No. 2) is recommended for 2013. This plant could be constructed in the Shadowbrook development in the southeastern part of Andover. The plant would be designed to remove iron and manganese from future Wells 10 and 11, and would be designed with a filtration capacity of 4.2 MGD. The proposed location is shown in Figure 8.

An additional water treatment plant (WTP No. 3) is recommended for 2017. This plant could be located in the Rural Reserve area in the northwestern part of the water system. The plant would have an original design capacity of 6 MGD to treat water from future wells constructed after Well 11. Wells in the Rural Reserve area could possibly utilize the Franconia-Ironton-Galesville aquifer, the capacity of which is currently unknown in that area. Therefore, the actual treatment capacity of WTP No. 3 may vary depending on the availability of a reliable source of groundwater within the area. Based on demand projections, this plant may need to be expanded to 9 MGD by 2040, so plans should be made during land procurement, design, and construction to allow for an expansion of the treatment capacity.

6.2.1 Backwash Reclaim Improvements

The City currently has plans to expand the backwash reclaim capacity at the existing water treatment plant in 2009. This will allow the City to backwash the existing filters more frequently to produce more water during the high demand season. For this study two alternatives were evaluated to increase backwash reclaim capacity. One option is to construct a new below-ground backwash reclaim tank with associated pumps, process piping, and other accessories. The second option considered is a plate settler unit, which would be housed in an above-ground structure, also with pumps, process piping, and accessories.

When a filter is backwashed, the precipitated iron and manganese minerals collected on the filter media are discharged to the backwash reclaim tank. In order to recycle the backwash water, the solid particulates must first be settled from solution. An adequately sized backwash reclaim tank provides

the volume necessary to allow for sedimentation time to remove most of the particulates prior to recycling the water. This creates a mineral sludge layer on the bottom of the tank, which is sent to the sanitary sewer system, while the clarified water is pumped from the top of the tank and recycled.

A plate settler unit could achieve the same end result as an adequately sized backwash reclaim tank. In this case, the stream of backwash water with suspended particulates is sent through the plate settler unit. The plate settler consists of a steel box-like structure with parallel plates that effectively allow the sedimentation of solids to occur at a much more rapid rate. Polymer is added to the backwash stream to assist the process. The backwash water can be reclaimed immediately, unlike the backwash reclaim tank which requires a settling period for the solids before recycling can begin.

With either process, the end result is a condensed sludge stream to be wasted and a clarified water stream to be recycled. The primary advantage of the plate settler is a smaller footprint since the settling process occurs at a greater rate and the large detention time is not required. The disadvantage would be additional maintenance of the polymer feed system, along with the mixers required for rapid mixing of the added polymer and the flocculation process that occurs prior to the solution entering the plate settler. Based on the cost estimates presented in Section 6.5 of this report, the plate settler with associated structure and accessories is the more expensive of the two options.

The proposed location on the existing water treatment plant site for a second reclaim tank or plate settler building is shown in the Site Plan in Appendix A.

6.3 Storage

Additional water storage is needed to serve the City's projected water demands. The volume of storage required on a water distribution system is determined by examining many variables, including operational needs, fire flow needs, and firm supply capacity. The calculations used for determining the existing and ultimate storage needs for the Andover water system are presented in Table 6.

Table 6
Storage Volume Requirements

		Existing	Ultimate
		3 Hour Fire	3 Hour Fire
A	Average Daily Water Use in gpd	2,873,899	5,217,177
B	Maximum / Average Day Ratio	3.06	3.70
C	Maximum Day Water Use in gpd (A x B)	8,802,000	17,472,129
D	Maximum Day Water Use in gpm	6,113	12,133
E	Firm Pumping Supply Capacity in gpm	6,792	12,750
F	ISO Design Fire Fighting Rate in gpm	3,500	3,500
G	Fire Fighting Duration in Hours	3	3
H	Design Fire Fighting Volume in gal (F x G x 60min/hour)	630,000	630,000
I	Total Coincident Demand in gpm (D + F)	9,613	15,633
J	Required Draft from Storage in gpm (I - E)	2,821	2,883
K	Adjusted Fire Fighting Storage in gal (G x 60 min/hr x J)	507,690	519,016
L	Equalization Storage in gal/day (C x 20%)	1,760,400	3,494,426
M	Total Storage Need in gal (K + L)	2,268,090	4,013,442
N	Storage Capacity in gal	2,500,000	2,500,000
O	Additional Storage Capacity Needed in gal (M - N)	0	1,513,442

The projected calculated storage need for the ultimate water system is approximately 4 million gallons. Adding two million gallons of additional storage capacity is recommended to meet this requirement. A two million gallon spiral-wound concrete ground storage reservoir could be constructed adjacent to the water treatment plant and hydraulically connected to the water treatment plant clearwell though interconnecting piping (refer to Appendix). This type of storage would provide the following advantages:

1. The existing high capacity pumps in the water treatment plant could be used to pump water from the ground storage reservoir to the distribution system.
2. Concrete ground storage reservoirs require minimal maintenance and have lower life cycle costs compared to elevated water towers.
3. Concrete ground storage reservoirs can be constructed beneath the ground or partially above the ground to help mask their appearance.
4. A number of qualified contractors can construct concrete ground storage reservoirs to enhance competitive bidding and reduce capital costs.

6.4 Distribution System

As discussed with regard to available fire flows on the existing system in Section 4.5, there are some isolated regions within the current service area where flows could be improved by upgrading to larger water mains and/or converting dead-ends, or branched-style pipe networks, to looped networks. Looping should be used wherever possible since it makes the supply more reliable, and increases the available flow at any given location. Dead ends result in a lack of redundancy of service to downstream areas (large areas will be out of service in the event of a main failure or system maintenance) and rapid losses of pressure and flow during high flow conditions, as are found during fire fighting operations. In addition to improving available fire flow rates, increased trunk main looping allows for better system balance between supply and storage facilities.

It should be noted that the existing system has many trunk main loops, and flow results are relatively good. The recommendations discussed here are intended to allow the City to focus further improvements where they are most needed. These upgrades should be coordinated with other utility work or street repairs if possible. As the water system expands to serve future service areas, these strategies should also be carried over to those new developments.

On Figure 8, a proposed trunk main layout to serve future land-use areas is illustrated. Several 8-, 10-, and 12-inch trunk main loops have been proposed to extend water service to the planned development areas, minimizing dead-ends where possible. Consideration should be given to the type of proposed land use when locating new trunk mains. Developments that require larger fire flow rates should be located close to trunk main loops. The water model developed for this study can be employed in the future to estimate available flow rates to certain areas under given conditions, and to aid in the sizing of water mains used to serve these areas.

6.4.1 Combined Single Pressure Zone Analysis

The Andover water system includes a low pressure zone and a high pressure zone as identified on Figure 2. The one million gallon water tower provides water storage and pressure for the high pressure zone. The high pressure zone receives mostly treated water from the water treatment plant. Well 3 pumps non-treated water directly into the high pressure zone during peak water demands. The 500,000 gallon water tower provides water storage and pressure for the low pressure zone. The low pressure zone receives treated water from the high pressure zone during non-peak water demands. Well 2 provides the majority of water for the low pressure zone during peak water demands so customers located on the low pressure zone receive mostly non-treated water during peak water demands.

The City's two pressure zone system requires additional operation and maintenance compared to a single pressure zone system. The pressure reducing station and controls must be carefully monitored by City staff and require periodic adjustments and repairs.

A single pressure zone was modeled without the 500,000 gallon water tower and pressure reducing station to determine the expected average day water

pressures and maximum day fire flows. The low pressure zone would receive adequate fire flows for the residential development. A single pressure zone would:

1. improve water quality for customers that are currently located in the low pressure zone during peak water demands
2. eliminate pressure spikes caused by the altitude valve station, which has resulted in damaged plumbing systems
3. increase the water pressure for customers located in the low pressure zone
4. eliminate the operation and maintenance that is currently required for the two pressure zone system

The existing 500,000 gallon water tower that serves the low pressure zone would need to be replaced with an expansion of the below-ground clearwell storage at the existing Water Treatment Plant No. 1. The City plans to demolish the 500,000 gallon tower and remove the altitude valve in 2010. These changes have been incorporated into the ultimate system analysis in Section 7.

6.5 Probable Construction Costs

The proposed improvements for the City's water system are summarized in Table 7. The approximate year of completion and Engineer's opinion of probable construction cost in 2007 dollars are also shown in Table 7.

Table 7
List of Future Water System Improvements

Proposed Improvement	Approximate Year of Completion	Engineer's Opinion of Probable Cost(1)
Test Wells 10 and 11	2008	$ 88,000
Water Tower Painting	2008	$ 600,000
Expand Water Treatment Plant Clearwell Capacity by 2 MG	2009	$ 1,740,000
Backwash Reclaim Tank at Water Treatment Plant	2009	$ 785,000
Plate Settler as Alternative to Backwash Reclaim Tank	2009	$ 890,000
South Coon Creek Drive Water Main	2010	$ 409,400
Demolish Low Pressure Zone Tower and Valve Station	2010	$ 168,000
Well 10	2012	$ 181,000
WTP No. 2	2013	$ 7,740,000
Well 11	2015	$ 181,000
Well 12	2016	$ 181,000
Well 13	2016	$ 181,000
WTP No. 3	2017	$ 9,000,000
Well 14	2028	$ 181,000
Well 15	2034	$ 181,000
Well 16	2039	$ 181,000
WTP Expansion	2040	$ 3,000,000
Well 17	2045	$ 181,000
Trunk Main Improvements (Excluding Coon Creek)	N/A	$ 6,133,900

7.0 Analysis of Ultimate Service Area with Proposed Improvements

7.1 System Pressures after Improvements

The model results for average day static pressures, with the proposed ultimate system layout described above, are shown in Figure 10. As expected, pressures are shown to have increased in the southwestern portion of the service area due to the elimination of the low pressure zone. Pressures have remained largely unchanged throughout the remainder of the existing service area.

Throughout the entire ultimate service area, static pressures are expected to fall in the 60 to 80 psi range, which is ideal for water system operation according to the American Water Works Association. There are isolated areas in the southwestern part of the system that are shown to have pressures slightly greater than 80 psi. This occurs at points with relatively low elevations, and is not expected to be a concern for operation of the water system.

7.2 Available Fire Flows after Improvements

The future available fire flows are represented in Figure 11. These flows represent the future expected available fire flows with all recommended system improvements as shown in Figure 8.

Comparing Figure 11 with the proposed trunk main layout in Figure 8, it can be seen that in locations where the proposed trunk mains dead-end at the system extents, frictional energy losses begin to limit the amount of flow available. If the loss in available fire flow is found to be unacceptable for a particular planned land use, improvements in fire flow can be made by increasing trunk main sizes and/or creating additional loops in the trunk main network. Specific questions can be addressed as they arise during development, using the water model as a tool to predict results under various scenarios. It is expected that the flow rates shown should be acceptable for most residential land uses.

Legend

Ultimate Average Day Pressure

- 60-65 psi
- 65-70 psi
- 70-75 psi
- 75-80 psi
- 80-85 psi

Source:
City of Andover, MN/DNR, and SEH.

0 1,250 2,500
Feet

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COMPREHENSIVE WATER SYSTEM PLAN

Andover, Minnesota

Ultimate Average Day Pressure

Figure 10

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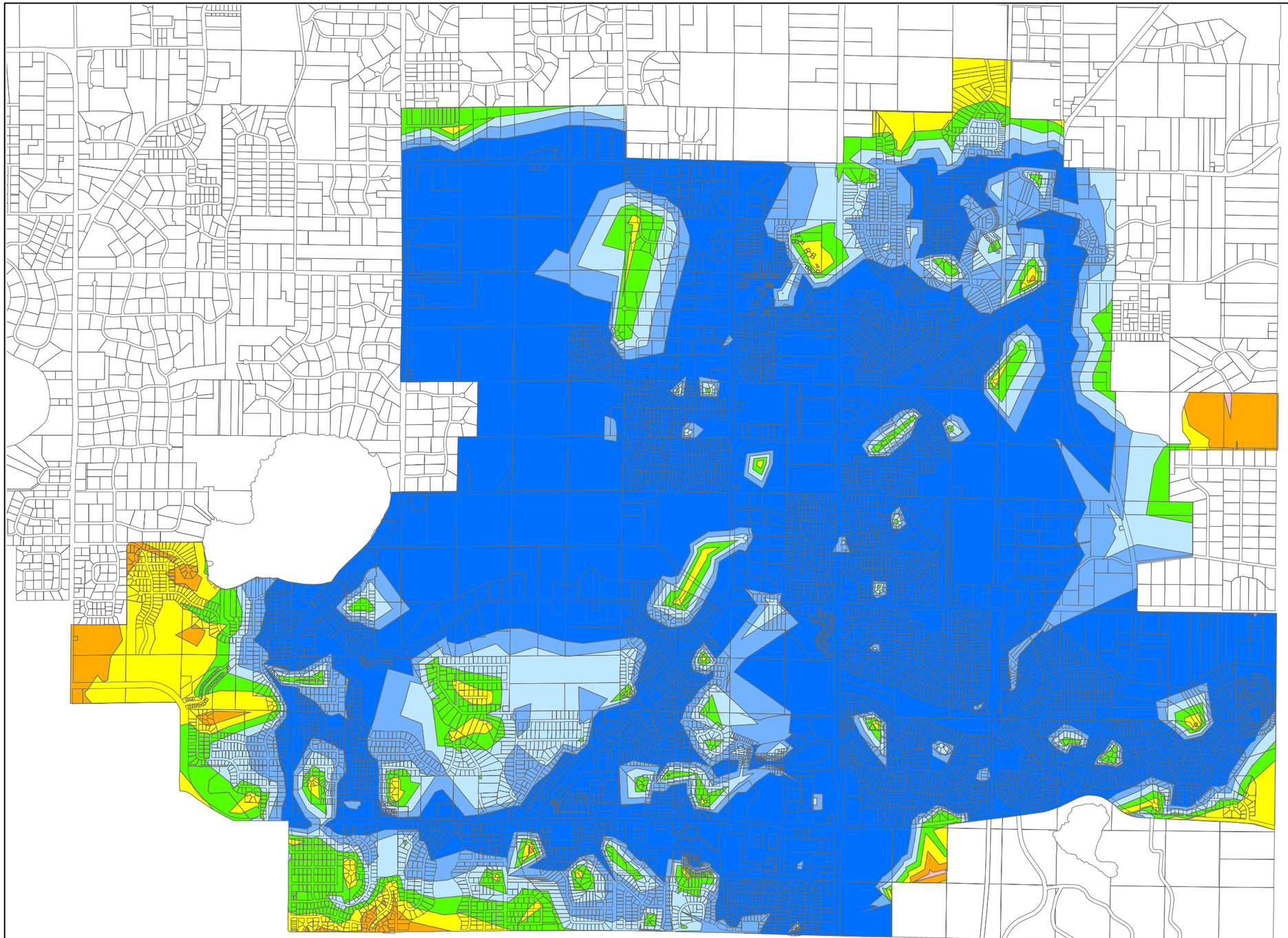

Legend

Maximum Day Fire Flow

- 0-500 gpm
- 500-1000 gpm
- 1000-1500 gpm
- 1500-2000 gpm
- 2000-2500 gpm
- 2500-3000 gpm
- 3000-3500 gpm
- 3500+ gpm

Source:
City of Andover, MN/DNR, and SEH.

0 1,250 2,500 Feet

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COMPREHENSIVE WATER SYSTEM PLAN

Andover, Minnesota

Ultimate Maximum Day Available Fire Flow

Figure 11

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7.3 Economic Analysis

This report has been prepared to assist in setting area charges and connection charges for the costs associated with supply, treatment, storage, and trunk water main. Although some of these costs could be recovered through water rates, this report assumes that all recovery of facility costs will be through a combination of area charges (distribution and storage) and connection charges (supply and treatment). The cost figures presented in this report represent an approximate opinion of cost, and are not a guarantee of maximum cost. *These estimates are based on 2008 construction costs, and should be adjusted in the future for inflation.*

Based on the projected maximum day demand, the associated facilities and costs required to serve the ultimate service area were shown in Table 7. Major facilities have been assigned costs individually. Trunk water main has been assigned a cost based on unit costs per lineal foot of water mains, including estimated valve placement every 500 feet.

Area charges include the cost of distribution and storage facilities. These charges are assigned based on land area to reflect pressure and fire protection needs, which are more closely tied to land area, and which create a need for additional storage facilities and distribution system upgrades (trunk mains). Table 8 shows recommended area charges to cover estimated facility costs.

Table 8
Area Charge Determination

Non-Rural Reserve

Facility Improvements	**2007 Estimated Project Cost**	
Trunk Main Improvements	$	4,867,238
Water Tank Maintenance	$	600,000
Demolition of Low Zone Water Tank and Valve Station	$	168,000
Expand Clearwell Capacity	$	1,740,000

Total Cost	$	7,375,238
Developable Acreage[(1)]		2,278
Cost per Developable Acre[(2)]	$	3,237

[(1)]Includes area not currently served by water subtracting wetlands and 10% assumed floodway (below 100-year flood elevation)

[(2)]Based on 2007 cost estimates, and should be adjusted in the future for inflation

Rural Reserve

Facility Improvements	**2007 Estimated Project Cost**	
Trunk Main Cost	$	1,676,063

Total Cost	$	1,676,063
Developable Acreage[(1)]		868
Cost per Developable Acre[(2)]	$	1,931

[(1)]Includes area not currently served by water subtracting wetlands and 10% assumed floodway (below 100-year flood elevation)

[(2)]Based on 2007 cost estimates, and should be adjusted in the future for inflation

Connection fees are commonly used to cover the costs of water supply and treatment facilities. As shown in Table 9, the connection fees are assigned based on the number of residential equivalency units (REU) of a particular customer. An REU is defined for the purpose of this study as the use of 335 gallons per day (gpd), which is typical of a single family home in Andover. In this way, facility costs are distributed among customers based on the amount of water that they use. For example, if an industrial customer uses 670 gpd, they will pay twice the connection fee of a typical single family home.

Table 9
Connection Fee Determination

Non-Rural Reserve

Facility Improvements	2007 Estimated Project Cost
Test Wells 10 and 11	$ 88,000
Plate Settler as Alternative to Backwash Reclaim Tank	$ 890,000
Well 10	$ 181,000
WTP No. 2	$ 7,740,000
Well 11	$ 181,000
Well 12	$ 181,000
Well 13	$ 181,000
WTP No. 3 (2/3 of Total Cost)	$ 6,000,000
Well 14	$ 181,000
WTP Expansion (2/3 of Total Cost)	$ 2,000,000

Total Cost	$ 17,623,000
Future Additional REUs[(1)]	4,881
Connection Fee per REU[(2)]	$ 3,610

[(1)] Residential Equivalency Units, based on water use assumption of 337.5 gpd/REU and ultimate projected average day demands

[(2)]Based on 2007 cost estimates, and should be adjusted in the future for inflation

Rural Reserve

Facility Improvements	2007 Estimated Project Cost
WTP No. 3 (1/3 of Total Cost)	$ 3,000,000
Well 15	$ 181,000
Well 16	$ 181,000
WTP Expansion (1/3 of Total Cost)	$ 1,000,000
Well 17	$ 181,000
Trunk Main Improvements (Rural Reserve Area Only)	$ 1,676,063

Total Cost	$ 6,219,063
Future Additional REUs[(1)]	2,062
Connection Fee per REU[(2)]	$ 3,016

[(1)] Residential Equivalency Units, based on water use assumption of 337.5 gpd/REU and ultimate projected average day demands

[(2)]Based on 2007 cost estimates, and should be adjusted in the future for inflation

It should be noted that these calculated costs are for full recovery of facilities and over-sizing of trunk water mains. This assigns all costs of new water system components and upgrades to new customers and new development. While the proposed facilities will be constructed mainly to serve growth, in some cases they also provide benefit to existing customers. The City can decide how much cost to assign to existing customers, and then recover a portion of these costs through water rates or other means.

8.0 Conclusions and Recommendations

8.1 Supply

Currently, firm supply capacity exceeds maximum day demands, indicating that water supply facilities are adequate for current system demands. With planned growth and expansion, supply capacity in the form of additional municipal wells will be needed to meet the projected demands.

Based on the demand projections, a schedule for supply and treatment improvements has been prepared (refer to Table 5 and Figure 9 in Section 6 of this report). In addition to projected increases in water demand, future plans for the elimination of wells that are not treated for iron and manganese will influence the need for additional supply capacity.

Future supply wells are planned in the Shadowbrook Development and in the Rural Reserve Area. Well siting studies and test wells are recommended to determine the suitability of these sites for production wells.

8.2 Treatment

The City's water treatment capacity will also need to be increased in the near future. During peak summer water demands, a portion of the water supply for Andover comes from remote wells that do not receive treatment for iron and manganese. The use of these wells should be phased out over time in the future. That, combined with increasing water demands will create a need for two future water treatment plants.

The first of these plants (WTP No. 2) should be constructed in the Shadowbrook Development in southeastern Andover in 2013. The capacity of WTP No. 2 is projected at 4.3 MGD. The second plant (WTP No. 3) could possibly be constructed in the Rural Reserve area northwest of the existing distribution system in 2017. The capacity of this plant is projected at 6 MGD. A 3 MGD expansion to WTP No. 3 is projected for the year 2040.

Short-term water treatment improvements to the existing water treatment plant include expansion of the filter backwash reclaim facilities. This study analyzes two options for increasing the backwash reclaim capacity, including a second backwash reclaim basin and a plate settler unit. Both of these options have advantages and disadvantages.

8.3 Storage

The projected storage need for the ultimate water system is approximately 4 million gallons. This will require approximately two million gallons of additional storage capacity. The construction of a two million gallon spiral-

wound concrete ground storage reservoir is recommended adjacent to the water treatment plant to meet this requirement.

8.4 Distribution System

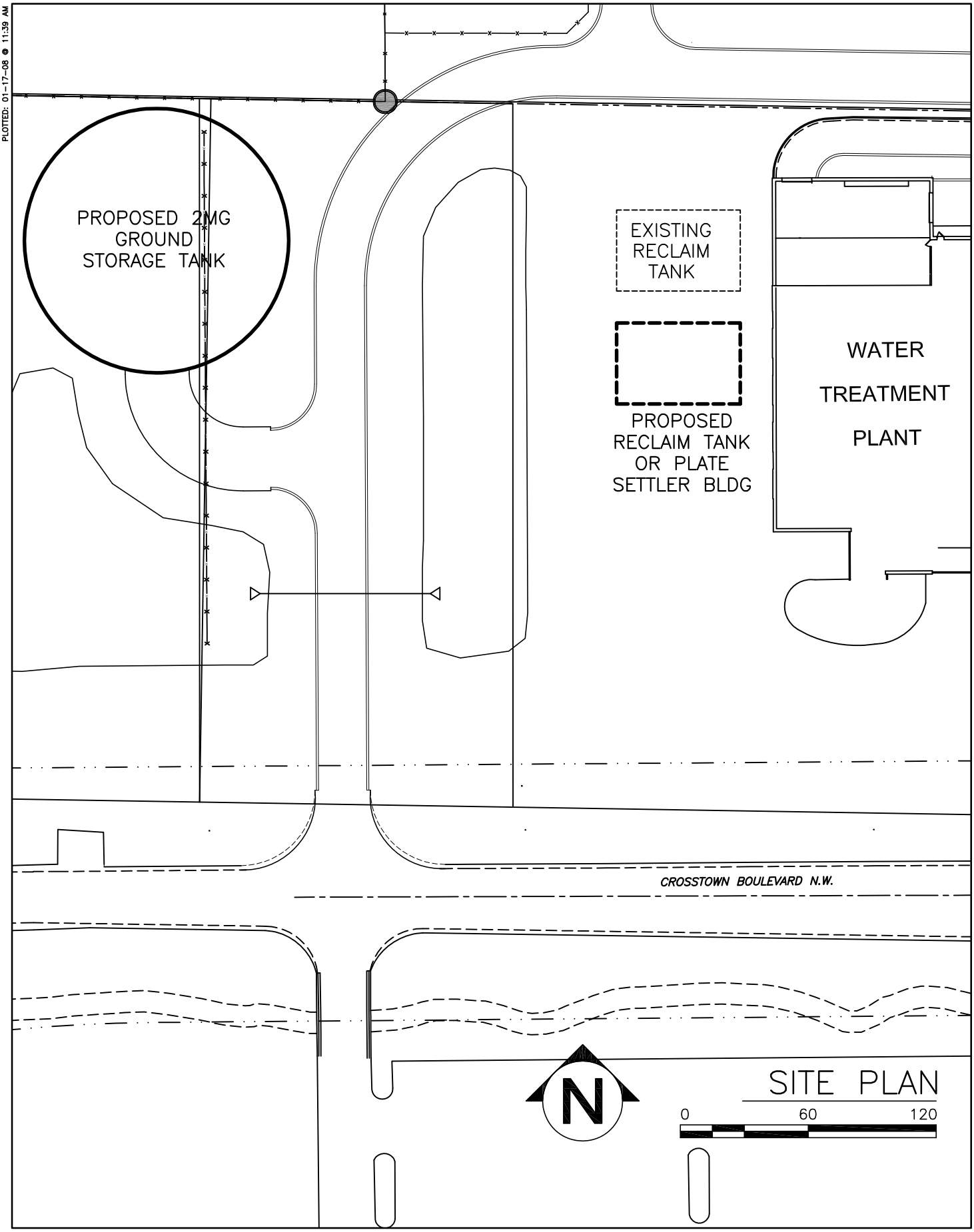
Hydraulic modeling was employed in the analysis of the existing water distribution system in Andover. Modeling results indicate that the existing water distribution system has capacity to meet normal operational water demands and emergency fire flows throughout the service area. It is recommended that dead end mains be eliminated where feasible to improve available fire flow rates and increase reliability.

The water service area is currently divided into two separate pressure zones, with the southwestern portion of the system operating at lower pressures. The City's two pressure zone system requires additional operation and maintenance compared to a single pressure zone system. Hydraulic analysis indicates that this lower pressure zone is not required for system operations. Combining the two pressure zones into a single pressure zone would reduce maintenance while improving the water quality and water pressures for customers that are currently located in the low pressure zone. The two pressure zones should be combined into a single pressure zone through demolition of the 500,000 gallon elevated storage tank serving the lower pressure zone, and decommissioning of an altitude valve which currently controls water flow into this zone.

The water distribution system will require expansion in the future to serve proposed development. Proposed development areas, along with future distribution system facilities to serve these areas are shown in Figure 8 in Section 5 of this report. The proposed system layout shown in Figure 8 was analyzed using the hydraulic model. Water mains were sized to provide the expected flow rates that will be needed, based on the type of land use expected in each proposed development area.

Appendix A

Water Treatment Plant Site Plan



PLOTTED: 01-17-08 @ 11:39 AM

S:\AE\A\ANDOVER\070300\5-DSGN\51-CADD\PROCESS\SITE PLAN A.DWG
DATE: 01-17-08 TIME: 11:32 am USER: RLEPPALA
XREFS:

SEH
3535 VADNAIS CENTER DR
ST PAUL, MN 55110
PHONE: 651.490.2000
FAX: 651.490.2150
WATTS: 800.325.2055
www.sehinc.com

SEH FILE NO.	A-ANDOV0703.00
CITY PROJECT NO.	
ISSUE DATE	JAN 2008
DESIGNED BY	GFJ
DRAWN BY	RCL

COMPREHENSIVE WATER PLAN FOR THE CITY OF ANDOVER, MINNESOTA

SHEET TITLE
SITE PLAN

FIGURE NO.
1

Appendix B

Model Data

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-1a	77.00	99.0	Ductile Iron	130.0
P-1b	77.00	99.0	Ductile Iron	130.0
P-3a	72.00	99.0	Ductile Iron	130.0
P-3b	72.00	99.0	Ductile Iron	130.0
P-2a	75.00	99.0	Ductile Iron	130.0
P-2b	75.00	99.0	Ductile Iron	130.0
P-1a	226.00	99.0	Ductile Iron	130.0
P-1b	226.00	99.0	Ductile Iron	130.0
P-620	197.00	16.0	Ductile Iron	130.0
P-619	888.00	6.0	Ductile Iron	130.0
P-618	225.00	6.0	Ductile Iron	130.0
P-617	246.00	6.0	Ductile Iron	130.0
P-616	417.00	6.0	Ductile Iron	130.0
P-614	272.00	6.0	Ductile Iron	130.0
P-613	257.00	6.0	Ductile Iron	130.0
P-612	228.00	6.0	Ductile Iron	130.0
P-611	276.00	8.0	Ductile Iron	130.0
P-609	471.00	8.0	Ductile Iron	130.0
P-607	1,156.00	8.0	Ductile Iron	130.0
P-580	437.00	12.0	Ductile Iron	130.0
P-605	836.00	8.0	Ductile Iron	130.0
P-604	275.00	8.0	Ductile Iron	130.0
P-603	165.00	8.0	Ductile Iron	130.0
P-602	454.00	8.0	Ductile Iron	130.0
P-601	1,953.00	8.0	Ductile Iron	130.0
P-600	265.00	8.0	Ductile Iron	130.0
P-599	1,135.00	8.0	Ductile Iron	130.0
P-598	556.00	8.0	Ductile Iron	130.0
P-597	625.00	8.0	Ductile Iron	130.0
P-596	698.00	8.0	Ductile Iron	130.0
P-595	251.00	8.0	Ductile Iron	130.0
P-594	342.00	8.0	Ductile Iron	130.0
P-593	1,310.00	8.0	Ductile Iron	130.0
P-592	469.00	8.0	Ductile Iron	130.0
P-590	443.00	8.0	Ductile Iron	130.0
P-589	456.00	8.0	Ductile Iron	130.0
P-591	477.00	8.0	Ductile Iron	130.0
P-588	480.00	8.0	Ductile Iron	130.0
P-587	153.00	8.0	Ductile Iron	130.0
P-586	1,012.00	8.0	Ductile Iron	130.0
P-584	180.00	8.0	Ductile Iron	130.0
P-583	322.00	8.0	Ductile Iron	130.0
P-582	671.00	8.0	Ductile Iron	130.0
P-581	412.00	8.0	Ductile Iron	130.0
P-579	310.00	12.0	Ductile Iron	130.0
P-578	726.00	12.0	Ductile Iron	130.0
P-577	737.00	12.0	Ductile Iron	130.0
P-575	225.00	12.0	Ductile Iron	130.0
P-574	169.00	12.0	Ductile Iron	130.0
P-573	339.00	12.0	Ductile Iron	130.0
P-572	407.00	12.0	Ductile Iron	130.0
P-571	383.00	12.0	Ductile Iron	130.0
P-570	822.00	12.0	Ductile Iron	130.0
P-569	1,118.00	12.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-567	1,401.00	8.0	Ductile Iron	130.0
P-566	430.00	8.0	Ductile Iron	130.0
P-564	418.00	8.0	Ductile Iron	130.0
P-563	474.00	10.0	Ductile Iron	130.0
P-562	445.00	8.0	Ductile Iron	130.0
P-231	213.00	8.0	Ductile Iron	130.0
P-561	82.00	16.0	Ductile Iron	130.0
P-183	402.00	16.0	Ductile Iron	130.0
P-446	162.00	8.0	Ductile Iron	130.0
P-558	739.00	8.0	Ductile Iron	130.0
P-230	670.00	8.0	Ductile Iron	130.0
P-557	922.00	12.0	Ductile Iron	130.0
P-556	627.00	12.0	Ductile Iron	130.0
P-554	103.00	8.0	Ductile Iron	130.0
P-553	341.00	8.0	Ductile Iron	130.0
P-458	737.00	8.0	Ductile Iron	130.0
P-552	326.00	8.0	Ductile Iron	130.0
P-551	308.00	8.0	Ductile Iron	130.0
P-550	849.00	8.0	Ductile Iron	130.0
P-549	122.00	8.0	Ductile Iron	130.0
P-548	467.00	8.0	Ductile Iron	130.0
P-395	329.00	8.0	Ductile Iron	130.0
P-547	85.00	8.0	Ductile Iron	130.0
P-546	377.00	8.0	Ductile Iron	130.0
P-206	438.00	8.0	Ductile Iron	130.0
P-545	84.00	8.0	Ductile Iron	130.0
P-544	359.00	8.0	Ductile Iron	130.0
P-543	121.00	8.0	Ductile Iron	130.0
P-542	1,056.00	8.0	Ductile Iron	130.0
P-541	108.00	8.0	Ductile Iron	130.0
P-540	431.00	8.0	Ductile Iron	130.0
P-169	811.00	8.0	Ductile Iron	130.0
P-539	206.00	8.0	Ductile Iron	130.0
P-536	54.00	10.0	Ductile Iron	130.0
P-530	308.00	12.0	Ductile Iron	130.0
P-56	804.00	12.0	Ductile Iron	130.0
P-531	383.00	10.0	Ductile Iron	130.0
P-529	491.00	10.0	Ductile Iron	130.0
P-527	361.00	10.0	Ductile Iron	130.0
P-526	183.00	12.0	Ductile Iron	130.0
P-520	503.00	12.0	Ductile Iron	130.0
P-48	754.00	12.0	Ductile Iron	130.0
P-519	225.00	12.0	Ductile Iron	130.0
P-517	1,204.00	8.0	Ductile Iron	130.0
P-516	859.00	8.0	Ductile Iron	130.0
P-515	1,158.00	8.0	Ductile Iron	130.0
P-514	470.00	8.0	Ductile Iron	130.0
P-513	160.00	6.0	Ductile Iron	130.0
P-512	588.00	6.0	Ductile Iron	130.0
P-494	289.00	6.0	Ductile Iron	130.0
P-511	215.00	6.0	Ductile Iron	130.0
P-510	329.00	8.0	Ductile Iron	130.0
P-508	373.00	8.0	Ductile Iron	130.0
P-509	216.00	6.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-116	245.00	8.0	Ductile Iron	130.0
P-506	353.00	10.0	Ductile Iron	130.0
P-144	317.00	10.0	Ductile Iron	130.0
P-507	1,251.00	6.0	Ductile Iron	130.0
P-505	699.00	12.0	Ductile Iron	130.0
P-472	602.00	12.0	Ductile Iron	130.0
P-502	246.00	6.0	Ductile Iron	130.0
P-501	676.00	6.0	Ductile Iron	130.0
P-294	914.00	6.0	Ductile Iron	130.0
P-500	259.00	6.0	Ductile Iron	130.0
P-499	785.00	6.0	Ductile Iron	130.0
P-288	104.00	6.0	Ductile Iron	130.0
P-498	215.00	6.0	Ductile Iron	130.0
P-497	367.00	8.0	Ductile Iron	130.0
P-270	369.00	8.0	Ductile Iron	130.0
P-496	304.00	6.0	Ductile Iron	130.0
P-495	202.00	6.0	Ductile Iron	130.0
P-191	337.00	6.0	Ductile Iron	130.0
P-493	144.00	6.0	Ductile Iron	130.0
P-492	533.00	6.0	Ductile Iron	130.0
P-195	439.00	6.0	Ductile Iron	130.0
P-491	175.00	6.0	Ductile Iron	130.0
P-490	459.00	6.0	Ductile Iron	130.0
P-200	237.00	6.0	Ductile Iron	130.0
P-489	226.00	6.0	Ductile Iron	130.0
P-488	201.00	6.0	Ductile Iron	130.0
P-487	227.00	6.0	Ductile Iron	130.0
P-204	427.00	6.0	Ductile Iron	130.0
P-484	241.00	12.0	Ductile Iron	130.0
P-482	557.00	12.0	Ductile Iron	130.0
P-485	191.00	6.0	Ductile Iron	130.0
P-33	331.00	12.0	Ductile Iron	130.0
P-483	75.00	8.0	Ductile Iron	130.0
P-480	376.00	8.0	Ductile Iron	130.0
P-479	114.00	8.0	Ductile Iron	130.0
P-478	750.00	10.0	Ductile Iron	130.0
P-327	208.00	10.0	Ductile Iron	130.0
P-477	97.00	16.0	Ductile Iron	130.0
P-475	399.00	16.0	Ductile Iron	130.0
P-473	314.00	8.0	Ductile Iron	130.0
P-471	460.00	12.0	Ductile Iron	130.0
P-470	1,386.00	8.0	Ductile Iron	130.0
P-469	1,020.00	8.0	Ductile Iron	130.0
P-467	504.00	8.0	Ductile Iron	130.0
P-466	748.00	8.0	Ductile Iron	130.0
P-465	421.00	8.0	Ductile Iron	130.0
P-464	274.00	8.0	Ductile Iron	130.0
P-463	348.00	8.0	Ductile Iron	130.0
P-462	518.00	8.0	Ductile Iron	130.0
P-461	483.00	8.0	Ductile Iron	130.0
P-460	517.00	8.0	Ductile Iron	130.0
P-456	1,075.00	8.0	Ductile Iron	130.0
P-455	591.00	8.0	Ductile Iron	130.0
P-454	409.00	10.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-453	1,568.00	16.0	Ductile Iron	130.0
P-452	330.00	16.0	Ductile Iron	130.0
P-451	1,420.00	16.0	Ductile Iron	130.0
P-449	1,092.00	8.0	Ductile Iron	130.0
P-448	496.00	8.0	Ductile Iron	130.0
P-447	660.00	8.0	Ductile Iron	130.0
P-445	347.00	8.0	Ductile Iron	130.0
P-444	377.00	8.0	Ductile Iron	130.0
P-443	632.00	8.0	Ductile Iron	130.0
P-442	289.00	8.0	Ductile Iron	130.0
P-441	193.00	8.0	Ductile Iron	130.0
P-439	160.00	8.0	Ductile Iron	130.0
P-438	1,077.00	8.0	Ductile Iron	130.0
P-437	217.00	6.0	Ductile Iron	130.0
P-436	723.00	6.0	Ductile Iron	130.0
P-435	181.00	6.0	Ductile Iron	130.0
P-434	858.00	6.0	Ductile Iron	130.0
P-433	279.00	6.0	Ductile Iron	130.0
P-432	729.00	6.0	Ductile Iron	130.0
P-431	742.00	6.0	Ductile Iron	130.0
P-430	893.00	6.0	Ductile Iron	130.0
P-429	270.00	6.0	Ductile Iron	130.0
P-428	998.00	6.0	Ductile Iron	130.0
P-427	54.00	6.0	Ductile Iron	130.0
P-426	221.00	8.0	Ductile Iron	130.0
P-414	939.00	8.0	Ductile Iron	130.0
P-425	1,363.00	8.0	Ductile Iron	130.0
P-424	197.00	8.0	Ductile Iron	130.0
P-423	983.00	8.0	Ductile Iron	130.0
P-422	321.00	8.0	Ductile Iron	130.0
P-421	419.00	8.0	Ductile Iron	130.0
P-420	381.00	8.0	Ductile Iron	130.0
P-419	776.00	8.0	Ductile Iron	130.0
P-418	350.00	8.0	Ductile Iron	130.0
P-417	857.00	8.0	Ductile Iron	130.0
P-416	237.00	8.0	Ductile Iron	130.0
P-415	420.00	8.0	Ductile Iron	130.0
P-413	1,074.00	8.0	Ductile Iron	130.0
P-412	356.00	8.0	Ductile Iron	130.0
P-411	479.00	8.0	Ductile Iron	130.0
P-410	346.00	8.0	Ductile Iron	130.0
P-409	387.00	8.0	Ductile Iron	130.0
P-408	344.00	8.0	Ductile Iron	130.0
P-407	384.00	8.0	Ductile Iron	130.0
P-406	593.00	8.0	Ductile Iron	130.0
P-405	322.00	8.0	Ductile Iron	130.0
P-404	321.00	8.0	Ductile Iron	130.0
P-403	303.00	8.0	Ductile Iron	130.0
P-402	741.00	8.0	Ductile Iron	130.0
P-401	702.00	8.0	Ductile Iron	130.0
P-400	329.00	8.0	Ductile Iron	130.0
P-399	400.00	8.0	Ductile Iron	130.0
P-398	555.00	8.0	Ductile Iron	130.0
P-397	435.00	6.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-396	133.00	6.0	Ductile Iron	130.0
P-394	306.00	8.0	Ductile Iron	130.0
P-393	385.00	8.0	Ductile Iron	130.0
P-392	641.00	8.0	Ductile Iron	130.0
P-391	707.00	8.0	Ductile Iron	130.0
P-389	360.00	8.0	Ductile Iron	130.0
P-388	344.00	8.0	Ductile Iron	130.0
P-387	891.00	8.0	Ductile Iron	130.0
P-386	358.00	8.0	Ductile Iron	130.0
P-385	353.00	8.0	Ductile Iron	130.0
P-384	525.00	8.0	Ductile Iron	130.0
P-383	329.00	8.0	Ductile Iron	130.0
P-382	816.00	8.0	Ductile Iron	130.0
P-381	224.00	8.0	Ductile Iron	130.0
P-380	289.00	8.0	Ductile Iron	130.0
P-379	135.00	8.0	Ductile Iron	130.0
P-378	224.00	8.0	Ductile Iron	130.0
P-377	249.00	8.0	Ductile Iron	130.0
P-376	165.00	8.0	Ductile Iron	130.0
P-375	1,054.00	8.0	Ductile Iron	130.0
P-374	1,119.00	8.0	Ductile Iron	130.0
P-373	480.00	8.0	Ductile Iron	130.0
P-372	198.00	8.0	Ductile Iron	130.0
P-371	275.00	8.0	Ductile Iron	130.0
P-370	428.00	8.0	Ductile Iron	130.0
P-369	544.00	8.0	Ductile Iron	130.0
P-368	225.00	8.0	Ductile Iron	130.0
P-367	220.00	8.0	Ductile Iron	130.0
P-366	466.00	8.0	Ductile Iron	130.0
P-365	217.00	6.0	Ductile Iron	130.0
P-364	595.00	8.0	Ductile Iron	130.0
P-363	206.00	10.0	Ductile Iron	130.0
P-362	353.00	10.0	Ductile Iron	130.0
P-361	516.00	10.0	Ductile Iron	130.0
P-360	852.00	10.0	Ductile Iron	130.0
P-359	331.00	10.0	Ductile Iron	130.0
P-358	634.00	10.0	Ductile Iron	130.0
P-357	324.00	10.0	Ductile Iron	130.0
P-356	339.00	10.0	Ductile Iron	130.0
P-355	399.00	12.0	Ductile Iron	130.0
P-354	802.00	8.0	Ductile Iron	130.0
P-353	1,318.00	8.0	Ductile Iron	130.0
P-352	1,193.00	8.0	Ductile Iron	130.0
P-351	621.00	8.0	Ductile Iron	130.0
P-350	241.00	8.0	Ductile Iron	130.0
P-349	279.00	8.0	Ductile Iron	130.0
P-348	204.00	6.0	Ductile Iron	130.0
P-347	281.00	6.0	Ductile Iron	130.0
P-346	412.00	6.0	Ductile Iron	130.0
P-345	263.00	6.0	Ductile Iron	130.0
P-344	244.00	6.0	Ductile Iron	130.0
P-343	1,793.00	8.0	Ductile Iron	130.0
P-342	386.00	8.0	Ductile Iron	130.0
P-341	351.00	8.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-340	690.00	8.0	Ductile Iron	130.0
P-339	119.00	6.0	Ductile Iron	130.0
P-338	975.00	8.0	Ductile Iron	130.0
P-337	450.00	8.0	Ductile Iron	130.0
P-336	897.00	8.0	Ductile Iron	130.0
P-335	486.00	8.0	Ductile Iron	130.0
P-334	100.00	8.0	Ductile Iron	130.0
P-333	273.00	8.0	Ductile Iron	130.0
P-332	639.00	8.0	Ductile Iron	130.0
P-331	1,386.00	8.0	Ductile Iron	130.0
P-328	222.00	10.0	Ductile Iron	130.0
P-326	273.00	10.0	Ductile Iron	130.0
P-325	261.00	10.0	Ductile Iron	130.0
P-324	448.00	10.0	Ductile Iron	130.0
P-323	369.00	10.0	Ductile Iron	130.0
P-322	1,031.00	8.0	Ductile Iron	130.0
P-321	810.00	8.0	Ductile Iron	130.0
P-320	342.00	8.0	Ductile Iron	130.0
P-319	353.00	8.0	Ductile Iron	130.0
P-318	1,067.00	8.0	Ductile Iron	130.0
P-317	409.00	8.0	Ductile Iron	130.0
P-316	1,007.00	8.0	Ductile Iron	130.0
P-315	1,240.00	8.0	Ductile Iron	130.0
P-313	285.00	8.0	Ductile Iron	130.0
P-312	730.00	8.0	Ductile Iron	130.0
P-311	1,172.00	6.0	Ductile Iron	130.0
P-309	718.00	8.0	Ductile Iron	130.0
P-308	345.00	8.0	Ductile Iron	130.0
P-306	655.00	8.0	Ductile Iron	130.0
P-305	420.00	8.0	Ductile Iron	130.0
P-304	267.00	8.0	Ductile Iron	130.0
P-303	853.00	8.0	Ductile Iron	130.0
P-302	247.00	8.0	Ductile Iron	130.0
P-301	234.00	8.0	Ductile Iron	130.0
P-300	168.00	8.0	Ductile Iron	130.0
P-299	212.00	8.0	Ductile Iron	130.0
P-298	363.00	8.0	Ductile Iron	130.0
P-297	473.00	8.0	Ductile Iron	130.0
P-296	331.00	8.0	Ductile Iron	130.0
P-295	494.00	6.0	Ductile Iron	130.0
P-293	1,344.00	6.0	Ductile Iron	130.0
P-292	661.00	6.0	Ductile Iron	130.0
P-291	620.00	6.0	Ductile Iron	130.0
P-290	947.00	6.0	Ductile Iron	130.0
P-289	731.00	6.0	Ductile Iron	130.0
P-287	398.00	6.0	Ductile Iron	130.0
P-286	275.00	6.0	Ductile Iron	130.0
P-285	219.00	6.0	Ductile Iron	130.0
P-284	227.00	6.0	Ductile Iron	130.0
P-283	196.00	6.0	Ductile Iron	130.0
P-282	192.00	6.0	Ductile Iron	130.0
P-281	331.00	8.0	Ductile Iron	130.0
P-280	664.00	8.0	Ductile Iron	130.0
P-279	331.00	8.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-278	668.00	8.0	Ductile Iron	130.0
P-277	527.00	8.0	Ductile Iron	130.0
P-276	650.00	8.0	Ductile Iron	130.0
P-275	266.00	8.0	Ductile Iron	130.0
P-274	200.00	8.0	Ductile Iron	130.0
P-273	728.00	8.0	Ductile Iron	130.0
P-271	299.00	8.0	Ductile Iron	130.0
P-269	1,009.00	8.0	Ductile Iron	130.0
P-53	244.00	12.0	Ductile Iron	130.0
P-268	684.00	8.0	Ductile Iron	130.0
P-266	390.00	8.0	Ductile Iron	130.0
P-265	549.00	8.0	Ductile Iron	130.0
P-264	986.00	8.0	Ductile Iron	130.0
P-263	676.00	8.0	Ductile Iron	130.0
P-262	363.00	8.0	Ductile Iron	130.0
P-261	488.00	8.0	Ductile Iron	130.0
P-260	742.00	8.0	Ductile Iron	130.0
P-259	374.00	8.0	Ductile Iron	130.0
P-258	488.00	8.0	Ductile Iron	130.0
P-257	1,283.00	8.0	Ductile Iron	130.0
P-256	261.00	8.0	Ductile Iron	130.0
P-255	542.00	8.0	Ductile Iron	130.0
P-254	1,493.00	8.0	Ductile Iron	130.0
P-253	641.00	8.0	Ductile Iron	130.0
P-252	1,493.00	8.0	Ductile Iron	130.0
P-251	520.00	6.0	Ductile Iron	130.0
P-250	265.00	8.0	Ductile Iron	130.0
P-249	559.00	6.0	Ductile Iron	130.0
P-248	191.00	6.0	Ductile Iron	130.0
P-247	773.00	6.0	Ductile Iron	130.0
P-246	479.00	6.0	Ductile Iron	130.0
P-245	325.00	6.0	Ductile Iron	130.0
P-244	607.00	8.0	Ductile Iron	130.0
P-243	477.00	8.0	Ductile Iron	130.0
P-242	196.00	8.0	Ductile Iron	130.0
P-241	469.00	8.0	Ductile Iron	130.0
P-240	388.00	8.0	Ductile Iron	130.0
P-239	572.00	8.0	Ductile Iron	130.0
P-238	457.00	8.0	Ductile Iron	130.0
P-237	613.00	6.0	Ductile Iron	130.0
P-236	239.00	6.0	Ductile Iron	130.0
P-235	839.00	8.0	Ductile Iron	130.0
P-234	327.00	6.0	Ductile Iron	130.0
P-232	1,381.00	8.0	Ductile Iron	130.0
P-229	643.00	8.0	Ductile Iron	130.0
P-228	395.00	8.0	Ductile Iron	130.0
P-227	1,409.00	8.0	Ductile Iron	130.0
P-226	356.00	8.0	Ductile Iron	130.0
P-225	492.00	8.0	Ductile Iron	130.0
P-224	484.00	8.0	Ductile Iron	130.0
P-223	802.00	8.0	Ductile Iron	130.0
P-222	930.00	8.0	Ductile Iron	130.0
P-221	450.00	8.0	Ductile Iron	130.0
P-220	921.00	8.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-217	506.00	8.0	Ductile Iron	130.0
P-216	607.00	6.0	Ductile Iron	130.0
P-215	653.00	12.0	Ductile Iron	130.0
P-214	635.00	6.0	Ductile Iron	130.0
P-211	1,376.00	6.0	Ductile Iron	130.0
P-210	674.00	12.0	Ductile Iron	130.0
P-32	626.00	12.0	Ductile Iron	130.0
P-209	790.00	10.0	Ductile Iron	130.0
P-208	68.00	10.0	Ductile Iron	130.0
P-207	413.00	6.0	Ductile Iron	130.0
P-205	626.00	6.0	Ductile Iron	130.0
P-203	652.00	6.0	Ductile Iron	130.0
P-202	368.00	6.0	Ductile Iron	130.0
P-201	347.00	6.0	Ductile Iron	130.0
P-199	262.00	6.0	Ductile Iron	130.0
P-198	257.00	6.0	Ductile Iron	130.0
P-197	333.00	6.0	Ductile Iron	130.0
P-194	656.00	10.0	Ductile Iron	130.0
P-193	324.00	10.0	Ductile Iron	130.0
P-192	218.00	10.0	Ductile Iron	130.0
P-190	941.00	10.0	Ductile Iron	130.0
P-189	563.00	10.0	Ductile Iron	130.0
P-188	175.00	10.0	Ductile Iron	130.0
P-186	552.00	6.0	Ductile Iron	130.0
P-185	926.00	6.0	Ductile Iron	130.0
P-184	1,379.00	6.0	Ductile Iron	130.0
P-182	522.00	16.0	Ductile Iron	130.0
P-181	376.00	16.0	Ductile Iron	130.0
P-180	1,351.00	6.0	Ductile Iron	130.0
P-179	517.00	6.0	Ductile Iron	130.0
P-178	335.00	6.0	Ductile Iron	130.0
P-177	355.00	6.0	Ductile Iron	130.0
P-176	541.00	6.0	Ductile Iron	130.0
P-175	598.00	6.0	Ductile Iron	130.0
P-174	362.00	8.0	Ductile Iron	130.0
P-171	1,289.00	8.0	Ductile Iron	130.0
P-170	103.00	8.0	Ductile Iron	130.0
P-168	655.00	6.0	Ductile Iron	130.0
P-167	226.00	6.0	Ductile Iron	130.0
P-166	347.00	6.0	Ductile Iron	130.0
P-165	720.00	6.0	Ductile Iron	130.0
P-164	337.00	8.0	Ductile Iron	130.0
P-163	341.00	8.0	Ductile Iron	130.0
P-162	300.00	8.0	Ductile Iron	130.0
P-161	510.00	8.0	Ductile Iron	130.0
P-160	470.00	8.0	Ductile Iron	130.0
P-159	469.00	8.0	Ductile Iron	130.0
P-158	1,331.00	8.0	Ductile Iron	130.0
P-157	920.00	6.0	Ductile Iron	130.0
P-156	837.00	6.0	Ductile Iron	130.0
P-155	153.00	8.0	Ductile Iron	130.0
P-154	254.00	8.0	Ductile Iron	130.0
P-153	216.00	8.0	Ductile Iron	130.0
P-152	355.00	8.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-151	367.00	8.0	Ductile Iron	130.0
P-150	603.00	8.0	Ductile Iron	130.0
P-149	362.00	6.0	Ductile Iron	130.0
P-148	383.00	6.0	Ductile Iron	130.0
P-147	383.00	6.0	Ductile Iron	130.0
P-146	154.00	6.0	Ductile Iron	130.0
P-145	410.00	10.0	Ductile Iron	130.0
P-143	223.00	10.0	Ductile Iron	130.0
P-142	645.00	10.0	Ductile Iron	130.0
P-141	858.00	8.0	Ductile Iron	130.0
P-140	564.00	8.0	Ductile Iron	130.0
P-138	322.00	8.0	Ductile Iron	130.0
P-137	602.00	8.0	Ductile Iron	130.0
P-136	148.00	8.0	Ductile Iron	130.0
P-135	310.00	8.0	Ductile Iron	130.0
P-134	386.00	8.0	Ductile Iron	130.0
P-133	350.00	8.0	Ductile Iron	130.0
P-132	321.00	8.0	Ductile Iron	130.0
P-131	602.00	8.0	Ductile Iron	130.0
P-130	316.00	8.0	Ductile Iron	130.0
P-129	1,241.00	8.0	Ductile Iron	130.0
P-128	320.00	8.0	Ductile Iron	130.0
P-127	600.00	8.0	Ductile Iron	130.0
P-126	337.00	10.0	Ductile Iron	130.0
P-125	277.00	10.0	Ductile Iron	130.0
P-124	411.00	10.0	Ductile Iron	130.0
P-123	339.00	8.0	Ductile Iron	130.0
P-122	389.00	8.0	Ductile Iron	130.0
P-121	268.00	8.0	Ductile Iron	130.0
P-120	944.00	8.0	Ductile Iron	130.0
P-119	1,225.00	8.0	Ductile Iron	130.0
P-118	460.00	8.0	Ductile Iron	130.0
P-25	574.00	12.0	Ductile Iron	130.0
P-115	420.00	8.0	Ductile Iron	130.0
P-114	69.00	8.0	Ductile Iron	130.0
P-112	125.00	12.0	Ductile Iron	130.0
P-110	156.00	12.0	Ductile Iron	130.0
P-109	576.00	12.0	Ductile Iron	130.0
P-108	1,283.00	12.0	Ductile Iron	130.0
P-107	256.00	12.0	Ductile Iron	130.0
P-106	336.00	12.0	Ductile Iron	130.0
P-105	335.00	12.0	Ductile Iron	130.0
P-104	355.00	12.0	Ductile Iron	130.0
P-103	615.00	12.0	Ductile Iron	130.0
P-102	162.00	12.0	Ductile Iron	130.0
P-101	382.00	12.0	Ductile Iron	130.0
P-100	367.00	12.0	Ductile Iron	130.0
P-99	431.00	12.0	Ductile Iron	130.0
P-98	254.00	12.0	Ductile Iron	130.0
P-97	392.00	12.0	Ductile Iron	130.0
P-96	435.00	12.0	Ductile Iron	130.0
P-95	676.00	12.0	Ductile Iron	130.0
P-94	676.00	12.0	Ductile Iron	130.0
P-92	505.00	12.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-91	656.00	12.0	Ductile Iron	130.0
P-90	472.00	12.0	Ductile Iron	130.0
P-89	205.00	12.0	Ductile Iron	130.0
P-88	244.00	12.0	Ductile Iron	130.0
P-87	685.00	12.0	Ductile Iron	130.0
P-86	179.00	16.0	Ductile Iron	130.0
P-85	1,473.00	12.0	Ductile Iron	130.0
P-84	430.00	12.0	Ductile Iron	130.0
P-82	724.00	12.0	Ductile Iron	130.0
P-81	186.00	12.0	Ductile Iron	130.0
P-80	808.00	12.0	Ductile Iron	130.0
P-79	1,290.00	12.0	Ductile Iron	130.0
P-78	504.00	12.0	Ductile Iron	130.0
P-77	831.00	12.0	Ductile Iron	130.0
P-76	429.00	12.0	Ductile Iron	130.0
P-75	1,131.00	12.0	Ductile Iron	130.0
P-74	931.00	12.0	Ductile Iron	130.0
P-73	362.00	12.0	Ductile Iron	130.0
P-72	577.00	12.0	Ductile Iron	130.0
P-71	348.00	12.0	Ductile Iron	130.0
P-70	761.00	12.0	Ductile Iron	130.0
P-69	231.00	12.0	Ductile Iron	130.0
P-68	496.00	12.0	Ductile Iron	130.0
P-67	301.00	12.0	Ductile Iron	130.0
P-66	1,204.00	12.0	Ductile Iron	130.0
P-65	208.00	12.0	Ductile Iron	130.0
P-64	486.00	12.0	Ductile Iron	130.0
P-63	301.00	12.0	Ductile Iron	130.0
P-62	297.00	12.0	Ductile Iron	130.0
P-61	345.00	12.0	Ductile Iron	130.0
P-60	318.00	12.0	Ductile Iron	130.0
P-59	342.00	12.0	Ductile Iron	130.0
P-58	402.00	12.0	Ductile Iron	130.0
P-57	488.00	12.0	Ductile Iron	130.0
P-54	412.00	12.0	Ductile Iron	130.0
P-52	1,282.00	12.0	Ductile Iron	130.0
P-51	54.00	12.0	Ductile Iron	130.0
P-46	327.00	12.0	Ductile Iron	130.0
P-45	144.00	12.0	Ductile Iron	130.0
P-44	1,238.00	12.0	Ductile Iron	130.0
P-43	1,222.00	12.0	Ductile Iron	130.0
P-42	397.00	12.0	Ductile Iron	130.0
P-41	89.00	12.0	Ductile Iron	130.0
P-40	384.00	12.0	Ductile Iron	130.0
P-39	862.00	12.0	Ductile Iron	130.0
P-38	315.00	12.0	Ductile Iron	130.0
P-36	319.00	12.0	Ductile Iron	130.0
P-35	569.00	12.0	Ductile Iron	130.0
P-34	130.00	12.0	Ductile Iron	130.0
P-31	1,150.00	12.0	Ductile Iron	130.0
P-30	371.00	12.0	Ductile Iron	130.0
P-29	429.00	12.0	Ductile Iron	130.0
P-28	208.00	12.0	Ductile Iron	130.0
P-27	363.00	12.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-26	937.00	12.0	Ductile Iron	130.0
P-23	511.00	12.0	Ductile Iron	130.0
P-22	426.00	6.0	Ductile Iron	130.0
P-21	312.00	6.0	Ductile Iron	130.0
P-20	209.00	6.0	Ductile Iron	130.0
P-19	225.00	10.0	Ductile Iron	130.0
P-18	879.00	10.0	Ductile Iron	130.0
P-17	155.00	8.0	Ductile Iron	130.0
P-15	1,238.00	8.0	Ductile Iron	130.0
P-14	474.00	8.0	Ductile Iron	130.0
P-13	412.00	8.0	Ductile Iron	130.0
P-12	1,108.00	8.0	Ductile Iron	130.0
P-11	219.00	8.0	Ductile Iron	130.0
P-10	662.00	8.0	Ductile Iron	130.0
P-9	363.00	8.0	Ductile Iron	130.0
P-8	284.00	8.0	Ductile Iron	130.0
P-7	287.00	8.0	Ductile Iron	130.0
P-6	459.00	8.0	Ductile Iron	130.0
P-5	293.00	8.0	Ductile Iron	130.0
P-4	461.00	8.0	Ductile Iron	130.0
P-3	489.00	8.0	Ductile Iron	130.0
P-1	609.00	8.0	Ductile Iron	130.0
P-113	653.00	6.0	Ductile Iron	130.0
P-468	727.00	6.0	Ductile Iron	130.0
P-476	390.00	6.0	Ductile Iron	130.0
P-481	816.00	6.0	Ductile Iron	130.0
P-576	443.00	6.0	Ductile Iron	130.0
P-622	323.00	6.0	Ductile Iron	130.0
P-623	219.00	6.0	Ductile Iron	130.0
P-624	801.00	8.0	Ductile Iron	130.0
P-625	465.00	8.0	Ductile Iron	130.0
P-626	459.00	8.0	Ductile Iron	130.0
P-627	177.00	6.0	Ductile Iron	130.0
P-628	539.00	8.0	Ductile Iron	130.0
P-629	771.00	8.0	Ductile Iron	130.0
P-630	385.00	8.0	Ductile Iron	130.0
P-631	524.00	8.0	Ductile Iron	130.0
P-632	1,135.00	8.0	Ductile Iron	130.0
P-633	1,117.00	8.0	Ductile Iron	130.0
P-634	557.00	8.0	Ductile Iron	130.0
P-636	884.00	8.0	Ductile Iron	130.0
P-637	404.00	8.0	Ductile Iron	130.0
P-638	582.00	8.0	Ductile Iron	130.0
P-639	317.00	8.0	Ductile Iron	130.0
P-640	736.00	8.0	Ductile Iron	130.0
P-642	1,244.00	16.0	Ductile Iron	130.0
P-644	547.00	6.0	Ductile Iron	130.0
P-648	255.00	8.0	Ductile Iron	130.0
P-649	1,091.00	8.0	Ductile Iron	130.0
P-650	996.00	8.0	Ductile Iron	130.0
P-651	642.00	8.0	Ductile Iron	130.0
P-652	339.00	8.0	Ductile Iron	130.0
P-653	412.00	8.0	Ductile Iron	130.0
P-654	389.00	8.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-655	854.00	8.0	Ductile Iron	130.0
P-656	796.00	8.0	Ductile Iron	130.0
P-657	356.00	8.0	Ductile Iron	130.0
P-658	827.00	8.0	Ductile Iron	130.0
P-659	489.00	8.0	Ductile Iron	130.0
P-660	313.00	8.0	Ductile Iron	130.0
P-661	385.00	8.0	Ductile Iron	130.0
P-662	407.00	8.0	Ductile Iron	130.0
P-663	186.00	8.0	Ductile Iron	130.0
P-664	440.00	8.0	Ductile Iron	130.0
P-665	417.00	8.0	Ductile Iron	130.0
P-666	381.00	8.0	Ductile Iron	130.0
P-667	508.00	8.0	Ductile Iron	130.0
P-668	188.00	12.0	Ductile Iron	130.0
P-669	554.00	16.0	Ductile Iron	130.0
P-670	583.00	16.0	Ductile Iron	130.0
P-671	1,173.00	12.0	Ductile Iron	130.0
P-674	684.00	8.0	Ductile Iron	130.0
P-675	346.00	12.0	Ductile Iron	130.0
P-676	290.00	12.0	Ductile Iron	130.0
P-677	537.00	12.0	Ductile Iron	130.0
P-678	542.00	12.0	Ductile Iron	130.0
P-679	745.00	12.0	Ductile Iron	130.0
P-681	354.00	12.0	Ductile Iron	130.0
P-682	211.00	8.0	Ductile Iron	130.0
P-685	846.00	8.0	Ductile Iron	130.0
P-686	315.00	8.0	Ductile Iron	130.0
P-687	1,029.00	8.0	Ductile Iron	130.0
P-688	547.00	10.0	Ductile Iron	130.0
P-689	647.00	10.0	Ductile Iron	130.0
P-690	792.00	10.0	Ductile Iron	130.0
P-692	366.00	12.0	Ductile Iron	130.0
P-695	507.00	8.0	Ductile Iron	130.0
P-697	293.00	10.0	Ductile Iron	130.0
P-698	388.00	12.0	Ductile Iron	130.0
P-694	247.00	6.0	Ductile Iron	130.0
P-699	228.00	8.0	Ductile Iron	130.0
P-700	264.00	12.0	Ductile Iron	130.0
P-701	405.00	8.0	Ductile Iron	130.0
P-702	964.00	12.0	Ductile Iron	130.0
P-703	259.00	8.0	Ductile Iron	130.0
P-704	170.00	12.0	Ductile Iron	130.0
P-705	394.00	8.0	Ductile Iron	130.0
P-706	909.00	8.0	Ductile Iron	130.0
P-707	283.00	8.0	Ductile Iron	130.0
P-708	873.00	10.0	Ductile Iron	130.0
P-709	430.00	10.0	Ductile Iron	130.0
P-710	1,863.00	10.0	Ductile Iron	130.0
P-712	551.00	8.0	Ductile Iron	130.0
P-713	353.00	8.0	Ductile Iron	130.0
P-714	166.00	8.0	Ductile Iron	130.0
P-715	238.00	8.0	Ductile Iron	130.0
P-716	179.00	8.0	Ductile Iron	130.0
P-717	359.00	8.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-719	319.00	8.0	Ductile Iron	130.0
P-720	167.00	8.0	Ductile Iron	130.0
P-721	200.00	8.0	Ductile Iron	130.0
P-722	147.00	8.0	Ductile Iron	130.0
P-723	35.00	8.0	Ductile Iron	130.0
P-724	122.00	8.0	Ductile Iron	130.0
P-725	1,039.00	10.0	Ductile Iron	130.0
P-726	961.00	10.0	Ductile Iron	130.0
P-727	539.00	12.0	Ductile Iron	130.0
P-728	348.00	10.0	Ductile Iron	130.0
P-729	988.00	12.0	Ductile Iron	130.0
P-730	479.00	12.0	Ductile Iron	130.0
P-731	324.00	8.0	Ductile Iron	130.0
P-732	603.00	8.0	Ductile Iron	130.0
P-733	290.00	8.0	Ductile Iron	130.0
P-734	886.00	8.0	Ductile Iron	130.0
P-735	894.00	12.0	Ductile Iron	130.0
P-736	469.00	8.0	Ductile Iron	130.0
P-737	329.00	8.0	Ductile Iron	130.0
P-738	258.00	8.0	Ductile Iron	130.0
P-739	546.00	8.0	Ductile Iron	130.0
P-740	1,195.00	12.0	Ductile Iron	130.0
P-741	459.00	12.0	Ductile Iron	130.0
P-742	764.00	10.0	Ductile Iron	130.0
P-748	556.00	12.0	Ductile Iron	130.0
P-749	303.00	12.0	Ductile Iron	130.0
P-750	670.00	12.0	Ductile Iron	130.0
P-751	547.00	12.0	Ductile Iron	130.0
P-753	444.00	8.0	Ductile Iron	130.0
P-754	396.00	8.0	Ductile Iron	130.0
P-755	593.00	8.0	Ductile Iron	130.0
P-756	1,496.00	8.0	Ductile Iron	130.0
P-757	292.00	8.0	Ductile Iron	130.0
P-758	651.00	8.0	Ductile Iron	130.0
P-759	582.00	12.0	Ductile Iron	130.0
P-761	337.00	8.0	Ductile Iron	130.0
P-762	92.00	8.0	Ductile Iron	130.0
P-763	669.00	8.0	Ductile Iron	130.0
P-764	564.00	8.0	Ductile Iron	130.0
P-766	490.00	10.0	Ductile Iron	130.0
P-769	136.00	12.0	Ductile Iron	130.0
P-770	149.00	8.0	Ductile Iron	130.0
P-771	322.00	8.0	Ductile Iron	130.0
P-772	561.00	8.0	Ductile Iron	130.0
P-773	373.00	8.0	Ductile Iron	130.0
P-774	206.00	8.0	Ductile Iron	130.0
P-775	552.00	12.0	Ductile Iron	130.0
P-776	247.00	12.0	Ductile Iron	130.0
P-777	124.00	8.0	Ductile Iron	130.0
P-778	367.00	8.0	Ductile Iron	130.0
P-780	467.00	12.0	Ductile Iron	130.0
P-781	64.00	10.0	Ductile Iron	130.0
P-783	923.00	8.0	Ductile Iron	130.0
P-784	151.00	12.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-787	303.00	10.0	Ductile Iron	130.0
P-788	495.00	12.0	Ductile Iron	130.0
P-789	468.00	12.0	Ductile Iron	130.0
P-790	150.00	12.0	Ductile Iron	130.0
P-791	629.00	12.0	Ductile Iron	130.0
P-792	766.00	8.0	Ductile Iron	130.0
P-794	420.00	10.0	Ductile Iron	130.0
P-795	445.00	10.0	Ductile Iron	130.0
P-796	1,112.00	8.0	Ductile Iron	130.0
P-797	221.00	12.0	Ductile Iron	130.0
P-798	428.00	12.0	Ductile Iron	130.0
P-799	241.00	8.0	Ductile Iron	130.0
P-800	798.00	8.0	Ductile Iron	130.0
P-801	373.00	8.0	Ductile Iron	130.0
P-802	192.00	8.0	Ductile Iron	130.0
P-803	692.00	6.0	Ductile Iron	130.0
P-804	1,818.00	12.0	Ductile Iron	130.0
P-806	376.00	12.0	Ductile Iron	130.0
P-807	262.00	12.0	Ductile Iron	130.0
P-808	262.00	12.0	Ductile Iron	130.0
P-809	637.00	10.0	Ductile Iron	130.0
P-810	1,397.00	10.0	Ductile Iron	130.0
P-811	359.00	10.0	Ductile Iron	130.0
P-812	339.00	10.0	Ductile Iron	130.0
P-813	1,269.00	10.0	Ductile Iron	130.0
P-814	611.00	6.0	Ductile Iron	130.0
P-815	246.00	8.0	Ductile Iron	130.0
P-816	160.00	8.0	Ductile Iron	130.0
P-818	605.00	8.0	Ductile Iron	130.0
P-819	351.00	8.0	Ductile Iron	130.0
P-820	861.00	8.0	Ductile Iron	130.0
P-821	337.00	8.0	Ductile Iron	130.0
P-822	317.00	8.0	Ductile Iron	130.0
P-823	339.00	8.0	Ductile Iron	130.0
P-824	861.00	8.0	Ductile Iron	130.0
P-825	476.00	10.0	Ductile Iron	130.0
P-826	415.00	10.0	Ductile Iron	130.0
P-827	516.00	10.0	Ductile Iron	130.0
P-828	391.00	10.0	Ductile Iron	130.0
P-829	355.00	10.0	Ductile Iron	130.0
P-830	512.00	10.0	Ductile Iron	130.0
P-831	382.00	10.0	Ductile Iron	130.0
P-832	338.00	10.0	Ductile Iron	130.0
P-833	188.00	10.0	Ductile Iron	130.0
P-834	324.00	8.0	Ductile Iron	130.0
P-835	389.00	8.0	Ductile Iron	130.0
P-836	393.00	8.0	Ductile Iron	130.0
P-837	1,252.00	8.0	Ductile Iron	130.0
P-838	289.00	6.0	Ductile Iron	130.0
P-839	283.00	6.0	Ductile Iron	130.0
P-840	180.00	6.0	Ductile Iron	130.0
P-841	153.00	8.0	Ductile Iron	130.0
P-842	473.00	8.0	Ductile Iron	130.0
P-843	631.00	12.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-844	94.00	12.0	Ductile Iron	130.0
P-846	710.00	12.0	Ductile Iron	130.0
P-847	2,089.00	8.0	Ductile Iron	130.0
P-848	178.00	8.0	Ductile Iron	130.0
P-849	337.00	10.0	Ductile Iron	130.0
P-850	653.00	10.0	Ductile Iron	130.0
P-851	355.00	10.0	Ductile Iron	130.0
P-852	269.00	8.0	Ductile Iron	130.0
P-853	317.00	8.0	Ductile Iron	130.0
P-854	729.00	8.0	Ductile Iron	130.0
P-855	410.00	8.0	Ductile Iron	130.0
P-856	150.00	8.0	Ductile Iron	130.0
P-857	277.00	8.0	Ductile Iron	130.0
P-858	176.00	6.0	Ductile Iron	130.0
P-859	274.00	8.0	Ductile Iron	130.0
P-860	214.00	8.0	Ductile Iron	130.0
P-861	695.00	8.0	Ductile Iron	130.0
P-862	696.00	10.0	Ductile Iron	130.0
P-863	269.00	10.0	Ductile Iron	130.0
P-864	406.00	10.0	Ductile Iron	130.0
P-865	219.00	10.0	Ductile Iron	130.0
P-866	462.00	10.0	Ductile Iron	130.0
P-868	845.00	8.0	Ductile Iron	130.0
P-869	270.00	8.0	Ductile Iron	130.0
P-871	277.00	8.0	Ductile Iron	130.0
P-872	708.00	8.0	Ductile Iron	130.0
P-873	274.00	8.0	Ductile Iron	130.0
P-874	983.00	8.0	Ductile Iron	130.0
P-875	653.00	8.0	Ductile Iron	130.0
P-876	178.00	8.0	Ductile Iron	130.0
P-877	699.00	8.0	Ductile Iron	130.0
P-878	334.00	8.0	Ductile Iron	130.0
P-879	321.00	8.0	Ductile Iron	130.0
P-881	689.00	8.0	Ductile Iron	130.0
P-882	321.00	8.0	Ductile Iron	130.0
P-883	351.00	8.0	Ductile Iron	130.0
P-884	316.00	8.0	Ductile Iron	130.0
P-885	422.00	8.0	Ductile Iron	130.0
P-886	1,004.00	8.0	Ductile Iron	130.0
P-887	573.00	8.0	Ductile Iron	130.0
P-888	159.00	6.0	Ductile Iron	130.0
P-889	179.00	6.0	Ductile Iron	130.0
P-890	439.00	8.0	Ductile Iron	130.0
P-891	309.00	8.0	Ductile Iron	130.0
P-893	161.00	6.0	Ductile Iron	130.0
P-894	872.00	8.0	Ductile Iron	130.0
P-895	268.00	8.0	Ductile Iron	130.0
P-897	208.00	12.0	Ductile Iron	130.0
P-898	300.00	12.0	Ductile Iron	130.0
P-899	358.00	12.0	Ductile Iron	130.0
P-900	252.00	12.0	Ductile Iron	130.0
P-901	175.00	12.0	Ductile Iron	130.0
P-902	496.00	12.0	Ductile Iron	130.0
P-903	312.00	8.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-904	463.00	8.0	Ductile Iron	130.0
P-905	212.00	6.0	Ductile Iron	130.0
P-906	447.00	6.0	Ductile Iron	130.0
P-907	833.00	8.0	Ductile Iron	130.0
P-908	104.00	8.0	Ductile Iron	130.0
P-913	474.00	8.0	Ductile Iron	130.0
P-914	286.00	8.0	Ductile Iron	130.0
P-915	511.00	8.0	Ductile Iron	130.0
P-916	497.00	8.0	Ductile Iron	130.0
P-917	228.00	8.0	Ductile Iron	130.0
P-918	342.00	12.0	Ductile Iron	130.0
P-957	460.00	12.0	Ductile Iron	130.0
P-959	59.00	6.0	Ductile Iron	130.0
P-960	717.00	6.0	Ductile Iron	130.0
P-961	451.00	8.0	Ductile Iron	130.0
P-962	84.00	10.0	Ductile Iron	130.0
P-963	284.00	8.0	Ductile Iron	130.0
P-964	73.00	8.0	Ductile Iron	130.0
P-968	145.00	10.0	Ductile Iron	130.0
P-969	437.00	10.0	Ductile Iron	130.0
P-967	619.00	8.0	Ductile Iron	130.0
P-966	364.00	6.0	Ductile Iron	130.0
P-970	222.00	6.0	Ductile Iron	130.0
P-971	185.00	6.0	Ductile Iron	130.0
P-972	332.00	6.0	Ductile Iron	130.0
P-973	329.00	6.0	Ductile Iron	130.0
P-974	222.00	6.0	Ductile Iron	130.0
P-975	110.00	8.0	Ductile Iron	130.0
P-976	47.00	8.0	Ductile Iron	130.0
P-977	546.00	12.0	Ductile Iron	130.0
P-979	703.00	12.0	Ductile Iron	130.0
P-980	681.00	12.0	Ductile Iron	130.0
P-981	588.00	8.0	Ductile Iron	130.0
P-982	107.00	8.0	Ductile Iron	130.0
P-983	21.00	8.0	Ductile Iron	130.0
P-984	123.00	8.0	Ductile Iron	130.0
P-985	135.00	8.0	Ductile Iron	130.0
P-986	15.00	8.0	Ductile Iron	130.0
P-987	124.00	8.0	Ductile Iron	130.0
P-988	138.00	8.0	Ductile Iron	130.0
P-989	148.00	8.0	Ductile Iron	130.0
P-990	476.00	8.0	Ductile Iron	130.0
P-991	636.00	8.0	Ductile Iron	130.0
P-992	215.00	8.0	Ductile Iron	130.0
P-993	432.00	8.0	Ductile Iron	130.0
P-994	153.00	8.0	Ductile Iron	130.0
P-995	125.00	8.0	Ductile Iron	130.0
P-996	160.00	8.0	Ductile Iron	130.0
P-997	224.00	8.0	Ductile Iron	130.0
P-998	226.00	8.0	Ductile Iron	130.0
P-999	233.00	8.0	Ductile Iron	130.0
P-1001	233.00	8.0	Ductile Iron	130.0
P-1002	223.00	8.0	Ductile Iron	130.0
P-1003	135.00	8.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-1004	223.00	8.0	Ductile Iron	130.0
P-1005	168.00	8.0	Ductile Iron	130.0
P-1006	354.00	8.0	Ductile Iron	130.0
P-1007	211.00	8.0	Ductile Iron	130.0
P-1008	366.00	8.0	Ductile Iron	130.0
P-1009	190.00	8.0	Ductile Iron	130.0
P-1010	655.00	8.0	Ductile Iron	130.0
P-1011	872.00	8.0	Ductile Iron	130.0
P-1012	358.00	8.0	Ductile Iron	130.0
P-1014	1,062.00	12.0	Ductile Iron	130.0
P-1015	261.00	12.0	Ductile Iron	130.0
P-1016	213.00	8.0	Ductile Iron	130.0
P-1017	956.00	8.0	Ductile Iron	130.0
P-1018	326.00	8.0	Ductile Iron	130.0
P-1019	257.00	8.0	Ductile Iron	130.0
P-1020	173.00	8.0	Ductile Iron	130.0
P-1021	221.00	8.0	Ductile Iron	130.0
P-1022	719.00	8.0	Ductile Iron	130.0
P-1023	893.00	8.0	Ductile Iron	130.0
P-1024	671.00	8.0	Ductile Iron	130.0
P-1025	745.00	8.0	Ductile Iron	130.0
P-1027	232.00	12.0	Ductile Iron	130.0
P-1028	989.00	8.0	Ductile Iron	130.0
P-1029	1,120.00	8.0	Ductile Iron	130.0
P-1030	735.00	12.0	Ductile Iron	130.0
P-1031	478.00	12.0	Ductile Iron	130.0
P-1032	447.00	8.0	Ductile Iron	130.0
P-1033	251.00	8.0	Ductile Iron	130.0
P-1034	935.00	8.0	Ductile Iron	130.0
P-1035	363.00	8.0	Ductile Iron	130.0
P-1036	67.00	8.0	Ductile Iron	130.0
P-1037	138.00	8.0	Ductile Iron	130.0
P-1038	386.00	8.0	Ductile Iron	130.0
P-1039	240.00	8.0	Ductile Iron	130.0
P-1040	892.00	8.0	Ductile Iron	130.0
P-1041	467.00	8.0	Ductile Iron	130.0
P-1042	124.00	8.0	Ductile Iron	130.0
P-1043	751.00	8.0	Ductile Iron	130.0
P-1044	179.00	8.0	Ductile Iron	130.0
P-1045	254.00	8.0	Ductile Iron	130.0
P-1046	240.00	8.0	Ductile Iron	130.0
P-1047	443.00	8.0	Ductile Iron	130.0
P-1048	931.00	10.0	Ductile Iron	130.0
P-1049	223.00	10.0	Ductile Iron	130.0
P-1050	173.00	10.0	Ductile Iron	130.0
P-1051	515.00	8.0	Ductile Iron	130.0
P-1052	208.00	8.0	Ductile Iron	130.0
P-1053	507.00	8.0	Ductile Iron	130.0
P-1055	323.00	8.0	Ductile Iron	130.0
P-1056	688.00	8.0	Ductile Iron	130.0
P-1057	306.00	8.0	Ductile Iron	130.0
P-1058	477.00	8.0	Ductile Iron	130.0
P-1059	481.00	8.0	Ductile Iron	130.0
P-1060	386.00	8.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-1061	320.00	8.0	Ductile Iron	130.0
P-1062	595.00	8.0	Ductile Iron	130.0
P-1063	802.00	8.0	Ductile Iron	130.0
P-1064	802.00	8.0	Ductile Iron	130.0
P-1065	616.00	8.0	Ductile Iron	130.0
P-1066	772.00	8.0	Ductile Iron	130.0
P-1067	760.00	8.0	Ductile Iron	130.0
P-1068	281.00	8.0	Ductile Iron	130.0
P-1069	290.00	12.0	Ductile Iron	130.0
P-1070	890.00	8.0	Ductile Iron	130.0
P-1071	1,098.00	8.0	Ductile Iron	130.0
P-1072	233.00	8.0	Ductile Iron	130.0
P-1073	791.00	12.0	Ductile Iron	130.0
P-1074	852.00	8.0	Ductile Iron	130.0
P-1075	926.00	8.0	Ductile Iron	130.0
P-1076	299.00	12.0	Ductile Iron	130.0
P-1077	386.00	8.0	Ductile Iron	130.0
P-1078	539.00	8.0	Ductile Iron	130.0
P-1079	137.00	12.0	Ductile Iron	130.0
P-1080	364.00	6.0	Ductile Iron	130.0
P-1081	339.00	8.0	Ductile Iron	130.0
P-1082	409.00	12.0	Ductile Iron	130.0
P-1083	550.00	12.0	Ductile Iron	130.0
P-1084	664.00	12.0	Ductile Iron	130.0
P-1085	131.00	10.0	Ductile Iron	130.0
P-1086	495.00	10.0	Ductile Iron	130.0
P-1087	237.00	10.0	Ductile Iron	130.0
P-1088	393.00	10.0	Ductile Iron	130.0
P-1089	150.00	10.0	Ductile Iron	130.0
P-1090	244.00	8.0	Ductile Iron	130.0
P-1091	230.00	8.0	Ductile Iron	130.0
P-1092	243.00	8.0	Ductile Iron	130.0
P-1093	306.00	8.0	Ductile Iron	130.0
P-1094	460.00	8.0	Ductile Iron	130.0
P-1095	305.00	8.0	Ductile Iron	130.0
P-1096	461.00	8.0	Ductile Iron	130.0
P-1097	354.00	8.0	Ductile Iron	130.0
P-1098	26.00	8.0	Ductile Iron	130.0
P-1099	159.00	8.0	Ductile Iron	130.0
P-1100	139.00	8.0	Ductile Iron	130.0
P-1101	424.00	8.0	Ductile Iron	130.0
P-1102	301.00	8.0	Ductile Iron	130.0
P-1103	181.00	8.0	Ductile Iron	130.0
P-1104	1,201.00	8.0	Ductile Iron	130.0
P-1105	286.00	8.0	Ductile Iron	130.0
P-1106	163.00	8.0	Ductile Iron	130.0
P-1107	256.00	6.0	Ductile Iron	130.0
P-1108	539.00	12.0	Ductile Iron	130.0
P-1109	155.00	12.0	Ductile Iron	130.0
P-1110	911.00	8.0	Ductile Iron	130.0
P-1111	939.00	8.0	Ductile Iron	130.0
P-1114	146.00	12.0	Ductile Iron	130.0
P-1115	315.00	12.0	Ductile Iron	130.0
P-1116	284.00	12.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-1117	364.00	12.0	Ductile Iron	130.0
P-1118	164.00	12.0	Ductile Iron	130.0
P-1119	83.00	12.0	Ductile Iron	130.0
P-1120	247.00	6.0	Ductile Iron	130.0
P-1121	67.00	8.0	Ductile Iron	130.0
P-1122	184.00	6.0	Ductile Iron	130.0
P-1123	296.00	6.0	Ductile Iron	130.0
P-1124	293.00	6.0	Ductile Iron	130.0
P-1125	97.00	6.0	Ductile Iron	130.0
P-1126	156.00	6.0	Ductile Iron	130.0
P-1127	154.00	6.0	Ductile Iron	130.0
P-1128	194.00	6.0	Ductile Iron	130.0
P-1129	196.00	6.0	Ductile Iron	130.0
P-1130	64.00	6.0	Ductile Iron	130.0
P-1131	137.00	6.0	Ductile Iron	130.0
P-1132	169.00	6.0	Ductile Iron	130.0
P-1133	318.00	6.0	Ductile Iron	130.0
P-1134	137.00	8.0	Ductile Iron	130.0
P-1135	102.00	8.0	Ductile Iron	130.0
P-1136	40.00	8.0	Ductile Iron	130.0
P-1137	83.00	8.0	Ductile Iron	130.0
P-1138	62.00	8.0	Ductile Iron	130.0
P-1139	127.00	8.0	Ductile Iron	130.0
P-1140	125.00	8.0	Ductile Iron	130.0
P-1141	88.00	8.0	Ductile Iron	130.0
P-1142	84.00	8.0	Ductile Iron	130.0
P-1143	193.00	8.0	Ductile Iron	130.0
P-1144	196.00	8.0	Ductile Iron	130.0
P-1219	320.00	8.0	Ductile Iron	130.0
P-1230	353.00	12.0	Ductile Iron	130.0
P-1231	326.00	12.0	Ductile Iron	130.0
P-1232	694.00	12.0	Ductile Iron	130.0
P-1233	518.00	12.0	Ductile Iron	130.0
P-1245	339.00	8.0	Ductile Iron	130.0
P-1246	377.00	8.0	Ductile Iron	130.0
P-196	648.00	8.0	Ductile Iron	130.0
P-212	1,097.00	10.0	Ductile Iron	130.0
P-213	599.00	10.0	Ductile Iron	130.0
P-330	1,474.00	16.0	Ductile Iron	130.0
P-390	783.00	16.0	Ductile Iron	130.0
P-440	478.00	16.0	Ductile Iron	130.0
P-457	807.00	16.0	Ductile Iron	130.0
P-1296	267.00	6.0	Ductile Iron	130.0
P-1343	454.00	8.0	Ductile Iron	130.0
P-1344	668.00	8.0	Ductile Iron	130.0
P-1345	531.00	8.0	Ductile Iron	130.0
P-1352	220.00	12.0	Ductile Iron	130.0
P-1353	662.00	12.0	Ductile Iron	130.0
P-1355	661.00	12.0	Ductile Iron	130.0
P-1356	261.00	12.0	Ductile Iron	130.0
P-1363	1,028.00	8.0	Ductile Iron	130.0
P-1366	1,018.00	8.0	Ductile Iron	130.0
P-1367	174.00	8.0	Ductile Iron	130.0
P-1378	1,535.00	12.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C
P-1381	388.00	8.0	Ductile Iron	130.0
P-1382	444.00	8.0	Ductile Iron	130.0
P-1383	241.00	8.0	Ductile Iron	130.0
P-1384	204.00	8.0	Ductile Iron	130.0
P-1388	981.00	8.0	Ductile Iron	130.0
P-1389	176.00	8.0	Ductile Iron	130.0
P-1390	1,295.00	8.0	Ductile Iron	130.0
P-1393	244.00	8.0	Ductile Iron	130.0
P-1394	363.00	8.0	Ductile Iron	130.0
P-1395	265.00	8.0	Ductile Iron	130.0
P-1396	263.00	8.0	Ductile Iron	130.0
P-1397	260.00	8.0	Ductile Iron	130.0
P-1398	207.00	8.0	Ductile Iron	130.0
P-1400	197.00	6.0	Ductile Iron	130.0
P-1401	627.00	8.0	Ductile Iron	130.0
P-1399	686.00	8.0	Ductile Iron	130.0
P-1402	599.00	8.0	Ductile Iron	130.0
P-1403	1,057.00	8.0	Ductile Iron	130.0
P-1406	360.00	8.0	Ductile Iron	130.0
P-1405	586.00	8.0	Ductile Iron	130.0
P-1407	185.00	8.0	Ductile Iron	130.0
P-1408	172.00	6.0	Ductile Iron	130.0
P-1409	331.00	8.0	Ductile Iron	130.0
P-1410	360.00	6.0	Ductile Iron	130.0
P-1411	472.00	6.0	Ductile Iron	130.0
P-1412	318.00	8.0	Ductile Iron	130.0
P-1414	773.00	8.0	Ductile Iron	130.0
P-1417	774.00	8.0	Ductile Iron	130.0
P-1418	324.00	8.0	Ductile Iron	130.0
P-1419	316.00	8.0	Ductile Iron	130.0
P-1420	1,083.00	12.0	Ductile Iron	130.0
P-1421	437.00	12.0	Ductile Iron	130.0
P-1422	196.00	8.0	Ductile Iron	130.0
P-1423	149.00	8.0	Ductile Iron	130.0
P-1424	472.00	8.0	Ductile Iron	130.0
P-1425	961.00	8.0	Ductile Iron	130.0
P-1426	422.00	8.0	Ductile Iron	130.0
P-1427	237.00	8.0	Ductile Iron	130.0
P-1428	513.00	8.0	Ductile Iron	130.0
P-1429	375.00	8.0	Ductile Iron	130.0
P-1430	570.00	8.0	Ductile Iron	130.0
P-1431	552.00	8.0	Ductile Iron	130.0
P-1432	1,673.00	8.0	Ductile Iron	130.0
P-1447	631.00	12.0	Ductile Iron	130.0
P-1448	404.00	12.0	Ductile Iron	130.0
P-1461	747.00	8.0	Ductile Iron	130.0
P-1462	1,429.00	6.0	Ductile Iron	130.0
P-1467	664.00	12.0	Ductile Iron	130.0
P-1468	1,105.00	12.0	Ductile Iron	130.0

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-994	895.00	Existing	Demand	Fixed	0.00
J-996	865.00	Existing	Demand	Fixed	0.00
J-997	867.00	Existing	Demand	Fixed	0.00
J-987	877.00	Existing	Demand	Fixed	0.00
J-988	877.00	Existing	Demand	Fixed	0.00
J-992	892.00	Existing	Demand	Fixed	0.00
J-1010	883.00	Existing	Demand	Fixed	0.00
J-1012	865.00	Existing	Demand	Fixed	0.00
J-1013	865.00	Existing	Demand	Fixed	0.00
J-998	878.00	Existing	Demand	Fixed	0.00
J-1007	900.00	Existing	Demand	Fixed	0.00
J-1008	900.00	Existing	Demand	Fixed	0.00
J-889	878.00	Zone-1	Demand	Fixed	0.00
J-823	900.00	Existing	Demand	Fixed	0.00
J-620	892.00	Zone-1	Demand	Fixed	0.00
J-520	900.00	Zone-1	Demand	Fixed	0.00
J-461	897.00	Zone-1	Demand	Fixed	0.00
J-886	876.00	Zone-1	Demand	Fixed	0.00
J-796	900.00	Zone-1	Demand	Fixed	0.00
J-924	899.00	Existing	Demand	Fixed	0.00
J-966	902.00	Zone-1	Demand	Fixed	0.00
J-890	876.00	Existing	Demand	Fixed	0.00
J-635	897.00	Zone-1	Demand	Fixed	0.00
J-880	870.00	Existing	Demand	Fixed	0.00
J-1054	890.00	Existing	Demand	Fixed	0.00
J-1034	891.00	Existing	Demand	Fixed	0.00
J-1028	901.00	Existing	Demand	Fixed	0.00
J-1025	904.00	Existing	Demand	Fixed	0.00
J-1026	902.00	Existing	Demand	Fixed	0.00
J-1027	900.00	Existing	Demand	Fixed	0.00
J-1031	901.00	Existing	Demand	Fixed	0.00
J-1035	900.00	Existing	Demand	Fixed	0.00
J-1032	898.00	Existing	Demand	Fixed	0.00
J-1029	899.00	Existing	Demand	Fixed	0.00
J-1033	900.00	Existing	Demand	Fixed	0.00
J-1030	898.00	Existing	Demand	Fixed	0.00
J-1019	900.00	Existing	Demand	Fixed	0.00
J-1016	897.00	Existing	Demand	Fixed	0.00
J-1018	900.00	Existing	Demand	Fixed	0.00
J-901	875.00	Zone-1	Demand	Fixed	0.00
J-1017	900.00	Existing	Demand	Fixed	0.00
J-1015	880.00	Existing	Demand	Fixed	0.00
J-1022	898.00	Existing	Demand	Fixed	0.00
J-1023	899.00	Existing	Demand	Fixed	0.00
J-1021	897.00	Existing	Demand	Fixed	0.00
J-1020	898.00	Existing	Demand	Fixed	0.00
J-1014	876.00	Existing	Demand	Fixed	0.00
J-872	899.00	Zone-1	Demand	Fixed	1.17
J-308	891.21	Zone-1	Demand	Fixed	1.97
J-343	882.78	Zone-1	Demand	Fixed	1.97
J-307	889.65	Zone-1	Demand	Fixed	1.97
J-305	887.55	Zone-1	Demand	Fixed	1.97
J-304	887.50	Zone-1	Demand	Fixed	1.97
J-341	881.60	Zone-1	Demand	Fixed	1.97
J-342	894.00	Zone-1	Demand	Fixed	1.97

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-306	887.55	Zone-1	Demand	Fixed	1.97
J-344	879.90	Zone-1	Demand	Fixed	1.97
J-168	876.40	Zone-1	Demand	Fixed	1.97
J-347	882.97	Zone-1	Demand	Fixed	1.97
J-169	876.40	Zone-1	Demand	Fixed	1.97
J-348	886.67	Zone-1	Demand	Fixed	1.97
J-383	874.00	Zone-1	Demand	Fixed	1.97
J-380	876.00	Zone-1	Demand	Fixed	1.97
J-309	891.48	Zone-1	Demand	Fixed	1.97
J-345	889.00	Zone-1	Demand	Fixed	1.97
J-346	882.97	Zone-1	Demand	Fixed	1.97
J-381	876.00	Existing	Demand	Fixed	1.97
J-340	881.91	Zone-1	Demand	Fixed	1.97
J-455	901.00	Zone-1	Demand	Fixed	1.97
J-419	882.97	Zone-1	Demand	Fixed	1.97
J-456	900.00	Zone-1	Demand	Fixed	1.97
J-457	901.00	Zone-1	Demand	Fixed	1.97
J-491	894.00	Zone-1	Demand	Fixed	1.97
J-454	900.00	Zone-1	Demand	Fixed	1.97
J-452	899.00	Zone-1	Demand	Fixed	1.97
J-416	887.55	Zone-1	Demand	Fixed	1.97
J-417	887.00	Zone-1	Demand	Fixed	1.97
J-418	887.00	Zone-1	Demand	Fixed	1.97
J-453	897.00	Zone-1	Demand	Fixed	1.97
J-494	905.00	Zone-1	Demand	Fixed	1.97
J-459	898.00	Zone-1	Demand	Fixed	1.97
J-521	895.00	Zone-1	Demand	Fixed	1.97
J-96	892.37	Zone-1	Demand	Fixed	1.97
Test_4-Flow	876.00	Zone-1	Demand	Fixed	1.97
J-493	900.00	Zone-1	Demand	Fixed	1.97
J-277	905.54	Zone-1	Demand	Fixed	1.97
J-492	897.00	Zone-1	Demand	Fixed	1.97
J-278	901.03	Zone-1	Demand	Fixed	1.97
J-458	900.00	Zone-1	Demand	Fixed	1.97
J-279	899.73	Zone-1	Demand	Fixed	1.97
J-303	889.65	Zone-1	Demand	Fixed	1.97
J-302	885.50	Zone-1	Demand	Fixed	1.97
J-78	894.30	Zone-1	Demand	Fixed	1.97
J-121	877.41	Zone-1	Demand	Fixed	1.97
J-74	894.23	Zone-1	Demand	Fixed	1.97
J-301	891.40	Zone-1	Demand	Fixed	1.97
J-275	902.00	Zone-1	Demand	Fixed	1.97
J-239	888.56	Zone-1	Demand	Fixed	1.97
J-276	902.00	Zone-1	Demand	Fixed	1.97
J-300	894.67	Zone-1	Demand	Fixed	1.97
J-92	892.85	Zone-1	Demand	Fixed	1.97
J-122	877.41	Zone-1	Demand	Fixed	1.97
J-127	876.71	Zone-1	Demand	Fixed	1.97
J-162	874.96	Zone-1	Demand	Fixed	1.97
J-163	878.59	Zone-1	Demand	Fixed	1.97
J-164	874.90	Zone-1	Demand	Fixed	1.97
J-128	875.71	Zone-1	Demand	Fixed	1.97
J-126	879.82	Zone-1	Demand	Fixed	1.97
J-124	873.87	Zone-1	Demand	Fixed	1.97
J-123	876.17	Zone-1	Demand	Fixed	1.97

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-160	878.00	Zone-1	Demand	Fixed	1.97
J-161	875.73	Zone-1	Demand	Fixed	1.97
J-125	876.86	Zone-1	Demand	Fixed	1.97
J-89	884.63	Zone-1	Demand	Fixed	1.97
J-8	873.73	Zone-1	Demand	Fixed	1.97
J-85	873.50	Zone-1	Demand	Fixed	1.97
J-231	885.50	Zone-1	Demand	Fixed	1.97
J-230	882.79	Zone-1	Demand	Fixed	1.97
J-412	875.00	Zone-1	Demand	Fixed	1.97
J-349	887.52	Zone-1	Demand	Fixed	1.97
J-384	883.00	Zone-1	Demand	Fixed	1.97
J-410	875.00	Zone-1	Demand	Fixed	1.97
J-411	875.00	Zone-1	Demand	Fixed	1.97
J-385	883.00	Zone-1	Demand	Fixed	1.97
J-232	894.93	Zone-1	Demand	Fixed	1.97
J-237	891.80	Zone-1	Demand	Fixed	1.97
J-272	901.23	Zone-1	Demand	Fixed	1.97
J-273	904.76	Zone-1	Demand	Fixed	1.97
J-274	904.76	Zone-1	Demand	Fixed	1.97
J-238	885.21	Zone-1	Demand	Fixed	1.97
J-236	883.80	Zone-1	Demand	Fixed	1.97
J-234	885.00	Zone-1	Demand	Fixed	1.97
J-233	887.32	Zone-1	Demand	Fixed	1.97
J-270	892.28	Zone-1	Demand	Fixed	1.97
J-271	895.53	Zone-1	Demand	Fixed	1.97
J-235	890.00	Zone-1	Demand	Fixed	1.97
J-451	895.00	Zone-1	Demand	Fixed	1.97
J-782	883.00	Zone-1	Demand	Fixed	1.97
J-781	882.00	Zone-1	Demand	Fixed	1.97
J-569	878.00	Zone-1	Demand	Fixed	1.97
J-37	878.50	Zone-1	Demand	Fixed	1.97
J-783	882.00	Zone-1	Demand	Fixed	1.97
J-748	905.00	Zone-1	Demand	Fixed	1.97
J-744	911.00	Zone-1	Demand	Fixed	1.97
J-743	908.00	Zone-1	Demand	Fixed	1.97
J-745	911.00	Zone-1	Demand	Fixed	1.97
J-747	910.00	Zone-1	Demand	Fixed	1.97
J-746	912.00	Zone-1	Demand	Fixed	1.97
J-33	877.77	Zone-1	Demand	Fixed	1.97
Test_1-Read	906.23	Zone-1	Demand	Fixed	1.97
J-813	900.00	Zone-1	Demand	Fixed	1.97
J-1	880.90	Zone-1	Demand	Fixed	1.97
J-632	904.00	Zone-1	Demand	Fixed	1.97
J-631	900.00	Zone-1	Demand	Fixed	1.97
J-812	892.00	Zone-1	Demand	Fixed	1.97
J-785	882.00	Zone-1	Demand	Fixed	1.97
J-784	881.00	Zone-1	Demand	Fixed	1.97
J-786	879.00	Zone-1	Demand	Fixed	1.97
J-811	895.00	Zone-1	Demand	Fixed	1.97
J-810	899.00	Zone-1	Demand	Fixed	1.97
J-742	905.00	Zone-1	Demand	Fixed	1.97
J-814	899.00	Zone-1	Demand	Fixed	1.97
J-789	880.00	Zone-1	Demand	Fixed	1.97
J-815	894.00	Zone-1	Demand	Fixed	1.97
J-817	893.00	Zone-1	Demand	Fixed	1.97

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-816	893.00	Zone-1	Demand	Fixed	1.97
J-51	898.54	Zone-1	Demand	Fixed	1.97
J-787	878.00	Zone-1	Demand	Fixed	1.97
J-62	890.85	Zone-1	Demand	Fixed	1.97
J-788	884.00	Zone-1	Demand	Fixed	1.97
J-55	898.00	Zone-1	Demand	Fixed	1.97
J-59	896.50	Zone-1	Demand	Fixed	1.97
J-818	891.00	Zone-1	Demand	Fixed	1.97
J-707	900.00	Zone-1	Demand	Fixed	1.97
J-706	900.00	Zone-1	Demand	Fixed	1.97
J-708	899.00	Zone-1	Demand	Fixed	1.97
J-741	900.00	Zone-1	Demand	Fixed	1.97
J-709	900.00	Zone-1	Demand	Fixed	1.97
J-705	891.00	Zone-1	Demand	Fixed	1.97
J-48	894.00	Zone-1	Demand	Fixed	1.97
J-819	890.00	Zone-1	Demand	Fixed	1.97
J-44	885.00	Zone-1	Demand	Fixed	1.97
J-740	900.00	Zone-1	Demand	Fixed	1.97
J-780	878.00	Zone-1	Demand	Fixed	1.97
J-564	879.00	Zone-1	Demand	Fixed	1.97
J-563	880.00	Zone-1	Demand	Fixed	1.97
J-566	878.00	Zone-1	Demand	Fixed	1.97
J-386	883.00	Zone-1	Demand	Fixed	1.97
J-567	879.00	Zone-1	Demand	Fixed	1.97
J-562	878.00	Zone-1	Demand	Fixed	1.97
J-527	902.00	Zone-1	Demand	Fixed	1.97
J-526	905.00	Zone-1	Demand	Fixed	1.97
J-528	902.00	Zone-1	Demand	Fixed	1.97
J-561	878.00	Zone-1	Demand	Fixed	1.97
J-529	902.00	Zone-1	Demand	Fixed	1.97
J-387	883.00	Zone-1	Demand	Fixed	1.97
J-450	900.00	Zone-1	Demand	Fixed	1.97
J-490	892.00	Zone-1	Demand	Fixed	1.97
J-413	875.00	Zone-1	Demand	Fixed	1.97
J-415	887.55	Zone-1	Demand	Fixed	1.97
J-414	875.00	Zone-1	Demand	Fixed	1.97
Test_6-Read	894.00	Zone-1	Demand	Fixed	1.97
J-389	874.90	Zone-1	Demand	Fixed	1.97
J-388	874.90	Zone-1	Demand	Fixed	1.97
J-11	871.87	Zone-1	Demand	Fixed	1.97
J-630	901.00	Zone-1	Demand	Fixed	1.97
J-15	874.48	Zone-1	Demand	Fixed	1.97
J-525	902.00	Zone-1	Demand	Fixed	1.97
J-495	886.00	Zone-1	Demand	Fixed	1.97
J-639	907.00	Zone-1	Demand	Fixed	1.97
J-496	890.00	Zone-1	Demand	Fixed	1.97
J-498	895.00	Zone-1	Demand	Fixed	1.97
J-497	898.00	Zone-1	Demand	Fixed	1.97
J-638	906.00	Zone-1	Demand	Fixed	1.97
J-633	902.00	Zone-1	Demand	Fixed	1.97
J-40	886.53	Zone-1	Demand	Fixed	1.97
J-634	904.00	Zone-1	Demand	Fixed	1.97
J-637	900.00	Zone-1	Demand	Fixed	1.97
J-636	900.00	Zone-1	Demand	Fixed	1.97
J-22	875.30	Zone-1	Demand	Fixed	1.97

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-560	874.00	Zone-1	Demand	Fixed	1.97
J-704	892.00	Zone-1	Demand	Fixed	1.97
J-522	890.00	Zone-1	Demand	Fixed	1.97
J-524	903.00	Zone-1	Demand	Fixed	1.97
J-523	880.00	Zone-1	Demand	Fixed	1.97
J-703	894.00	Zone-1	Demand	Fixed	1.97
J-26	880.88	Zone-1	Demand	Fixed	1.97
J-499	895.00	Zone-1	Demand	Fixed	1.97
J-700	902.00	Zone-1	Demand	Fixed	1.97
J-702	899.00	Zone-1	Demand	Fixed	1.97
J-701	902.00	Zone-1	Demand	Fixed	1.97
J-316	895.62	Zone-1	Demand	Fixed	1.97
J-351	887.52	Zone-1	Demand	Fixed	1.97
J-352	887.52	Zone-1	Demand	Fixed	1.97
J-353	888.59	Zone-1	Demand	Fixed	1.97
J-317	897.60	Zone-1	Demand	Fixed	1.97
J-97	892.10	Zone-1	Demand	Fixed	1.97
J-359	898.00	Zone-1	Demand	Fixed	1.97
J-358	898.00	Zone-1	Demand	Fixed	1.97
J-396	881.00	Zone-1	Demand	Fixed	1.97
J-12	871.64	Zone-1	Demand	Fixed	1.97
J-397	898.00	Zone-1	Demand	Fixed	1.97
J-318	894.78	Zone-1	Demand	Fixed	1.97
J-390	886.17	Zone-1	Demand	Fixed	1.97
J-424	881.10	Zone-1	Demand	Fixed	1.97
J-355	876.00	Zone-1	Demand	Fixed	1.97
J-245	896.00	Zone-1	Demand	Fixed	1.97
J-280	904.76	Zone-1	Demand	Fixed	1.97
J-423	886.00	Zone-1	Demand	Fixed	1.97
J-354	875.00	Zone-1	Demand	Fixed	1.97
J-319	894.78	Zone-1	Demand	Fixed	1.97
J-420	884.00	Zone-1	Demand	Fixed	1.97
J-422	880.00	Zone-1	Demand	Fixed	1.97
J-421	884.00	Zone-1	Demand	Fixed	1.97
J-464	900.00	Zone-1	Demand	Fixed	1.97
J-428	877.00	Zone-1	Demand	Fixed	1.97
J-429	898.00	Zone-1	Demand	Fixed	1.97
J-466	897.00	Zone-1	Demand	Fixed	1.97
J-465	902.00	Zone-1	Demand	Fixed	1.97
J-463	900.00	Zone-1	Demand	Fixed	1.97
J-425	893.36	Zone-1	Demand	Fixed	1.97
J-460	900.00	Zone-1	Demand	Fixed	1.97
J-426	876.76	Zone-1	Demand	Fixed	1.97
J-427	878.00	Zone-1	Demand	Fixed	1.97
J-462	896.00	Zone-1	Demand	Fixed	1.97
J-467	900.00	Zone-1	Demand	Fixed	1.97
J-356	876.00	Zone-1	Demand	Fixed	1.97
J-391	883.70	Zone-1	Demand	Fixed	1.97
J-392	898.00	Zone-1	Demand	Fixed	1.97
J-393	894.00	Zone-1	Demand	Fixed	1.97
J-357	896.10	Zone-1	Demand	Fixed	1.97
J-533	903.30	Zone-1	Demand	Fixed	1.97
J-289	891.61	Zone-1	Demand	Fixed	1.97
Test_8-Flow	879.00	Zone-1	Demand	Fixed	1.97
J-530	902.50	Zone-1	Demand	Fixed	1.97

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-532	905.80	Zone-1	Demand	Fixed	1.97
J-531	904.40	Zone-1	Demand	Fixed	1.97
J-281	906.60	Zone-1	Demand	Fixed	1.97
J-136	875.19	Zone-1	Demand	Fixed	1.97
J-135	875.19	Zone-1	Demand	Fixed	1.97
J-172	874.82	Zone-1	Demand	Fixed	1.97
J-173	874.82	Zone-1	Demand	Fixed	1.97
J-137	875.15	Zone-1	Demand	Fixed	1.97
J-134	875.15	Zone-1	Demand	Fixed	1.97
J-209	887.59	Zone-1	Demand	Fixed	1.97
J-244	889.00	Zone-1	Demand	Fixed	1.97
J-7	873.73	Zone-1	Demand	Fixed	1.97
J-171	874.82	Zone-1	Demand	Fixed	1.97
J-79	890.03	Zone-1	Demand	Fixed	1.97
J-138	876.86	Zone-1	Demand	Fixed	1.97
J-133	875.07	Zone-1	Demand	Fixed	1.97
J-179	876.17	Zone-1	Demand	Fixed	1.97
J-86	873.50	Zone-1	Demand	Fixed	1.97
J-200	885.86	Zone-1	Demand	Fixed	1.97
J-82	889.50	Zone-1	Demand	Fixed	1.97
J-178	876.17	Zone-1	Demand	Fixed	1.97
J-139	877.57	Zone-1	Demand	Fixed	1.97
J-174	874.56	Zone-1	Demand	Fixed	1.97
J-175	874.50	Zone-1	Demand	Fixed	1.97
J-177	875.00	Zone-1	Demand	Fixed	1.97
J-176	875.00	Zone-1	Demand	Fixed	1.97
J-285	899.98	Zone-1	Demand	Fixed	1.97
J-249	889.00	Zone-1	Demand	Fixed	1.97
J-286	899.73	Zone-1	Demand	Fixed	1.97
J-288	890.00	Zone-1	Demand	Fixed	1.97
J-287	892.37	Zone-1	Demand	Fixed	1.97
J-284	899.98	Zone-1	Demand	Fixed	1.97
J-282	905.20	Zone-1	Demand	Fixed	1.97
J-246	896.97	Zone-1	Demand	Fixed	1.97
J-247	888.69	Zone-1	Demand	Fixed	1.97
J-248	889.24	Zone-1	Demand	Fixed	1.97
J-283	905.20	Zone-1	Demand	Fixed	1.97
J-242	885.00	Zone-1	Demand	Fixed	1.97
J-313	891.71	Zone-1	Demand	Fixed	1.97
J-312	895.00	Zone-1	Demand	Fixed	1.97
J-314	892.93	Zone-1	Demand	Fixed	1.97
J-315	893.00	Zone-1	Demand	Fixed	1.97
J-350	887.52	Zone-1	Demand	Fixed	1.97
J-311	891.22	Zone-1	Demand	Fixed	1.97
J-243	885.80	Zone-1	Demand	Fixed	1.97
J-207	887.70	Zone-1	Demand	Fixed	1.97
J-208	885.63	Zone-1	Demand	Fixed	1.97
J-310	891.28	Zone-1	Demand	Fixed	1.97
J-93	880.00	Zone-1	Demand	Fixed	1.97
J-469	901.00	Zone-1	Demand	Fixed	1.97
J-794	895.00	Zone-1	Demand	Fixed	1.97
J-793	905.00	Zone-1	Demand	Fixed	1.97
J-795	893.00	Zone-1	Demand	Fixed	1.97
J-798	900.00	Zone-1	Demand	Fixed	1.97
J-797	901.00	Zone-1	Demand	Fixed	1.97

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-792	900.00	Zone-1	Demand	Fixed	1.97
J-757	900.00	Zone-1	Demand	Fixed	1.97
J-756	899.00	Zone-1	Demand	Fixed	1.97
J-758	902.00	Zone-1	Demand	Fixed	1.97
J-791	900.00	Zone-1	Demand	Fixed	1.97
J-759	900.00	Zone-1	Demand	Fixed	1.97
J-38	882.53	Zone-1	Demand	Fixed	1.97
J-644	902.00	Zone-1	Demand	Fixed	1.97
J-41	886.53	Zone-1	Demand	Fixed	1.97
J-645	896.00	Zone-1	Demand	Fixed	1.97
J-647	904.00	Zone-1	Demand	Fixed	1.97
J-646	896.00	Zone-1	Demand	Fixed	1.97
J-609	900.00	Zone-1	Demand	Fixed	1.97
J-820	889.00	Zone-1	Demand	Fixed	1.97
J-34	875.66	Zone-1	Demand	Fixed	1.97
Test_5-Read	881.00	Zone-1	Demand	Fixed	1.97
J-608	895.00	Zone-1	Demand	Fixed	1.97
J-643	902.00	Zone-1	Demand	Fixed	1.97
J-120	879.01	Zone-1	Demand	Fixed	1.97
J-70	896.63	Zone-1	Demand	Fixed	1.97
J-799	895.00	Zone-1	Demand	Fixed	1.97
J-63	893.85	Zone-1	Demand	Fixed	1.97
J-56	894.20	Zone-1	Demand	Fixed	1.97
J-67	891.80	Zone-1	Demand	Fixed	1.97
J-165	875.86	Zone-1	Demand	Fixed	1.97
J-129	878.50	Zone-1	Demand	Fixed	1.97
J-166	874.77	Zone-1	Demand	Fixed	1.97
J-81	889.95	Zone-1	Demand	Fixed	1.97
J-167	876.00	Zone-1	Demand	Fixed	1.97
J-4	882.30	Zone-1	Demand	Fixed	1.97
J-719	892.00	Zone-1	Demand	Fixed	1.97
J-52	898.28	Zone-1	Demand	Fixed	1.97
J-753	905.00	Zone-1	Demand	Fixed	1.97
J-755	911.00	Zone-1	Demand	Fixed	1.97
J-754	898.00	Zone-1	Demand	Fixed	1.97
J-718	903.00	Zone-1	Demand	Fixed	1.97
J-45	889.00	Zone-1	Demand	Fixed	1.97
J-49	895.70	Zone-1	Demand	Fixed	1.97
J-790	890.00	Zone-1	Demand	Fixed	1.97
J-717	898.00	Zone-1	Demand	Fixed	1.97
J-752	902.00	Zone-1	Demand	Fixed	1.97
J-648	902.00	Zone-1	Demand	Fixed	1.97
J-578	896.00	Zone-1	Demand	Fixed	1.97
J-577	894.00	Zone-1	Demand	Fixed	1.97
J-579	889.00	Zone-1	Demand	Fixed	1.97
J-399	898.00	Zone-1	Demand	Fixed	1.97
J-398	898.00	Zone-1	Demand	Fixed	1.97
J-576	899.00	Zone-1	Demand	Fixed	1.97
J-539	901.00	Zone-1	Demand	Fixed	1.97
J-538	902.00	Zone-1	Demand	Fixed	1.97
J-571	878.00	Zone-1	Demand	Fixed	1.97
J-575	897.00	Zone-1	Demand	Fixed	1.97
J-572	899.00	Zone-1	Demand	Fixed	1.97
J-600	897.00	Zone-1	Demand	Fixed	1.97
J-607	897.00	Zone-1	Demand	Fixed	1.97

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-606	905.00	Zone-1	Demand	Fixed	1.97
J-640	904.00	Zone-1	Demand	Fixed	1.97
J-468	898.00	Zone-1	Demand	Fixed	1.97
J-642	903.00	Zone-1	Demand	Fixed	1.97
J-605	900.00	Zone-1	Demand	Fixed	1.97
J-601	903.00	Zone-1	Demand	Fixed	1.97
J-16	883.70	Zone-1	Demand	Fixed	1.97
J-602	902.00	Zone-1	Demand	Fixed	1.97
J-604	897.00	Zone-1	Demand	Fixed	1.97
J-603	893.00	Zone-1	Demand	Fixed	1.97
J-710	897.00	Zone-1	Demand	Fixed	1.97
J-750	910.00	Zone-1	Demand	Fixed	1.97
J-27	871.00	Zone-1	Demand	Fixed	1.97
J-711	899.00	Zone-1	Demand	Fixed	1.97
J-23	878.45	Zone-1	Demand	Fixed	1.97
J-688	875.00	Zone-1	Demand	Fixed	1.97
Test_3-Flow	902.00	Zone-1	Demand	Fixed	1.97
J-649	897.00	Zone-1	Demand	Fixed	1.97
J-684	877.00	Zone-1	Demand	Fixed	1.97
J-687	875.00	Zone-1	Demand	Fixed	1.97
J-686	878.00	Zone-1	Demand	Fixed	1.97
J-712	894.00	Zone-1	Demand	Fixed	1.97
J-535	904.00	Zone-1	Demand	Fixed	1.97
J-534	901.20	Zone-1	Demand	Fixed	1.97
J-536	901.00	Zone-1	Demand	Fixed	1.97
J-537	902.90	Zone-1	Demand	Fixed	1.97
J-30	876.17	Zone-1	Demand	Fixed	1.97
J-570	888.00	Zone-1	Demand	Fixed	1.97
J-714	891.00	Zone-1	Demand	Fixed	1.97
J-713	900.00	Zone-1	Demand	Fixed	1.97
J-715	896.00	Zone-1	Demand	Fixed	1.97
J-751	902.00	Zone-1	Demand	Fixed	1.97
J-716	904.00	Zone-1	Demand	Fixed	1.97
J-256	891.60	Zone-1	Demand	Fixed	1.97
J-291	894.00	Zone-1	Demand	Fixed	1.97
J-255	899.50	Zone-1	Demand	Fixed	1.97
J-293	893.00	Zone-1	Demand	Fixed	1.97
J-257	898.57	Zone-1	Demand	Fixed	1.97
J-292	893.00	Zone-1	Demand	Fixed	1.97
J-253	894.79	Zone-1	Demand	Fixed	1.97
J-290	894.00	Zone-1	Demand	Fixed	1.97
J-435	895.00	Zone-1	Demand	Fixed	1.97
J-254	891.41	Zone-1	Demand	Fixed	1.97
J-219	899.04	Zone-1	Demand	Fixed	1.97
J-218	903.82	Zone-1	Demand	Fixed	1.97
J-258	899.00	Zone-1	Demand	Fixed	1.97
J-320	890.32	Zone-1	Demand	Fixed	1.97
J-90	887.61	Zone-1	Demand	Fixed	1.97
J-94	891.01	Zone-1	Demand	Fixed	1.97
J-323	893.00	Zone-1	Demand	Fixed	1.97
J-322	890.69	Zone-1	Demand	Fixed	1.97
J-321	877.43	Zone-1	Demand	Fixed	1.97
J-295	891.00	Zone-1	Demand	Fixed	1.97
J-259	898.21	Zone-1	Demand	Fixed	1.97
J-294	891.00	Zone-1	Demand	Fixed	1.97

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-298	894.00	Zone-1	Demand	Fixed	1.97
J-297	891.00	Zone-1	Demand	Fixed	1.97
J-296	891.00	Zone-1	Demand	Fixed	1.97
J-434	893.00	Zone-1	Demand	Fixed	1.97
J-362	875.00	Zone-1	Demand	Fixed	1.97
J-544	900.50	Zone-1	Demand	Fixed	1.97
J-543	903.50	Zone-1	Demand	Fixed	1.97
J-328	894.97	Zone-1	Demand	Fixed	1.97
J-363	874.50	Zone-1	Demand	Fixed	1.97
J-327	890.72	Zone-1	Demand	Fixed	1.97
J-508	902.00	Zone-1	Demand	Fixed	1.97
J-507	903.00	Zone-1	Demand	Fixed	1.97
J-506	902.00	Zone-1	Demand	Fixed	1.97
J-542	905.00	Zone-1	Demand	Fixed	1.97
J-541	902.90	Zone-1	Demand	Fixed	1.97
J-509	904.00	Zone-1	Demand	Fixed	1.97
J-364	874.50	Zone-1	Demand	Fixed	1.97
J-430	898.00	Zone-1	Demand	Fixed	1.97
J-470	875.00	Zone-1	Demand	Fixed	1.97
J-13	882.92	Zone-1	Demand	Fixed	1.97
J-433	900.00	Zone-1	Demand	Fixed	1.97
J-432	900.00	Zone-1	Demand	Fixed	1.97
J-431	875.00	Zone-1	Demand	Fixed	1.97
J-366	874.50	Zone-1	Demand	Fixed	1.97
J-365	874.50	Zone-1	Demand	Fixed	1.97
J-329	894.00	Zone-1	Demand	Fixed	1.97
J-369	874.50	Zone-1	Demand	Fixed	1.97
J-368	874.50	Zone-1	Demand	Fixed	1.97
J-367	874.50	Zone-1	Demand	Fixed	1.97
Test_3-Read	904.00	Zone-1	Demand	Fixed	1.97
J-217	888.29	Zone-1	Demand	Fixed	1.97
J-252	893.17	Zone-1	Demand	Fixed	1.97
J-69	890.00	Zone-1	Demand	Fixed	1.97
J-6	876.99	Zone-1	Demand	Fixed	1.97
Test_1-Flow	903.22	Zone-1	Demand	Fixed	1.97
J-214	898.13	Zone-1	Demand	Fixed	1.97
J-213	886.71	Zone-1	Demand	Fixed	1.97
J-212	893.78	Zone-1	Demand	Fixed	1.97
J-216	899.36	Zone-1	Demand	Fixed	1.97
J-251	891.51	Zone-1	Demand	Fixed	1.97
J-215	899.36	Zone-1	Demand	Fixed	1.97
J-76	893.00	Zone-1	Demand	Fixed	1.97
J-141	874.63	Zone-1	Demand	Fixed	1.97
J-105	900.49	Zone-1	Demand	Fixed	1.97
J-140	880.88	Zone-1	Demand	Fixed	1.97
J-107	896.10	Zone-1	Demand	Fixed	1.97
J-142	872.64	Zone-1	Demand	Fixed	1.97
J-106	900.50	Zone-1	Demand	Fixed	1.97
J-101	903.77	Zone-1	Demand	Fixed	1.97
J-100	903.77	Zone-1	Demand	Fixed	1.97
J-72	888.96	Zone-1	Demand	Fixed	1.97
J-104	902.78	Zone-1	Demand	Fixed	1.97
J-103	901.23	Zone-1	Demand	Fixed	1.97
J-102	899.58	Zone-1	Demand	Fixed	1.97
J-211	886.39	Zone-1	Demand	Fixed	1.97

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-144	874.49	Zone-1	Demand	Fixed	1.97
J-180	878.00	Zone-1	Demand	Fixed	1.97
J-326	894.78	Zone-1	Demand	Fixed	1.97
J-146	874.61	Zone-1	Demand	Fixed	1.97
J-145	879.71	Zone-1	Demand	Fixed	1.97
J-109	899.89	Zone-1	Demand	Fixed	1.97
J-325	894.78	Zone-1	Demand	Fixed	1.97
J-299	890.70	Zone-1	Demand	Fixed	1.97
J-324	892.93	Zone-1	Demand	Fixed	1.97
J-361	875.00	Zone-1	Demand	Fixed	1.97
J-98	895.13	Zone-1	Demand	Fixed	1.97
J-360	875.00	Zone-1	Demand	Fixed	1.97
J-182	878.28	Zone-1	Demand	Fixed	1.97
J-189	877.28	Zone-1	Demand	Fixed	1.97
J-188	877.44	Zone-1	Demand	Fixed	1.97
J-186	877.40	Zone-1	Demand	Fixed	1.97
J-210	884.50	Zone-1	Demand	Fixed	1.97
J-83	887.08	Zone-1	Demand	Fixed	1.97
J-87	882.05	Zone-1	Demand	Fixed	1.97
J-148	874.96	Zone-1	Demand	Fixed	1.97
J-183	878.28	Zone-1	Demand	Fixed	1.97
J-147	873.10	Zone-1	Demand	Fixed	1.97
J-185	875.66	Zone-1	Demand	Fixed	1.97
J-149	872.54	Zone-1	Demand	Fixed	1.97
J-184	878.28	Zone-1	Demand	Fixed	1.97
J-505	901.00	Zone-1	Demand	Fixed	1.97
Test_7-Flow	876.40	Zone-1	Demand	Fixed	1.97
J-619	906.00	Zone-1	Demand	Fixed	1.97
J-691	875.00	Zone-1	Demand	Fixed	1.97
J-693	894.00	Zone-1	Demand	Fixed	1.97
J-692	879.00	Zone-1	Demand	Fixed	1.97
J-42	884.10	Zone-1	Demand	Fixed	1.97
J-769	902.00	Zone-1	Demand	Fixed	1.97
J-768	911.00	Zone-1	Demand	Fixed	1.97
J-767	902.00	Zone-1	Demand	Fixed	1.97
J-690	875.00	Zone-1	Demand	Fixed	1.97
J-39	886.53	Zone-1	Demand	Fixed	1.97
J-3	877.79	Zone-1	Demand	Fixed	1.97
J-694	900.00	Zone-1	Demand	Fixed	1.97
J-721	892.00	Zone-1	Demand	Fixed	1.97
J-28	879.71	Zone-1	Demand	Fixed	1.97
J-720	903.00	Zone-1	Demand	Fixed	1.97
J-724	891.00	Zone-1	Demand	Fixed	1.97
J-723	890.00	Zone-1	Demand	Fixed	1.97
J-722	900.00	Zone-1	Demand	Fixed	1.97
J-697	901.00	Zone-1	Demand	Fixed	1.97
J-696	890.00	Zone-1	Demand	Fixed	1.97
J-695	893.00	Zone-1	Demand	Fixed	1.97
J-760	902.00	Zone-1	Demand	Fixed	1.97
J-699	901.00	Zone-1	Demand	Fixed	1.97
J-698	901.00	Zone-1	Demand	Fixed	1.97
J-766	910.00	Zone-1	Demand	Fixed	1.97
J-68	891.80	Zone-1	Demand	Fixed	1.97
J-206	887.80	Zone-1	Demand	Fixed	1.97
J-241	886.84	Zone-1	Demand	Fixed	1.97

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-130	878.50	Zone-1	Demand	Fixed	1.97
J-71	885.51	Zone-1	Demand	Fixed	1.97
J-75	893.92	Zone-1	Demand	Fixed	1.97
J-203	885.06	Zone-1	Demand	Fixed	1.97
J-202	887.80	Zone-1	Demand	Fixed	1.97
J-201	886.00	Zone-1	Demand	Fixed	1.97
J-205	887.70	Zone-1	Demand	Fixed	1.97
J-240	878.00	Zone-1	Demand	Fixed	1.97
J-204	883.40	Zone-1	Demand	Fixed	1.97
J-131	877.57	Zone-1	Demand	Fixed	1.97
J-729	890.00	Zone-1	Demand	Fixed	1.97
J-728	878.00	Zone-1	Demand	Fixed	1.97
J-763	903.00	Zone-1	Demand	Fixed	1.97
J-765	903.00	Zone-1	Demand	Fixed	1.97
J-764	903.00	Zone-1	Demand	Fixed	1.97
J-53	895.70	Zone-1	Demand	Fixed	1.97
Test_4-Read	875.00	Zone-1	Demand	Fixed	1.97
J-57	903.41	Zone-1	Demand	Fixed	1.97
J-132	879.01	Zone-1	Demand	Fixed	1.97
J-46	894.80	Zone-1	Demand	Fixed	1.97
J-60	890.72	Zone-1	Demand	Fixed	1.97
J-64	893.85	Zone-1	Demand	Fixed	1.97
J-472	895.00	Zone-1	Demand	Fixed	1.97
J-437	899.00	Zone-1	Demand	Fixed	1.97
J-436	900.00	Zone-1	Demand	Fixed	1.97
J-439	898.00	Zone-1	Demand	Fixed	1.97
J-474	890.00	Zone-1	Demand	Fixed	1.97
J-473	896.00	Zone-1	Demand	Fixed	1.97
J-617	901.00	Zone-1	Demand	Fixed	1.97
J-616	901.00	Zone-1	Demand	Fixed	1.97
J-615	892.00	Zone-1	Demand	Fixed	1.97
J-471	898.00	Zone-1	Demand	Fixed	1.97
J-651	904.00	Zone-1	Demand	Fixed	1.97
J-618	903.00	Zone-1	Demand	Fixed	1.97
J-475	898.00	Zone-1	Demand	Fixed	1.97
J-501	902.00	Zone-1	Demand	Fixed	1.97
J-500	897.00	Zone-1	Demand	Fixed	1.97
J-540	904.00	Zone-1	Demand	Fixed	1.97
J-504	900.00	Zone-1	Demand	Fixed	1.97
J-503	902.00	Zone-1	Demand	Fixed	1.97
J-502	900.00	Zone-1	Demand	Fixed	1.97
J-20	882.92	Zone-1	Demand	Fixed	1.97
J-477	885.00	Zone-1	Demand	Fixed	1.97
J-476	882.00	Zone-1	Demand	Fixed	1.97
J-24	876.93	Zone-1	Demand	Fixed	1.97
J-479	899.00	Zone-1	Demand	Fixed	1.97
J-478	898.00	Zone-1	Demand	Fixed	1.97
J-614	893.00	Zone-1	Demand	Fixed	1.97
J-547	896.50	Zone-1	Demand	Fixed	1.97
J-546	900.00	Zone-1	Demand	Fixed	1.97
J-545	897.00	Zone-1	Demand	Fixed	1.97
J-549	896.00	Zone-1	Demand	Fixed	1.97
J-548	896.00	Zone-1	Demand	Fixed	1.97
J-31	876.71	Zone-1	Demand	Fixed	1.97
J-727	889.00	Zone-1	Demand	Fixed	1.97

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-726	893.00	Zone-1	Demand	Fixed	1.97
J-725	888.00	Zone-1	Demand	Fixed	1.97
J-580	896.00	Zone-1	Demand	Fixed	1.97
J-762	901.00	Zone-1	Demand	Fixed	1.97
J-761	905.00	Zone-1	Demand	Fixed	1.97
J-581	891.00	Zone-1	Demand	Fixed	1.97
J-17	874.48	Zone-1	Demand	Fixed	1.97
J-610	889.00	Zone-1	Demand	Fixed	1.97
J-650	902.00	Zone-1	Demand	Fixed	1.97
J-613	886.00	Zone-1	Demand	Fixed	1.97
J-612	898.00	Zone-1	Demand	Fixed	1.97
J-611	897.00	Zone-1	Demand	Fixed	1.97
J-585	877.00	Zone-1	Demand	Fixed	1.97
J-583	875.00	Zone-1	Demand	Fixed	1.97
J-582	897.00	Zone-1	Demand	Fixed	1.97
J-589	883.00	Zone-1	Demand	Fixed	1.97
J-587	893.00	Zone-1	Demand	Fixed	1.97
J-586	896.00	Zone-1	Demand	Fixed	1.97
J-143	874.49	Zone-1	Demand	Fixed	1.97
J-331	891.29	Zone-1	Demand	Fixed	1.97
J-95	890.45	Zone-1	Demand	Fixed	1.97
J-99	901.83	Zone-1	Demand	Fixed	1.97
J-334	888.96	Zone-1	Demand	Fixed	1.97
J-333	903.00	Zone-1	Demand	Fixed	1.97
J-332	889.96	Zone-1	Demand	Fixed	1.97
J-406	876.00	Zone-1	Demand	Fixed	1.97
J-267	895.79	Zone-1	Demand	Fixed	1.97
J-266	895.79	Zone-1	Demand	Fixed	1.97
J-265	894.80	Zone-1	Demand	Fixed	1.97
J-441	900.00	Zone-1	Demand	Fixed	1.97
J-269	892.28	Zone-1	Demand	Fixed	1.97
J-268	891.10	Zone-1	Demand	Fixed	1.97
J-194	881.10	Zone-1	Demand	Fixed	1.97
J-330	893.93	Zone-1	Demand	Fixed	1.97
J-338	895.00	Zone-1	Demand	Fixed	1.97
J-196	880.31	Zone-1	Demand	Fixed	1.97
J-195	880.90	Zone-1	Demand	Fixed	1.97
J-159	878.88	Zone-1	Demand	Fixed	1.97
J-373	876.00	Zone-1	Demand	Fixed	1.97
J-371	875.00	Zone-1	Demand	Fixed	1.97
J-335	903.00	Zone-1	Demand	Fixed	1.97
J-370	874.54	Zone-1	Demand	Fixed	1.97
J-337	903.35	Zone-1	Demand	Fixed	1.97
J-372	875.00	Zone-1	Demand	Fixed	1.97
J-336	893.36	Zone-1	Demand	Fixed	1.97
J-442	890.00	Zone-1	Demand	Fixed	1.97
J-480	899.00	Zone-1	Demand	Fixed	1.97
Test_2-Read	907.90	Zone-1	Demand	Fixed	1.97
J-408	875.00	Zone-1	Demand	Fixed	1.97
J-443	895.00	Zone-1	Demand	Fixed	1.97
J-407	875.00	Zone-1	Demand	Fixed	1.97
J-379	883.00	Zone-1	Demand	Fixed	1.97
J-376	887.32	Zone-1	Demand	Fixed	1.97
J-14	882.92	Zone-1	Demand	Fixed	1.97
J-375	890.00	Zone-1	Demand	Fixed	1.97

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-378	883.00	Zone-1	Demand	Fixed	1.97
J-10	870.14	Zone-1	Demand	Fixed	1.97
J-377	887.32	Zone-1	Demand	Fixed	1.97
J-403	903.00	Zone-1	Demand	Fixed	1.97
J-402	900.00	Zone-1	Demand	Fixed	1.97
J-401	894.00	Zone-1	Demand	Fixed	1.97
J-405	876.00	Zone-1	Demand	Fixed	1.97
J-440	895.00	Zone-1	Demand	Fixed	1.97
J-404	903.00	Zone-1	Demand	Fixed	1.97
J-482	895.00	Zone-1	Demand	Fixed	1.97
J-445	900.00	Zone-1	Demand	Fixed	1.97
J-409	875.00	Zone-1	Demand	Fixed	1.97
J-444	894.00	Zone-1	Demand	Fixed	1.97
J-447	900.00	Zone-1	Demand	Fixed	1.97
J-481	897.00	Zone-1	Demand	Fixed	1.97
J-446	895.00	Zone-1	Demand	Fixed	1.97
J-114	875.30	Zone-1	Demand	Fixed	1.97
J-112	876.00	Zone-1	Demand	Fixed	1.97
J-111	875.30	Zone-1	Demand	Fixed	1.97
J-151	875.57	Zone-1	Demand	Fixed	1.97
J-115	883.00	Zone-1	Demand	Fixed	1.97
J-150	873.06	Zone-1	Demand	Fixed	1.97
J-110	899.89	Zone-1	Demand	Fixed	1.97
Test_5-Flow	881.00	Zone-1	Demand	Fixed	1.97
J-229	883.03	Zone-1	Demand	Fixed	1.97
J-264	901.49	Zone-1	Demand	Fixed	1.97
J-73	888.04	Zone-1	Demand	Fixed	1.97
J-77	893.21	Zone-1	Demand	Fixed	1.97
J-91	889.00	Zone-1	Demand	Fixed	1.97
J-190	879.77	Zone-1	Demand	Fixed	1.97
J-119	880.97	Zone-1	Demand	Fixed	1.97
J-5	876.99	Zone-1	Demand	Fixed	1.97
J-66	890.43	Zone-1	Demand	Fixed	1.97
J-80	889.95	Zone-1	Demand	Fixed	1.97
J-155	875.00	Zone-1	Demand	Fixed	1.97
J-154	872.66	Zone-1	Demand	Fixed	1.97
J-152	879.21	Zone-1	Demand	Fixed	1.97
J-113	875.00	Zone-1	Demand	Fixed	1.97
J-116	875.66	Zone-1	Demand	Fixed	1.97
J-118	875.80	Zone-1	Demand	Fixed	1.97
J-153	872.66	Zone-1	Demand	Fixed	1.97
J-117	880.59	Zone-1	Demand	Fixed	1.97
J-193	887.64	Zone-1	Demand	Fixed	1.97
J-157	876.15	Zone-1	Demand	Fixed	1.97
J-192	891.70	Zone-1	Demand	Fixed	1.97
J-84	883.30	Zone-1	Demand	Fixed	1.97
J-88	883.00	Zone-1	Demand	Fixed	1.97
J-158	879.19	Zone-1	Demand	Fixed	1.97
J-156	878.00	Zone-1	Demand	Fixed	1.97
Test_7-Read	876.40	Zone-1	Demand	Fixed	1.97
J-198	880.30	Zone-1	Demand	Fixed	1.97
J-197	877.28	Zone-1	Demand	Fixed	1.97
J-191	879.53	Zone-1	Demand	Fixed	1.97
J-400	898.00	Zone-1	Demand	Fixed	1.97
J-199	884.94	Zone-1	Demand	Fixed	1.97

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-262	902.00	Zone-1	Demand	Fixed	1.97
J-226	886.20	Zone-1	Demand	Fixed	1.97
J-261	899.56	Zone-1	Demand	Fixed	1.97
J-228	882.79	Zone-1	Demand	Fixed	1.97
J-263	901.49	Zone-1	Demand	Fixed	1.97
J-227	885.50	Zone-1	Demand	Fixed	1.97
J-225	890.00	Zone-1	Demand	Fixed	1.97
J-222	892.20	Zone-1	Demand	Fixed	1.97
J-221	889.42	Zone-1	Demand	Fixed	1.97
J-220	898.54	Zone-1	Demand	Fixed	1.97
J-260	900.00	Zone-1	Demand	Fixed	1.97
J-224	890.20	Zone-1	Demand	Fixed	1.97
J-223	894.93	Zone-1	Demand	Fixed	1.97
J-339	885.01	Zone-1	Demand	Fixed	1.97
J-771	902.00	Zone-1	Demand	Fixed	1.97
J-739	900.00	Zone-1	Demand	Fixed	1.97
J-738	900.00	Zone-1	Demand	Fixed	1.97
J-774	876.00	Zone-1	Demand	Fixed	1.97
J-773	878.00	Zone-1	Demand	Fixed	1.97
J-772	891.00	Zone-1	Demand	Fixed	1.97
J-737	900.00	Zone-1	Demand	Fixed	1.97
J-733	910.00	Zone-1	Demand	Fixed	1.97
J-732	891.00	Zone-1	Demand	Fixed	1.97
J-731	884.00	Zone-1	Demand	Fixed	1.97
J-736	900.00	Zone-1	Demand	Fixed	1.97
J-735	902.00	Zone-1	Demand	Fixed	1.97
J-734	910.00	Zone-1	Demand	Fixed	1.97
J-596	897.00	Zone-1	Demand	Fixed	1.97
J-595	900.00	Zone-1	Demand	Fixed	1.97
J-594	901.00	Zone-1	Demand	Fixed	1.97
J-599	903.00	Zone-1	Demand	Fixed	1.97
J-598	903.00	Zone-1	Demand	Fixed	1.97
J-597	893.00	Zone-1	Demand	Fixed	1.97
J-593	902.00	Zone-1	Demand	Fixed	1.97
J-558	870.00	Zone-1	Demand	Fixed	1.97
J-557	873.00	Zone-1	Demand	Fixed	1.97
J-592	893.00	Zone-1	Demand	Fixed	1.97
J-559	877.00	Zone-1	Demand	Fixed	1.97
J-32	876.76	Zone-1	Demand	Fixed	1.97
J-36	875.66	Zone-1	Demand	Fixed	1.97
J-54	893.36	Zone-1	Demand	Fixed	1.97
J-777	878.00	Zone-1	Demand	Fixed	1.97
J-776	881.00	Zone-1	Demand	Fixed	1.97
J-779	877.00	Zone-1	Demand	Fixed	1.97
J-778	880.00	Zone-1	Demand	Fixed	1.97
J-50	895.70	Zone-1	Demand	Fixed	1.97
J-775	880.00	Zone-1	Demand	Fixed	1.97
Test_8-Read	882.30	Zone-1	Demand	Fixed	1.97
J-58	896.50	Zone-1	Demand	Fixed	1.97
J-108	891.00	Zone-1	Demand	Fixed	1.97
Test_6-Flow	896.00	Zone-1	Demand	Fixed	1.97
J-61	885.20	Zone-1	Demand	Fixed	1.97
J-65	891.87	Zone-1	Demand	Fixed	1.97
J-43	884.56	Zone-1	Demand	Fixed	1.97
J-47	894.00	Zone-1	Demand	Fixed	1.97

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-809	892.00	Zone-1	Demand	Fixed	1.97
J-29	875.00	Zone-1	Demand	Fixed	1.97
J-2	878.39	Zone-1	Demand	Fixed	1.97
J-770	902.00	Zone-1	Demand	Fixed	1.97
J-808	899.00	Zone-1	Demand	Fixed	1.97
J-804	901.00	Zone-1	Demand	Fixed	1.97
J-803	901.00	Zone-1	Demand	Fixed	1.97
J-802	900.00	Zone-1	Demand	Fixed	1.97
J-807	900.00	Zone-1	Demand	Fixed	1.97
J-806	902.00	Zone-1	Demand	Fixed	1.97
J-805	890.00	Zone-1	Demand	Fixed	1.97
J-511	902.00	Zone-1	Demand	Fixed	1.97
J-550	901.00	Zone-1	Demand	Fixed	1.97
J-590	879.00	Zone-1	Demand	Fixed	1.97
J-514	900.00	Zone-1	Demand	Fixed	1.97
J-513	896.00	Zone-1	Demand	Fixed	1.97
J-512	903.00	Zone-1	Demand	Fixed	1.97
J-25	876.93	Zone-1	Demand	Fixed	1.97
J-487	892.00	Zone-1	Demand	Fixed	1.97
J-486	886.00	Zone-1	Demand	Fixed	1.97
J-485	887.00	Zone-1	Demand	Fixed	1.97
J-489	890.00	Zone-1	Demand	Fixed	1.97
J-488	893.00	Zone-1	Demand	Fixed	1.97
J-21	875.30	Zone-1	Demand	Fixed	1.97
J-556	902.00	Zone-1	Demand	Fixed	1.97
J-555	902.00	Zone-1	Demand	Fixed	1.97
J-554	900.00	Zone-1	Demand	Fixed	1.97
J-374	890.00	Zone-1	Demand	Fixed	1.97
J-591	893.00	Zone-1	Demand	Fixed	1.97
J-9	871.87	Zone-1	Demand	Fixed	1.97
J-553	900.00	Zone-1	Demand	Fixed	1.97
J-517	898.00	Zone-1	Demand	Fixed	1.97
J-516	902.00	Zone-1	Demand	Fixed	1.97
J-515	904.00	Zone-1	Demand	Fixed	1.97
J-552	902.00	Zone-1	Demand	Fixed	1.97
J-551	902.00	Zone-1	Demand	Fixed	1.97
J-518	902.00	Zone-1	Demand	Fixed	1.97
J-625	909.00	Zone-1	Demand	Fixed	1.97
J-624	909.00	Zone-1	Demand	Fixed	1.97
J-623	908.00	Zone-1	Demand	Fixed	1.97
J-628	903.00	Zone-1	Demand	Fixed	1.97
J-627	903.00	Zone-1	Demand	Fixed	1.97
J-626	904.00	Zone-1	Demand	Fixed	1.97
J-660	902.00	Zone-1	Demand	Fixed	1.97
J-801	896.00	Zone-1	Demand	Fixed	1.97
J-800	900.00	Zone-1	Demand	Fixed	1.97
J-622	906.00	Zone-1	Demand	Fixed	1.97
J-18	871.64	Zone-1	Demand	Fixed	1.97
J-621	906.00	Zone-1	Demand	Fixed	1.97
J-629	901.00	Zone-1	Demand	Fixed	1.97
J-662	894.00	Zone-1	Demand	Fixed	1.97
J-484	888.00	Zone-1	Demand	Fixed	1.97
J-449	896.00	Zone-1	Demand	Fixed	1.97
J-483	890.00	Zone-1	Demand	Fixed	1.97
J-661	896.00	Zone-1	Demand	Fixed	1.97

Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Pattern	Base Flow (gpm)
J-448	900.00	Zone-1	Demand	Fixed	1.97
J-1024	903.00	Zone-1	Demand	Fixed	3.98
J-181	876.00	Zone-1	Demand	Composite	6.17
J-641	898.00	Zone-1	Demand	Composite	6.87
J-568	878.00	Zone-1	Demand	Composite	7.07
J-382	877.50	Zone-1	Demand	Composite	8.47
J-574	899.00	Zone-1	Demand	Composite	9.57
J-573	895.00	Zone-1	Demand	Composite	10.17
J-689	876.17	Zone-1	Demand	Composite	10.37
J-730	878.00	Zone-1	Demand	Composite	11.27
J-588	886.00	Zone-1	Demand	Composite	15.07
J-438	900.00	Zone-1	Demand	Composite	15.87

Scenario: Base
Steady State Analysis
Pump Report

Label	Pump Definition
PMP-HSP_#1	Well 4 - Full Capacity
PMP-Well_1_Pu	Well_1-J-128 (PMP-Well_1_Pump)
PMP-Well_2_Pu	Well_2-J-168 (PMP-Well_2_Pump)
PMP-Well_3_Pu	Well_3-J-64 (PMP-Well_3_Pump)

Scenario: Base
Steady State Analysis
Reservoir Report

Label	Elevation (ft)
Well_4	750.00
Well_3	740.00
Well_2	750.00
Well_1	700.00

Scenario: Base
Steady State Analysis
Tank Report

Label	Base Elevation (ft)	Minimum Elevation (ft)	Initial HGL (ft)	Maximum Elevation (ft)	Tank Diameter (ft)
T-1	971.00	971.00	1,008.00	1,010.00	47.32
T-2	1,011.00	1,011.00	1,053.00	1,055.00	65.23

Appendix C

Pipe and Node Map