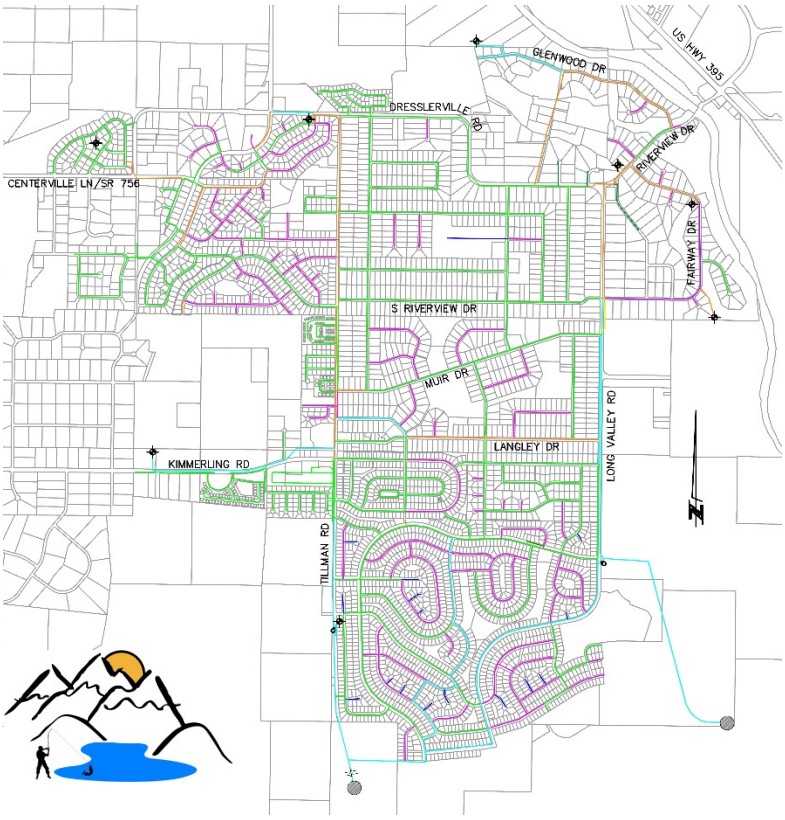
Gardnerville Ranchos
General Improvement District
2017 Water Master Plan

Final
July 2017



Prepared for:

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LIST OF ACRONYMS/ABBREVIATIONS

ac	Acre
ADD	Average Daily Demand
ADMM	Average Day during Maximum Month
AWWA	American Water Works Association
CDP	Census-Designated Place
CIP	Capital Improvement Plan
DU	Dwelling Unit
EA	Each
EPA	Environmental Protection Agency
ft	Feet
FY	Fiscal Year
gal	Gallons
gpd	Gallons per Day
gpm	Gallons per Minute
GRGID or District	Gardnerville Ranchos General Improvement District
HWL	High Water Level
IFC	International Fire Code
LF	Linear Feet
MCL	Maximum Contaminant Level
MDD	Maximum Day Demand
MG	Million Gallons
mgd	Million Gallons per Day
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NDWR	Nevada Division of Water Resources
NRS	Nevada Revised Statutes
PHD	Peak Hour Demand
PRV	Pressure Reducing Valve
PVC	Polyvinyl Chloride
SR	State Route
TBD	To Be Determined
µg/L	Micrograms per Liter
VFD	Variable Frequency Drive

1.0 EXECUTIVE SUMMARY

1.1 General Overview

This Water Master Plan has been prepared for the Gardnerville Ranchos General Improvement District (GRGID or District) to document existing conditions, plan for regular life cycle infrastructure replacement, and determine capacity upgrades required for existing and future demands. Objectives of the Master Plan study were accomplished through the following tasks:

- Documentation of existing water system components and infrastructure age through review of record drawings and development of comprehensive system maps.
- Development of water demand factors through analysis of meter data by user type and comparison with historical well production data.
- Update and evaluation of the existing computer-based hydraulic model based on system mapping and fire hydrant flow tests for calibration.
- Estimation of projected water demands associated with infill areas and future growth.
- Evaluation of future water supply strategies to accommodate growth.
- Recommendation of improvements to address existing and future conditions.
- Development of a short-term and long-term Capital Improvement Plan (CIP) over a 20+ year planning period.

1.2 Summary of Findings

The GRGID water system consists of approximately 58 miles of 2-inch through 16-inch distribution piping, seven active groundwater wells, two storage tanks, and a booster pump station. The system currently relies exclusively on groundwater for water supply. According to the 2010 U.S. Census, the 2010 population for the Gardnerville Ranchos Census-Designated Place (CDP) was 11,312, which includes residents outside of the GRGID boundaries and water service area. As of 2017, there are approximately 4,300 water connections served by GRGID. Pipe age within the GRGID distribution system ranges from less than a year old to over 50 years old. Although a significant portion of the system was constructed in the 1970s, the District has completed several waterline replacement projects over the years to replace aging infrastructure. Over 70% of the system is less than 30 years old and less than 3% of the system is over 40 years old.

Future growth that could potentially be served by the GRGID water system includes infill areas, undeveloped land within GRGID boundaries, and developed/undeveloped land outside of current GRGID boundaries with potential to be annexed into the District or served as out-of-District customers. The potential growth and trend of smaller residential lots could leave GRGID with 4,400 additional residential dwelling units at buildout.

Existing and projected water demands were developed from a review of historical well production data and available water meter records to develop water demand factors by user type. The existing average day and maximum day demands are estimated at 2,029 gallons per minute (gpm) and 5,073 gpm, respectively. The amount of non-revenue water (system losses) are currently unknown but were estimated at 16-19% of the total water demand. With the Water Meter Program in full effect as of 2017, the actual percentage of non-revenue water can be confirmed over the next couple of years by obtaining a complete set of metered water usage data and comparing with well production data. The water system was evaluated against existing and future water demands in accordance with NAC requirements for water storage, supply, and

distribution. For the existing system, results of the analysis indicate a capacity deficiency in the upper pressure zone (High Side) that can be addressed through well improvement projects. For future demands at 10-year and 20-year projections, additional water supply sources and storage will be required to accommodate growth.

Short-term and long-term CIPs were developed and prioritized based on the results of the hydraulic model, storage and capacity evaluations, and an asset management plan for aging infrastructure.

1.3 Summary of Recommendations

Recommendations resulting from preparation of the Water Master Plan are summarized below.

1.3.1 Capital Improvement Plan

- A short-term CIP (0-5 years) was developed based on evaluation of the existing system and includes the following recommended projects:
    - Well 4 Replacement
    - Pressure Reducing/Sustaining Valve between Pressure Zones
    - Well 5 Water Quality Zone Testing
    - Well 2 Redirect to High Side
    - 3.0 MG Tank Interior Recoating
    - Total short-term CIP cost = $1,692,000
- A long-term CIP (20+ years) was developed considering future development and system replacement based on age:
    - Replace aging infrastructure as needed. The amount to be saved is dependent on several factors including actual timing of replacement, final project costs, inflation rates, savings interest rates, etc.
    - Additional well(s) and storage tank(s) to accommodate future growth. Siting and preliminary design/sizing of these facilities are not included in this Master Plan and would require further study.

1.3.2 Future Growth Considerations

- To accommodate future growth at 10-year and 20-year demand projections, additional well(s) and storage capacity will be required.
- A regional connection should be investigated as a long-term water supply strategy to accommodate future growth and diversify the source of supply for GRGID.
- As future growth is planned, the hydraulic model should be updated to reflect actual development densities, water demands, and connection points to determine the need and timing for upgrades within the GRGID water system.
- Future growth projects should be funded through impact fees paid by development.

1.3.3 On-Going Maintenance and Planning

- Field assessments should be scheduled regularly to monitor the condition of the existing system and to identify and prioritize rehabilitation/replacement projects.
- The actual percentage of non-revenue water (aka system losses) should be tracked as more meter records become available to assess system performance. If more than 10% of non-revenue water is suspected to be a result of real and apparent losses (unauthorized consumption, waterline breaks/leaks, etc.), GRGID should consider a leak detection survey and water loss audit to identify problem areas.

- The Water Master Plan should be updated at 5-year intervals to reflect current conditions and to re-evaluate the short-term and long-term CIP.
- An updated water rate study should be prepared after obtaining additional meter records to determine if adjustments are necessary to the base service charge to support operation costs and to ensure GRGID is saving/reserving sufficient funds.

2.0 INTRODUCTION

2.1 GRGID Background and History

In the mid-1960s, C.E. (Red) Swift owned a large tract of land that he planned to develop into a subdivision. For approval of the proposed subdivision, Douglas County required service by a municipal water system and paved roadways within the subdivision. Swift initially attempted to annex the land into the towns of Minden and Gardnerville, but was unsuccessful due to the distance from both towns. Undeterred, Swift moved forward to create the Gardnerville Ranchos General Improvement District (GRGID or District). GRGID was established through Douglas County Ordinance 147 on April 9, 1965 pursuant to Chapter 318 of the Nevada Revised Statutes (NRS). The GRGID service boundary is located in the central portion of Township 12N, Range 20E, M.D.B.&.M.

The first Board of Trustees included C.E. Swift, D.A. Swift, W.P. Bednar, M.K. Swift, and C.N. Swift. Following formation of GRGID, the Board of Trustees secured grants and loans to finance water and street improvements within District boundaries. The properties within Unit 2, Unit 3, Unit 4, and Country Club Estates (the golf course area) were part of the original annexation to the District on May 17, 1967. Ranchos Estates, Unit 5, and Unit 6 were annexed into the District on April 3, 1973 and Unit 7 was annexed into the District on July 18, 1974. Water and sewer improvements for Units 6 and 7 were constructed five years prior to the first residences being built in those areas. Over the years, GRGID's service boundary has continued to grow with the annexation of multiple residential and commercial developments including Pleasantview Subdivision, Silver Ranch Estates, Sunburst Subdivision, Hidden Creek Subdivision, Rocky Terrace Subdivision, Rainshadow Ranch, 540 acres of land south and east of Long Valley Road, Heritage Subdivision on Kimmerling Road, Tillman Commercial Center, Langtree Commercial Center, and many other smaller parcels. Unit 1 was de-annexed from the District during a point in the early history of GRGID but is included in the water service area. A map of the units/subdivisions, water service area, and GRGID boundaries is provided in Figure 1.

GRGID has grown significantly since the late 1960s and 1970s and currently provides water service to approximately 4,300 connections. The water system consists of approximately 58 miles of 2-inch through 16-inch distribution piping, seven active groundwater wells, two storage tanks, and a booster pump station.

2.2 GRGID Structure

GRGID is governed by a five-member Board of Trustees that are elected by the registered voters who reside within the District boundaries. The GRGID District Manager is responsible for carrying out the policies set forth by the Board of Trustees. Board meetings are held the first Wednesday of each month and are open to the public.

GRGID is responsible for the operation and maintenance of its water system, sewer system, streets, storm drain system, and streetlights, as well as maintenance of open spaces, parks, and recreational areas. GRGID reviews all proposed housing and commercial development projects located within District boundaries. The District's recommendations are then forwarded to Douglas County Community Development and Douglas County Commission for review and approval.

2.3 Water Rates and Connection Fees

2.3.1 Current Water Rates

GRGID water rates vary by user type. Current water rates are summarized in Table 1 based on the GRGID Policy and Procedures Manual [1].

Table 1: Current Water Rates

User Type	Monthly Base Service Charge[1,2]	Monthly Consumption Charge (>10,000 gallons)	Effective Date of Base Charge[1]
In-District Metered Customers	$21.50	$0.90/1,000 gallons	1/1/06
Out-of-District Metered Customers	$33.00	$0.90/1,000 gallons	10/1/00

[1] Per GRGID Policy and Procedures Manual [1].

[2] Base service charge includes initial 10,000 gallons.

2.3.2 History of Water Rates and Water Meter Program

A history of water rate studies and rate increases over the last 20 years is summarized below.

Current In-District water rates presented in Table 1 were determined by a 2003 water rate study prepared by Lumos & Associates [2]. Based on recommendations in the 2003 study, the Board held a public hearing in November 2003 and adopted a rate increase over a three-year period effective January 1, 2004. In-District and non-metered rates were increased incrementally from $15.00 per month to $21.50 per month in 2006. Prior rate changes include an increase in the In-District water rates (metered and non-metered) from $13.00 per month in 1999 to $15.00 per month in 2001. Out-of-District rates were increased from $31.00 per month in 1999 to $33.00 per month in 2000.

In May 2004, the Board of Trustees approved a Pilot Water Meter Program as a means to obtain residential water use data for the preparation of an updated water rate study. The initial pilot program consisted of the installation of 401 residential water meters (approximately 10% of the District's customers) followed by the monitoring of consumptive use data for a full year in 2005. The Pilot Water Meter Program was presented to and adopted by the Board in April 2006.

At the end of 2006 an updated water rate study was initiated to evaluate meter data from the Pilot Water Meter Program and develop a new rate structure. In the initial draft of the updated rate study, tiered water rates based on zoning were considered as alternatives for a future rate structure. Upon review of the alternatives by the Board in December 2006 and January 2007, the tiered rate structure alternatives were eliminated, as they would be difficult to implement. In January 2007 the Board passed a motion to continue the current base charge for In-District customers of $21.50 per month and an additional charge of $0.90 per 1,000 gallons beyond 10,000 gallons. The updated water rate study was completed in March 2007 with a recommended incremental rate increase to begin in 2009 as outlined in Table 2 [3].

Table 2: Water Rates Recommended in 2007 Water Rate Study

	Recommended Base Service Charge Increases[1]		
User Type	**2009**	**2012**	**2015**
In-District Customers	$23.00	$24.50	$26.00
Out-of-District Customers	$34.50	$36.00	$37.50

[1] Per 2007 Water Rate Study [3]. Rates have not been implemented.

The Water Meter Program adopted by the Board required all customers be metered within a 10-year period by March 2017. The Water Meter Program also required that meters be installed for residential customers on an "attrition" basis for all properties with title ownership transfers and for all new construction. To delay the water rate increases recommended in Table 2, the Board required that property owners pay for the material and installation costs of the new meters. The District also implemented an enhancement to the program with discounts on meter costs and other incentives to encourage water meter installations. As of March 2017, the Water Meter Program is in full effect and customers are being charged based on monthly meter readings.

2.3.3 Current Connection Fees

GRGID connection fees vary by user type and water service size. Current connection fees are summarized in Table 3 based on the GRGID Policy and Procedures Manual [1].

Table 3: Current Connection Fees

Service Size	Connection Fee A[1,2]	Connection Fee B[1,3]
Water Service Connection		
¾″	$4,950	$1,855
1″	$8,250	$2,790
1½″	$16,500	$7,050
2″	$26,400	$13,350
2½″	$29,600	$21,550
3″	$52,800	$32,375
4″	$82,500	$60,000
Fire Protection Connection		
All	$750	

[1] Per GRGID Policy and Procedures Manual, effective 3/6/13 [1].

[2] Connection Fee A: Applies to parcels legally created within the District after 3/6/13 and Out-of-District customers connecting to the system.

[3] Connection Fee B: Applies to parcels legally created within the District on or prior to 3/6/13 and connecting to the system. Connection Fee A will be in effect after 1/1/20. Areas annexed into the District prior to 3/6/13 that have not paid annexation fees will be charged at the new rate (Connection Fee A).

2.3.4 History of Connection Fees

Connection fees are charged to customers joining GRGID's water system to generate revenue for capital improvements and system upgrades so that costs related to growth are not absorbed by existing customers. Current connection fees presented in Table 3 were adopted by the Board of Trustees on March 6, 2013 based on a 2011 Capital Contribution Fee Analysis prepared by Lumos & Associates [4]. Previous fees were developed in the late 1980s and needed adjustment to address significant growth and improvements over the years. For In-District parcels created on or before March 6, 2013, the previous connection fees (Connection Fee B in Table 3) will remain in effect until 2020, after which Connection Fee A will be in effect for all new customers. Areas annexed into the District prior to March 6, 2013 that have not paid annexation fees will be charged at the new rate (Connection Fee A).

3.0 DESCRIPTION OF EXISTING SYSTEM

GRGID owns and operates a community water system under Permit No. NV0000066 and serves approximately 4,300 water connections. A description of the existing water supply, storage, and distribution facilities is provided in the sections to follow.

3.1 Distribution System

The GRGID water distribution system consists of approximately 58 miles of 2-inch through 16-inch waterlines. An inventory of existing waterlines by pipe size is summarized in Table 4.

Table 4: Pipe Size Inventory

Pipe Size	Approximate Length[1] (ft)	% of System
2"	2,200	0.7%
4"	3,800	1.2%
6"	70,100	23.0%
8"	152,700	50.2%
10"	28,200	9.3%
12"	42,800	14.1%
14"	800	0.3%
16"	3,700	1.2%
Total	304,300	100.0%

[1] Pipeline lengths exclude water service connections and fire hydrant laterals.

A map of the existing water system is presented in Figure 2 with color coding by pipe diameter. A larger fold-out version of this map is provided in Appendix A. In addition, a set of 11x17 water system maps with an index sheet is provided in Appendix B as a reference for water system operations. The system maps were prepared utilizing available record drawings and include the locations of fire hydrants and isolation valves. System mapping is intended to be updated on a regular basis with input from operations personnel and with completion of future water system improvement projects.

3.2 Groundwater Wells

The GRGID water system relies exclusively on groundwater and has a total of seven active production wells. A summary of information on the GRGID groundwater wells including current pumping capacities is provided in Table 5. Detailed information on well construction, pump/motor specifications, and well driller's reports are contained in Appendix C. Well 7 is inactive and not planned for future use but is still equipped with a pump/motor and is included in the details of Appendix C.

Table 5: Existing Groundwater Wells

Well No.	Pressure Zone	Location	Year Drilled/ Rehabbed	Backup Power	Current Capacity[1] (gpm)
1	High Side	Fairway Dr.	1965/2007	yes	1,350
2	Low Side	Riverview Dr.	2004	yes	1,750
4	High Side	Near Fairway Dr./Putter Ct.	1978	no	300
5	High Side	Kimmerling Rd.	1984	yes	1,200
6	Low Side	Sierra Vista Dr.	1989	no	700
8	Low Side	Glenwood Dr.	1997	yes	1,200
9	Low Side	Rocky Terrace Dr.	2005	yes	800
Total Capacity (all wells)					7,300
Total Capacity (excluding Well 5)[2]					6,100

[1] Well capacities provided by GRGID on 5/3/17.

[2] Well 5 capacity excluded due to high arsenic (used only for emergency purposes).

Six of the GRGID groundwater wells are pumped a regular basis (Wells 1, 2, 4, 6, 8, and 9). Well 9 operates on a variable frequency drive (VFD) which helps maintain pressure in the Rocky Terrace area. Well 5 is only used on an emergency basis due to high arsenic levels that frequently exceed the maximum contaminant level (MCL) of 10 micrograms per liter (µg/L) as established by the Environmental Protection Agency (EPA) as a primary drinking water standard. Water quality zone testing on Well 5 was recommended in the 2014 Water Resource Plan prepared for GRGID to determine if there is a specific aquifer zone creating the arsenic problem [5]. The water quality zone testing will be included in the short-term Capital Improvement Plan (CIP).

Well 4 is manually throttled back to avoid pumping air and sand, but is planned for replacement based on results of test well drilling completed in April-May of 2017. Two water quality samples were collected and tested as part of the test well drilling project and the results were found to be in compliance with drinking water standards [6].

Historical pumping rates and water levels for each well were evaluated in the 2014 Water Resource Plan prepared for GRGID [5]. The Water Resource Plan identified production rate declines from 2011-2013 in Wells 1, 2, 4, 6, and 9 ranging from 10-50 gpm per year. The pumping rate declines appeared to be correlated to pumping levels lowering in the summer months due to drought conditions. Although groundwater water levels and pumping rates will fluctuate over time

with basin-wide pumping activities, precipitation (wet vs. dry years), basin recharge, and other factors, the production rate decline observed in recent years should be considered in water supply planning for future growth.

3.3 Storage Tanks

The GRGID water system includes two tanks to provide operational, emergency, and fire storage for the system. A summary of information on the GRGID storage tanks is provided in Table 6.

Table 6: Existing Storage Tanks

Tank	Pressure Zone	Type	Diameter (ft)	Side Wall Height (ft)	Base Elevation (ft)	HWL (ft)	Year Installed
1.5 MG	Low Side	Welded Steel	90	32	4,980	5,009	1984
3.0 MG	High Side	Welded Steel	130	32	5,040	5,069	1992

Cleaning and inspection was performed for each storage tank in October 2015. Overall the tanks were observed to be in good condition with a near-term recommendation to remove and replace the interior coating systems. Recoating of the 1.5 MG tank was prioritized due to blistering on the interior tank surface observed during the tank inspection. The interior tank recoating for the 1.5 MG tank was completed in May 2016 and interior recoating of the 3.0 MG tank will be included in the short-term CIP. The tank exteriors were observed to be in good condition during the October 2015 inspection but will be included in the 10-15 year CIP with the next interior recoating projects. Tank recoating projects should be completed every 10-15 years on average in accordance with industry standard.

3.4 Pressure Zones

GRGID's water system is divided into two pressure zones referred to as the High Side and the Low Side. The boundary between pressure zones generally follows South Riverview Drive with the High Size to the south and the Low Side to the north. The High Side pressure zone also includes a portion of the distribution system east of Long Valley Road along South Riverview Drive and Fairway Drive up to Well 1. A pressure zone map is presented in Figure 3.

The High Side pressure zone is served by the 3.0 MG storage tank and Wells 1, 4, and 5. The Low Side pressure zone is served by the 1.5 MG storage tank and Wells 2, 6, 8, and 9. The pressures zones are interconnected at five different locations as shown in Figure 3, but isolation valves are typically shut off to maintain pressures within each zone. There are currently no pressure reducing valves (PRVs) in the system for automatic transfer of water from the High Side to the Low Side, but isolation valves between pressure zones can be manually operated for maintenance/emergency purposes. For example, the 1.5 MG tank was removed from service during the interior recoating project in 2016 and valves were opened to allow the 3.0 MG tank to serve the Low Side pressure zone. The addition of a pressure reducing/sustaining valve between pressure zones will be included in the short-term CIP to provide a means of transferring water from the High Side to the Low Side for improved operational flexibility. The pressure reducing/sustaining valve would be beneficial during normal system operations by allowing water to circulate to the Low Side while still maintaining pressures within the High Side. The valve would also be beneficial during emergency conditions (e.g., a fire demand on the Low Side) and for

maintenance purposes (e.g., to maintain operations during tank recoating projects). The recommended location for a pressure reducing/sustaining valve is near the western boundary between the pressure zones to optimize flow distribution through the system. Potential locations are near the intersection of South Riverview Drive and Tillman Road or near the intersection of South Riverview Drive and Arrowhead Drive.

Water from the Low Side can be pumped to the High Side via the Long Valley Booster Pump Station located near the intersection of Long Valley Road and Blue Rock Road. The Long Valley Booster Pump Station was installed 1998 and consists of two booster pumps (1 duty + 1 standby), each with a 500 gpm capacity. The booster pumps operate in alternating lead-lag mode but can be manually operated in parallel for a combined capacity of 700-750 gpm.

3.5 System Age and Pipe Material

Pipe age within the GRGID distribution system ranges from less than a year old to over 50 years old. Although a significant portion of the system was constructed in the 1970s, the District has completed several waterline replacement projects over the years to replace aging infrastructure. Over 70% of the system is less than 30 years old and less than 3% of the system is over 40 years old. Total pipeline lengths by age are summarized in Table 7 and are further detailed in Appendix D by pipe diameter. The existing water system with color coding by pipe age is presented in Figure 4.

Table 7: Pipe Age Summary

Pipe Age (years)	Approximate Length[1] (ft)	% of System
40-50+	7,700	2.5%
30-40	76,600	25.2%
20-30	118,600	39.0%
10-20	89,000	29.2%
0-10	12,400	4.1%
Total	304,300	100.0%

[1] Pipeline lengths exclude water service connections and fire hydrant laterals.

Pipeline materials in the distribution system include C900 polyvinyl chloride (PVC), Schedule 40 PVC, and asbestos-cement. The majority of the system contains C900 PVC pipeline (over 70%) with a small portion of asbestos-cement (7%). All steel waterlines in the distribution system have been replaced. Some of the older portions of the water system in Units 6 and 7 contain Schedule 40 PVC which is more susceptible to failure/leaks due to thinner pipe walls and poor bedding during installation. In addition, a significant portion of the waterlines in Unit 6 and 7 were installed outside of the right-of-way and/or in locations difficult to access for maintenance and repair (e.g. within yards, under structures). The actual quantity of Schedule 40 PVC remaining in the system is unknown but is estimated to be between 15-25%. Replacement of the old Schedule 40 PVC should be prioritized in the CIP.

Distribution system waterlines are typically assumed to have a useful life expectancy of 60 years

based on industry and local standards (e.g., *Douglas County Listing of Capital Asset Components & Typical Average Useful Lives for Depreciation Purposes* [7]) although some materials have been known to exceed its service life (e.g. C900 PVC and asbestos cement). A useful life assumption of 60 years will be used for planning purposes in the development of the CIP, but higher priority will be placed on replacing the remaining Schedule 40 PVC waterlines.

4.0 REGULATORY STANDARDS

The GRGID water system is regulated by the Nevada Division of Environmental Protection (NDEP), Nevada Division of Water Resources (NDWR), and other federal, state, and local government entities. A review of applicable regulations per the Nevada Administrative Code (NAC) for evaluation of the existing and future water supply, storage, and distribution facilities is provided in the sections to follow.

4.1 Water Supply

Systems that rely exclusively on groundwater for water supply are subject to NAC 445A.6672 which requires total capacity in the system sufficient to meet the following:

- Average Day Demand: Total system capacity (including storage) should be sufficient to meet the average day demand (ADD) and fire demand with the most productive well out of service.
- Maximum Day Demand: Total system capacity (including storage) should be sufficient to meet the maximum day demand (MDD) and fire demand with all facilities in service.

When evaluating total capacity of an existing system to meet MDD, only the alternative pumping capacity and the storage capacity can be considered as sources of supply per NAC 445A.66725.1. A well or booster pump can be considered alternative pumping capacity when equipped with a source of backup power (e.g. emergency generator).

4.2 Storage

Storage requirements for existing public water systems are governed by NAC 445A.6674, 445A.66745, 445A.6675, and 445A.66755. Storage capacity includes operating storage, emergency reserve, and fire demand. NAC requirements for storage are as follows:

- Operating Storage: Operating storage should be as determined by an engineer based on historical data and supply capacity to meet the requirements of MDD.
- Emergency Reserve: Emergency reserve should be an amount as determined appropriate by the engineer.
- Fire Demand: Storage requirements for fire demand must be calculated in accordance with the fire authority.
- Storage Exemption: An existing water system is exempt from storage requirements if the system has an alternative pumping capacity that can meet requirements for MDD, peak hour demand (PHD), and fire flow.

In addition to the above considerations, NAC 445A.6674(a) states that an existing water system should provide a storage capacity sufficient to meet demands while maintaining pressures indicated in NAC 445A.6711. The total storage capacity and pump capacity for each pressure zone must be sufficient to meet MDD within each zone (NAC 445A.6674.3). Water stored in a higher pressure zone can serve a lower pressure zone if a pressure regulator is installed between zones (NAC 445A.6674.3.a)

4.3 Distribution

Distribution system requirements in accordance with NAC standards are summarized in Table 8.

Table 8: Requirements for Distribution Systems

Parameter	Criteria	Source
Minimum Pressure @ MDD + Fire Flow	20 psi	NAC 445A.6711.1(a), 445A.6672.2(a)
Minimum Pressure @ PHD	30 psi	NAC 445A.6711.1(c), 445A.6672.2(b)
Minimum Pressure @ MDD	40 psi	NAC 445A.6711.1(b), 445A.6672.2(c)
Maximum Static Pressure	100 psi	NAC 445A.6711.2
Maximum Velocity[1]	8 fps	NAC 445A.6672.2
Minimum Water Main Diameter	6-inches	NAC 445A.67115.2

[1] For all conditions except fire flow.

5.0 EXISTING AND PROJECTED WATER DEMANDS

A discussion of existing land uses, future growth areas, and an estimation of existing and projected water demands is provided in the sections to follow.

5.1 Land Use Planning

5.1.1 Existing Land Uses

The Gardnerville Ranchos area was historically used for agricultural/ranching purposes but over time has also developed into urban and rural areas. GRGID is primarily a residential community with existing land uses including single-family residential, multi-family residential (apartments, townhouses, duplexes), commercial/industrial, community/public facilities (parks, fire stations, churches), schools, and parks.

GRGID provides over one-third of the housing for the Carson Valley with a diverse market ranging from one-third acre single-family residences to 5-acre single-family residences with custom built homes [8]. Some of the newer residential neighborhoods such as the Cedar Creek System are denser with approximately six dwelling units per acre. According to the 2010 U.S. Census [9], the 2010 population for the Gardnerville Ranchos Census-Designated Place (CDP) was 11,312, which includes residents outside of the GRGID boundaries and water service area shown in Figure 1. As of 2017, there are approximately 4,300 water connections served by GRGID.

A summary of existing land uses served by the GRGID water system is summarized in Table 9. For the purposes of this Master Plan and evaluating water demands, the single-family residential land use is designated for existing lot sizes less than 2/3 acre and the single-family estates land use is designated for lot sizes 2/3 acre and larger to account for higher irrigation demands associated with larger lots. The senior living facility on Kimmerling Road has also been separated out to account for higher water usage than the commercial and community land uses.

Table 9: Existing Land Uses

Land Use	Dwelling Units (DUs)	Area (ac)
Single-Family Residential[1]	3,105	-
Single-Family Estates[1]	262	-
Multi-Family Residential	884	-
Commercial/Industrial	-	26.1
Community/Public	-	14.7
Schools	-	40.6
Parks	-	38.2
Other (Senior Living Facility)	-	2.7
Total	4,251	122.3

[1] Single-family residential lot sizes = less than 2/3 acre. Single-family estates lot sizes = 2/3 acre and greater.

Areas currently served by GRGID's water system are shown in Figure 5. Land use codes and future use designations for areas surrounding GRGID are also shown in Figure 5.

The Carson Valley Golf Course offices and country club are connected to the GRGID water system and are included in the commercial acreage shown in Table 9. Irrigation demands for the golf course, however, are served by separate groundwater wells owned and operated by the Carson Valley Golf Course. The Dresslerville/Washoe Tribe also operates their own water system and is not part of the GRGID system.

5.1.2 Infill and Future Growth

Future growth that would potentially be served by the GRGID water system includes infill areas, undeveloped land within GRGID boundaries, and developed/undeveloped land outside of current GRGID boundaries with potential to be annexed into the District or served as out-of-District customers. Future land use designations for residential developments in the Douglas County Master Plan [8] are divided into classes by dwelling units per acre as follows:

- Single-Family Residential – Designation for single-family units with densities ranging from no less than one to a maximum of six dwelling units per acre.
- Multi-Family Residential – Designation for multi-family units with densities ranging from no less than six to a maximum of 16 dwelling units per acre.
- Single-Family Estates – Designation for single-family units in rural areas with densities ranging from one to two acres per dwelling unit.

There are three general areas within or surrounding GRGID that are designated for "Future Development and Receiving Areas" in the Douglas County Master Plan [8]. The first Receiving Area is Bing's Aggregate Pit located north of Kimmerling Road which is currently zoned heavy industrial/commercial. As the Bing Pit operations near termination, a portion of the area could be developed into single-family residential lots. The acquisition of development rights and adoption of a comprehensive specific plan with proposed unit densities and environmental mitigations would be required before the Bing Pit could be established for residential development. It is anticipated only a portion of the land in this area will be developable. As such, a density of 1.2 dwelling units per acre is assumed for planning purposes to account for partial development.

The second Receiving Area, commonly referred to as Ranchos 8 and 9, is the undeveloped land located along the southern and eastern outskirts of GRGID within District boundaries (but outside of current water service area) including the 80 acres of land located at the end of Tillman Lane. It is anticipated that this land will be developed as single-family residential with lot densities of approximately six dwelling units per acre consistent with recent development within GRGID and compatible with the Douglas County Master Plan.

The third Receiving Area is the undeveloped land west of GRGID outside of District boundaries near Rubio Way and Centerville Lane/SR 756. Existing development surrounding this Receiving Area is primarily rural residential with larger lot sizes. For planning purposes, it is assumed this area will be developed with single-family estates with approximate lot sizes of one acre.

Receiving Areas, infill areas, and other existing/future development areas that could potentially join GRGID are shown in Figure 6 with acreages and/or estimated dwelling unit counts where applicable.

A summary of infill and future growth areas that could potentially be served by the GRGID water system is provided in Table 10. Future areas for community/public, schools, and park land uses were scaled proportionally by comparing existing dwelling unit counts (single-family and multi-family) to infill/future dwelling unit counts. The anticipated growth and trend of smaller residential lots could potentially leave GRGID with 4,400 additional residential dwelling units at buildout.

Table 10: Infill and Future Growth Land Uses

	Infill		Future Growth		Total Infill + Future	
Land Use	**DUs**	**Area (ac)**	**DUs**	**Area (ac)**	**DUs**	**Area (ac)**
Single-Family Residential	178	-	3,975	-	4,153	-
Single-Family Estates	20	-	198	-	218	-
Multi-Family Residential	16	-	-	-	16	-
Commercial/Industrial	-	15.4	-	27.3	-	42.7
Community/Public	-	-	-	14.1	-	14.1
Schools	-	-	-	39.0	-	39.0
Parks	-	-	-	36.7	-	36.7
Total	214	15.4	4,173	117.0	4,387	132.4

5.2 Existing Water Demands

5.2.1 Well Production

Historical well production data is summarized in Table 11 and detailed by month in Appendix E. The ADD from 2009-2016 was 2,917,000 gpd (2,026 gpm). A decrease in well production of approximately 10% is shown in 2015-2016 as compared to 2013-2014 and may be a result of meter installations and an increased awareness of water usage and conservation.

Table 11: Historical Well Production, 2009-2016

Year	Annual Total (gal)	ADD (gpd)	Maximum Month (gal)	Average Day During Max Month, ADMM (gpd)
2009	1,090,114,000	2,987,000	197,023,000	6,356,000
2010	1,034,501,000	2,834,000	184,567,000	5,954,000
2011	996,225,000	2,729,000	180,854,000	5,834,000
2012	1,159,042,000	3,175,000	190,741,000	6,153,000
2013	1,126,640,000	3,087,000	199,581,000	6,438,000
2014	1,125,146,000	3,083,000	173,407,000	5,594,000
2015	980,498,000	2,686,000	151,251,000	4,879,000
2016	1,006,537,000	2,758,000	184,710,000	5,958,000
2009-2016 Average	1,064,838,000	2,917,000	182,767,000	5,896,000

5.2.2 Metered Water Usage and Water Demand Factors

To determine water demand factors based on actual water usage, monthly meter records were reviewed for 2016 by land use type. A full year of meter records were available for approximately 60% of the residential connections. Average water demand factors by land use type are presented in Table 12 and detailed meter data is included in Appendix F. The water demand factors below represent water used by customers and do not account for non-revenue water (aka system losses).

Table 12: Water Demand Factors Based on 2016 Meter Records

Land Use	Unadjusted Demand Factor	
	gpd/DU	gpd/ac
Single-Family Residential	490	-
Single-Family Estates	1,040	-
Multi-Family Residential	290	-
Commercial/Industrial	-	1,600
Community/Public	-	570
Schools	-	1,400
Parks	-	2,200
Other (Senior Living Facility)	-	4,100

5.2.3 Peaking Factors

Daily well production records for the summer months (June-August) were reviewed for the MDD and compared to the ADD to determine a maximum day peaking factor. The historical MDDs and corresponding peaking factors from 2014-2016 are summarized in Table 13. Daily summer well production data is included in Appendix G.

Table 13: Historical Maximum Day Demand, 2014-2016

Parameter	2014	2015	2016	2014-2016 Average
ADD (gpd)	3,083,000	2,686,000	2,758,000	2,842,000
MDD (gpd)	6,947,000	6,860,000	7,113,000	6,973,000
Date of MDD	6/24/2014	6/25/2015	7/28/2016	-
MDD/ADD Peaking Factor	2.25	2.55	2.58	2.45

From 2014-2016 the average MDD/ADD peaking factor was 2.45. A peaking factor rounded to 2.50 is recommended for use in this Master Plan. In the absence of hourly production well data, a PHD/MDD peaking factor of 1.50 is recommended based on industry standard. Recommend peaking factors for maximum day and peak hour based on historical data and industry standards are summarized in Table 14.

Table 14: Recommended Peaking Factors

Parameter	Recommended Value	Source
MDD/ADD Peaking Factor	2.50	2014-2016 Average, Table 13
PHD/MDD Peaking Factor	1.50	Industry Standard

5.2.4 Existing Water Demands

Water demand factors obtained from the 2016 meter records were compared with historical well production data to validate the demand factors and estimate non-revenue water (aka system losses) in the system. Non-revenue water is defined by the American Water Works Association (AWWA) as the distributed volume of water not reflected in customer billings and includes the sum of the following:

- Unbilled Authorized Consumption: Water for firefighting, flushing, etc.
- Apparent Losses: Unauthorized consumption, data handling errors, meter inaccuracies
- Real Losses: System leaks, waterline breaks, storage tank overflows

Because historical meter records are only available for a portion of the system, the actual percentage of non-revenue water is currently unknown. An estimate of 16-19% for non-revenue water was used to adjust the water demand factors to more closely align with the 2009-2016 average well production of 2.917 million gallons per day (mgd). Existing water demands by user type using adjusted demand factors are presented in Table 15.

Table 15: Existing Water Demands

Land Use	Existing Counts		Adjusted Demand Factor[1]		Existing Water Demands			
					ADD		MDD	PHD
	DUs	Area (ac)	gpd/ DU	gpd/ ac	(gpd)	(gpm)	(gpm)	(gpm)
Single-Family Residential	3,105		640		1,987,000	1,380	3,450	5,175
Single-Family Estates	262		1,310		343,000	238	595	893
Multi-Family Residential	884		370		327,000	227	568	852
Commercial/ Industrial		26.1		2,000	52,000	36	90	135
Community/ Public		14.7		720	11,000	8	19	29
Schools		40.6		1,800	73,000	50	127	191
Parks		38.2		3,000	115,000	80	200	300
Other (Senior Living)		2.7		5,200	14,000	10	24	36
Total Estimated Demand w/Non-Revenue Water					2,922,000	2,029	5,073	7,610
versus								
Total Average Well Production (2009-2016)					2,917,000	2,026		

[1] Demand factors from Table 12 adjusted for 16-19% non-revenue losses (estimated) and 6% adder for 2009-2016 well production average (2009-2016 well production average is 6% higher than 2016 well production).

5.3 Projected Water Demands

Annual population growth rates were analyzed in the 2014 Water Resource Plan based on data from the Nevada State Demographer's office and the 2010 U.S. Census Bureau [5]. In the Water Resource Plan, annual growth rates for the next 20-years were estimated at 0.3-0.5% annually, however, if a large residential subdivision is approved in one of the Receiving Areas, the annual growth rate could be much higher. The timing of future developments is unknown, but for the purposes of this Master Plan a 1.5% growth rate is assumed for a conservative estimate of future water demands. Although population growth is difficult to predict, a rate of 1.5% accounts for new subdivisions being approved at a reasonable rate without overestimating growth. Growth estimates should be reassessed with the next Master Plan update and adjusted as necessary to better align with development plans. Ultimately the timing, sizing, and location of new infrastructure required for growth will be determined by development needs as they occur with consideration for future needs so that new facilities are planned to align with the District's Master Plan objectives.

Projected 10-year and 20-year water demands at the assumed growth rate of 1.5% are summarized in Table 16.

Table 16: Projected 10-Yr and 20-Yr Water Demands

Condition	ADD (gpm)	MDD (gpm	PHD (gpm)	Equivalent Increase in SFR DUs	% of Buildout Demand
Existing Demands	2,029	5,073	7,610	-	48%
Projected 10-yr Demands (2027)[1]	2,355	5,887	8,830	730	55%
Projected 20-yr Demands (2037)[1]	2,733	6,832	10,248	850	64%
Total				1,580	

[1] Assuming an annual growth rate of 1.5%.

Projected water demands at buildout considering all existing land uses, infill areas, future growth, and potential Receiving Areas are summarized in Table 17. Future areas for community/public, schools, and park land uses were scaled proportionally by comparing existing dwelling unit counts (single-family and multi-family) to infill/future dwelling unit counts.

Table 17: Projected Buildout Water Demands

Land Use	Buildout		Demand Factor		Projected Water Demands			
					ADD		MDD	PHD
	DUs	Area (ac)	gpd/ DU	gpd/ ac	(gpd)	(gpm)	(gpm)	(gpm)
Single-Family Residential	7,258		640		4,645,000	3,226	8,064	12,096
Single-Family Estates	480		1,310		629,000	437	1,092	1,638
Multi-Family Residential	900		370		333,000	231	578	867
Commercial/ Industrial		68.8		2,000	138,000	96	240	359
Community/ Public		28.8		720	21,000	15	36	55
Schools		79.6		1,800	143,000	99	248	372
Parks		74.9		3,000	225,000	156	391	586
Other (Senior Living)		2.7		5,200	14,000	10	24	36
Total	8,638	254.8			6,148,000	4,270	10,674	16,010

Water demand projections in Tables 16 and 17 are conservative and do not consider the effects of decreased water demands related to the Water Meter Program. A decrease in well production of approximately 10% was noted in 2015-2016 as compared to 2013-2014 and could potentially be related to successful implementation of the Water Meter Program. With the Water Meter Program in full effect as of March 2017, an additional reduction in water demands is anticipated and could be up to 10-20%. The impact of water demand reductions should be considered in conjunction with the sizing of infrastructure for future growth.

6.0 HYDRAULIC MODELING

The GRGID water model was updated to reflect current conditions and was used to evaluate the water system at existing and projected water demands. Model development and results are presented in the sections to follow.

6.1 Model Update

The GRGID water model was updated using Bentley WaterCAD V8i software. Water demands developed in Section 5.0 were input to the model by adding dwelling unit counts and acreages for each land use type to the nearest nodes along with the corresponding water demand factors. Physical data such as pipe diameters/locations were updated by reviewing record drawings.

6.2 Model Calibration

To check the model for accuracy, fire flow tests were conducted in April 2017 at five locations in the system in accordance with AWWA Standard M17. Data obtained from the fire flow tests includes static pressure, hydrant flow, and residual pressure during hydrant flow. The hydrant flows were simulated in the water model and the pressures generated by the model were compared to the field data. To calibrate the model, the Hazen Williams roughness coefficients ('C' Values) were adjusted as summarized in Table 18.

Table 18: Roughness Coefficients for Water Model

Pipe Material	Hazen Williams C Value
C900 PVC/Schedule 40 PVC	140
Asbestos Cement	130

Results of the fire flow tests versus water model results and a map of the test locations is included in Appendix H. On average, the model results were within 5% of the fire flow tests with the exception of the test location on Rocky Terrace Drive. Residual pressure in the model at this location were 15% higher than the residual pressure noted during the fire flow test. The lower residual pressure observed during the fire flow test may be a result of closed or partially-closed valves within the area. In general, the fire flow tests show that the water model is a good reflection of the existing system.

6.3 Required Fire Flows

Minimum required fire flows for the system were updated based on the International Fire Code (IFC) with input from the East Fork Fire Protection District Deputy Chief (Steve Eisele, 4/28/17). A summary of required fire flows and durations for all buildings within GRGID larger than 3,600 square feet is provided in Table 19 and detailed in Appendix I. Residential units with less than 3,600 square feet have a required fire flow of 1,000 gpm for 1 hour per the IFC, however, a conservative fire flow of 1,500 gpm for 2 hours is preferred by the Fire Protection District and was used in the model at all locations other than those listed in Table 19.

Table 19: Required Fire Flows

Properties	Location	Required Fire Flow[1] (gpm)	Duration (hrs)	Pressure Zone
Commercial/Community				
Carson Valley Senior Living	1189 Kimmerling Rd.	2,300	3	High Side
Dollar General	1257 Pit Rd.	1,500	2	High Side
Elks Lodge	1227 Kimmerling Rd.	2,000	3	High Side
Langtree Square	1302 Langley Dr.	2,000	2	High Side
NuSystems	1266 Dresslerville Rd.	1,700	2	Low Side
Misc. Commercial	811 Short Ct.	2,100	3	High Side
Post Office	1271 Kimmerling Rd.	1,700	2	High Side
Tillman Center	1281 Kimmerling Rd.	2,700	3	High Side
Calvary Chapel	1004 Dresslerville Rd.	2,100	3	Low Side
Schools				
CC Meneley Elementary School	Muir Dr.	2,600	3	High Side
Gene Scarselli Elementary School	Long Valley Rd.	2,700	3	High Side
Pau Wa Lu Middle School	Long Valley Rd.	3,500	4	High Side
Apartments				
Clock Tower Center Apartments	806 Tillman Ln.	3,500	4	High Side

[1] Fire flows per IFC include 50% reduction for fire sprinklers and the addition of a sprinkler demand per input from the East Fork Fire Protection District Deputy Chief (Steve Eisele, 4/28/17).

6.4 Model Scenarios and Evaluation Criteria

The hydraulic capacity of the water system and compliance with minimum pressure requirements per NAC standards were evaluated through the following model scenarios:

- Scenario 1 – MDD: An analysis of MDD conditions to assess the system's ability to maintain a minimum system pressure of 40 psi and maximum pipeline velocity of 8 fps.
- Scenario 2 – PHD: An analysis of PHD conditions to assess the system's ability to maintain a minimum system pressure of 30 psi and maximum pipeline velocity of 8 fps.

- Scenario 3 – MDD + Fire Flow: An analysis of MDD conditions with the required fire flow at each junction to assess the system's ability to deliver the minimum fire flow while maintaining a minimum system pressure of 20 psi.
- Scenario 4 – Static Conditions: An analysis of static conditions with no water demands applied to assess the system's ability to maintain a maximum static pressure of 100 psi.

6.5 Model Results

6.5.1 Existing Conditions

The comprehensive results for Model Scenarios 1-4 under existing conditions are contained in Appendix J and are summarized below:

- Scenario 1 – MDD: The total existing demand under MDD conditions is 2,029 gpm. Under MDD conditions the lowest water system pressure is 49 psi and the maximum velocity is 5.3 fps which meet the evaluation criteria. The MDD scenario was conducted with Wells 1, 4, 6, and 9 on.
- Scenario 2 – PHD: The total existing demand under PHD conditions is 5,073 gpm. Under PHD conditions the lowest water system pressure is 41 psi and the maximum velocity is 5.5 fps which meets the evaluation criteria. The PHD scenario was conducted with Wells 1, 4, 6, 8, and 9 on.
- Scenario 3 – MDD + Fire Flow: Under MDD + Fire Flow condition all fire flows were met within the system except at Junction 249 (dead end at the east end of Mary Jo Drive). The available fire flow at this location is 1,248 gpm at a residual pressure of 20 psi and the required fire flow is 1,500 gpm. Increasing the pipe diameter from 6-inch to 8-inch at this location satisfies the fire flow requirement, however, upsizing the main is not a priority because the minimum IFC requirement of 1,000 gpm is still achieved. The MDD + Fire Flow scenario was conducted with all the wells on.
- Scenario 4 – Static Conditions: Under static conditions, pressures exceed 100 psi at the following locations:
  - Rocky Terrace Subdivision: Static pressures range from 100-110 psi. Pressures are regulated in this area with individual PRVs.
  - Rainshadow Ranch Subdivision: Static pressures range from 95-105 psi. Pressures are regulated in this area with individual PRVs.
  - Kimmerling Road (West of Bing Road): Static pressures in this area range from 102-110 psi. Pressure issues have not been reported in this area.
  - Junction 46 (Fairway Drive near Well 1): Static pressure near the Well 1 discharge is 103 psi. Pressure issues have not been reported in this area.

7.0 SYSTEM CAPACITY ANALYSIS

An analysis of system capacity for existing and future conditions is provided in this section.

7.1 Existing Conditions

7.1.1 Existing System Capacity

The existing system capacity was evaluated to determine if there is sufficient storage and alternative pumping capacity (i.e., pumps/wells with emergency generators) to meet MDD and fire demand in accordance with NAC requirements. The existing system capacity analysis by pressure zone is presented in Table 20.

Table 20: Existing System Capacity vs. MDD + Fire Demand Analysis

Parameter		High Side		Low Side		Total (MG)	
		(MG)	(gpm)	(MG)	(gpm)	(MG)	(gpm)
Total Available Storage		3.00	2,083	1.50	1,042	4.50	3,125
Required Fire Storage[1]	-	0.84	583	0.38	263	1.22	846
Remaining Storage	=	2.16	1,500	1.12	779	3.28	2,279
Alternative Pumping Capacity[2]	+	1.94	1,350	5.40	3,750	7.34	5,097
Total Available Capacity	=	4.10	2,850	6.52	4,529	10.62	7,376
vs							
Maximum Day Demand		4.92	3,418	2.38	1,655	7.30	5,073
Excess Capacity		-	-	4.14	2,874	3.32	2,304
Additional Capacity Needed		0.82	570	-	-	-	-

[1] High Side: Middle school requires 3,500 gpm for 4 hours. Low Side: Calvary chapel requires 2,100 gpm for 3 hours.

[2] Well 1 (High Side) and Wells 2, 8, and 9 (Low Side) are equipped with emergency generators and may be considered "alternative pumping capacity" per NAC 445A.66755. Well 5 capacity not included due to high arsenic levels.

As shown in Table 20, the Low Side has a total excess capacity of 2,874 gpm and the High Side needs an additional 570 gpm total capacity. Water from the Low Side can be transferred to the High Side via the Long Valley Booster Station, but the pumping system is limited to 500 gpm capacity and because the station is not equipped with an emergency generator it cannot be considered alternative pumping capacity for the above analysis.

An alternative method of evaluating system capacity is to provide sufficient pumping capacity in in each zone (with or without backup power) sufficient to meet MDD conditions so that operating storage in the tanks can be reserved for peak system demands in excess of MDD (see Section 7.1.2 for storage analysis). An analysis of existing pumping capacity versus MDD is presented in Table 21. As shown in the analysis, an additional 1,270 gpm pumping capacity is needed on the High Side to meet existing MDD conditions.

Table 21: Existing Pumping Capacity vs. MDD Analysis

Parameter	High Side	Low Side	Total
MDD (gpm)	3,418	1,655	5,073
Pumping Capacity (gpm)[1]	2,150	3,950	6,100
Excess Capacity (gpm)	-	2,295	1,028
Additional Capacity Needed (gpm)	1,270	-	-

[1] High Side Pumping Capacity: Includes Wells 1, 4, and Long Valley Booster. Well 5 capacity excluded due to high arsenic (emergency use only).
Low Side Pumping Capacity: Includes Wells 2, 6, 8, and 9 with 500 gpm capacity subtracted for transfer to High Side with Long Valley Booster.

7.1.2 Existing Storage Capacity

In evaluating existing storage capacity, there are many factors that should be considered including the following:

- Sufficient operating storage to supplement capacity of pumping facilities during peak system demands.
- Sufficient reserve capacity to supply system demands for the duration of an emergency event (e.g., a waterline break or pump station failure).
- Fire storage as determined by the local fire authority to account for all sizes, classes, and uses of buildings within the service area.
- Future water demands associated with population growth in the service area.
- Water quality as related to residence time and circulation of water within the storage tank (i.e., excessive design volumes should be avoided to prevent water quality degradation).

The East Fork Fire Protection District Deputy Chief, Steve Eisele, was contacted to determine minimum fire storage requirements as summarized in Section 6.3. In accordance with the latest version of the IFC and input from the Deputy Chief, the largest fire flow demand for the High Side is for the Pau Wa Lu Middle School at 3,500 gpm for 4 hours and the largest fire flow demand for the Low Side is the Calvary Chapel at 2,100 gpm for 3 hours.

For operating storage, a capacity equivalent to 6 hours of peak demands above MDD is recommended in each pressure zone to supplement pumping capacities of the wells during peak demands. It is recommended that the MDD conditions be met through pumping of the wells and Long Valley Booster Station with the improvements outlined in Section 7.1.3.

For emergency reserve, a capacity equivalent to 75% of the ADD is recommended in each

pressure zone to provide storage capacity during an emergency event.

The existing storage analysis is presented in Table 22 by pressure zone. There is sufficient storage in both pressure zones with the ability to serve approximately 261 additional single-family residential units on a system wide basis.

Table 22: Existing Storage Analysis

Parameter		High Side (MG)	Low Side (MG)	Total (MG)
Total Available Storage		3.00	1.50	4.50
Operating, (6 hrs PHD - MDD)	-	0.61	0.30	0.91
Emergency Reserve (75% ADD)	-	1.47	0.72	2.19
Fire Storage[1]	-	0.84	0.38	1.22
Remaining Storage	=	0.08	0.10	0.18
Allowable Growth (Excess Storage as Equivalent Single-Family DUs)		118	143	261

[1] High Side: Middle school requires 3,500 gpm for 4 hours. Low Side: Calvary chapel requires 2,100 gpm for 3 hours.

7.1.3 Existing Capacity Improvements

Capacity deficiencies identified in Section 7.1.1 for the High Side include an alternative pumping capacity deficiency of 570 gpm (backup power required) and an overall pumping capacity deficiency of 1,270 gpm (with or without backup power). To address the pumping capacity deficiency on the High Side, the following alternatives were considered:

- Alternative 1: Replace Well 4 and add emergency generator
  Desired capacity = 600-800 gpm
- Alternative 2: Upgrade Long Valley Booster Station and equip with emergency generator
  Added capacity = 1,500–2,000 gpm
- Alternative 3: Redirect Well 2 from Low Side to High Side
  Added capacity = 1,400-1,600 gpm
- Alternative 4: Add arsenic treatment or blending facility for Well 5
  Added capacity = 1,200 gpm

The preferred alternatives are Alternative 1 (replace Well 4) with test well drilling already completed in April-May of 2017 and Alternative 3 (redirect Well 2) to take advantage of the excess capacity on the Low Side. These alternatives are the most cost-effective in addressing the pumping deficiency and could potentially provide an additional 2,000-2,400 gpm pumping capacity on the High Side. Increasing pumping capacity on the High Side will also provide a more reliable means to remove the 3.0 MG tank from service for recoating of the interior (also included in the short-term CIP). Additional analysis will be needed to determine feasibility and required infrastructure for the Well 2 redirect. Capacity of the Well 4 replacement would be determined

with additional pump testing during production well drilling. It is recommended that these improvements be included in the short-term CIP. Alternative 2 (booster station upgrade) and Alternative 4 (arsenic treatment or blending) are more costly to implement, but may be required in the future to address growth and/or aging infrastructure.

Water quality zone testing on Well 5 will also be included in the short-term CIP as recommended in Section 3.2. If the zone testing results indicate higher quality water can be obtained from Well 5 by blocking zones with high arsenic, additional capacity may be available to the High Side to address capacity deficiencies. However, the production capacity of Well 5 may be reduced if the length of screened interval is decreased.

7.2 Future Conditions

7.2.1 10-Year and 20-Year System Capacity

The future system capacity analyses by pressure zone for 10-year and 20-year demand projections are presented in Tables 23 and 24. The total system capacity will be sufficient for 10-year MDD projections with the completion of the Well 4 replacement and Well 2 redirect projects discussed in Section 7.1.3 to address existing capacity deficiencies. For the 20-year MDD projections, there is a deficiency in system capacity on the High Side of 251 gpm which could be addressed with the addition of an emergency generator to the Long Valley Booster Station so that it can be considered alternative pumping capacity.

Table 23: Future System Capacity vs. MDD + Fire Demand Analysis: 10-Year Projections

Parameter		High Side (MG)	High Side (gpm)	Low Side (MG)	Low Side (gpm)	Total (MG) (MG)	Total (MG) (gpm)
Total Available Storage		3.00	2,083	1.50	1,042	4.50	3,125
Required Fire Storage[1]	-	0.84	583	0.38	263	1.22	846
Remaining Storage	=	2.16	1,500	1.12	779	3.28	2,279
Alternative Pumping Capacity[2]	+	4.82	3,350	2.88	2,000	7.70	5,350
Total Available Capacity	=	6.98	4,850	4.00	2,779	10.98	7,629
vs							
10-Yr Maximum Day Demand[3]		6.33	4,396	2.15	1,491	8.48	5,887
Excess Capacity		0.65	454	1.85	1,288	2.50	1,742
Additional Capacity Needed		-	-	-	-	-	-

[1] High Side: Middle school requires 3,500 gpm for 4 hours. Low Side: Calvary chapel requires 2,100 gpm for 3 hours.

[2] Assume Well 4 replacement (600 gpm capacity) and Well 2 redirect complete (1,400 gpm capacity). Assume Wells 1, 2, 4 (High Side) and Well 8 and 9 (Low Side) are equipped with emergency generators and may be considered "alternative pumping capacity" per NAC 445A.66755. Well 5 capacity not included due to high arsenic levels (emergency use only).

[3] Assuming 1.5% annual growth rate.

Table 24: Future System Capacity vs. MDD + Fire Demand Analysis: 20-Year Projections

Parameter		High Side (MG)	High Side (gpm)	Low Side (MG)	Low Side (gpm)	Total (MG) (MG)	Total (MG) (gpm)
Total Available Storage		3.00	2,083	1.50	1,042	4.50	3,125
Required Fire Storage[1]	-	0.84	583	0.38	263	1.22	846
Remaining Storage	=	2.16	1,500	1.12	779	3.28	2,279
Alternative Pumping Capacity[2]	+	4.82	3,350	2.88	2,000	7.70	5,350
Total Available Capacity	=	6.98	4,850	4.00	2,779	10.98	7,629
vs							
20-Yr Maximum Day Demand[3]		7.35	5,101	2.49	1,731	9.84	6,832
Excess Capacity		-	-	1.51	1,049	1.14	797
Additional Capacity Needed		0.37	251	-	-	-	-

[1] High Side: Middle school requires 3,500 gpm for 4 hours. Low Side: Calvary chapel requires 2,100 gpm for 3 hours.

[2] Assume Well 4 replacement (600 gpm capacity) and Well 2 redirect complete (1,400 gpm capacity). Assume Wells 1, 2, 4 (High Side) and Well 8 and 9 (Low Side) are equipped with emergency generators and may be considered "alternative pumping capacity" per NAC 445A.66755. Well 5 capacity not included due to high arsenic levels.

[3] Assuming 1.5% annual growth rate.

Similar to the existing system analysis, an evaluation of pumping capacity required for 10-year and 20-year MDD projections is presented in Table 25. This analysis assumes that total pumping capacity in each pressure zone is sufficient to meet MDD (with or without backup power) and operating storage in the tanks is reserved for peak system demands in excess of MDD. As shown in Table 25 an additional 550 gpm pumping capacity will be needed for 10-year MDD projections and an additional 1,300 gpm pumping capacity will be needed for 20-year MDD projections. Additional capacity could be achieved with additional wells and potentially upsizing the Long Valley Booster Station (limited by excess capacity available on Low Side).

Table 25: Future Pumping Capacity vs. MDD Analysis: 10-Year and 20-Year Projections

Parameter	High Side	Low Side	Total
10-Year Projection			
MDD (gpm)	4,396	1,491	5,887
Alternative Pumping Capacity (gpm)[1]	3,850	2,200	6,050
Excess Capacity (gpm)	-	709	163
Additional Capacity Needed (gpm)	550	-	-
20-Year Projection			
MDD (gpm)	5,101	1,731	6,832
Alternative Pumping Capacity (gpm)[1]	3,850	2,200	6,050
Excess Capacity (gpm)	-	469	0
Additional Capacity Needed (gpm)	1,300	-	782

[1] High Side Pumping Capacity: Well 4 replacement (600 gpm capacity) and Well 2 redirect complete (1,400 gpm capacity). Capacity includes Wells 1, 2, 4, and Long Valley Booster. Well 5 capacity excluded due to high arsenic (emergency use only).
Low Side Pumping Capacity: Includes Wells 6, 8, and 9 with 500 gpm capacity subtracted for transfer to High Side with Long Valley Booster.

7.2.2 Future Storage Capacity

A storage analysis for 10-year and 20-year demand projections is presented in Table 26 by pressure zone. If growth occurs as estimated, an additional 0.53 MG storage will be needed within the next 10 years on the High Side. A total of 0.96 MG of storage will be needed on the High Side with 20-year demand projections, but should be sized for 1.5 MG to accommodate additional growth and variability in growth rates.

Table 26: Future Storage Analysis: 10-Year and 20-Year Projections

Parameter	High Side (MG)	Low Side (MG)	Total (MG)
10-Year Projection			
Total Available Storage	3.00	1.50	4.50
Operating, (6 hrs PHD - MDD)	0.79	0.27	1.06
Emergency Reserve (75% ADD)	1.90	0.64	2.54
Fire Storage[1]	0.84	0.38	1.22
Excess Storage	-	0.21	-
Additional Storage Needed	0.53	-	0.32
20-Year Projection			
Total Available Storage	3.00	1.50	4.50
Operating, (6 hrs PHD - MDD)	0.92	0.31	1.23
Emergency Reserve (75% ADD)	2.20	0.75	2.95
Fire Storage[1]	0.84	0.38	1.22
Excess Storage	-	0.06	-
Additional Storage Needed	0.96	-	0.90

[1] High Side: Middle school requires 3,500 gpm for 4 hours. Low Side: Calvary chapel requires 2,100 gpm for 3 hours.

7.3 Future Water Supply Planning

Future water supply planning alternatives were presented to the Board of Trustees on November 2, 2016. Pros and cons/challenges were presented for each water supply alternative which included: 1) surface water treatment; 2) additional well field development; and 3) a regional connection with a nearby water system. A policy decision adopted by the Board during the meeting was to continue developing the wellfield for the next seven years with the addition of an arsenic treatment/blending facility, if needed. Beyond the seven years, the Board would like to begin working on agreements with other water systems for a potential regional connection. The long-term water supply goal is to have a diversified water supply system consisting of groundwater wells and a regional connection.

8.0 CAPITAL IMPROVEMENT PLAN

8.1 Cost Estimating

Cost estimates presented in the CIP have been prepared for planning purposes to provide guidance in project planning and timing of implementation. Unit costs were developed from bid tabulations and experience with similar project designs. Final project costs will vary depending on project scope/complexity, schedule, and labor/material costs at the time of bid. The CIP is intended as a planning tool to ensure GRGID is saving/reserving adequate funds for necessary improvement projects and should be updated regularly.

8.2 Project Costs

8.2.1 Water System Asset Management Plan

A water system asset management plan was developed and prioritized by comparing the age of existing water system components with the anticipated useful life of each component. The age of water system components were determined through development history and as-built drawings. Useful life assumptions were based on industry standard considering the *Douglas County Listing of Capital Asset Components & Typical Average Useful Lives for Depreciation Purposes* [7]. The following useful life assumptions were used for the asset management plan:

- Waterlines (including valves and fittings) = 60 years
- Fire Hydrants = 60 (assume replacement at same time as waterlines)
- Water Meters = 30
- Welded Steel Tank = 60
- Tank Coating = 15
- Groundwater Wells = 45
- Booster Pumps = 20

Total replacement costs for aging infrastructure were determined considering the replacement year (i.e. end of useful life) and an inflation rate of 2%. System replacement costs in 10-year increments are summarized in Appendix K. The total cost to replace the system at the end of each component's useful life is approximately $89 million. Aging infrastructure should only be replaced as needed and timing may fall long before or after the useful life assumptions.

8.2.2 Proposed Improvements Based on Condition

As discussed in Section 3.0, some of the older portions of the water system in Units 6 and 7 contain Schedule 40 PVC and should be prioritized for replacement due to poor installation, inadequate pressure rating of the pipe, and difficulties accessing the pipe for maintenance/repair. Estimated project costs associated with replacing the Schedule 40 PVC pipeline are summarized in Table 27. It is recommended that the replacement of the Schedule 40 PVC waterline be addressed in the next 5-15 years of the CIP.

Table 27: Costs for Schedule 40 PVC Pipeline Replacement

Item	Quantity	Unit	Unit Cost[1]	Total Cost
4" Waterline (Replace w/6")	3,800	LF	$ 70	$ 266,000
6" Waterline	26,700	LF	$ 70	$ 1,870,000
8" Waterline	35,800	LF	$ 80	$ 2,860,000
12" Waterline	2,500	LF	$ 100	$ 250,000
Fire Hydrants	135	EA	$ 7,500	$ 1,020,000
			Total	$ 6,270,000

[1] Waterline replacement includes isolation valves, restrained joints, fittings, excavation, backfill, and restoration of finish grade.

Water quality zone testing on Well 5 was recommended in the 2014 Water Resource Plan to determine if there is a specific aquifer zone with higher levels of arsenic [5]. The goal of the zone testing would be to potentially block off zones with higher arsenic for an improved water quality meeting the drinking water standards. The estimated cost associated with zone testing on Well 5 is provided in Table 28 and is recommended for inclusion in the near-term CIP.

Table 28: Costs for Well 5 Water Quality Zone Testing

Item	Quantity	Unit	Unit Cost	Total Cost
Well 5 Water Quality Zone Testing[1]	1	LS	$30,000	$30,000

[1] Does not include improvements to Well 5 for permanent isolation of zones.

8.2.3 Capacity and Operational Improvements for Existing System

Additional pumping capacity is required on the High Side to meet existing MDD conditions. In addition, the ability to transfer water from the High Side to the Low Side is needed to improve operational flexibility. Estimated project costs associated with the replacement of Well 4, the redirect of Well 2 to the High Side, and the addition of a pressure reducing/sustaining valve between pressure zones are summarized in Table 29. It is recommended that the capacity improvement projects be addressed in the short-term CIP.

Table 29: Costs for Capacity and Operational Improvements to the Existing System

Item	Quantity	Unit	Unit Cost	Total Cost
Well 4 Replacement and Addition of Emergency Generator	1	LS	$ 1,000,000	$ 1,000,000
Well 2 Redirect to High Side[1]	1	LS	$ 200,000	$ 200,000
Pressure Reducing/Sustaining Valve Between Pressure Zones	1	LS	$ 50,000	$ 50,000

[1] Assume re-equipping of Well 2 pump and approximately 1,000 LF of 10-inch waterline.

8.2.4 Capacity Improvements for Future Growth

To accommodate future growth and Receiving Areas, additional pumping and storage capacity will need to be provided in the system. Estimated project costs for capacity improvements associated with future growth are summarized in Table 30. Funding for future growth projects should be through impact fees paid by development.

Table 30: Capacity Improvements for Future Growth

Item	Quantity	Unit	Unit Cost	Total Cost
Replace Long Valley Booster Station and Equip with Emergency Generator	1	LS	$ 500,000	$ 500,000
Additional Wells	2	EA	$ 1,000,000	$ 2,000,000
1.5 MG Storage Tank	1	LS	$ 1,500,000	$ 1,500,000

8.2.5 On-Going Maintenance and Planning

On-going maintenance and planning projects recommended for inclusion in the CIP are as follows:

- Field assessments should be scheduled regularly to monitor the condition of the existing system and to identify and prioritize rehabilitation/replacement projects.
- The actual percentage of non-revenue water (aka system losses) should be tracked as more meter records become available to assess system performance. If more than 10% of non-revenue water is suspected to be a result of real and apparent losses (unauthorized consumption, waterline breaks/leaks, etc.), GRGID should consider a leak detection survey and water loss audit to identify problem areas.
- The Water Master Plan should be updated at 5-year intervals to reflect current conditions and to re-evaluate the short-term and long-term CIP.
- An updated water rate study should be prepared after obtaining additional meter records

to determine if adjustments are necessary to the base service charge to support operation costs and to ensure GRGID is saving/reserving sufficient funds.

8.3 Capital Improvement Plan

Recommended improvement projects are separated into a short-term CIP (0-5 years), long-term CIP (20+ years), and intermediate 5-year increments as summarized in Table 31 on the next page. The District currently has two bonds for previous water system projects which will be paid off in the next several years. For future waterline replacement projects, consideration should be given to completing smaller scale projects until the District's current bonds are paid off. Water infrastructure projects completed before bond repayment can be funded through the District's existing water enterprise fund with revenues collected from connection fees. Upon retirement of the existing bonds, a new bond could be secured to complete larger scale projects such as replacement of the Schedule 40 PVC waterlines in Units 6 and 7 (included in the 5-10 Year and 10-15 Year CIP).

Table 31: Recommended CIP

Fiscal Years (FY)	Recommended Project/Study	Total Cost (Current)	Total Cost (2% Inflation)
	0-5 Year CIP (Short-Term)		
2017-18	Well 4 Replacement	$ 1,000,000	$ 1,000,000
	Pressure Reducing/Sustaining Valve Between Pressure Zones	$ 50,000	$ 50,000
2018-19	Well 5 Water Quality Zone Testing	$ 30,000	$ 31,000
	Well 2 Redirect to High Side	$ 200,000	$ 204,000
2019-20	3.0 MG Tank Interior Recoating	$ 350,000	$ 364,000
2020-22	Updated Water Rate Study	$ 40,000	$ 43,000
	Total	$ 1,670,000	$ 1,692,000
	5-10 Year CIP		
2022-27	5-Yr Update to Water Master Plan	$ 25,000	$ 28,000
	Replace Long Valley Booster Station	$ 500,000	$ 552,000
	Waterline Replacement Projects (Sch 40 PVC)	$ 3,140,000	$ 3,830,000
	Future Growth: (1) Additional Well[1]	$ 1,000,000	$ 1,220,000
	Future Growth: 1.5 MG Storage Tank[1]	$ 1,500,000	$ 1,830,000
	Regional Water Supply Connection[2]	TBD	TBD
	Total	$ 6,165,000	$ 7,460,000
	10-15 Year CIP		
2027-32	5-Yr Update to Water Master Plan	$ 25,000	$ 30,000
	Waterline Replacement Projects (Sch 40 PVC)	$ 3,140,000	$ 4,230,000
	Total	$ 3,165,000	$ 4,260,000
	15-20 Year CIP		
2032-37	5-Yr Update to Water Master Plan	$ 25,000	$ 34,000
	1.5 MG Tank Interior/Exterior Recoating	$ 425,000	$ 572,000
	3.0 MG Tank Interior/Exterior Recoating	$ 600,000	$ 808,000
	Well 5 and Well 6 Replacement	$ 2,000,000	$ 2,690,000
	Waterline Replacement Projects	$ 640,000	$ 860,000
	Future Growth: (1) Additional Well[1]	$ 1,000,000	$ 1,490,000
	Total	$ 4,690,000	$ 6,454,000
	20+ Year CIP (Long-Term)		
	Replace Aging Infrastructure[3]	$ 33,000,000	$ 74,000,000
	Future Growth: New Tanks ($/MG)[1]	$ 1,000,000	$ 1,500,000
	Future Growth: New Wells ($/Well)[1]	$ 1,000,000	$ 1,500,000
	Arsenic Treatment/Blending Facility[2]	TBD	TBD

[1] Future growth projects should be funded through impact fees paid by development. Costs do not include transmission mains to connect to existing system, power to site, land costs, etc.

[2] Further study required to estimate costs and timing.

[3] Total cost to replace system over next 60 years in accordance with asset management plan (Appendix K) considering improvements included in 0-20 Year CIP.

9.0 REFERENCES

[1] Gardnerville Ranchos General Improvement District, Policies and Procedures Manual – Appendix B Water Rates, Fees and Charges, 2 November 2011.

[2] Gardnerville Ranchos General Improvement District Water Rate Study, prepared by Lumos & Associates, September 2003.

[3] Gardnerville Ranchos General Improvement District Water Rate Study, prepared by Lumos & Associates, March 2007.

[4] Gardnerville Ranchos General Improvement District Capital Contribution Fee Analysis, prepared by Lumos & Associates, August 2011.

[5] Gardnerville Ranchos General Improvement District Water Resource Plan, prepared by Lumos & Associates, July 2014.

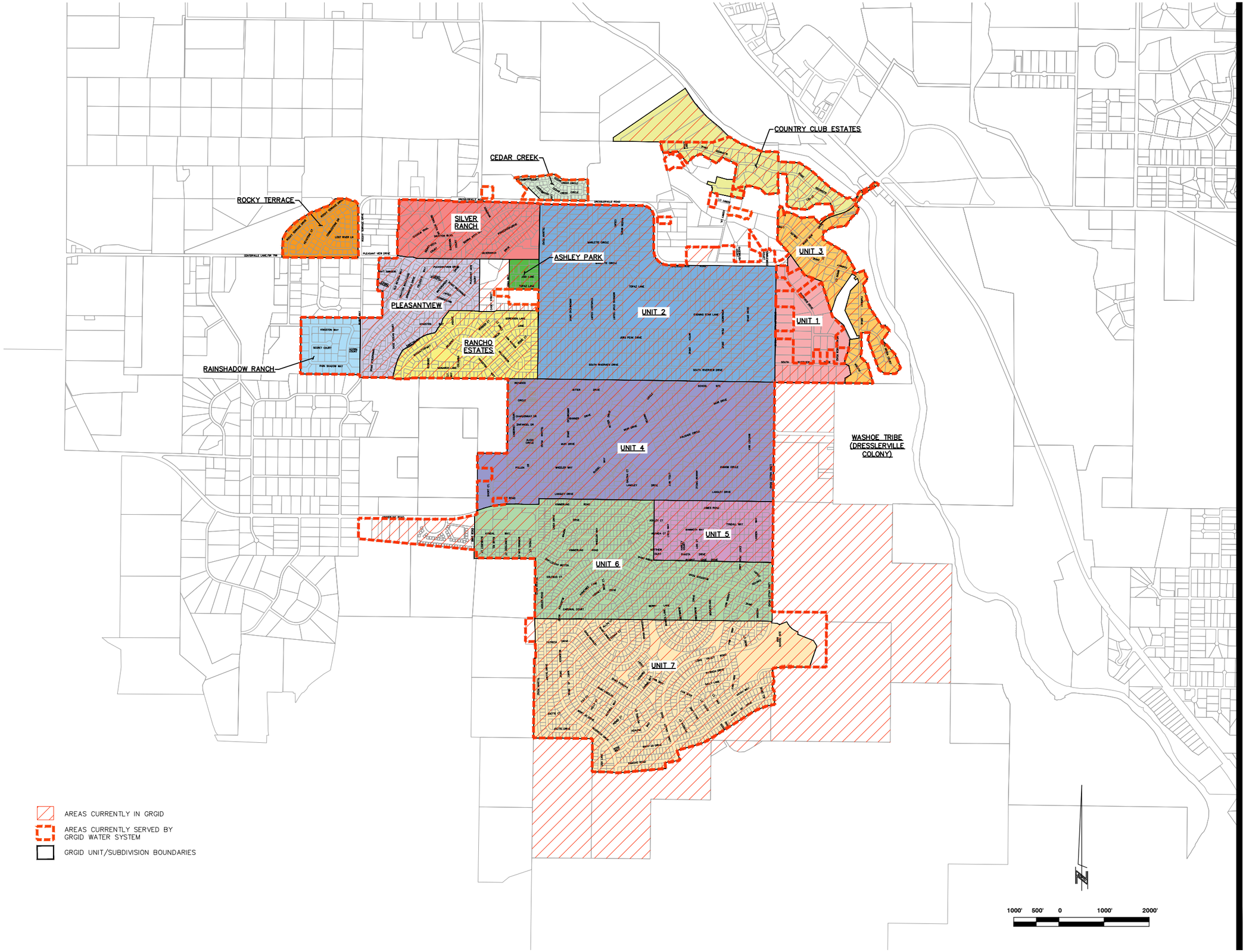
[6] Gardnerville Ranchos General Improvement District Replacement Well 4, Test Hole Results Memo, prepared by Lumos & Associates, June 9, 2017.

[7] *Douglas County Listing of Capital Asset Components & Typical Average Useful Lives of Depreciation Purposes*, 6 May 2009.

[8] Douglas County, Nevada Master Plan 2011 Update, prepared by Douglas County Community Development Department, Adopted 1 March 2012.

[9] United States Census Bureau, American Fact Finder Community Facts: Gardnerville Ranchos CDP, Nevada, 05 July 2016. <http://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml>

FIGURES



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GRGID WATER MASTER PLAN
SERVICE AREA & GRGID UNITS
FIGURE 1

DOUGLAS COUNTY
GARDNERVILLE
NEVADA

REV	DATE	DESCRIPTION	BY

1

DATE:	JULY 2017
DRAWN BY:	KT/CS
DESIGNED BY:	-
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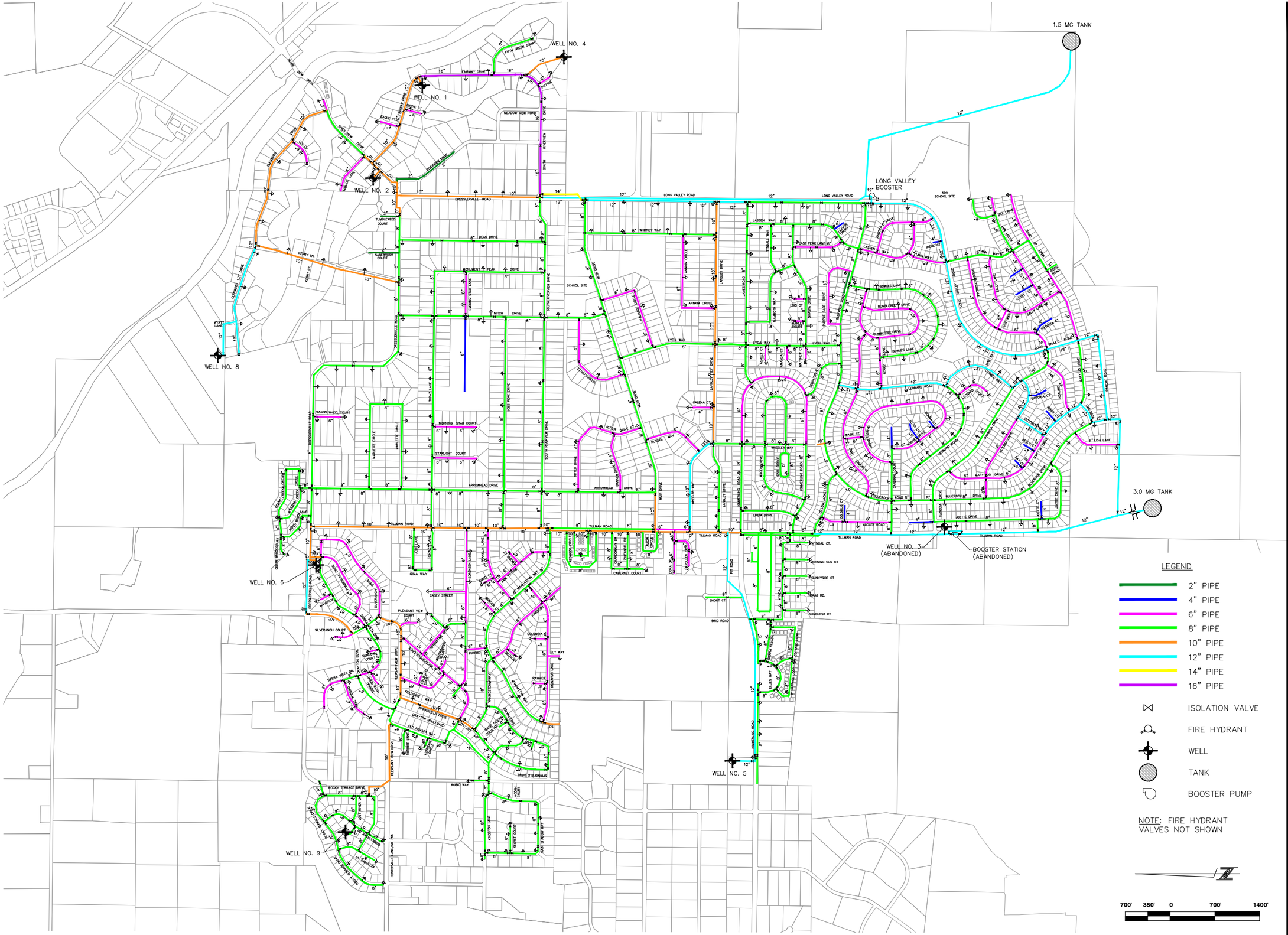

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GRGID WATER MASTER PLAN
WATER SYSTEM MAP
FIGURE 2

GARDNERVILLE — DOUGLAS COUNTY — NEVADA

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2

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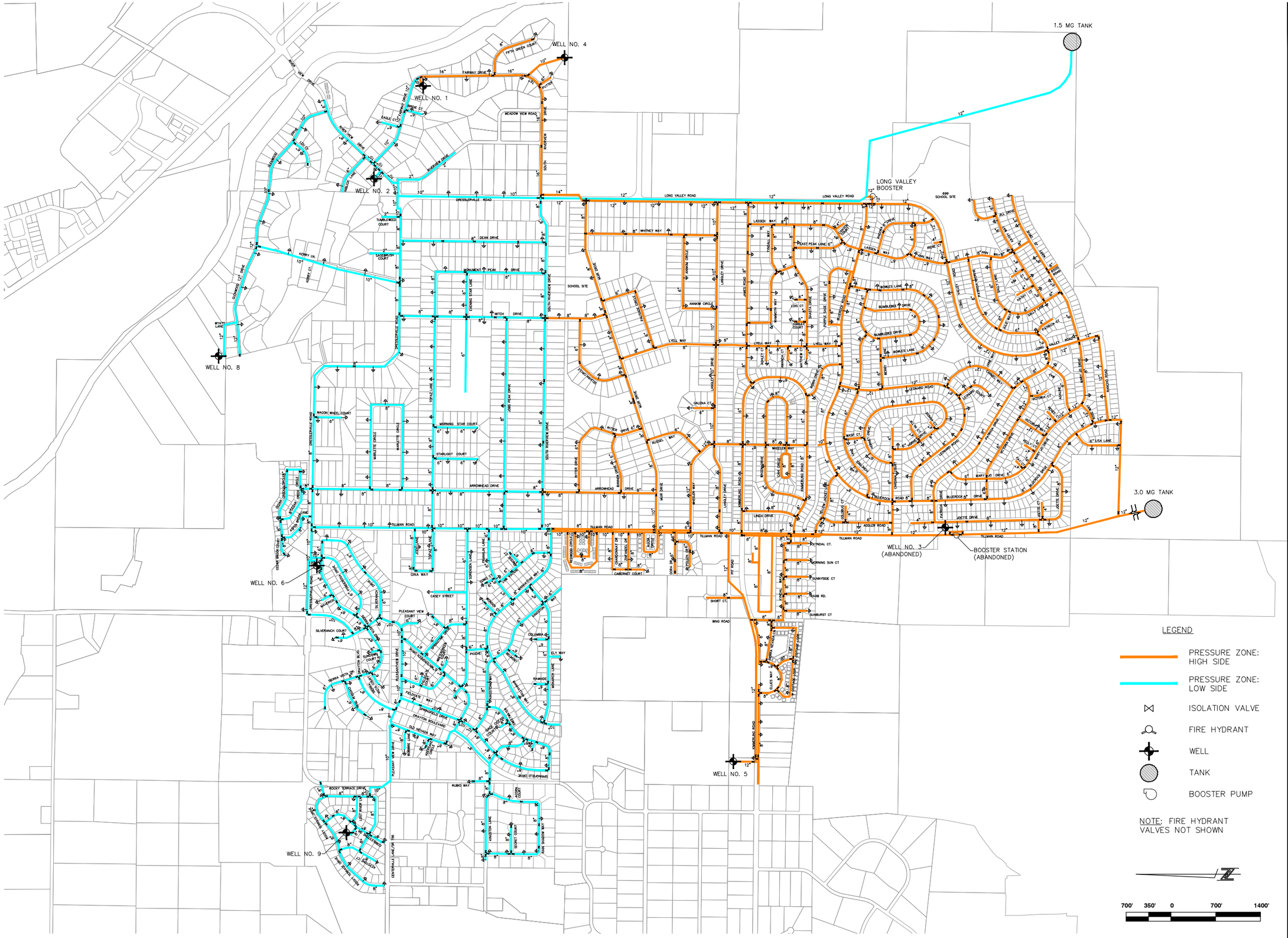

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GRGID WATER MASTER PLAN
PRESSURE ZONE MAP
FIGURE 3

GARDNERVILLE — DOUGLAS COUNTY — NEVADA

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3

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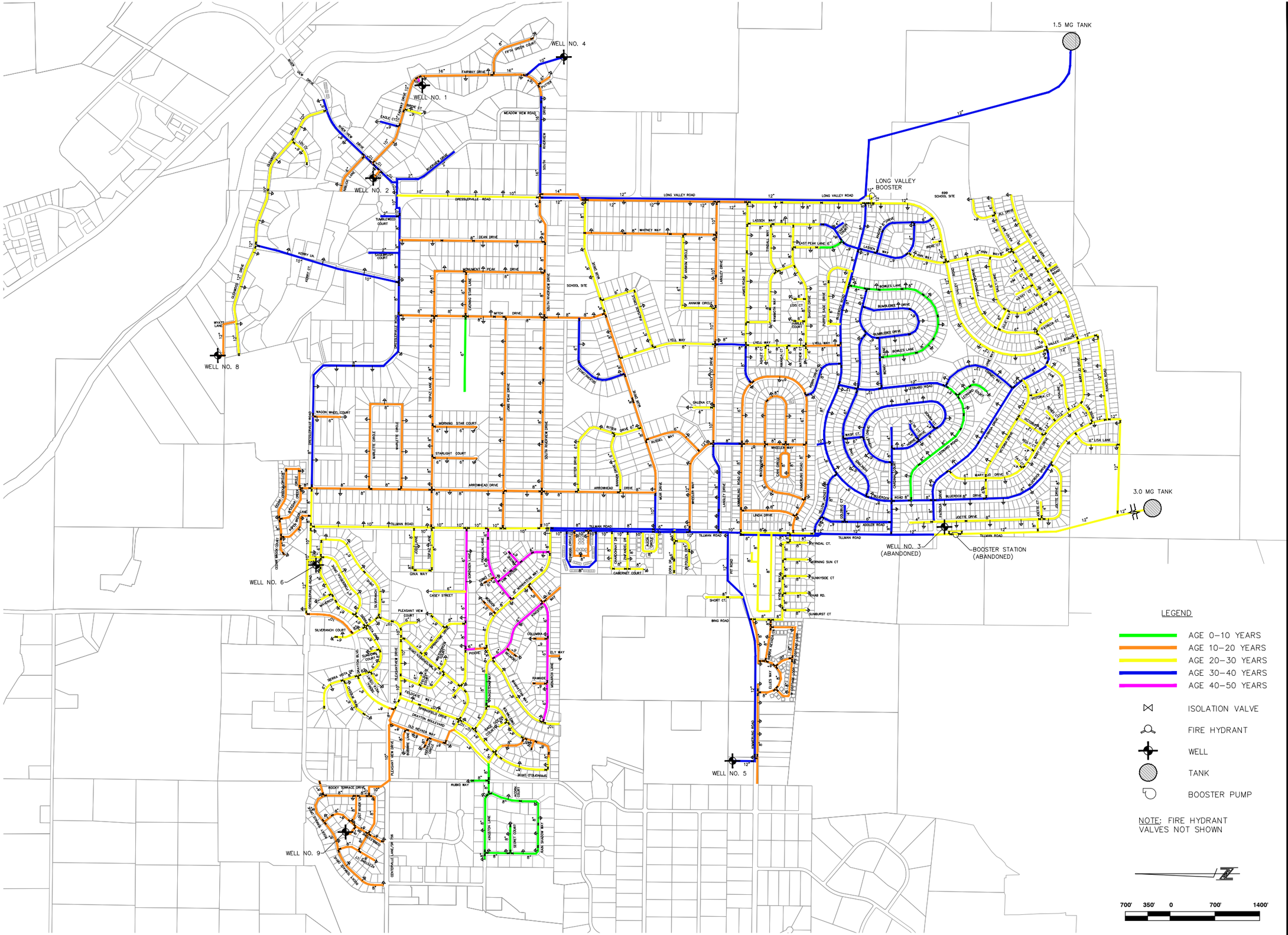

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GRGID WATER MASTER PLAN
WATER SYSTEM AGE MAP
FIGURE 4

DOUGLAS COUNTY
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GARDNERVILLE

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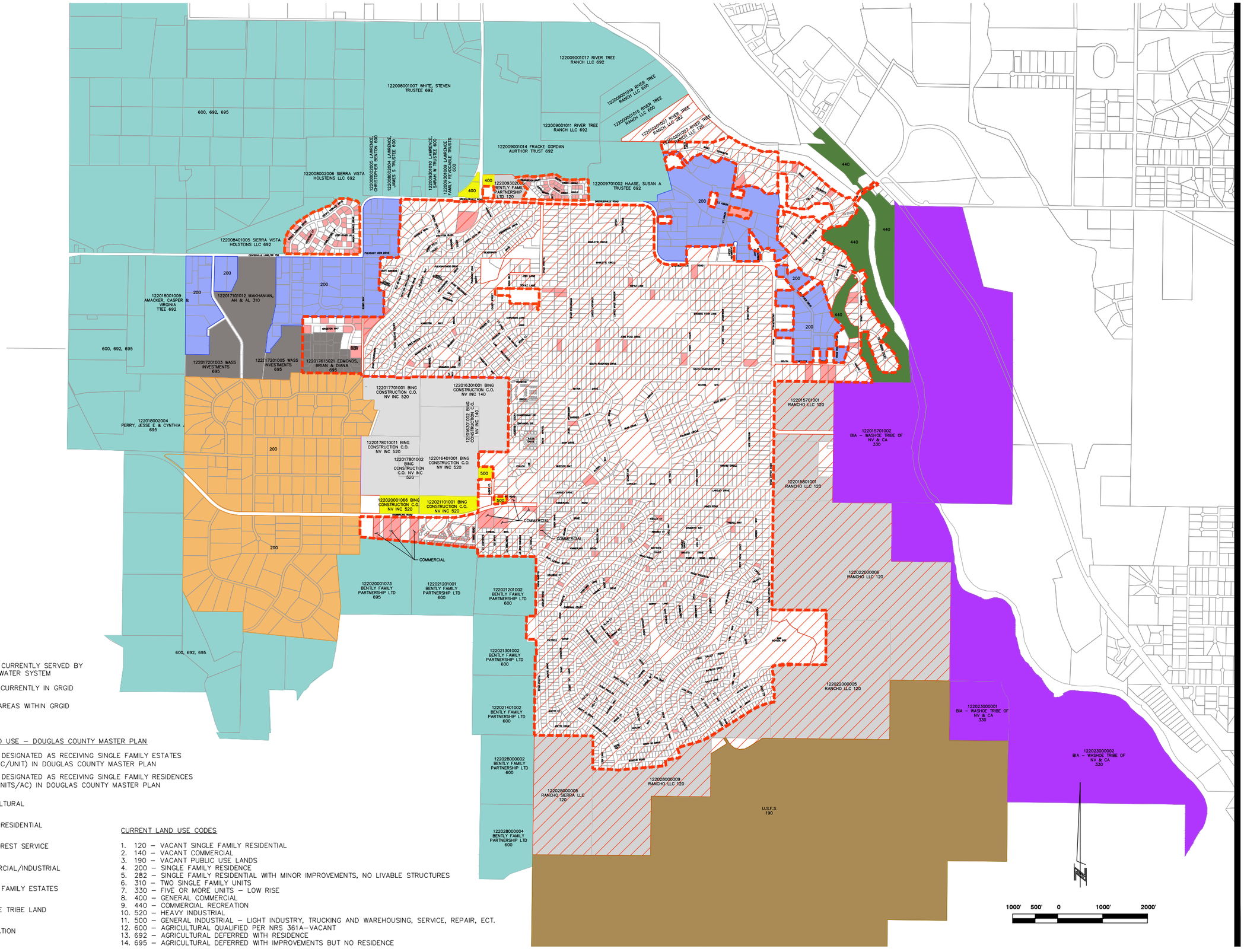

AREAS CURRENTLY SERVED BY GRGID WATER SYSTEM

AREAS CURRENTLY IN GRGID

INFILL AREAS WITHIN GRGID

FUTURE LAND USE – DOUGLAS COUNTY MASTER PLAN

AREAS DESIGNATED AS RECEIVING SINGLE FAMILY ESTATES (1–2 AC/UNIT) IN DOUGLAS COUNTY MASTER PLAN

AREAS DESIGNATED AS RECEIVING SINGLE FAMILY RESIDENCES (1–6 UNITS/AC) IN DOUGLAS COUNTY MASTER PLAN

AGRICULTURAL

RURAL RESIDENTIAL

U.S. FOREST SERVICE

COMMERCIAL/INDUSTRIAL

SINGLE FAMILY ESTATES

WASHOE TRIBE LAND

RECREATION

CURRENT LAND USE CODES

1. 120 – VACANT SINGLE FAMILY RESIDENTIAL
2. 140 – VACANT COMMERCIAL
3. 190 – VACANT PUBLIC USE LANDS
4. 200 – SINGLE FAMILY RESIDENCE
5. 282 – SINGLE FAMILY RESIDENTIAL WITH MINOR IMPROVEMENTS, NO LIVABLE STRUCTURES
6. 310 – TWO SINGLE FAMILY UNITS
7. 330 – FIVE OR MORE UNITS – LOW RISE
8. 400 – GENERAL COMMERCIAL
9. 440 – COMMERCIAL RECREATION
10. 520 – HEAVY INDUSTRIAL
11. 500 – GENERAL INDUSTRIAL – LIGHT INDUSTRY, TRUCKING AND WAREHOUSING, SERVICE, REPAIR, ECT.
12. 600 – AGRICULTURAL QUALIFIED PER NRS 361A–VACANT
13. 692 – AGRICULTURAL DEFERRED WITH RESIDENCE
14. 695 – AGRICULTURAL DEFERRED WITH IMPROVEMENTS BUT NO RESIDENCE

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GRGID WATER MASTER PLAN
CURRENT SERVICE AREAS & ZONING
FIGURE 5

DOUGLAS COUNTY

GARDNERVILLE

NEVADA

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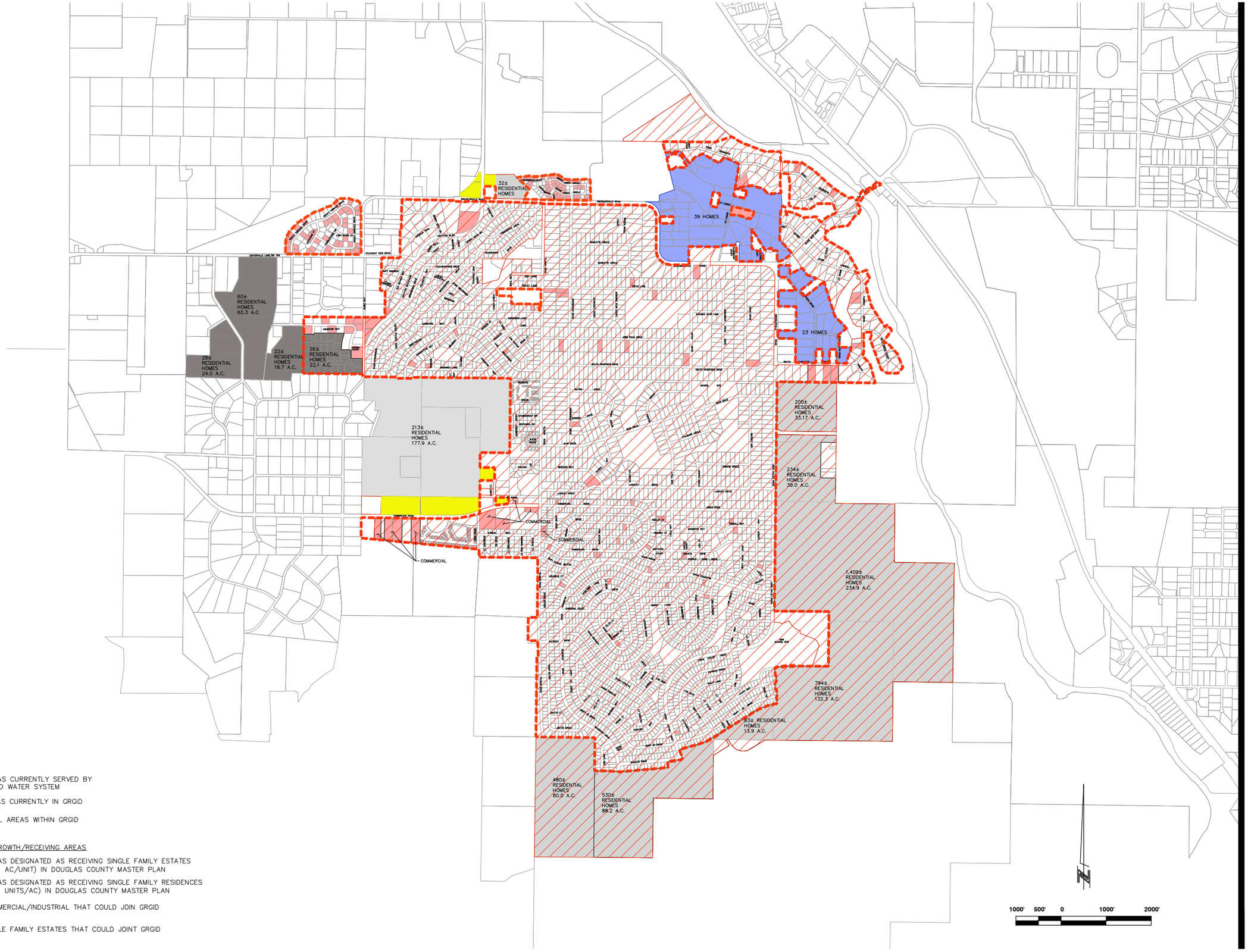
L:\LAPro\8989.005 – Water Master Plan\DWG\Civil3D\8989005_GRONTH.dwg,FIG 5 – CURRENT ZONING, 07/25/2017 11:01 am ktoleheim



AREAS CURRENTLY SERVED BY GRGID WATER SYSTEM

AREAS CURRENTLY IN GRGID

INFILL AREAS WITHIN GRGID

FUTURE GROWTH/RECEIVING AREAS

AREAS DESIGNATED AS RECEIVING SINGLE FAMILY ESTATES (1-2 AC/UNIT) IN DOUGLAS COUNTY MASTER PLAN

AREAS DESIGNATED AS RECEIVING SINGLE FAMILY RESIDENCES (1-6 UNITS/AC) IN DOUGLAS COUNTY MASTER PLAN

COMMERCIAL/INDUSTRIAL THAT COULD JOIN GRGID

SINGLE FAMILY ESTATES THAT COULD JOINT GRGID

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GRGID WATER MASTER PLAN
RECEIVING AREAS & POTENTIAL GROWTH
FIGURE 6

DOUGLAS COUNTY

GARDNERVILLE

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APPENDICES

Appendix A – Water System Map

Appendix B – Water System Sheet Set

Appendix C – Database of Wells

Appendix D – System Age Inventory

Appendix E – Monthly Well Production, 2009-2017

Appendix F – Monthly Meter Records, 2016

Appendix G – Daily Summer Well Production, 2014-2016

Appendix H – Fire Hydrant Flow Tests

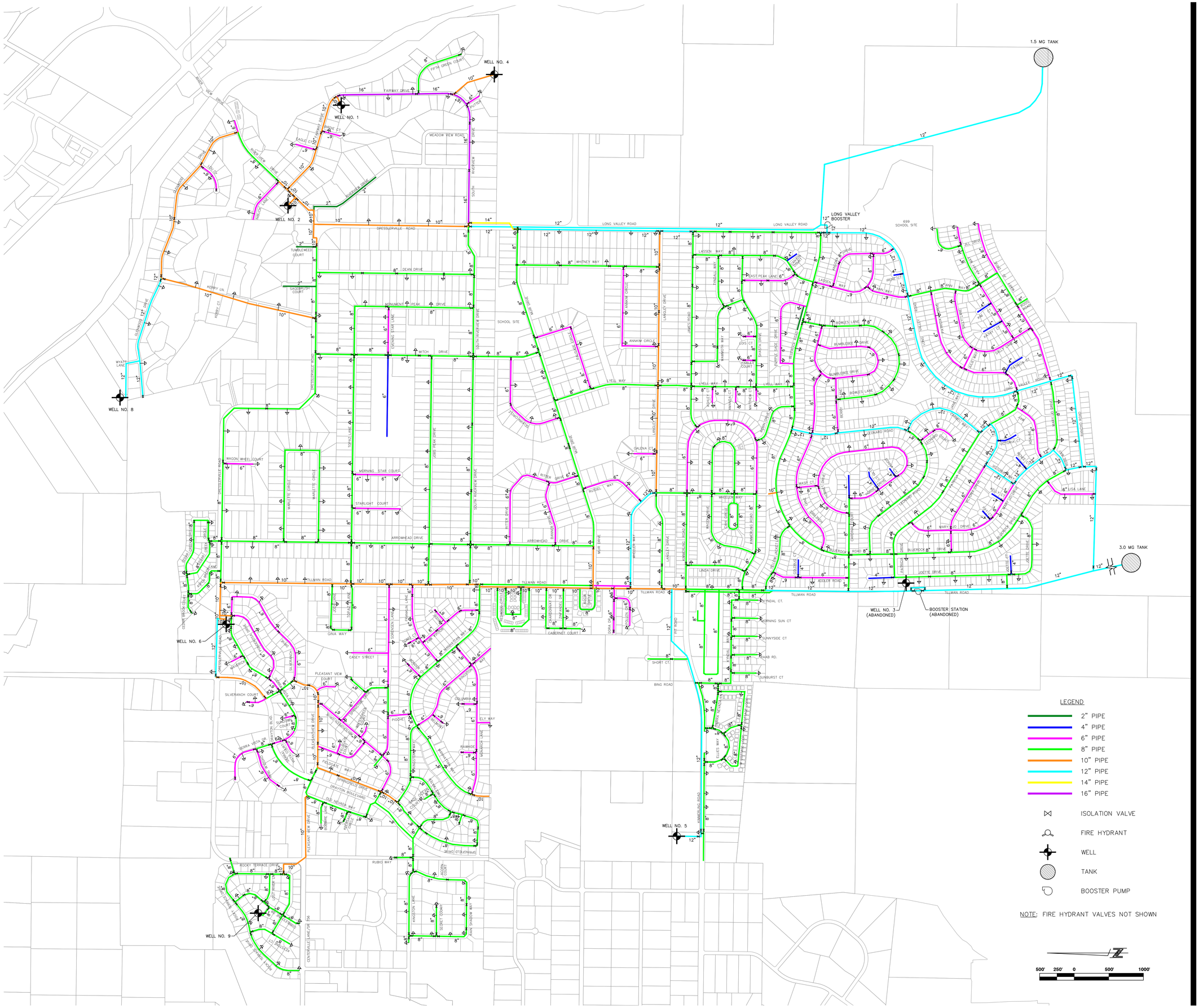
Appendix I – Fire Flow Requirements per IFC

Appendix J – Water Model Output – Existing Conditions

Appendix K – Asset Management Plan – System Replacement Costs

Appendix A

Water System Map



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WATER MASTER PLAN
WATER SYSTEM MAP

DOUGLAS COUNTY
GARDNERVILLE NEVADA

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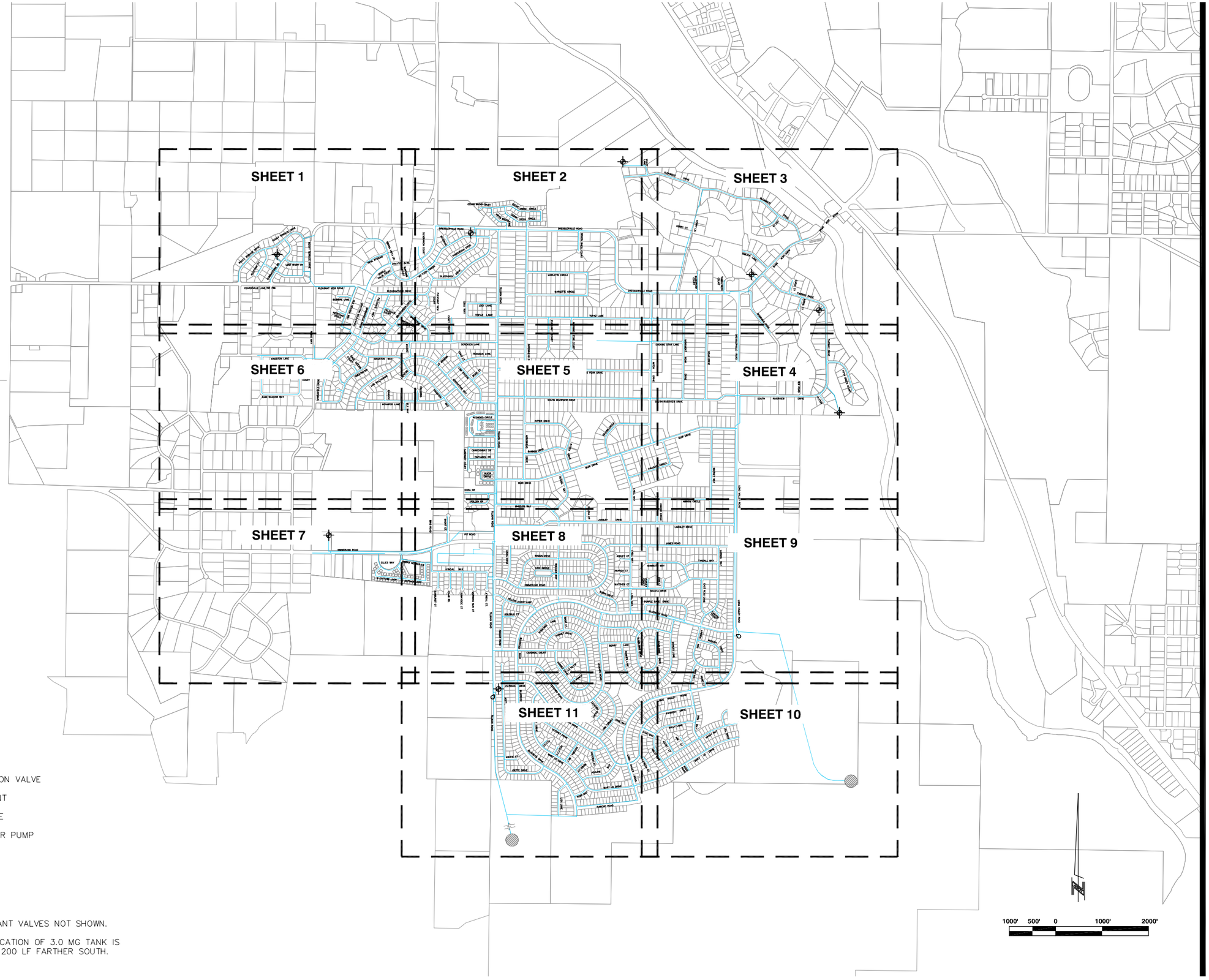
Appendix B

Water System Sheet Set



LEGEND

- ISOLATION VALVE
- HYDRANT
- PIPELINE
- BOOSTER PUMP
- WELL
- TANK

NOTES:

1. FIRE HYDRANT VALVES NOT SHOWN.
2. ACTUAL LOCATION OF 3.0 MG TANK IS APPROX. 3,200 LF FARTHER SOUTH.

1000' 500' 0 1000' 2000'

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MATERIALS TESTING

GRGID WATER MASTER PLAN

SYSTEM MAP

GARDNERVILLE DOUGLAS NEVADA

REV	DATE	DESCRIPTION	BY

INDEX

DATE: JULY 2017
DRAWN BY:
DESIGNED BY:
CHECKED BY:
JOB NO.: 8989.005

LUMOS & ASSOCIATES

800 EAST COLLEGE PARKWAY
CARSON CITY, NEVADA 89706
TEL (775) 883-7077
FAX (775) 883-7114

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SURVEYING / GIS
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SYSTEM MAP

GRGID — DOUGLAS — GARDNERVILLE — NEVADA

REV	DATE	DESCRIPTION	BY

1

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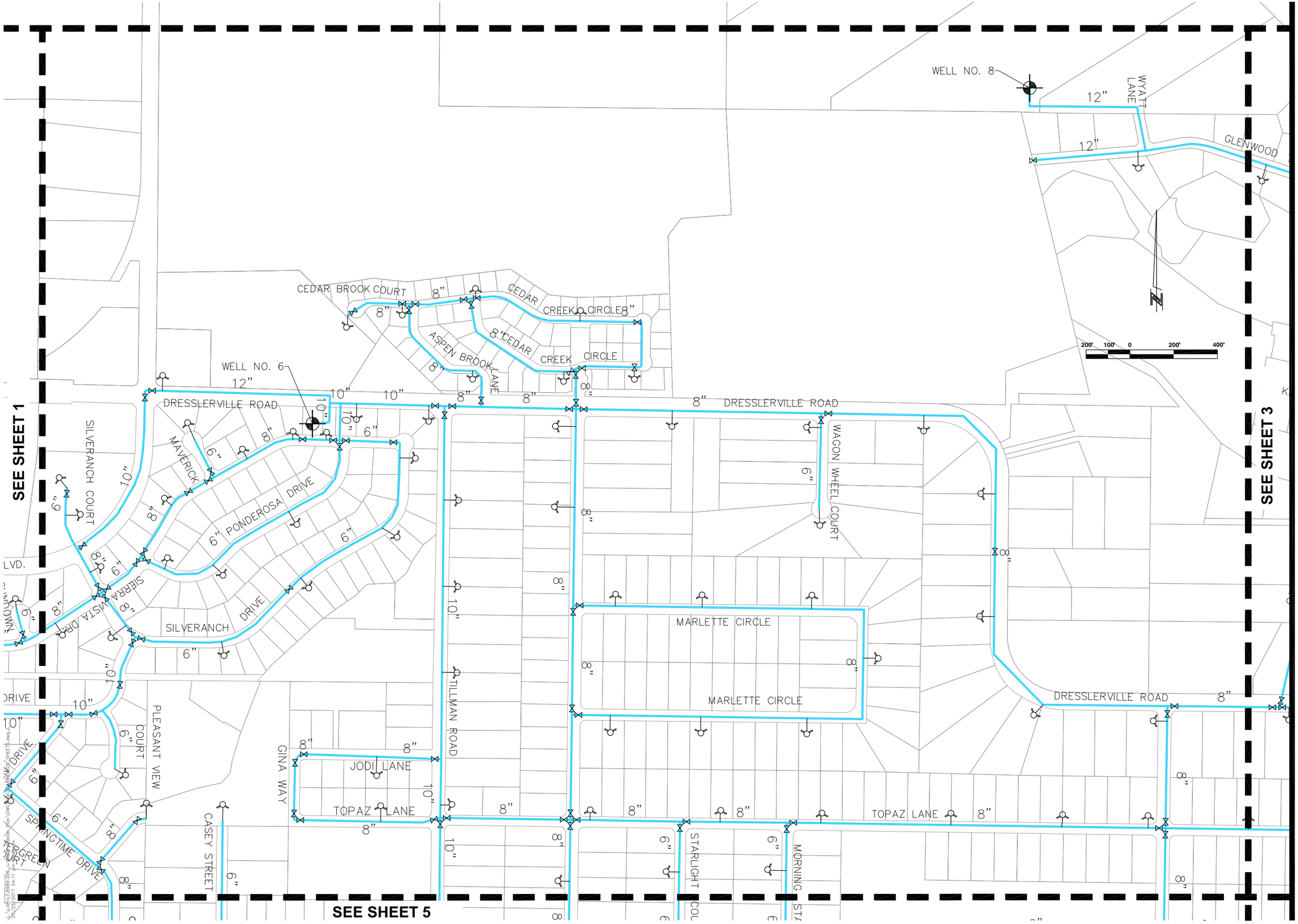

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GRGID

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DOUGLAS COUNTY, NEVADA

GARDNERVILLE

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SEE SHEET 2

SEE SHEET 4

WYATT LANE
GLENWOOD 12" DRIVE
GLENWOOD DRIVE
LOU CT
RIVER VIEW DRIVE
KERRY CT.
KERRY LN.
NIBLICK LANE
RIVER VIEW DRIVE
SAGEBRUSH COURT
TUMBLEWEED COURT
SLERVILLE ROAD
EAGLE CT
FAIRWAY DRIVE
BIRDIE CT
RIVERVIEW DRIVE
WELL NO. 2
WELL NO. 1

200' 100' 0 200' 400'

SEE SHEET 3

SEE SHEET 5

EVENING STAR LANE

MONUMENT PEAK DRIVE

DEAN DRIVE

DRESSLERVILLE ROAD

MITCH DRIVE

VALVE CLOSED FOR NORMAL OPERATION

MEADOW VIEW ROAD

FAIRWAY DRIVE

FIFTH GREEN COURT

PUTTER

SOUTH RIVERVIEW DRIVE

VALVE CLOSED FOR NORMAL OPERATION

C.C. MENELEY ELEMENTARY SCHOOL

WELL NO.4

MUIR DRIVE

VALVE CLOSED FOR NORMAL OPERATION

PALISADE CIRCLE

WHITNEY WAY

LONG VALLEY ROAD

ANNKIM CIRCLE

SEE SHEET 9

200' 100' 0 200' 400'

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DATE: JULY 2017
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SEE SHEET 2

SEE SHEET 6

SEE SHEET 4

SEE SHEET 8

WINTERGREEN DRIVE

SORENSEN LANE

FRANKLIN LANE

PIOCHE

WONDER CT

COMO CT

BOLIVIA WAY

BODIE CT

MANHATTAN WAY

BELMONT

COLUMBIA

KINGSTON WAY

ELY WAY

ARROWHEAD DRIVE

STARLIGHT COURT

MORNING STAR COURT

MITCH PARK

MITCH DRIVE

JOBS PEAK DRIVE

SOUTH RIVERVIEW DRIVE

VALVE CLOSED FOR NORMAL OPERATION

VALVES CLOSED FOR NORMAL OPERATION

REDWOOD CIRCLE

TILLMAN ROAD

RITTER DRIVE

SELKIRK CIRCLE

BANNER DRIVE

RITTER DRIVE

CHARDONNAY DR

ZINFANDEL DR

CABERNET COURT

ALICIA CIRCLE

MUIR DRIVE

RUSSEL WAY

LYELL WAY

PALISADE CIR

RANCHOS ASPEN PARK

BING'S AGGREGATE PIT

DORA DR

POLLEN CR

WHEELER WAY

200' 100' 0 200' 400'

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SEE SHEET 1

SEE SHEET 5

SEE SHEET 7

RUBIO WAY

KINGSTON LANE

SECRET COURT

ACORN COURT

RAIN SHADOW WAY

SAGE OCEAN COURT

SWEETWATER

KINGSTON WAY

PIOCHE

SPRINGFIELD DRIVE

MANHATTAN WAY

BELMONT

COLUMBIA

RAWHIDE

MONARCH LANE

ELY WAY

8" 10" 6"

200' 100' 0 200' 400'

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DOUGLAS COUNTY, NEVADA

GARDNERVILLE

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6

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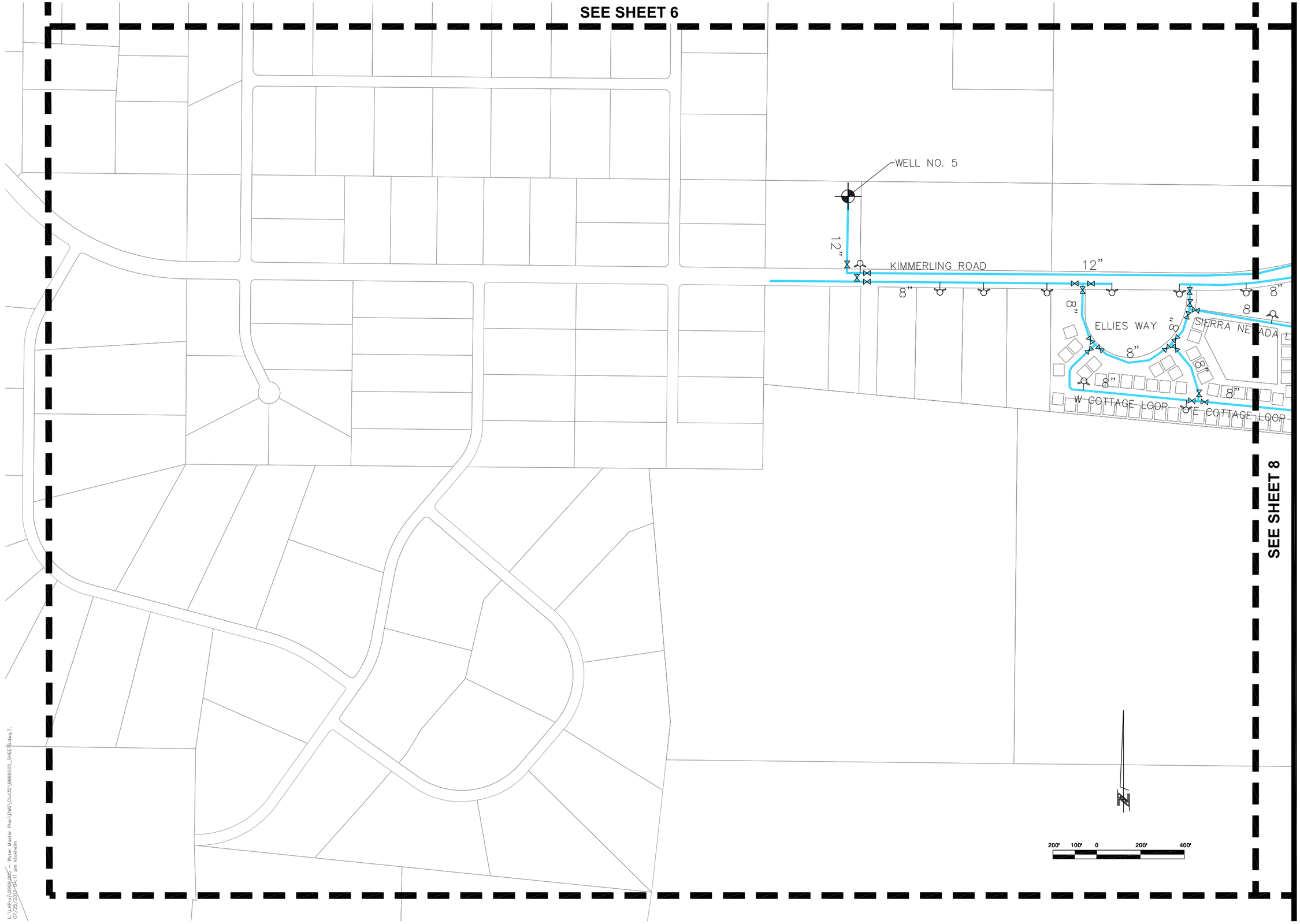
SEE SHEET 6



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DOUGLAS

GARDNERVILLE

NEVADA

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SEE SHEET 5

SEE SHEET 7

SEE SHEET 9

SEE SHEET 11

POLLEN CR 6"
WHEELER WAY 12"
TILLMAN ROAD 10"
GALENA CT. 6"
LANGLEY DRIVE 10"
ANNKIM CIRCLE 8"
BING ROAD
SHORT CT. 8"
PIT ROAD 12"
LANGLEY DRIVE 8"
KIMMERLING ROAD 8"
LINDA DRIVE 8"
WAGON DRIVE 8"
CAHI CIRCLE 8"
WHEELER WAY 8"
KIMMERLING ROAD 8"
ASHLEY CT 8"
LYELL WAY 8"
MAMMOTH WAY 8"
AMANDA CT 8"
MATTHEW CT 8"
HARLEY COURT 8"
LOIS CT 8"
SHASTA DRIVE 8"
ROBIN DRIVE 8"
PURPLE SAGE DR 8"
BLUEROCK ROAD 8"
SIERRA NEVADA LN 8"
COTTAGE LOOP 8"
KYNDAL WAY 8"
SUNBURST CT 8"
RAAB RD. 8"
SUNNYSIDE CT 8"
MORNING SUN CT 8"
KYNDAL CT. 8"
YELLOW JACKET LANE 8"
GOLDBUG CT 4"
ADDLER ROAD 8"
HONEYBEE LANE 6"
WASP CT. 6"
HORNET DRIVE 6"
BLUEROCK ROAD 8"
CARDINAL COURT 8"
HORNET DRIVE 4"
ALTKN CT 4"
DONNA CT 4"
LEONARD ROAD 12"
BERRY LANE 6"
BOWLES LANE 6"
BUMBLEBEE DRIVE 6"
PATRICIA DRIVE 8"
WELL NO. 3 (ABANDONED)

200' 100' 0 200' 400'

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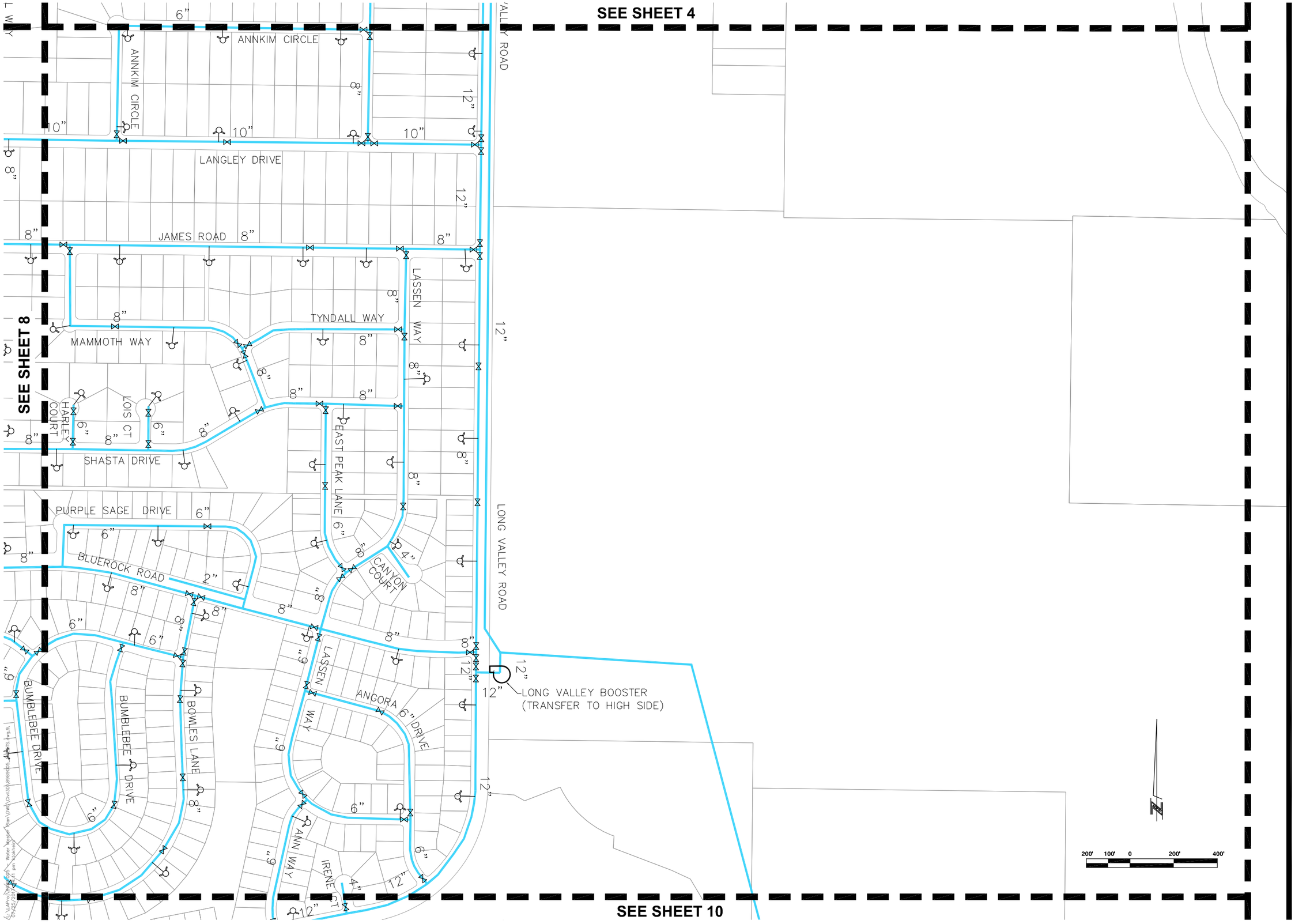

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SEE SHEET 9

SEE SHEET 11

GENE SCARSELLI ELEMENTARY SCHOOL
& PAU WA LU MIDDLE SCHOOL

LONG VALLEY ROAD
PATRICIA DRIVE
SALLY LANE
JULIE WAY
KATHY CT
KIM CT
KATHY WAY
JILL DRIVE
MARY JO DRIVE
ROOS ROAD
PATRICIA CT
SALLY LANE
IRENE CT
ANN WAY
8"ANN WAY

12"
8"
6"
4"

1.5 MG TANK
(LOW SIDE PRESSURE ZONE)

200' 100' 0 200' 400'

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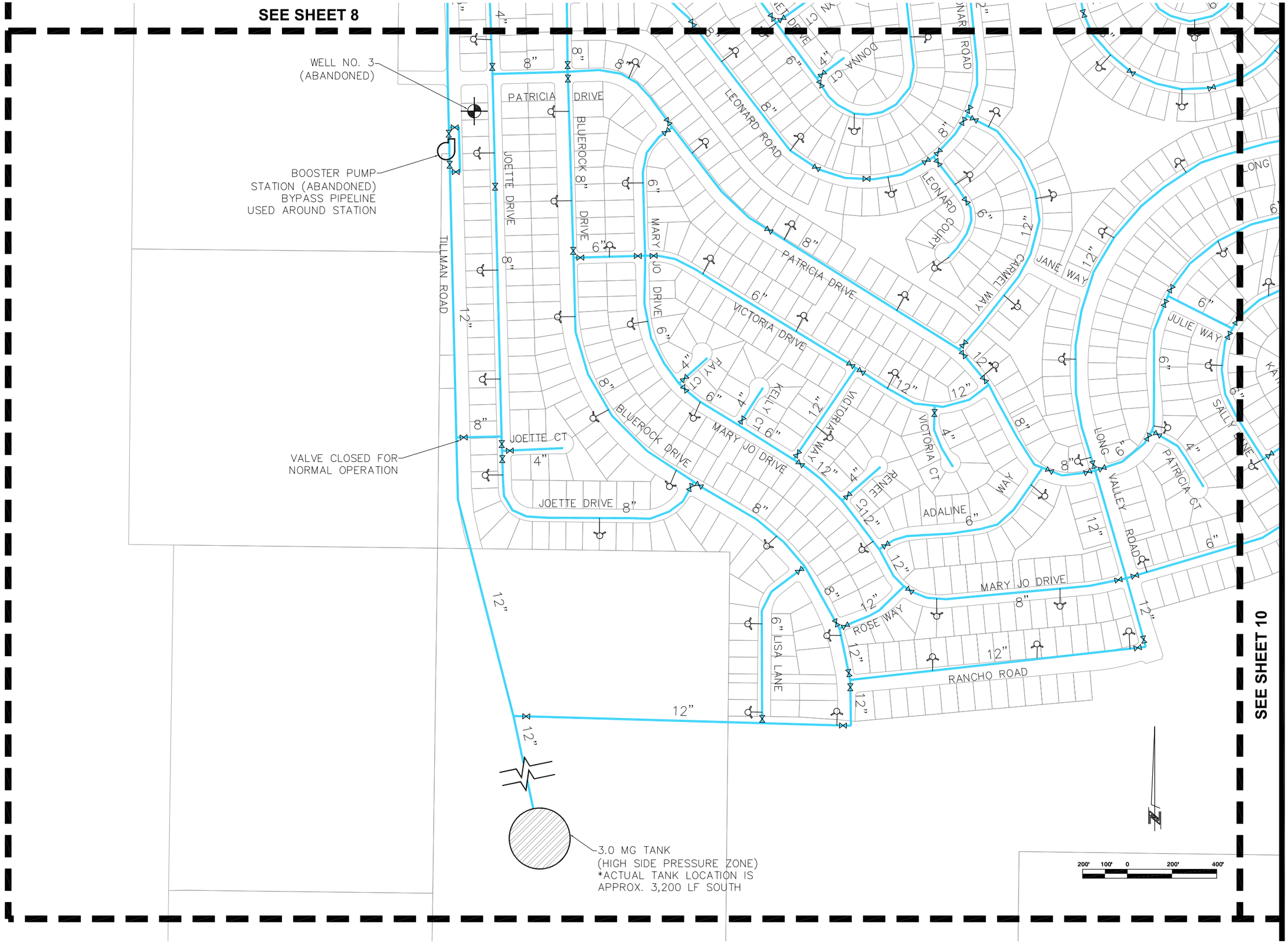
SEE SHEET 8



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Appendix C

Database of Wells

Well Construction, Pump and Motor Data updated May 2014				
Well	1	2	4	5
Year Drilled	1965/2007	2004	1978	1984
State Log #	9832/103124	93217	18097/19471	25320
electric log	no	yes	no	
As Built	no	no	no	no
rated capacity gpm)	2250/1350	2000+	350	1200
seal depth (ft)	52	115	**none**	138
pumping level_original (ft)	70	180' @ 1800gpm		152'@1200gpm
pumping level_current (ft)	196	110	95	
original static (ft)	5	35	7	55.5
Org. specific capacity (gpm/ft)	34 @2250gpm	12 @1800gpm		12 @ 1200gpm
current specific capacity (gpm/ft)	9.5 @ 1100gpm			
casing dia. (in)	18"w/14"sleeve	16	16	16
total depth (ft)	420	670	375	450
screen from (ft)	140	270	183	200
screen to (ft)	420	650	372	450
slot size (in)	0.1	0.1	1/4 x 3"	0.2
screen type	wirewrap	wire wrap	mill slot	wire wrap
gravel pack	3/8" minus		none	1/4"x3/8"
graveled section (ft)	20'-420'	115' to 670'	none	138'-450'
T/R/Section	nene15T12R20	swse10T12R20	sene15N12E20	nene20T12R20
easting	-119.71730143	-119.72277666	-119.71700261	-119.75464457
northing	38.90947714	38.91159207	38.90334746	38.89591288
elevation, well head (ft)	~4832	~4830	~4846	~4805
recent rehab	2007-rebuilt		2008	
pump column	10" x 235'	10" x 262'	6" x 210'	8" x 200'
pump intake setting (ft)	240'	268	214	204
pump capacity (gpm)	1500	1600	600	1200
pump curve				
pump manf	National	Goulds	Goulds	Floway
pump model #	K12HC	14RJMC	8RJHC	12LKH
pump stages	7	5 x 13.6"OD	5 x 7.5"OD	6
pump set date	2007	2004	1997	1992?
motor manf.	USMotors	USMotors	Franklin	
motor HP	200	250	100	150
motor rpm	1775	1780	3600	1770
motor type	line shaft	line shaft	submersible	line shaft
motor electrical	460v 230amp	460v 292amps	460v	
motor model	AA70A	hollowshaft		
motor serial number	H020052SLG	110250v2SLH-C		
motor set date	2001	2004	1997	
discharge pressure (psi)	104	110	95	
TDH (ft)	380	450	400	360
last camera log	2007			

Well Construction, Pump and Motor Data updated May 2014				
Well	6	7	8	9
Year Drilled	1989	1994	1997	2005
State Log #	32531	44114	67795	98220
electric log	no		yes	yes
As Built	no	no	no	no
rated capacity (gpm)				1000
seal depth (ft)	50	53	100	100
pumping level_original (ft)		414'@235gpm	170'@1000gpm	149' @ 1000gpm
Pumping level_current (ft)	175		175' @ 1000gpm	145' @ 845gpm
original static (ft)	45	40	46	28
Org. specific capacity (gpm/ft)		0.6 @ 235gpm	9.2 @ 1194gpm	8 @ 1000gpm
current specific capacity (gpm/ft)	7 @ 706gpm		7 @ 1050 gpm	8 @ 814gpm
casing dia. (in)	18	6	16	12
total depth (ft)	434	480	500	390
screen from (ft)	210	300/460	260	240
screen to (ft)	430	320/480	500	390
slot size (in)	0.1	1/8 x 3"	0.08	0.05
screen type	wire wrap	slot	wire wrap	wire wrap
gravel pack	1/8x1/4	yes	#4 x #8	yes
graveled section (ft)	50'-434'	53'-480'	0-500'	0-390
T/R/Section	sesw9T12R20	sese21T12R20	nenw10T12R20	swse8T12R20
easting	-119.74391699	-119.73730140	-119.73297441	-119.75887240
northing	38.91384831	38.89230296	38.91812375	38.91242917
elevation, well head (ft)	~4800	~4871	~4800	~4809
recent rehab	2006		2005	
pump column	6"x212'	3"x275'	8" x 235'	8" x 180'
pump intake setting (ft)	~216	279	245'	202
pump capacity (gpm)	700	135	1350	800
pump curve	yes		yes	yes
pump manf	Gould	Fairbanks	Floway	Weir 10"
pump model #	9RCLC	6L	12JKH	10DKH
pump stages	3 x 9"	8	7	13
pump set date	2006	1995	1999	2006
motor manf.	Franklin	Franklin	US motor	USMotor
motor HP	100	20	200	125
motor rpm	3550		1785	1780
motor type	submersible	submersible	line shaft	line shaft
motor electrical	400v 126amp		460v 228amp	460v 142amp
motor model				
motor serial number	E94		R488A-BO5-5832m	60361-1-1
motor set date	2006	1995	1999	2006
discharge pressure (psi)	95		125	116
TDH (ft)	400	410	385	414
last camera log	2006			2006

WELL LOG AND REPORT TO THE STATE ENGINEER OF NEVADA

Log No. 9832
Rec. Nov. 12 1965
Well No.
Permit No. 22787-22932
Do not fill in.

PLEASE COMPLETE THIS FORM IN ITS ENTIRETY

Owner Swift Builders, Unit #3 Driller Wayne Burroughs

Address Gardnerville, Nevada Address 2171 E Second St. Reno, Nevada Lic. No. 257

Location of well: NE ¼ NE ¼ Sec 4 215 20, T. 12N/8, R 19E, in Douglas County

Permit No.

Water will be used for Commercial & Domestic Total depth of well 450 Feet

Size of drilled hole 24 inch Weight of casing per linear foot 8 Gauge

Thickness of casing 8 Gauge Temp. of water Cold

Diameter and length of casing 18 " X 420 ' 14 " X 34'
(Casing 12" in diameter and under give inside diameter; casing 12" in diameter give outside diameter.)

If flowing well give flow in c.f.s. or g.p.m. and pressure

If nonflowing well give depth of standing water from surface 18'

If flowing well describe control works
(Type and size of valve, etc.)

Date of commencement of well 7-15-65 Date of completion of well 10-25-65

Type of well rig 72 Star Cable Tool

LOG OF FORMATIONS

From feet	To feet	Thickness feet	Type of material
-0-	4	4	Topsoil
4	49	45	Sandy Clay, Boulders & Gravel
49	82	33	Boulders & Gravel, Yellow Clay
82	163	81	Gravel & Boulders packed in Sandy Yellow Clay
163	189	26	Sandy Clay & Gravel
189	361	172	Sticky Yel. Clay & Sand
361	389	28	Cemented Gravel
389	440	53	Large Gravel & Course Sand
442	450	8	Boulders & Gravel Bedded in Yellow Clay

(OVER)

Water-bearing Formation, Casing Perforations, etc.

Chief aquifer (water-bearing formation)
from 5 to 442 ft.

Other aquifers 63 to 66 ft.
167 to 174 ft.
249 to 258 ft.
389 to 442 ft.

First water at 5 feet.

Casing perforated
from 160 to 420 ft.

Size of perforations
1/4 X 2

919

LOG OF FORMATIONS—Continued

From feet	To feet	Thickness	Type of material

CASING RECORD

Diam. casing	From feet	To feet	Length	REMARKS—Seals, Grouting, etc.
26"	-0-	52		Conducter Casing concreted in from 52' to datum
18"	-0-	420		
14"	416	450	450	Set in 24" drilled hole and gravel packed with river washed gravel from 52' to 450'

GENERAL INFORMATION—Pumping Test, or Boiling Test, Quality of Water, etc.

2250 GPM at 70'

WELL DRILLER'S STATEMENT

This well was drilled under my jurisdiction and the above information is true to my best information and belief.

Signed Wayne Burroughs
Well Driller

By.....

License No. 257

Dated Nov. 8, 19 65

(Not to be filled in by Driller)

WHITE - DIVISION OF WATER RESOURCES
CANARY - CLIENT'S COPY
PINK - WELL DRILLER'S COPY

PRINT OR TYPE ONLY
DO NOT WRITE ON BACK

STATE OF NEVADA
DIVISION OF WATER RESOURCES
WELL DRILLER'S REPORT

Please complete this form in its entirety in accordance with NRS 534.170 and NAC 534.340

OFFICE USE ONLY
Log No. 103124
Permit No.
Basin 105

NOTICE OF INTENT NO. 58649

1. OWNER Gardnerville Ranchos General Improvement Dist
MAILING ADDRESS 931 Mitch Drive
Gardnerville, NV 89410

ADDRESS AT WELL LOCATION 1/4 mile south of the intersection of Fairway & Riverview Drive in Gardnerville Ranchos

2. LOCATION NE 1/4 NE 1/4 Sec. 15 T 12N N/S R 20E E Douglas County
PERMIT NO. 22787-22982 (Issued by Water Resources) | Parcel No. | Subdivision Name

3. WORK PERFORMED
☐ New Well ☐ Replace ☒ Recondition
☐ Deepen ☐ Abandon ☐ Other

4. PROPOSED USE
☐ Domestic ☐ Irrigation ☐ Test
☒ Municipal/Industrial ☐ Monitor ☐ Stock

5. WELL TYPE
☐ Cable ☐ Rotary ☐ RVC
☐ Air ☐ Other

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
After well rehabilitation, we conducted a video of well and found several holes in the 18" casing. It was decided to install a 14" steel liner to extend the life of the well. During the video of the well, we saw that the area from 140' to 320' was slotted with a Mills Knife with only 4 rows per foot. Many of the slots were on one side of the casing. We decided to re-perforate this area to allow more water in. We used an 18" Mills Knife and perforated the 18" casing from 140' tp 320' with 6 rows per foot. We bailed the well to 420' and installed 280' of 14" wire screen and 140' of 14" blank casing. After the casing installation, we filled the surrounding annulus with 3/8 minus gravel pack. We then swabbed the gravel pack into place to within 20' of surface.				

Date started 1/24/2007 , 19___
Date completed 2/24/1907 , 19___

7. WELL TEST DATA
TEST METHOD: ☐ Bailer ☐ Pump ☐ Air Lift

G.P.M.	Draw Down (Feet Below Static)	Time (Hours)

8. WELL CONSTRUCTION
Depth Drilled ____ Feet Depth Cased 420' Feet

HOLE DIAMETER (BIT SIZE)

	From	To
____ Inches	____ Feet	____ Feet
____ Inches	____ Feet	____ Feet
____ Inches	____ Feet	____ Feet

CASING SCHEDULE

Size O.D. (Inches)	Weight/Ft. (Pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)
14"		.250	surface	140'

Perforations:
Type perforation Johnson HyCap screen
Size perforation .100 slot
From 140' feet to 420' feet
From ____ feet to ____ feet
From ____ feet to ____ feet
From ____ feet to ____ feet
From ____ feet to ____ feet

Surface Seal: ☒ Yes ☐ No
Depth of Seal 52'
Placement Method: ☐ Pumped ☐ Poured
Seal Type: ☐ Neat Cement ☐ Cement Grout ☒ Concrete Grout

Gravel Packed: ☐ Yes ☒ No
From 20' feet to 420' feet

9. WATER LEVEL
Static water level 38' feet below land surface
Artesian flow ____ G.P.M. ____ P.S.I.
Water temperature ____ °F Quality ____

10. DRILLER'S CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.

Name Carson Pump (Contractor)
Address p.o. Box 20159 (Contractor)
Carson City, NV. 89721

Nevada contractor's license number issued by the State Contractor's Board 39920

Nevada driller's license number issued by the Division of Water Resources, the on-site driller 1482

Signed ____ (By driller performing actual drilling on-site or contractor)

Date 3/17/2007

USE ADDITIONAL SHEETS IF NECESSARY

WHITE - DIVISION OF WATER RESOURCES
CANARY - CLIENT'S COPY
PINK - WELL DRILLER'S COPY

PRINT OR TYPE ONLY
DO NOT WRITE ON BACK

STATE OF NEVADA
DIVISION OF WATER RESOURCES
WELL DRILLER'S REPORT

Please complete this form in its entirety in accordance with NRS 534.170 and NAC 534.340

OFFICE USE ONLY
Log No. 93217
Permit No. 48752
Basin 105

NOTICE OF INTENT NO. 51942

OWNER Gardnerville Ranchos GID
MAILING ADDRESS 931 Mitch Drive
Gardnerville, NV 89410

ADDRESS AT WELL LOCATION Well #2A

2. LOCATION SW 1/4 SE 1/4 Sec. 10 T 12N N/S R 20E E Douglas County
PERMIT NO. 48752 (Issued by Water Resources) 1220-10-811-014 (Parcel No.) (Subdivision Name)

3. WORK PERFORMED: [X] New Well [ ] Replace [ ] Recondition [ ] Deepen [ ] Abandon [ ] Other
4. PROPOSED USE: [ ] Domestic [ ] Irrigation [ ] Test [X] Municipal/Industrial [ ] Monitor [ ] Stock
5. WELL TYPE: [ ] Cable [ ] Rotary [X] RVC [ ] Air [ ] Other

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
sand/cobbles w/s clay		0	40	
sand & gravel w/cobbles		40	128	88
sand & gravel w/clay		128		
stringers			151	23
br. clay w/sand		151	170	19
sand/gravel w/cobbles		170	296	126
tan clay w/sand, gravel		296		
& cobbles			303	7
tan clay w/s sand		303	309	6
sand & gravel w/tan clay		309	320	11
clay w/sm. gravel & sand		320	325	5
sand & gravel w/cobbles		325	350	25
clay w/sand & gravel		350	375	25
ravel & coarse sand		375	381	6
hd. rock w/sand & gravel		381	406	25
clay		406		
w/sand,gravel,cobbles			414	8
sand/gravel/cobbles		414		
w/clay stringers			463	49
sand/gravel/clay w/s		463		
cobbles			472	9
sand/gravel/cobbles w/s		472		
clay			491	19
hd. rock, sand & gravel		491	562	71
Continued on next page				

Date started 4/2/04 , 19__
Date completed 4/26/04 , 19__

7. WELL TEST DATA

TEST METHOD: [ ] Bailer [X] Pump [ ] Air Lift

	G.P.M.	Draw Down (Feet Below Static)	Time (Hours)
P/L 179.23	1800	144.30	91.5 hrs

8. WELL CONSTRUCTION

Depth Drilled 696 Feet Depth Cased 670 Feet

HOLE DIAMETER (BIT SIZE)

	From	To
36 Inches	0 Feet	40 Feet
24 Inches	40 Feet	696 Feet
Inches	Feet	Feet

CASING SCHEDULE

Size O.D. (Inches)	Weight/Ft. (Pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)
30		.375	0	40
16		.312	+2	270
16		.312	340	360

continued pg2

Perforations:
Type perforation wire wrap
Size perforation .100 slot

From	270	feet to	340 feet
From	360	feet to	440 feet
From	460	feet to	530 feet
From	550	feet to	650 feet
From		feet to	feet

Surface Seal: [X] Yes [ ] No
Depth of Seal 115
Placement Method: [X] Pumped [ ] Poured
Seal Type: [ ] Neat Cement [X] Cement Grout [ ] Concrete Grout

Gravel Packed: [X] Yes [ ] No
From 115 feet to 696 feet

9. WATER LEVEL

Static water level 34.90 feet below land surface
Artesian flow ____ G.P.M. ____ P.S.I.
Water temperature cool °F Quality good

10. DRILLER'S CERTIFICATION

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

Name Humboldt Drilling & Pump Co., Inc.
Contractor
Address 4675 W. Winnemucca Blvd
Contractor
Winnemucca, Nevada 89445

Nevada contractor's license number issued by the State Contractor's Board 56797

Nevada driller's license number issued by the Division of Water Resources, the on-site driller 2177

Signed [signature]
By driller performing actual drilling on-site or contractor

Date 4/30/04

WHITE - DIVISION OF WATER RESOURCES
CANARY - CLIENT'S COPY
PINK - WELL DRILLER'S COPY

PRINT OR TYPE ONLY
DO NOT WRITE ON BACK

STATE OF NEVADA
DIVISION OF WATER RESOURCES

WELL DRILLER'S REPORT

Please complete this form in its entirety in accordance with NRS 534.170 and NAC 534.340

OFFICE USE ONLY
Log No. 93217
Permit No. 48752
Basin 106

Page 2
NOTICE OF INTENT NO. 51942

1. OWNER Gardnerville Ranchose GID
MAILING ADDRESS 931 Mitch Drive
Gardnerville, NV 89410

ADDRESS AT WELL LOCATION Well #2A

2. LOCATION SW 1/4 SE 1/4 Sec. 10 T 12N N/S R 20E E Douglas County
PERMIT NO. 48752 (Issued by Water Resources) | 1220-10-811-014 (Parcel No.) | Subdivision Name

3. WORK PERFORMED
☐ New Well ☐ Replace ☐ Recondition
☐ Deepen ☐ Abandon ☐ Other

4. PROPOSED USE
☐ Domestic ☐ Irrigation ☐ Test
☐ Municipal/Industrial ☐ Monitor ☐ Stock

5. WELL TYPE
☐ Cable ☐ Rotary ☐ RVC
☐ Air ☐ Other

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
sand,gravel,cobbles w/s		562		
clay			577	15
clay w/sand & gravel		577	581	4
sand/gravel/cobbles w/s		581		
clay			611	30
sand & clay		611	614	3
clay w/s sand		614	629	15
sand/gravel/clay		629	638	9
sandy clay		638	696	58

Date started 4/2/04 , 19__
Date completed 4/26/04 , 19__

7. WELL TEST DATA
TEST METHOD: ☐ Bailer ☐ Pump ☐ Air Lift

G.P.M.	Draw Down (Feet Below Static)	Time (Hours)

8. WELL CONSTRUCTION
Depth Drilled _____ Feet Depth Cased _____ Feet

HOLE DIAMETER (BIT SIZE)

	From	To
_____ Inches	_____ Feet	_____ Feet
_____ Inches	_____ Feet	_____ Feet
_____ Inches	_____ Feet	_____ Feet

CASING SCHEDULE

Size O.D. (Inches)	Weight/Ft. (Pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)
16"		.312	440	460
16"		.312	530	550
16"		.312	650	670

Perforations:
Type perforation _____
Size perforation _____
From _____ feet to _____ feet
From _____ feet to _____ feet
From _____ feet to _____ feet
From _____ feet to _____ feet
From _____ feet to _____ feet

Surface Seal: ☐ Yes ☐ No
Depth of Seal _____
Placement Method: ☐ Pumped ☐ Poured
Seal Type: ☐ Neat Cement ☐ Cement Grout ☐ Concrete Grout

Gravel Packed: ☐ Yes ☐ No
From _____ feet to _____ feet

9. WATER LEVEL
Static water level _____ feet below land surface
Artesian flow _____ G.P.M. _____ P.S.I.
Water temperature _____ °F Quality _____

10. DRILLER'S CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.

Name Humboldt Drilling & Pump Co., Inc.
Contractor
Address 4675 W. Winnemucca Blvd
Contractor
Winnemucca, Nevada 89445

Nevada contractor's license number issued by the State Contractor's Board 56797

Nevada driller's license number issued by the Division of Water Resources, the on-site driller 2177

Signed _____
By driller performing actual drilling on-site or contractor
Date 4/30/04

WHITE—DIVISION OF WATER RESOURCES
CANARY—CLIENT'S COPY
PINK—WELL DRILLER'S COPY

STATE OF NEVADA
DIVISION OF WATER RESOURCES

WELL DRILLERS REPORT

Please complete this form in its entirety

OFFICE USE ONLY
Log No. 18097
Permit No. 29361 36027
Basin Carson Valley

1. OWNER Gardnerville Rancho's Gen. Imp. Dist. ss Gardnerville Nev.

2. LOCATION SE NE ¼ NE ¼ Sec. 15 T. 12 N/S R. 20 E. Douglas County
PERMIT NO. [redacted] 29561

3. TYPE OF WORK				4. PROPOSED USE				5. TYPE WELL			
New Well	☐	Recondition	☐	Domestic	☐	Irrigation	☐	Test	☒	Cable	☒	Rotary	☐
Deepen	☐	Other	☐	Municipal	☐	Industrial	☐	Stock	☐	Other	☐		

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
Silt & Gravel		0	6	6
Boulder & Gravel		6	15	9
Hardpack Gravel & Boulders		15	40	25
Hardpack Gravel, Cobblestone & sand		40	50	10
Hardpack Gravel, Sand-streaks & Cobblestone		50	60	10
Gravel & Sand, hardpacked		60	65	5
Large Gravel & Samd		65	70	5
Coarse sand		85	80	5
Clay, Gravel & Sand		80	90	10
Fine sand		90	100	10
Sand & Gravel		100	105	5
Coarse Gravel		105	110	5
Cobblestones, Bouldres & Sand		110	115	5
Cobblestones & Sand		115	120	5
Fine Sand		120	132	12
Clay & Gravel, hardpacked		132	135	3
Sand & Gravel & Boulders		135	140	5
Sand		140	145	5
Coarse Gravel & Sand		145	150	5
Coarse Sand		150	155	5
Hardpacked Sand & Gravel		155	160	5
Cobblestones & Sand		160	165	5
Boulders, Clay & Sand		165	175	10
Sand & Gravel		175	180	5

Date started April - 3, 19 78
Date completed April - 26, 19 78

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump

BAILER TEST
G.P.M. ..... Draw down ..... feet ..... hours
G.P.M. ..... Draw down ..... feet ..... hours
G.P.M. ..... Draw down ..... feet ..... hours

8. WELL CONSTRUCTION

Diameter hole 6 inches Total depth 370 feet
Casing record 370 feet---.188 wall
Weight per foot 10 Thickness

Diameter	From	To
inches	0 feet	370 feet
inches	feet	feet
inches	feet	feet
inches	feet	feet
inches	feet	feet
inches	feet	feet

Surface seal: Yes ☐ No ☒ Type
Depth of seal feet
Gravel packed: Yes ☐ No ☒
Gravel packed from feet to feet

Perforations:
Type perforation
Size perforation
From feet to feet
From feet to feet
From feet to feet
From feet to feet
From feet to feet

9. WATER LEVEL

Static water level 7 Feet below land surface
Flow G.P.M.
Water temperature 66 ° F. Quality good

10. DRILLERS CERTIFICATION

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

Name Dustin W Graham
Address 945 Fairway Drive - Gardnerville
Nevada contractor's license number 12953
Nevada driller's license number 751
Signed Dw Graham
Date May 18 - 1978

USE ADDITIONAL SHEETS IF NECESSARY

5471

WHITE—DIVISION OF WATER RESOURCES
CANARY—CLIENT'S COPY
PINK—WELL DRILLER'S COPY

PAGE 2

STATE OF NEVADA
DIVISION OF WATER RESOURCES

WELL DRILLERS REPORT

Please complete this form in its entirety

OFFICE USE ONLY
Log No.....
Permit No.....
Basin.....

1. OWNER Gardnerville Rancho's Gen. Imp. District ADDRESS Gardnerville, Nevada

2. LOCATION NE ¼ NE ¼ Sec. 15 T. 12 N/S R. 20 E. Douglas County
PERMIT NO. 29561

3. TYPE OF WORK: New Well ☐ Recondition ☐ Deepen ☐ Other ☐

4. PROPOSED USE: Domestic ☐ Irrigation ☐ Test ☒ Municipal ☐ Industrial ☐ Stock ☐

5. TYPE WELL: Cable ☒ Rotary ☐ Other ☐

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
Cobblestones & Sand		180	185	5
Hardpacked Gravel & Cobblestones		185	200	15
Hardpacked Gravel, Clay & Sand		200	205	5
Hardpacked sand & coarse Gravel		205	210	5
Some Gravel, hardpacked clay & Sand		210	220	10
Sandy Clay, some Gravel		220	225	5
Sandstone & streaks of Clay		225	232	7
Hardpacked Gravel & Sand		232	235	3
Sand, coarse Gravel & Boulders		235	245	10
Hardpacked Gravel- large & small		245	250	5
Coarse Sand		250	255	5
Coarse & fine Sand, Rock		255	c260	5
Coarse sand, Gravel & Boulders		260	270	10
Boulders, Coarse Sand & Gravel		270	280	10
Coarse Gravel, Boulders & Sarp Sand		280	295	15
Sharp sand, Cobblestones & Boulders		295	300	5

Date started....., 19.....
Date completed....., 19.....

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump

BAILER TEST
G.P.M..... Draw down.....feet .....hours
G.P.M..... Draw down.....feet .....hours
G.P.M..... Draw down.....feet .....hours

8. WELL CONSTRUCTION
Diameter hole 6 inches Total depth 370 feet
Casing record 370 ----.188 wall
Weight per foot.....Thickness.....

Diameter	From	To
.....inches	.....feet	.....feet
.....inches	.....feet	.....feet
.....inches	.....feet	.....feet
.....inches	.....feet	.....feet
.....inches	.....feet	.....feet
.....inches	.....feet	.....feet

Surface seal: Yes ☐ No ☐ Type.....
Depth of seal.....feet
Gravel packed: Yes ☐ No ☐
Gravel packed from.....feet to.....feet

Perforations:
Type perforation.....
Size perforation.....
From.....feet to.....feet
From.....feet to.....feet
From.....feet to.....feet
From.....feet to.....feet
From.....feet to.....feet

9. WATER LEVEL
Static water level.....Feet below land surface.....
Flow.....G.P.M.....
Water temperature.....° F. Quality.....

10. DRILLERS CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.

Name.....
Address.....
Nevada contractor's license number.....
Nevada driller's license number.....
Signed.....
Date.....

USE ADDITIONAL SHEETS IF NECESSARY

5471

WHITE—DIVISION OF WATER RESOURCES
CANARY—CLIENT'S COPY
PINK—WELL DRILLER'S COPY

PAGE 3

STATE OF NEVADA
DIVISION OF WATER RESOURCES

WELL DRILLERS REPORT

Please complete this form in its entirety

OFFICE USE ONLY
Log No.....
Permit No.....
Basin.....

1. OWNER Gardnerville Rancho's Gen. Impr. Distr. ADDRESS Gardnerville, Nevada 89410

2. LOCATION NE ¼ SE ¼ NE ¼ Sec. 15 T. 12 N/S R. 20 E. Douglas County
PERMIT NO. 29561

3. TYPE OF WORK				4. PROPOSED USE				5. TYPE WELL			
New Well	☐	Recondition	☐	Domestic	☐	Irrigation	☒	Test	☐	Cable	☒	Rotary	☐
Deepen	☐	Other	☐	Municipal	☐	Industrial	☐	Stock	☐	Other	☐		

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
Coarse Sand		300	305	5
Boulders & Clay		305	315	10
Cement Gravel		315	325	10
Boulders & some Clay		325	335	10
Boulders, Coarse Gravel & Clay		335	345	10
Boulders, Clay & hard-packed Sand		345	350	5
Coarse Sand & Clay, hard & Compact		350	355	5
Cement formation with Boulders		355	360	5
Boulders & Clay		360	370	10

Date started....., 19.....
Date completed....., 19.....

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump

BAILER TEST
G.P.M..... Draw down.....feet .....hours
G.P.M..... Draw down.....feet .....hours
G.P.M..... Draw down.....feet .....hours

8. WELL CONSTRUCTION

Diameter hole 6 inches Total depth 370 feet
Casing record 370 feet---.188 wall
Weight per foot.....Thickness.....

Diameter	From	To
.....inches	.....feet	.....feet
.....inches	.....feet	.....feet
.....inches	.....feet	.....feet
.....inches	.....feet	.....feet
.....inches	.....feet	.....feet
.....inches	.....feet	.....feet

Surface seal: Yes ☐ No ☐ Type.....
Depth of seal.....feet
Gravel packed: Yes ☐ No ☐
Gravel packed from.....feet to.....feet

Perforations:
Type perforation.....
Size perforation.....
From.....feet to.....feet
From.....feet to.....feet
From.....feet to.....feet
From.....feet to.....feet
From.....feet to.....feet

9. WATER LEVEL

Static water level.....Feet below land surface.....
Flow.....G.P.M.....
Water temperature.....° F. Quality.....

10. DRILLERS CERTIFICATION

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

Name.....

Address.....

11.52
Nevada contractor's license number.....

Nevada driller's license number.....

Signed.....

Date.....

USE ADDITIONAL SHEETS IF NECESSARY

5471

DIVISION OF WATER RESOURCES

STATE OF NEVADA
DIVISION OF WATER RESOURCES

WELL DRILLERS REPORT

Please complete this form in its entirety

OFFICE USE ONLY
Log No. 19471
Permit No.
Basin

1. OWNER Gardnerville Ranchos GID ADDRESS 931 Mitch Drive
Gardnerville, Nevada 89410

2. LOCATION SE ¼ NE ¼ Sec. 15 T. 12N (N) S R. 20 E. Douglas County
PERMIT NO. 29561

3. TYPE OF WORK
New Well [X] Recondition [ ]
Deepen [ ] Other [ ]

4. PROPOSED USE
Domestic [ ] Irrigation [ ] Test [ ]
Municipal [X] Industrial [ ] Stock [ ]

5. TYPE WELL
Cable [X] Rotary [ ]
Other [ ]

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
Yellow Clay/Boulders		0	20	20
Loose Cobblestones	WB	20	31	11
Yellow Clay/Boulders		31	42	11
Small Gravel	WB	42	52	10
Gravel/Cobblestones	WB	52	112	60
Yellow Clay/Boulders		112	122	10
Yellow Clay/Gravel		122	162	40
Coarse Gravel/Cobbles	WB	162	186	24
Yellow Clay/Cobbles		186	231	45
Cemented Gravel/Cobbles		231	258	27
Yellow Clay/Gravel		258	286	28
Cemented Gravel		286	334	48
Yellow Clay/Gravel		334	350	16
Cemented Gravel		350	375	25

Date started October 9, 1978, 19
Date completed November 29, 1978, 19

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump

BAILER TEST
G.P.M. Draw down feet hours
G.P.M. Draw down feet hours
G.P.M. Draw down feet hours

8. WELL CONSTRUCTION
Diameter hole 16 inches Total depth 375 feet
Casing record
Weight per foot 42.05 Thickness .250

Diameter	From	To
16 inches	Plus 2 feet	M 375 feet
inches	feet	feet
inches	feet	feet
inches	feet	feet
inches	feet	feet
inches	feet	feet

Surface seal: Yes [X] No [ ] Type Cement Grout
Depth of seal 53'-6" feet
Gravel packed: Yes [ ] No [XX]
Gravel packed from feet to feet

Perforations:
Type perforation Factory Milled Slots
Size perforation 1/4" x 3"
From 183 feet to 372 feet
From feet to feet
From feet to feet
From feet to feet
From feet to feet

9. WATER LEVEL
Static water level 14 Feet below land surface
Flow G.P.M.
Water temperature Cold° F. Quality

10. DRILLERS CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.

Name Reno Pump & Supply
Address 7468 South Virginia Street
Reno, Nevada 89511

Nevada contractor's license number 5307
Nevada driller's license number 285
Signed Harry W. Jones
Date 12/1/78

USE ADDITIONAL SHEETS IF NECESSARY

5471

WHITE—DIVISION OF WATER RESOURCES
CANARY—CLIENT'S COPY
PINK—WELL DRILLER'S COPY

STATE OF NEVADA
DIVISION OF WATER RESOURCES

WELL DRILLERS REPORT

Please complete this form in its entirety

OFFICE USE ONLY
Log No. 25320
Permit No.
Basin CARSON V. 8-105

PRINT OR TYPE ONLY

NOTICE OF INTENT NO. 2553

1. OWNER GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
MAILING ADDRESS 931 MITCH DRIVE GARDNERVILLE, NV 89410
ADDRESS AT WELL LOCATION ON KIMMERLING ROAD - 1.5 MILES WEST OF TILLMAN

2. LOCATION NE ¼ NE ¼ Sec. 20 T 12 N/S R 20 E DOUGLAS County
PERMIT NO. 47106 (Issued by Water Resources) | Parcel No. | Subdivision Name

3. TYPE OF WORK: New Well ☒ Recondition ☐ Deepen ☐ Other ☐

4. PROPOSED USE: Domestic ☐ Irrigation ☐ Test ☐ Municipal ☒ Industrial ☐ Stock ☐

5. TYPE WELL: Cable ☐ Rotary ☒ Other ☐ REVERSE

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
brn silty sand, small boulders		0	20	20
sand & small boulders		20	40	20
sand & gravel & cobbles		40	100	60
fine sand & gravel w/trace of clay		100	140	40
fine sand, gravel & cobbles		140	220	80
fine sand, gravel & cobbles w/trace of clay		220	240	20
fine sand, gravel & cobbles	xx	240	260	20
fine sand & gravel	xx	260	300	40
fine sand & gravel w/ small clay layers	xx	300	320	20
fine sand & gravel & clay layers	xx	320	355	35
gravel (hard)	xx	355	360	5
sand & gravel	xx	360	380	20
fine sand & gravel	xx	380	420	30
sand & gravel w/small clay layers	xx	420	440	20
clay		440	455	15
sand & gravel	xx	455	460	5
clay, sand & gravel layers small		460	520	60

Test Hole to 520 ft abandoned/Production well to 450 ft

Date started MARCH 29, 1984
Date completed MAY 2, 1984

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump
1400	1200	97	48

BAILER TEST
G.P.M. ..... Draw down ..... feet ..... hours
G.P.M. ..... Draw down ..... feet ..... hours
G.P.M. ..... Draw down ..... feet ..... hours

8. WELL CONSTRUCTION
Diameter hole 22 inches Total depth 450 feet
Casing record 16" x .250 wall
Weight per foot 42.05 Thickness

Diameter	From	To
16 inches	+1 feet	450 feet
inches	feet	feet
inches	feet	feet
inches	feet	feet
inches	feet	feet
inches	feet	feet

Surface seal: Yes ☒ No ☐ Type sand-cement grout
Depth of seal 138 feet
Gravel packed: Yes ☒ No ☐
Gravel packed from 138 feet to 450 feet
1/4" to 3/8" quartz pebbles
Perforations:
Type perforation Johnson Screen 16" Double Extra Heavy
Size perforation 200th slot
From 200 feet to 450 feet
From ..... feet to ..... feet
From ..... feet to ..... feet
From ..... feet to ..... feet
From ..... feet to ..... feet

9. WATER LEVEL
Static water level 55½ feet below land surface
Flow ..... G.P.M. ..... P.S.I.
Water temperature 64.4 ° F. Quality good

10. DRILLERS CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.
Name CHARLES SARGENT IRRIGATION, INC. (Contractor)
Address P. O. BOX 2480 RENO, NV 89505 (Contractor)
Nevada contractor's license number 21246
Nevada contractor's drillers number 1391 LARRY WHITESEL
Nevada driller's license number 1388 GENE MAPEL (Actual Driller)
Signed Gene Mapel (Contractor)
Date MAY 3, 1984

USE ADDITIONAL SHEETS IF NECESSARY

(Rev 6-81) O-627 CR434

WHITE–DIVISION OF WATER RESOURCES
CANARY–CLIENT'S COPY
PINK–WELL DRILLER'S COPY

STATE OF NEVADA
DIVISION OF WATER RESOURCES

WELL DRILLER'S REPORT

Please complete this form in its entirety

PRINT OR TYPE ONLY

OFFICE USE ONLY
Log No. 32531
Permit No. 51308
Basin 8-105 Carson V.

NOTICE OF INTENT NO. 10801

1. OWNER GARDNERVILLE RANCHOS
MAILING ADDRESS c/o Lumos & Associates
800 E. Graves, Carson City, Nv. 89701

ADDRESS AT WELL LOCATION
GARDNERVILLE RANCHOS / Dresserville & Tomlin
Gardnervile, nv.

2. LOCATION SE ¼ SW ¼ Sec. 9 T 12 (N)/S R. 20 E. Douglas County

PERMIT NO. 51308 (Issued by Water Resources) | Parcel No. | Subdivision Name

3. TYPE OF WORK
New Well ☒ Recondition ☐
Deepen ☐ Other ☐

4. PROPOSED USE GRID #6
Domestic ☐ Irrigation ☐ Test ☐
Municipal ☒ Industrial ☐ Stock ☐

5. TYPE WELL
Cable ☐ Rotary ☒
Other ☐

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
Top soil		0	3	3
Coarse sand, gravel, and small boulders		3	40	37
Sand & gravel		40	429	389
Clay		429	434	5

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Date started September 12 19 89
Date completed Ocotboer 20, 19 89

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump

BAILER TEST
G.P.M. ..... Draw down ..... feet ..... hours
G.P.M. ..... Draw down ..... feet ..... hours
G.P.M. ..... Draw down ..... feet ..... hours

8. WELL CONSTRUCTION
Diameter 26 inches Total depth 434 feet
..... inches
..... inches
Casing record 18 inch x .375 inch wall
Weight per foot 70.59 Thickness .....

Diameter	From	To
18 inches	+1 feet	210 feet
..... inches	..... feet	..... feet
..... inches	430 feet	434 feet
..... inches	..... feet	..... feet
..... inches	..... feet	..... feet
..... inches	..... feet	..... feet

Surface seal: Yes ☒ No ☐ Type Cement sand grout
Depth of seal 50 feet
Gravel packed: Yes ☒ No ☐
Gravel packed from 50 feet to 434 feet
Chevreaux 1/8 icnh x 1/4 inch Quartz Pebbles

Perforations:
Type perforation Roscoe Moss 18 inch wire wrap screen
Size perforation .100 inch slot mild steel Heavy wieght

From ..... feet to ..... feet
From 210 feet to 430 feet
From ..... feet to ..... feet
From ..... feet to ..... feet
From ..... feet to ..... feet

9. WATER LEVEL
Static water level 45 feet below land surface
Flow ..... G.P.M. ..... P.S.I.
Water temperature cold °F Quality good

10. DRILLER'S CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.
Name CHAS. SARGENT IRRIGAITON INC. (Contractor)
Address 9955 N. VIRGINIA ST., RENO, NV. 89506 (Contractor)
Nevada contractor's license number issued by the State Contractor's Board 21246
Nevada contractor's driller's number issued by the Division of Water Resources 1391
Nevada driller's license number issued by the Division of Water Resources the on-site driller 1573
Signed ..... (By driller performing actual drilling on site or contractor)
Date 11-20-89

(Rev. 11-85) USE ADDITIONAL SHEETS IF NECESSARY (O)-627

Corrected

REPORT NO. 94.14

STATE OF NEVADA
DIVISION OF WATER RESOURCES
WELL DRILLER'S REPORT

LOG NO 44774
PERMIT NO.
BASIN 8-105

NOTICE OF INTENT NO. 23892

1. OWNER Gardnerville Ranchos General Improvement District
MAILING ADDRESS Gardnerville, Nv 89706

ADDRESS OF WELL Kimmerling Rd Blue Rock
Test Well #7

2. WELL LOCATION SE 1/4 SE 1/4 SEC. 21 T 12N R 20 E DOUGLAS COUNTY

PERMIT NO M/O-748 PARCEL NO _____ SUBDIVISION NAME GARDNERVILLE RANCHOS

3. TYPE OF WORK	4. PROPOSED USE	5. WELL TYPE
[X] New Well [ ] Replace [ ] Recondition	[ ] Domestic [ ] Irrigation [X] Test	[ ] Cable [X] Rotary [ ] RVC
[ ] Deepen [ ] Abandon [ ] Other	[X] Municipal/Industrial [ ] Monitor [ ] Stock	[ ] Air [X] Mud

6. LITHOLOGIC LOG

MATERIAL	STRATA	FROM	TO	THICKNESS
Granite, cobbles & boulders		0	47	47
Grn,yellow,brn,wht,red,orange,coarse		47		
sands & gravels, traces of brown clay		47	146	99
Tan,yellow,wht,semi-decomposed		146		
granite, tan clay stringers		146	223	77
Blk & wht granite, some fractures with		223		
traces of green & tan D.G.		223	480	

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Notes : Test pumped at 235 GPM with a drawdown of 374'.

Date Started 2/3/94 Date Completed 2/15/94

7. WELL TEST DATA

TEST METHOD [ ] Bailer [X] Pump [ ] Air Lift

	GPM	DRAWDOWN	TIME (HRS)
1	235	374	4

8. WELL CONSTRUCTION

Depth Drilled 480 Depth Cased 480

HOLE DIAMETER (BIT SIZE)

10 5/8 Inches +1.5 Feet 480 Feet
_____ Inches _____ Feet _____ Feet
_____ Inches _____ Feet _____ Feet

CASING SCHEDULE

Size O.D.	Weight/Ft	Wall Thickness	From	To
6 5/8	12.92	.188	+1.5	480

PERFORATIONS:

Type Perforation Factory Size Perforation 1/8 x 3 tri.
From 460 Feet to 480 Feet
From 300 Feet to 320 Feet
From _____ Feet to _____ Feet

SURFACE SEAL: [X] Yes [ ] No SEAL TYPE:
Seal Depth 53'
PLACEMENT METHOD: [X] Pumped [ ] Poured
[X] Neat Cement [ ] Cement Grout [ ] Concrete Grout

GRAVEL PACKED: [X] Yes [ ] No
From 53 Feet to 480 Feet

9. WATER LEVEL

Static Water Level 40 Feet Below Land Surface
Artesian Flow _____ GPM _____ PSI
Water Temperature COOL F Quality _____

10. DRILLER'S CERTIFICATION

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

Name AQUA DRILLING & WELL SERVICE, INC
Address 625 SPICE ISLANDS DR STE L
SPARKS, NV 89431

NV. CONTRACTOR'S LIC. NO. 15291 DRILLER'S LIC. NO. ON SITE 1152

Signed Roger M Thiel
By driller performing actual drilling on site or contractor

Dated 3/11/94

WHITE - DIVISION OF WATER RESOURCES
CANARY - CLIENT'S COPY
PINK - WELL DRILLER'S COPY

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DO NOT WRITE ON BACK

STATE OF NEVADA
DIVISION OF WATER RESOURCES
WELL DRILLER'S REPORT

Please complete this form in its entirety in accordance with NRS 534.170 and NAC 534.340

OFFICE USE ONLY
Log No. 67795
Permit No.
Basin 105

NOTICE OF INTENT NO. 369418

1. OWNER Gardnerville Ranchos Gen. Improvement Dist.
MAILING ADDRESS 931 Mitch Drive
Gardnerville, NV 89410

ADDRESS AT WELL LOCATION
Wyatt Lane, Gardnerville

2. LOCATION NE 1/4 NW 1/4 Sec. 10 T 12N N/S R 20E E Douglas County
PERMIT NO. 62004 (Issued by Water Resources) | Parcel No. | Subdivision Name

3. WORK PERFORMED
☒ New Well ☐ Replace ☐ Recondition
☐ Deepen ☐ Abandon ☐ Other

4. PROPOSED USE
☐ Domestic ☐ Irrigation ☐ Test
☒ Municipal/Industrial ☐ Monitor ☐ Stock

5. WELL TYPE
☐ Cable ☐ Rotary ☒ RVC
☐ Air ☐ Other

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
Top soil		0	2	2
Small gravel w/sand		2	14	12
Rock, cobbles, gravel to 1"	x	14	40	26
Sand	x	40	42	2
Rock, cobbles, gravel		42	48	6
Cemented sand, rock		48	77	29
Sandy clay		77	79	2
Cemented sand, rock		79	89	10
Gravel w/streaks of clay		89	99	10
Hard rock		99	103	4
Cemented gravel/rock		103	106	3
Hard rock		106	117	11
Cemented gravel w/sand		117	189	72
See next line		189	228	39
Cemented gravel w/sand & streaks of clay				
See next line		228	258	30
Small gravel w/sand & streaks of gray clay				
See next line		258	310	52
Small gravel w/sand & streaks of clay				
See next line		310	394	84
Small to medium gravel w/sand & streaks of clay				
Sand w/clay		394	399	5
See next line		399	412	13
Small to medium gravel w/streaks of clay				
See next line		412	435	23
Sandy brn clay w/streaks of sand				
Brown sandy clay		435	441	6

Date started 7/29/97 , 19__
Date completed 8/8/97 , 19__

7. WELL TEST DATA
TEST METHOD: ☐ Bailer ☒ Pump ☐ Air Lift

G.P.M.	Draw Down (Feet Below Static)	Time (Hours)
1000	170	24 hrs.

8. WELL CONSTRUCTION
Depth Drilled 524 Feet Depth Cased 500 Feet

HOLE DIAMETER (BIT SIZE)

		From	To
48	Inches	0 Feet	20 Feet
28	Inches	20 Feet	100 Feet
22	Inches	100 Feet	524 Feet

CASING SCHEDULE

Size O.D. (Inches)	Weight/Ft. (Pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)
16		1/4	+2	500

Perforations:
Type perforation Johnson wire wrap
Size perforation .08
From 260 feet to 500 feet
From ____ feet to ____ feet
From ____ feet to ____ feet
From ____ feet to ____ feet
From ____ feet to ____ feet

Surface Seal: ☒ Yes ☐ No
Depth of Seal 100
Placement Method: ☒ Pumped ☐ Poured
Seal Type: ☐ Neat Cement ☒ Cement Grout ☐ Concrete Grout

Gravel Packed: ☒ Yes ☐ No
From 0 feet to 524 feet

9. WATER LEVEL
Static water level 46 feet below land surface
Artesian flow ____ G.P.M. ____ P.S.I.
Water temperature Cool °F Quality Good

10. DRILLER'S CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.

Name Humboldt Drilling & Pump Co., Inc.
Contractor
Address 4675 W. Winnemucca Blvd
Contractor
Winnemucca, NV 89445

Nevada contractor's license number issued by the State Contractor's Board 015234

Nevada driller's license number issued by the Division of Water Resources, the on-site driller 1572

Signed [signature]
By driller performing actual drilling on-site or contractor

Date 8-30-97

DIVISION OF WATER RESOURCES
CLIENT'S COPY
WELL DRILLER'S COPY

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STATE OF NEVADA
DIVISION OF WATER RESOURCES

WELL DRILLER'S REPORT

Please complete this form in its entirety in accordance with NRS 534.170 and NAC 534.340

OFFICE USE ONLY
Log No. 62795
Permit No.
Basin 105

NOTICE OF INTENT NO. 36941

1. OWNER Gardnerville Ranchos Gen. Improvement Dist.
MAILING ADDRESS 931 Mitch Drive
Gardnerville, NV 89410

ADDRESS AT WELL LOCATION Wyatt Lane, Gardnerville

2. LOCATION NE 1/4 NW 1/4 Sec. 10 T 12N N/S R 20E E Douglas County
PERMIT NO. 62004 (Issued by Water Resources) | Parcel No. | Subdivision Name

3. WORK PERFORMED
☐ New Well ☐ Replace ☐ Recondition
☐ Deepen ☐ Abandon ☐ Other

4. PROPOSED USE
☐ Domestic ☐ Irrigation ☐ Test
☐ Municipal/Industrial ☐ Monitor ☐ Stock

5. WELL TYPE
☐ Cable ☐ Rotary ☐ RVC
☐ Air ☐ Other

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
See next line		441	470	29
Sand & small gravel w/streaks of sandy clay				
See next line		470	478	8
Small gravel w/sand & streaks of clay				
See next line		478	524	46
Small to medium gravel w/sand & streaks of clay				

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Date started 7/29/97 , 19__
Date completed 8/8/97 , 19__

7. WELL TEST DATA
TEST METHOD: ☐ Bailer ☐ Pump ☐ Air Lift

G.P.M.	Draw Down (Feet Below Static)	Time (Hours)

8. WELL CONSTRUCTION
Depth Drilled _____ Feet Depth Cased _____ Feet

HOLE DIAMETER (BIT SIZE)

	From	To
_____ Inches	_____ Feet	_____ Feet
_____ Inches	_____ Feet	_____ Feet
_____ Inches	_____ Feet	_____ Feet

CASING SCHEDULE

Size O.D. (Inches)	Weight/Ft. (Pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)

Perforations:
Type perforation _____
Size perforation _____
From _____ feet to _____ feet
From _____ feet to _____ feet
From _____ feet to _____ feet
From _____ feet to _____ feet
From _____ feet to _____ feet

Surface Seal: ☐ Yes ☐ No
Depth of Seal _____
Placement Method: ☐ Pumped ☐ Poured
Seal Type: ☐ Neat Cement ☐ Cement Grout ☐ Concrete Grout

Gravel Packed: ☐ Yes ☐ No
From _____ feet to _____ feet

9. WATER LEVEL
Static water level _____ feet below land surface
Artesian flow _____ G.P.M. _____ P.S.I.
Water temperature _____ °F Quality _____

10. DRILLER'S CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.

Name Humboldt Drilling & Pump Co., Inc. (Contractor)
Address 4675 W. Winnemucca Blvd (Contractor)
Winnemucca, NV 89445

Nevada contractor's license number issued by the State Contractor's Board 015234

Nevada driller's license number issued by the Division of Water Resources, the on-site driller 1572

Signed _____ (By driller performing actual drilling on-site or contractor)
Date _____

STATE OF NEVADA
DIVISION OF WATER RESOURCES

WELL DRILLER'S REPORT

Please complete this form in its entirety in accordance with NRS 534.170 and NAC 534.340

OFFICE USE ONLY
Log No. 98220
Permit No.
Basin 105

NOTICE OF INTENT NO. 56294

1. OWNER Rocky Terrace Estates
MAILING ADDRESS 1080 Centerville Lane
Gardnerville, NV 89410
ADDRESS AT WELL LOCATION Gardnerville, NV

2. LOCATION SW 1/4 SE Sec. 8 T 12 N/S R 20 E Douglas County
PERMIT NO. 71727 Issued By Water Resources
Parcel No.
Subdivision Name

3. WORK PERFORMED: [x] New Well [ ] Replace [ ] Recondition [ ] Deepen [ ] Abandon [ ] Other

4. PROPOSED USE: [ ] Domestic [ ] Irrigation [ ] Test [x] Municipal/Indu [ ] Monitor [ ] Shock

5. WELL TYPE: [ ] Cable [ ] Rotary [x] RVC [ ] Air [ ] Other

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
Fill dirt		0	2	2
Sand, gravel and cobbles		2	116	114
Clay w/coarse sand		116	119	3
Sand, gravel and cobles		119	148	29
Sand and gravel		148	160	12
Sand and gravel w/clay stringers		160	287	127
Clay w/sand layers		287	299	12
Sand & gravel w/clay layers		299	309	10
Sand & gravel w/hard rock		309	356	47
Sand & gravel-few cobbles		356	400	44
Sand & gravel, little clay		400	416	16

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8. WELL CONSTRUCTION
Depth Drilled 416 Feet Depth Cased 390 Feet

HOLE DIAMETER (BIT SIZE)

		From		To	
30	Inches	0	Feet	100	Feet
22	Inches	100	Feet	416	Feet
	Inches		Feet		Feet

CASING SCHEDULE

Size O.D. (inches)	Weight (pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)
24		0.250	0	100
12 3/4		0.250	+2	390

Type Perforation Wire Wrap
Size Perforation 0.050
From 240 feet to 390 feet
From feet to feet
From feet to feet

Surface Seal : [x] Yes [ ] No
Seal Type : [ ] Neat Cement [x] Cement Grout [ ] Concrete Grout
Depth of Seal 100'
As per conv w/ Humboldt Drilling 7/23/08
Placement Method : [x] Pumped [ ] Poured
Gravel Packed : [x] Yes [ ] No
From 3 feet to 416 feet
From feet to feet

9. WATER LEVEL
Static Water Level 28 feet below land surface
Artesian flow NA G.P.M. P.S.I.
Water temperature Cool °F Quality Good

10. DRILLER'S CERTIFICATION

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

Name Hydro Resources Nevada Inc. dba Humboldt Drilling and Pump Co.
Address 4975 West Winnemucca Boulevard
Winnemucca, Nevada 89445

NV Contractor's LIC# issued by the State Contractor's Board	56797
NV Driller's LIC# issued by Div. of Water Resources, on-site driller	2177
Signed : C. Jaynes - Office	Date : 7/8/05

Date Started May 6 2005
Date Completed May 11 2005

7. WELL TEST DATA

TEST METHOD : [ ] BAILER [x] PUMP [ ] AIR LIFT

	G.P.M.	Draw Down (Feet Below Static)	Time (Hours)
Pumping Level 149'	1000	121	24

Appendix D

System Age Inventory

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
SYSTEM AGE INVENTORY

TOTAL PIPE LENGTH BY SIZE (ROUNDED)

2" (LF)	4" (LF)	6" (LF)	8" (LF)	10" (LF)	12" (LF)	14" (LF)	16" (LF)	Total Length (LF)	No. Valves	No. Fire Hydrants
2,200	3,800	70,100	152,700	28,200	42,800	800	3,700	304,300	646	453

TOTAL PIPE LENGTH BY SIZE, 40-50+ YEARS OLD

2" (LF)	4" (LF)	6" (LF)	8" (LF)	10" (LF)	12" (LF)	14" (LF)	16" (LF)	Total Length (LF)	No. Valves	No. Fire Hydrants
0	0	7,246	404	69	0	0	0	7,719	21	12

TOTAL PIPE LENGTH BY SIZE, 30-40 YEARS OLD

2" (LF)	4" (LF)	6" (LF)	8" (LF)	10" (LF)	12" (LF)	14" (LF)	16" (LF)	Total Length (LF)	No. Valves	No. Fire Hydrants
1,870	1,225	16,200	28,967	7,961	18,822	0	1,573	76,618	68	76

TOTAL PIPE LENGTH BY SIZE, 20-30 YEARS OLD

2" (LF)	4" (LF)	6" (LF)	8" (LF)	10" (LF)	12" (LF)	14" (LF)	16" (LF)	Total Length (LF)	No. Valves	No. Fire Hydrants
364	2,596	35,245	48,937	12,341	19,095	0	0	118,578	292	191

TOTAL PIPE LENGTH BY SIZE, 10-20 YEARS OLD

2" (LF)	4" (LF)	6" (LF)	8" (LF)	10" (LF)	12" (LF)	14" (LF)	16" (LF)	Total Length (LF)	No. Valves	No. Fire Hydrants
0	0	9,328	64,073	7,807	4,870	758	2,114	88,950	213	144

TOTAL PIPE LENGTH BY SIZE, 0-10 YEARS OLD

2" (LF)	4" (LF)	6" (LF)	8" (LF)	10" (LF)	12" (LF)	14" (LF)	16" (LF)	Total Length (LF)	No. Valves	No. Fire Hydrants
0	0	2,094	10,305	0	0	0	0	12,399	52	30

Appendix E

Monthly Well Production, 2009-2017

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
MONTHLY WELL PRODUCTION DATA, 2009-2017

	Monthly Well Production (gallons)									
Month	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**Average**
Jan	18,912,000	25,704,000	23,938,000	33,678,000	21,448,000	31,143,000	30,105,000	22,240,000	20,203,000	25,896,000
Feb	25,788,000	26,546,000	25,979,000	26,125,000	22,404,000	26,366,000	26,612,000	27,515,000	18,827,000	25,916,875
Mar	33,695,000	36,865,000	28,586,000	29,638,000	38,140,000	42,553,000	53,913,000	29,910,000	23,833,000	36,662,500
Apr	88,481,000	55,363,000	51,069,000	86,465,000	106,626,000	100,931,000	87,854,000	68,687,000	-	80,684,500
May	124,168,000	96,743,000	116,769,000	150,539,000	132,921,000	127,098,000	89,704,000	91,066,000	-	116,126,000
Jun	147,978,000	167,868,000	127,470,000	165,012,000	155,584,000	169,712,000	142,455,000	152,561,000	-	153,580,000
Jul	197,023,000	174,103,000	165,242,000	190,741,000	199,581,000	173,407,000	132,439,000	167,527,000	-	175,007,875
Aug	179,518,000	184,567,000	180,854,000	171,941,000	167,696,000	146,107,000	151,251,000	184,710,000	-	170,830,500
Sep	154,374,000	143,569,000	133,915,000	142,221,000	142,949,000	150,531,000	134,226,000	135,348,000	-	142,141,625
Oct	56,514,000	65,337,000	79,078,000	102,962,000	79,447,000	93,043,000	76,220,000	76,073,000	-	78,584,250
Nov	34,453,000	33,790,000	33,829,000	33,313,000	28,852,000	32,209,000	30,113,000	28,359,000	-	31,864,750
Dec	29,210,000	24,046,000	29,496,000	26,407,000	30,992,000	32,046,000	25,606,000	22,541,000	-	27,543,000
Total	1,090,114,000	1,034,501,000	996,225,000	1,159,042,000	1,126,640,000	1,125,146,000	980,498,000	1,006,537,000	-	1,064,837,875
Average Day (gpd)	2,987,000	2,834,000	2,729,000	3,175,000	3,087,000	3,083,000	2,686,000	2,758,000	-	2,917,000
Max Month (gallons)	197,023,000	184,567,000	180,854,000	190,741,000	199,581,000	173,407,000	151,251,000	184,710,000	-	182,766,750
ADMM (gpd)	6,356,000	5,954,000	5,834,000	6,153,000	6,438,000	5,594,000	4,879,000	5,958,000	-	5,896,000

= Maximum Month

Appendix F

Monthly Meter Records, 2016

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
2016 METER DATA: RESIDENTIAL

Residential: In-District

Month	No. of Days	No. Meters	No. DUs	Monthly (gal)	Average Daily (gpd/DU)
Jan 2016	31	1,913	1,913	10,645,076	180
Feb 2016	28	1,933	1,933	9,243,060	171
Mar 2016	31	1,956	1,956	10,315,003	170
Apr 2016	30	1,975	1,975	11,756,003	198
May 2016	31	2,169	2,169	25,064,017	373
Jun 2016	30	2,269	2,269	33,138,011	487
Jul 2016	31	2,307	2,307	52,937,028	740
Aug 2016	31	2,397	2,397	79,708,000	1,073
Sep 2016	30	2,445	2,445	80,770,000	1,101
Oct 2016	31	2,457	2,457	36,430,000	478
Nov 2016	30	2,691	2,691	51,897,000	643
Dec 2016	31	2,772	2,772	18,882,001	220
Total	365	-	-	420,785,199	-
Average	-	2,274	2,274	35,065,433	486

Residential: Out-of-District (Low-Density)

Month	No. of Days	No. Meters	No. DUs	Monthly (gal)	Average Daily (gpd/DU)
Jan 2016	31	9	9	37,000	133
Feb 2016	28	9	9	33,000	131
Mar 2016	31	10	10	35,000	113
Apr 2016	30	10	10	77,000	257
May 2016	31	11	11	180,000	528
Jun 2016	30	11	11	349,000	1,058
Jul 2016	31	11	11	634,000	1,859
Aug 2016	31	11	11	1,041,000	3,053
Sep 2016	30	11	11	1,115,000	3,379
Oct 2016	31	12	12	353,000	949
Nov 2016	30	17	17	356,000	698
Dec 2016	31	16	16	182,000	367
Total	365	-	-	4,392,000	-
Average	-	12	12	366,000	1,044

Multi-Family Residential: Duplexes

Month	No. of Days	No. Meters	No. DUs	Monthly (gal)	Average Daily (gpd/DU)
Jan 2016	31	17	34	238,000	226
Feb 2016	28	17	34	160,000	168
Mar 2016	31	17	34	175,000	166
Apr 2016	30	17	34	187,000	183
May 2016	31	23	46	330,000	231
Jun 2016	30	27	54	512,000	316
Jul 2016	31	27	54	666,000	398
Aug 2016	31	28	56	870,000	501
Sep 2016	30	28	56	953,000	567
Oct 2016	31	28	56	552,000	318
Nov 2016	30	32	64	591,000	308
Dec 2016	31	32	64	412,000	208
Total	365	-	-	5,646,000	-
Average	-	24	49	470,500	299

Multi-Family Residential: Wine St. 4 Plex

Month	No. of Days	No. Meters	No. DUs	Monthly (gal)	Average Daily (gpd/DU)
Jan 2016					
Feb 2016					
Mar 2016					
Apr 2016					
May 2016	31	1	4	30,000	
Jun 2016	30	2	8	62,000	258
Jul 2016	31	2	8	63,000	254
Aug 2016	31	2	8	71,000	286
Sep 2016	30	2	8	89,000	371
Oct 2016	31	2	8	62,000	250
Nov 2016	30	2	8	22,000	
Dec 2016	31	2	8	33,000	133
Total	245	-	-	432,000	-
Average	-	2	8	54,000	259

Multi-Family Residential: 06 Sagebrook Apartments - 14 Units

Month	No. of Days	No. Meters	No. DUs	Monthly (gal)	Average Daily (gpd/DU)
Jan 2016					
Feb 2016					
Mar 2016					
Apr 2016					
May 2016	31	1	14		
Jun 2016	30	1	14	122,000	290
Jul 2016	31	1	14	126,000	290
Aug 2016	31	1	14	154,000	355
Sep 2016	30	1	14	145,000	345
Oct 2016	31	1	14	111,000	256
Nov 2016	30	1	14		
Dec 2016	31	1	14	58,000	134
Total	245	-	-	716,000	-
Average	-	1	14	119,333	278

Multi-Family Residential: 07 Sagebrook Apartments - 14 Units

Month	No. of Days	No. Meters	No. DUs	Monthly (gal)	Average Daily (gpd/DU)
Jan 2016					
Feb 2016					
Mar 2016					
Apr 2016					
May 2016	31	1	14		
Jun 2016	30	1	14	112,000	267
Jul 2016	31	1	14	126,000	290
Aug 2016	31	1	14	205,000	472
Sep 2016	30	1	14	215,000	512
Oct 2016	31	1	14	132,000	304
Nov 2016	30	1	14		
Dec 2016	31	1	14	32,000	74
Total	245	-	-	822,000	-
Average	-	1	14	137,000	320

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
2016 METER DATA: NON-RESIDENTIAL

		Monthly Water Usage (gallons)													Average		Demand		
Account Name	Address	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Total	Demand (gpd)	Area (ac)	Factor (gpd/ac)	Land Use Category	Land Use Detail
Bentley Family, Inc.	1167 Kimmerling Rd.	-	-	-	-	-	-	-	5,000	-	-	-	-	5,000	14				
Brooks Golf	1031 Riverview Dr.	1,000	-	1,000	1,000	-	1,000	1,000	1,000	-	-	1,000	-	7,000	19				
Cahi #6 HOA	1 Cahi Circle	-	1,000	72,000	67,000	201,000	308,000	329,000	133,000	230,000	13,000	-	-	1,354,000	3,710	0.76	4,881	Park	Neighborhood Park
Calvary Chapel	1004 Dresslerville Rd.	3,000	7,000	38,000	47,000	114,000	144,000	141,000	55,000	96,000	6,000	3,000	3,000	657,000	1,800	4.00	465	Community	Church
Calvary Chapel	1004 Dresslerville Rd.	2,000	2,000	2,000	2,000	1,000	-	1,000	1,000	4,000	2,000	2,000	2,000	21,000	58				
Carson Valley Senior Living	1189 Kimmerling Rd.	230,000	230,000	211,000	224,000	166,000	196,000	215,000	179,000	184,000	224,000	199,000	246,000	2,504,000	6,860	2.72	4,091	Other	Senior Living Facility
Carson Valley Senior Living	1189 Kimmerling Rd.	-	45,000	184,000	208,000	183,000	260,000	269,000	161,000	248,000	-	-	-	1,558,000	4,268				
Carson Valley Country Club	1029 Riverview Dr.	34,000	50,000	61,000	79,000	128,000	179,000	181,000	79,000	108,000	46,000	36,000	36,000	1,017,000	2,786	1.20	2,322	Commercial	Restaurant
Carson Valley Golf Course	1025 Riverview Dr.	23,000	28,000	24,000	28,000	32,000	43,000	45,000	24,000	40,000	34,000	28,000	31,000	380,000	1,041	1.10	946	Commercial	Office-Retail
Cascade Sierra Properties	1307 Langley Dr.	1,000	2,000	2,000	2,000	3,000	2,000	3,000	1,000	2,000	2,000	1,000	1,000	22,000	60	0.25	241	Commercial	Offices
Clocktower Center, LLC	806 Tillman	79,000	101,000	280,000	219,000	415,000	431,000	550,000	248,000	275,000	280,000	87,000	98,000	3,063,000	8,392				
Dollar General	1 Kimmerling	2,000	9,000	14,000	22,000	3,000	2,000	2,000	9,000	5,000	11,000	7,000	6,000	92,000	252	1.60	158	Commercial	Retail
Douglas County Parks Dept.	1 Aspen Park	3,000	18,000	373,000	486,000	978,000	1,290,000	1,319,000	512,000	642,000	35,000	50,000	69,000	5,775,000	15,822	19.00	2,321	Park	Community Park
Douglas County Parks Dept.	1 Aspen Park	-	-	-	-	2,597,000	2,393,000	2,875,000	1,996,000	463,000	-	-	-	10,324,000	28,285				
Douglas County School District	1 Ranchos Park	-	-	90,000	100,000	260,000	365,000	265,000	169,000	71,000	15,000	-	-	1,335,000	3,658	10.79	985	School	
Douglas County School District	1 C.C. Meneley	62,000	83,000	172,000	188,000	474,000	554,000	399,000	199,000	260,000	79,000	44,000	32,000	2,546,000	6,975				
Douglas County School District	1 Scarselli Elementary	32,000	123,000	544,000	610,000	1,581,000	1,899,000	1,720,000	604,000	1,014,000	203,000	26,000	18,000	8,374,000	22,942	10.30	2,228	School	
Douglas County School District	1 Pau-Wa-Lu	26,000	138,000	717,000	551,000	1,543,000	1,956,000	1,842,000	660,000	955,000	109,000	27,000	17,000	8,541,000	23,400	17.50	1,337	School	
East Fork Fire District	940 Mitch Dr.	8,000	6,000	49,000	26,000	50,000	63,000	80,000	31,000	66,000	7,000	10,000	8,000	404,000	1,107	3.41	397	Community	Fire
East Fork Fire District	941 Mitch Dr.	-	-	5,000	6,000	14,000	19,000	18,000	11,000	13,000	1,000	1,000	2,000	90,000	247				
FISH	921 Mitch Dr.	-	1,000	-	7,000	15,000	22,000	14,000	10,000	8,000	1,000	-	1,000	79,000	216	0.88	247	Community	Church
Frontier Communications	773 Tillman Lane	3,000	2,000	1,000	-	-	-	1,000	1,000	-	-	-	1,000	9,000	25	0.20	123	Commercial	
Gary Moss	795 Tillman Lane	3,000	2,000	29,000	32,000	23,000	22,000	18,000	16,000	39,000	9,000	8,000	8,000	209,000	573	0.41	1,395	Commercial	Restaurant
GRGID	950 Mitch Rd.	420,000	-	-	730,000	660,000	660,000	1,250,000	520,000	540,000	-	-	-	4,780,000	13,096	17.20	1,520	Park	Community Park
GRGID	950 Mitch Rd.	50,000	210,000	240,000	240,000	300,000	1,060,000	1,060,000	300,000	900,000	320,000	80,000	-	4,760,000	13,041				
GRGID	740 Bluerock Rd.	-	-	54,000	62,000	78,000	110,000	120,000	67,000	92,000	1,000	-	-	584,000	1,600	1.07	1,492	Park	Neighborhood Park
GRGID	739 Robin Dr.	-	-	3,000	8,000	3,000	4,000	4,000	4,000	3,000	-	-	-	29,000	79	0.10	832	Park	Neighborhood Park
GRGID	931 Mitch Dr.	10,000	13,000	13,000	12,000	12,000	21,000	27,000	10,000	34,000	26,000	24,000	28,000	230,000	630	1.43	840	Community	District Offices
GRGID	931 Mitch Dr.	4,000	3,000	11,000	18,000	29,000	44,000	44,000	15,000	33,000	5,000	-	1,000	207,000	567				
Jehovah's Witness	1151 Kimmerling Rd.	3,000	47,000	161,000	164,000	165,000	220,000	198,000	101,000	78,000	49,000	3,000	3,000	1,192,000	3,266	3.15	1,036	Community	Church
JM Discount Liquor	1294 Kimmerling Rd.	10,000	16,000	26,000	42,000	44,000	73,000	94,000	35,000	66,000	26,000	14,000	13,000	459,000	1,258	0.65	1,935	Commercial	
John & Karrie Baker	789 Tillman Ln.	15,000	20,000	17,000	18,000	14,000	-	1,000	9,000	-	-	-	1,000	95,000	260	0.17	1,562	Commercial	Hotel
John McDougal	783 Tillman Ln.	12,000	13,000	11,000	12,000	11,000	13,000	14,000	11,000	14,000	16,000	16,000	16,000	159,000	436	0.33	1,306	Commercial	Hotel
John McDougal	1309 Langley Dr.	60,000	47,000	20,000	22,000	21,000	24,000	30,000	28,000	33,000	27,000	24,000	32,000	368,000	1,008	0.25	4,033	Commercial	Misc Commercial
Langtree Square	1302 Langley Dr.	37,000	40,000	36,000	5,000	2,000	2,000	60,000	41,000	56,000	75,000	28,000	25,000	407,000	1,115	1.00	1,115	Commercial	Misc Commercial
Mary Ellen Padgett (Asst. Living)	979 Riverview Dr.	8,000	10,000	-	69,000	93,000	210,000	322,000	-	-	-	-	-	712,000	3,891	1.80	2,162	Commercial	Assisted Living
Mike Hakansson	791 Tillman Ln.	4,000	6,000	10,000	12,000	13,000	19,000	24,000	10,000	23,000	7,000	3,000	4,000	135,000	370	0.19	1,957	Commercial	Misc Commercial
Misc. Commercial	751 Tillman Lane	16,000	17,000	18,000	12,000	28,000	33,000	27,000	16,000	19,000	2,000	2,000	3,000	193,000	529	0.20	2,644	Commercial	
NuSystems, Inc.	1266 Dresslerville Rd.	2,000	2,000	-	107,000	46,000	54,000	62,000	32,000	59,000	14,000	2,000	2,000	382,000	1,047	1.51	694	Commercial	Retail
PJ's Liquor and Fine Wine	1276 Kimmerling Rd.	1,000	2,000	4,000	6,000	8,000	17,000	19,000	5,000	18,000	1,000	2,000	1,000	84,000	230	0.30	767	Commercial	
RBC	811 Short Ct.	14,000	19,000	35,000	47,000	46,000	54,000	77,000	32,000	100,000	83,000	40,000	19,000	566,000	1,551	0.99	1,564	Commercial	Restaurant
RBC	1276 Pit Rd. A	30,000	10,000	30,000	35,000	38,000	38,000	54,000	29,000	37,000	35,000	19,000	18,000	373,000	1,022	1.26	1,127	Commercial	Misc
RBC	1276 Pit Rd. B	2,000	2,000	13,000	17,000	16,000	20,000	19,000	10,000	20,000	18,000	5,000	2,000	144,000	395				Commercial/Retail
Robert Whear	813 Short Ct.	6,000	6,000	6,000	4,000	2,000	4,000	4,000	4,000	1,000	3,000	4,000	4,000	48,000	132	0.14	939	Commercial	Storage Facility
Sierra Ranchos Car Wash	1284 Kimmerling Rd.	81,000	39,000	31,000	26,000	43,000	60,000	53,000	45,000	2,000	-	67,000	127,000	574,000	1,573	0.52	3,024	Commercial	
Southland Corp.	805 Tillman Lane	9,000	13,000	11,000	13,000	22,000	13,000	15,000	10,000	16,000	18,000	17,000	21,000	178,000	488	0.42	1,159	Commercial	Gas Station
Stor-All, LLC	812 Short Ct.	7,000	4,000	10,000	12,000	10,000	13,000	12,000	9,000	13,000	14,000	8,000	9,000	121,000	332	0.59	822	Commercial	Storage Facility
Stor-All, LLC	808 Short Ct.	-	-	1,000	1,000	2,000	22,000	10,000	5,000	10,000	4,000	-	1,000	56,000	153				Storage Facility
Sunshine and Rainbows, Inc.	1288 Dresslerville Rd.	7,000	8,000	15,000	23,000	22,000	28,000	30,000	14,000	27,000	7,000	-	-	181,000	496	1.35	763	School	Daycare
Sunshine and Rainbows, Inc.	1288 Dresslerville Rd.	7,000	8,000	15,000	23,000	22,000	28,000	30,000	14,000	27,000	7,000	6,000	7,000	194,000	532				
Tahoe Douglas Elks Lodge	1227 Kimmerling Rd.	2,000	29,000	55,000	36,000	119,000	129,000	135,000	55,000	113,000	18,000	2,000	3,000	696,000	1,907	2.70	706	Commercial	
Tillman Center, LLC	1281 Kimmerling Rd.	77,000	87,000	209,000	202,000	230,000	323,000	321,000	173,000	310,000	118,000	94,000	84,000	2,228,000	6,104				
Tillman Center, LLC	1281 Kimmerling Rd.	80,000	94,000	76,000	76,000	78,000	115,000	138,000	83,000	97,000	87,000	79,000	89,000	1,092,000	2,992	6.40	1,997	Commercial	Grocery, Restaurant, Etc
Tillman Center, LLC	1 Bing Rd.	-	-	-	-	883,000	44,000	-	417,000	-	-	-	-	1,344,000	3,682				
Under the Magic Pine Tree	927 Mitch Dr.	13,000	17,000	16,000	36,000	44,000	43,000	62,000	26,000	46,000	10,000	20,000	37,000	370,000	1,014	0.70	1,448	School	Daycare
USPS	1271 Kimmerling Rd.	1,000	1,000	31,000	38,000	38,000	46,000	49,000	21,000	54,000	1,000	1,000	1,000	282,000	773	1.80	429	Community	Post Office
Valley Garden Center	1144 Highway 395 N.	3,000	20,000	29,000	81,000	108,000	149,000	164,000	52,000	97,000	32,000	13,000	-	748,000	2,049	3.32	618	Commercial	Nursery

Appendix G

Daily Summer Well Production, 2014-2016

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
DAILY WELL PRODUCTION DATA - JUNE 2014

	Daily Well Production (gallons)						
Day	**Well 1**	**Well 2**	**Well 4**	**Well 6**	**Well 8**	**Well 9**	**Total**
1	2,469,000	1,302,667	489,000	246,667	-	816,444	5,323,778
2	1,649,000	1,302,667	489,000	246,667	-	1,632,889	5,320,222
3	1,509,000	1,440,000	496,000	360,000	-	1,230,000	5,035,000
4	1,618,000	956,000	451,000	210,000	-	1,189,000	4,424,000
5	1,578,000	1,577,000	487,000	490,000	-	1,199,000	5,331,000
6	1,194,250	1,508,000	478,000	530,000	-	1,193,000	4,903,250
7	1,194,250	1,635,333	485,667	503,333	-	1,233,333	5,051,917
8	1,194,250	1,635,333	485,667	503,333	-	1,233,333	5,051,917
9	1,194,250	1,635,333	485,667	503,333	-	1,233,333	5,051,917
10	1,564,000	1,882,000	481,000	410,000	-	1,201,000	5,538,000
11	1,570,000	1,639,000	485,000	430,000	-	1,217,000	5,341,000
12	1,562,000	1,736,000	484,000	670,000	-	1,211,000	5,663,000
13	1,557,000	1,660,000	480,000	520,000	-	1,212,000	5,429,000
14	1,544,667	1,635,333	721,000	503,333	-	1,233,333	5,637,667
15	1,544,667	1,635,333	721,000	503,333	-	1,233,333	5,637,667
16	1,544,667	2,019,333	482,000	433,333	-	1,167,333	5,646,667
17	1,515,000	1,053,000	478,000	280,000	-	1,241,000	4,567,000
18	1,591,000	1,573,000	610,000	490,000	-	1,197,000	5,461,000
19	1,964,000	2,156,000	356,000	800,000	-	1,568,000	6,844,000
20	1,141,000	1,389,000	480,000	470,000	-	882,000	4,362,000
21	1,535,667	1,635,333	524,000	503,333	-	1,233,333	5,431,667
22	1,535,667	1,635,333	436,000	503,333	-	1,233,333	5,343,667
23	1,535,667	2,513,333	612,000	1,083,333	-	913,333	6,657,667
24	1,949,000	2,606,000	351,000	1,190,000	102,000	749,000	6,947,000
25	1,117,000	1,292,000	480,000	90,000	1,009,000	912,000	4,900,000
26	1,551,000	767,000	475,000	310,000	1,123,000	1,181,000	5,407,000
27	1,538,000	1,768,000	359,250	480,000	338,000	1,231,000	5,714,250
28	1,552,667	1,635,333	359,250	503,333	526,000	1,233,333	5,809,917
29	1,552,667	1,635,333	359,250	503,333	526,000	1,233,333	5,809,917
30	1,552,667	1,895,333	359,250	833,333	526,000	1,172,333	6,338,917
31							
Total	46,118,000	48,753,333	14,440,000	15,103,333	4,150,000	35,415,333	163,980,000

= Maximum Day of Summer

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
DAILY WELL PRODUCTION DATA - JULY 2014

	Daily Well Production (gallons)						
Day	**Well 1**	**Well 2**	**Well 4**	**Well 6**	**Well 8**	**Well 9**	**Total**
1	1,496,000	1,918,000	236,000	265,000	574,000	284,750	4,773,750
2	1,957,000	1,918,000	612,000	500,000	953,000	569,500	6,509,500
3	1,145,000	1,332,000	360,000	600,000	108,000	1,527,000	5,072,000
4	1,502,000	1,909,000	474,500	650,000	524,500	895,000	5,955,000
5	1,488,500	1,854,750	476,125	612,500	635,875	1,594,000	6,661,750
6	1,491,875	1,827,063	475,844	584,375	570,156	1,438,000	6,387,313
7	1,525,625	2,045,188	471,531	753,125	367,469	1,750,000	6,912,938
8	1,448,000	1,692,000	481,000	500,000	970,000	1,126,000	6,217,000
9	1,502,000	1,744,000	475,000	500,000	373,000	1,184,000	5,778,000
10	1,501,000	1,817,000	475,000	600,000	279,000	1,207,000	5,879,000
11	1,525,000	1,404,000	477,000	600,000	872,000	1,202,000	6,080,000
12	1,513,800	1,556,333	478,333	466,667	996,667	1,187,000	6,198,800
13	1,513,800	1,644,889	476,556	477,778	1,002,778	1,186,000	6,301,800
14	1,513,800	1,467,778	480,111	455,556	990,556	1,188,000	6,095,800
15	1,513,800	1,822,000	473,000	500,000	1,015,000	1,184,000	6,507,800
16	1,513,800	1,253,000	474,000	500,000	1,067,000	1,176,000	5,983,800
17	1,535,000	1,207,000	474,000	300,000	1,037,000	1,199,000	5,752,000
18	1,518,000	1,340,000	476,000	400,000	1,017,000	1,184,000	5,935,000
19	1,464,333	1,183,333	450,667	300,000	750,333	1,030,333	5,179,000
20	1,483,889	1,003,889	473,778	200,000	556,556	1,090,222	4,808,333
21	1,444,778	1,362,778	427,556	400,000	944,111	970,444	5,549,667
22	1,523,000	645,000	520,000	-	169,000	1,210,000	4,067,000
23	1,687,000	887,000	495,000	200,000	473,000	1,333,000	5,075,000
24	1,456,000	887,000	453,000	200,000	463,000	1,091,000	4,550,000
25	1,567,000	1,218,000	486,000	200,000	1,070,000	1,198,000	5,739,000
26	1,558,000	1,232,667	487,333	466,667	932,000	1,193,667	5,870,333
27	1,548,667	1,221,444	487,556	444,444	904,667	1,207,778	5,814,556
28	1,567,333	1,243,889	487,111	488,889	959,333	1,179,556	5,926,111
29	1,530,000	1,199,000	488,000	400,000	850,000	1,236,000	5,703,000
30	1,616,000	1,001,000	508,000	400,000	330,000	1,196,000	5,051,000
31	1,806,000	470,000	463,000	-	459,000	2,169,000	5,367,000
Total	47,456,000	43,307,000	14,573,000	12,965,000	22,214,000	37,186,250	177,701,250

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
DAILY WELL PRODUCTION DATA - AUGUST 2014

	Daily Well Production (gallons)						
Day	**Well 1**	**Well 2**	**Well 4**	**Well 6**	**Well 8**	**Well 9**	**Total**
1	1,806,000	1,095,000	634,000	200,000	648,000	473,000	4,856,000
2	1,375,000	931,667	435,000	300,000	674,333	1,096,667	4,812,667
3	1,375,000	931,667	435,000	300,000	674,333	1,096,667	4,812,667
4	1,375,000	931,667	435,000	300,000	674,333	1,096,667	4,812,667
5	1,572,000	759,000	485,000	100,000	343,000	1,202,000	4,461,000
6	1,541,000	796,000	485,000	-	360,000	1,219,000	4,401,000
7	1,600,000	649,000	480,000	100,000	627,000	1,192,000	4,648,000
8	1,597,000	974,000	487,000	400,000	490,000	1,210,000	5,158,000
9	1,564,333	1,037,333	483,333	133,333	329,333	1,208,333	4,756,000
10	1,564,333	1,037,333	483,333	133,333	329,333	1,208,333	4,756,000
11	1,564,333	1,037,333	483,333	133,333	329,333	1,208,333	4,756,000
12	1,229,000	436,000	482,000	-	803,000	425,000	3,375,000
13	1,355,000	245,000	488,000	-	461,000	1,212,000	3,761,000
14	1,617,000	546,000	482,000	200,000	513,000	1,203,000	4,561,000
15	1,588,000	987,000	478,000	400,000	444,000	1,209,000	5,106,000
16	1,564,667	733,500	484,000	500,000	582,000	1,180,667	5,044,833
17	1,564,667	779,125	484,000	500,000	582,000	1,180,667	5,090,458
18	1,564,667	939,344	484,000	500,000	582,000	1,180,667	5,250,677
19	1,629,000	482,031	485,000	400,000	1,107,000	1,188,000	5,291,031
20	1,563,000	916,000	480,000	100,000	654,000	1,186,000	4,899,000
21	1,556,000	1,420,000	483,000	400,000	637,000	1,169,000	5,665,000
22	1,572,000	1,208,000	484,000	200,000	407,000	1,249,000	5,120,000
23	1,561,000	1,080,667	481,667	500,000	603,667	1,179,000	5,406,000
24	1,561,000	1,080,667	481,667	500,000	603,667	1,179,000	5,406,000
25	1,561,000	1,080,667	481,667	500,000	603,667	1,179,000	5,406,000
26	1,527,000	714,000	481,000	300,000	499,000	1,147,000	4,668,000
27	1,613,000	283,000	485,000	-	526,000	1,258,000	4,165,000
28	1,550,000	680,000	475,000	200,000	425,000	1,178,000	4,508,000
29	1,604,000	984,000	488,000	800,000	418,000	1,206,000	5,500,000
30	1,552,750	1,040,000	471,500	325,000	645,000	1,187,750	5,222,000
31							
Total	46,266,750	25,815,000	14,485,500	8,425,000	16,575,000	34,107,750	145,675,000

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
DAILY WELL PRODUCTION DATA - JUNE 2015

	Daily Well Production (gallons)						
Day	**Well 1**	**Well 2**	**Well 4**	**Well 6**	**Well 8**	**Well 9**	**Total**
1	1,635,333	1,438,000	421,667	1,000,000	-	-	4,495,000
2	1,642,000	66,000	419,000	1,000,000	-	-	3,127,000
3	1,613,000	2,878,000	426,000	1,000,000	-	-	5,917,000
4	1,610,000	1,420,000	423,000	1,000,000	-	-	4,453,000
5	1,239,000	923,000	423,000	1,000,000	-	-	3,585,000
6	1,611,667	371,333	454,000	666,667	-	-	3,103,667
7	1,493,778	472,556	406,000	777,778	-	-	3,150,111
8	1,729,556	270,111	502,000	555,556	-	-	3,057,222
9	1,258,000	675,000	310,000	1,000,000	-	-	3,243,000
10	1,619,000	964,000	418,000	1,000,000	135,000	-	4,136,000
11	1,583,000	368,000	538,000	1,000,000	16,000	-	3,505,000
12	1,073,000	648,000	356,000	1,000,000	137,000	-	3,214,000
13	1,595,667	1,154,333	406,333	1,000,000	382,000	-	4,538,333
14	1,599,444	1,212,222	409,889	1,000,000	350,000	-	4,571,556
15	1,591,889	1,096,444	402,778	1,000,000	414,000	-	4,505,111
16	1,607,000	1,328,000	417,000	1,000,000	286,000	-	4,638,000
17	1,593,000	1,385,000	418,000	-	663,000	-	4,059,000
18	1,597,000	1,431,000	420,000	1,000,000	130,000	-	4,578,000
19	1,580,000	1,229,000	412,000	1,000,000	473,000	-	4,694,000
20	1,567,000	1,683,333	419,000	1,333,333	655,333	-	5,658,000
21	1,554,667	1,694,556	417,667	1,222,222	792,889	-	5,682,000
22	1,579,333	1,672,111	420,333	1,444,444	517,778	-	5,634,000
23	1,530,000	1,717,000	415,000	1,000,000	1,068,000	-	5,730,000
24	1,630,000	1,359,000	422,000	1,000,000	422,000	-	4,833,000
25	1,889,000	2,247,000	407,000	1,000,000	1,317,000	-	6,860,000
26	1,186,000	1,425,000	416,000	1,000,000	210,000	-	4,237,000
27	1,523,667	1,294,667	404,333	1,000,000	484,667	-	4,707,333
28	1,471,111	1,220,444	405,556	1,000,000	420,778	-	4,517,889
29	1,576,222	1,368,889	403,111	1,000,000	548,556	-	4,896,778
30	1,366,000	1,072,000	408,000	1,000,000	293,000	-	4,139,000
31							
Total	46,144,333	36,084,000	12,520,667	29,000,000	9,716,000	-	133,465,000

= Maximum Day of Summer

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
DAILY WELL PRODUCTION DATA - JULY 2015

	Daily Well Production (gallons)						
Day	**Well 1**	**Well 2**	**Well 4**	**Well 6**	**Well 8**	**Well 9**	**Total**
1	1,550,000	848,000	1,407,000	805,897	33,000	-	4,643,897
2	1,809,000	1,238,000	227,000	950,250	570,000	-	4,794,250
3	1,635,250	909,250	249,800	950,250	189,000	327,750	4,261,300
4	1,510,688	746,438	270,240	852,688	141,750	309,813	3,831,615
5	1,390,516	603,578	296,392	747,016	106,313	309,609	3,453,423
6	2,004,547	1,377,734	91,568	1,251,047	318,938	363,828	5,407,662
7	1,137,000	258,000	341,000	560,000	-	256,000	2,552,000
8	1,030,000	175,000	352,000	430,000	-	309,000	2,296,000
9	1,177,000	122,000	401,000	500,000	-	334,000	2,534,000
10	1,293,000	147,000	451,000	570,000	-	304,000	2,765,000
11	1,467,333	471,333	381,333	666,667	-	338,667	3,325,333
12	1,520,222	642,889	386,556	704,444	-	329,778	3,583,889
13	1,414,444	299,778	376,111	628,889	-	347,556	3,066,778
14	1,626,000	986,000	397,000	780,000	170,000	312,000	4,271,000
15	1,627,000	1,132,000	400,000	800,000	234,000	336,000	4,529,000
16	1,610,000	1,194,000	397,000	660,000	354,000	463,000	4,678,000
17	1,606,000	918,000	396,000	1,000,000	-	461,000	4,381,000
18	1,583,000	1,258,667	396,667	873,333	250,000	396,333	4,758,000
19	1,580,667	1,260,444	396,111	888,889	499,333	423,222	5,048,667
20	1,585,333	1,256,889	397,222	857,778	667	369,444	4,467,333
21	1,576,000	1,264,000	395,000	920,000	998,000	477,000	5,630,000
22	459,000	146,000	449,000	660,000	9,000	294,000	2,017,000
23	1,610,000	1,790,000	349,000	760,000	345,000	344,000	5,198,000
24	1,606,000	976,000	394,000	1,020,000	347,000	467,000	4,810,000
25	1,868,333	1,274,667	400,333	963,333	512,000	399,000	5,417,667
26	1,763,222	1,244,778	394,222	875,556	448,667	417,667	5,144,111
27	1,973,444	1,304,556	406,444	1,051,111	575,333	380,333	5,691,222
28	1,553,000	1,185,000	382,000	700,000	322,000	455,000	4,597,000
29	1,580,000	1,160,000	400,000	1,000,000	399,000	227,000	4,766,000
30	1,567,000	1,489,000	399,000	1,000,000	456,000	809,000	5,720,000
31	1,545,000	1,740,000	396,000	700,000	451,000	595,000	5,427,000
Total	47,258,000	29,419,000	12,376,000	25,127,147	7,730,000	11,156,000	133,066,147

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
DAILY WELL PRODUCTION DATA - AUGUST 2015

	Daily Well Production (gallons)						
Day	**Well 1**	**Well 2**	**Well 4**	**Well 6**	**Well 8**	**Well 9**	**Total**
1	1,540,667	1,224,000	394,333	833,333	349,333	426,000	4,767,667
2	1,540,667	1,224,000	394,333	833,333	349,333	426,000	4,767,667
3	1,540,667	1,224,000	394,333	833,333	349,333	426,000	4,767,667
4	1,546,000	1,198,000	396,000	1,000,000	412,000	486,000	5,038,000
5	1,560,000	1,067,000	399,000	1,000,000	339,000	455,000	4,820,000
6	1,546,000	1,036,000	390,000	1,000,000	386,000	453,000	4,811,000
7	1,584,000	1,106,000	403,000	1,000,000	385,000	489,000	4,967,000
8	1,485,000	909,000	392,333	933,333	278,333	281,667	4,279,667
9	1,485,000	909,000	392,333	933,333	278,333	281,667	4,279,667
10	1,485,000	909,000	392,333	933,333	278,333	281,667	4,279,667
11	1,364,000	1,092,000	395,000	700,000	78,000	334,000	3,963,000
12	1,566,000	942,000	394,000	1,000,000	225,000	369,000	4,496,000
13	1,560,000	1,196,000	391,000	700,000	369,000	464,000	4,680,000
14	1,553,000	1,114,000	394,000	1,000,000	360,000	476,000	4,897,000
15	1,545,000	1,241,333	392,333	966,667	450,000	457,667	5,053,000
16	1,545,000	1,241,333	392,333	966,667	450,000	457,667	5,053,000
17	1,545,000	1,241,333	392,333	966,667	450,000	457,667	5,053,000
18	1,542,000	1,356,500	394,500	950,000	353,000	470,500	5,066,500
19	1,542,000	1,356,500	394,500	950,000	353,000	470,500	5,066,500
20	1,506,000	1,528,000	387,000	900,000	625,000	546,000	5,492,000
21	1,530,000	1,314,000	392,000	1,000,000	366,000	386,000	4,988,000
22	1,534,000	1,132,333	391,333	966,667	557,667	500,333	5,082,333
23	1,534,000	1,132,333	391,333	966,667	557,667	500,333	5,082,333
24	1,534,000	1,132,333	391,333	966,667	557,667	500,333	5,082,333
25	1,685,000	1,825,000	441,000	700,000	752,000	547,000	5,950,000
26	1,358,000	883,000	339,000	1,000,000	286,000	368,000	4,234,000
27	1,541,000	1,409,000	394,000	900,000	407,000	481,000	5,132,000
28	1,520,000	1,227,000	390,000	1,000,000	425,000	498,000	5,060,000
29	1,525,333	1,277,333	398,667	966,667	425,000	421,000	5,014,000
30	1,525,333	1,277,333	398,667	966,667	425,000	421,000	5,014,000
31	1,525,333	1,277,333	398,667	966,667	425,000	421,000	5,014,000
Total	47,393,000	37,002,000	12,201,000	28,800,000	12,302,000	13,553,000	151,251,000

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
DAILY WELL PRODUCTION DATA - JUNE 2016

	Daily Well Production (gallons)						
Day	**Well 1**	**Well 2**	**Well 4**	**Well 6**	**Well 8**	**Well 9**	**Total**
1	1,688,000	1,424,000	499,000	900,000	-	-	4,511,000
2	1,601,000	1,184,000	490,000	700,000	195,000	-	4,170,000
3	1,619,000	1,798,000	491,000	1,100,000	195,000	-	5,203,000
4	1,459,000	1,445,333	491,000	1,000,000	369,667	-	4,765,000
5	1,459,000	1,445,333	491,000	1,000,000	369,667	-	4,765,000
6	1,459,000	1,445,333	491,000	1,000,000	369,667	-	4,765,000
7	1,597,000	1,565,000	486,000	1,000,000	443,000	-	5,091,000
8	1,393,000	1,834,000	487,000	800,000	287,000	-	4,801,000
9	1,585,000	1,979,000	491,000	900,000	595,000	-	5,550,000
10	1,573,000	1,792,000	485,000	1,100,000	469,000	-	5,419,000
11	1,584,333	1,169,333	485,667	966,667	272,333	-	4,478,333
12	1,584,333	1,169,333	485,667	966,667	272,333	-	4,478,333
13	1,584,333	1,169,333	485,667	966,667	272,333	-	4,478,333
14	1,526,000	1,561,000	468,000	1,100,000	417,000	-	5,072,000
15	1,238,000	1,420,000	484,000	900,000	244,000	-	4,286,000
16	1,205,000	1,754,000	479,000	800,000	-	-	4,238,000
17	1,594,000	1,988,000	492,000	800,000	223,000	-	5,097,000
18	1,523,000	1,574,667	466,333	900,000	515,333	-	4,979,333
19	1,523,000	1,574,667	466,333	900,000	515,333	-	4,979,333
20	1,523,000	1,574,667	466,333	900,000	515,333	-	4,979,333
21	1,536,000	1,834,000	473,000	1,100,000	450,000	205,000	5,598,000
22	1,654,000	1,479,000	501,000	1,100,000	413,000	160,000	5,307,000
23	1,481,000	1,922,000	455,000	1,000,000	1,068,000	162,000	6,088,000
24	1,470,000	1,729,000	445,000	900,000	382,000	67,000	4,993,000
25	1,509,667	1,795,333	462,333	1,033,333	856,000	78,667	5,735,333
26	1,509,667	1,795,333	462,333	1,033,333	856,000	78,667	5,735,333
27	1,509,667	1,795,333	462,333	1,033,333	856,000	78,667	5,735,333
28	1,508,000	1,876,000	460,000	1,000,000	980,000	201,000	6,025,000
29	1,484,000	1,740,000	456,000	1,000,000	959,000	-	5,639,000
30	1,528,000	1,638,000	462,000	1,000,000	793,000	178,000	5,599,000
31							
Total	45,508,000	48,471,000	14,320,000	28,900,000	14,153,000	1,209,000	152,561,000

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
DAILY WELL PRODUCTION DATA - JULY 2016

	Daily Well Production (gallons)							
Day	**Well 1**	**Well 2**	**Well 4**	**Well 5**	**Well 6**	**Well 8**	**Well 9**	**Total**
1	1,491,000	2,111,000	455,000	-	1,000,000	1,008,000	-	6,065,000
2	1,635,750	1,920,250	455,750	-	1,020,536	778,250	71,500	5,882,036
3	1,635,750	1,920,250	455,750	-	1,325,000	778,250	71,500	6,186,500
4	1,635,750	1,920,250	455,750	-	1,251,250	778,250	71,500	6,112,750
5	1,635,750	1,920,250	455,750	-	1,145,938	778,250	71,500	6,007,438
6	1,251,000	1,972,000	565,000	-	1,577,813	1,255,000	165,000	6,785,813
7	1,505,000	1,808,000	458,000	-	1,030,000	472,000	246,000	5,519,000
8	1,260,000	1,398,000	383,000	-	830,000	814,000	-	4,685,000
9	1,436,000	1,650,333	439,000	-	980,000	772,333	67,000	5,344,667
10	1,436,000	1,650,333	439,000	-	980,000	772,333	67,000	5,344,667
11	1,436,000	1,650,333	439,000	-	980,000	772,333	67,000	5,344,667
12	1,499,000	1,943,000	454,000	-	1,010,000	454,000	-	5,360,000
13	1,474,000	1,580,000	450,000	-	1,010,000	971,000	427,000	5,912,000
14	1,495,000	1,791,000	452,000	-	1,010,000	544,000	86,000	5,378,000
15	1,478,000	1,896,000	436,000	-	1,010,000	973,000	198,000	5,991,000
16	1,473,333	1,887,000	425,000	-	1,006,667	971,667	85,333	5,849,000
17	1,473,333	1,887,000	425,000	-	1,006,667	971,667	85,333	5,849,000
18	1,473,333	1,887,000	425,000	-	1,006,667	971,667	85,333	5,849,000
19	1,467,000	1,857,000	424,000	-	1,000,000	389,000	203,000	5,340,000
20	1,476,000	1,723,000	424,000	-	1,000,000	983,000	173,000	5,779,000
21	1,393,000	1,807,000	428,000	-	940,000	903,000	-	5,471,000
22	1,437,000	2,129,000	427,000	-	1,000,000	938,000	-	5,931,000
23	1,415,667	2,133,000	434,000	-	1,033,333	1,030,333	50,000	6,096,333
24	1,415,667	2,133,000	434,000	-	1,033,333	1,030,333	50,000	6,096,333
25	1,415,667	2,133,000	434,000	-	1,033,333	1,030,333	50,000	6,096,333
26	1,477,000	1,994,000	422,000	-	900,000	604,000	850,000	6,247,000
27	1,285,000	1,719,000	413,000	81,000	1,000,000	276,000	787,000	5,561,000
28	1,497,000	1,252,000	415,000	1,081,000	800,000	1,239,000	829,000	7,113,000
29	914,000	1,493,000	402,000	880,000	1,000,000	331,000	546,000	5,566,000
30	931,000	1,512,667	451,333	1,546,000	1,000,000	98,000	163,667	5,702,667
31	931,000	1,512,667	451,333	1,546,000	1,000,000	98,000	163,667	5,702,667
Total	43,779,000	56,190,333	13,627,667	5,134,000	31,920,536	23,786,000	5,730,333	180,167,869

= Maximum Day of Summer

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
DAILY WELL PRODUCTION DATA - AUGUST 2016

	Daily Well Production (gallons)							
Day	**Well 1**	**Well 2**	**Well 4**	**Well 5**	**Well 6**	**Well 8**	**Well 9**	**Total**
1	931,000	1,512,667	451,333	1,546,000	1,000,000	98,000	163,667	5,702,667
2	1,025,000	1,849,000	456,000	1,001,000	800,000	38,000	848,000	6,017,000
3	1,042,000	1,695,000	443,000	583,000	1,000,000	293,000	873,000	5,929,000
4	1,133,000	1,608,000	450,000	642,000	1,000,000	278,000	807,000	5,918,000
5	1,116,000	1,873,000	443,000	549,000	900,000	228,000	900,000	6,009,000
6	970,000	1,822,000	445,000	578,333	1,000,000	249,000	660,000	5,724,333
7	970,000	1,822,000	445,000	578,333	1,000,000	249,000	660,000	5,724,333
8	970,000	1,822,000	445,000	578,333	1,000,000	249,000	660,000	5,724,333
9	977,000	1,627,000	439,000	680,000	1,000,000	241,000	792,000	5,756,000
10	963,000	1,622,000	445,000	677,000	1,000,000	241,000	784,000	5,732,000
11	887,000	1,615,000	437,000	669,000	800,000	175,000	739,000	5,322,000
12	1,014,000	1,515,000	441,000	793,000	1,000,000	226,000	780,000	5,769,000
13	1,032,000	1,724,667	439,667	550,667	966,667	250,333	633,667	5,597,667
14	1,032,000	1,724,667	439,667	550,667	966,667	250,333	633,667	5,597,667
15	1,032,000	1,724,667	439,667	550,667	966,667	250,333	633,667	5,597,667
16	999,000	1,464,000	434,000	666,000	1,000,000	262,000	781,000	5,606,000
17	945,000	1,545,000	438,000	673,000	800,000	196,000	766,000	5,363,000
18	926,000	1,474,000	439,000	500,000	1,000,000	242,000	774,000	5,355,000
19	1,188,000	2,044,000	436,000	563,000	1,000,000	248,000	345,000	5,824,000
20	1,055,000	1,887,667	456,000	559,333	933,333	215,000	541,333	5,647,667
21	1,055,000	1,887,667	456,000	559,333	933,333	215,000	541,333	5,647,667
22	1,055,000	1,887,667	456,000	559,333	933,333	215,000	541,333	5,647,667
23	759,000	1,764,000	381,000	467,000	700,000	86,000	321,000	4,478,000
24	1,224,000	1,916,000	438,000	-	1,000,000	229,000	840,000	5,647,000
25	1,289,000	2,097,000	537,000	632,000	1,200,000	205,000	548,000	6,508,000
26	540,000	1,369,000	352,000	613,000	800,000	34,000	195,000	3,903,000
27	1,127,667	1,997,333	459,667	447,667	1,033,333	224,000	575,667	5,865,333
28	1,127,667	1,997,333	459,667	447,667	1,033,333	224,000	575,667	5,865,333
29	1,127,667	1,997,333	459,667	447,667	1,033,333	224,000	575,667	5,865,333
30	867,000	1,655,000	385,000	329,000	700,000	230,000	303,000	4,469,000
31	1,032,000	1,739,000	434,000	291,000	1,000,000	267,000	358,000	5,121,000
Total	31,411,000	54,278,667	13,680,333	18,282,000	29,500,000	6,632,000	19,149,667	172,933,667

Appendix H

Fire Hydrant Flow Tests

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
FIRE HYDRANT FLOW TESTS VS WATER MODEL RESULTS

			Fire Flow Test Results[1]					Water Model Results[2]						
			Residual Hydrant		Flow Hydrant			Residual Hydrant				Flow Hydrant		
Test No.	Location	Pressure Zone	Static Pressure (psi)	Residual Pressure (psi)	Static Pressure (psi)	Pitot Pressure (psi)	Calculated Hydrant Flow (gpm)	Static Pressure (psi)	% Diff	Residual Pressure (psi)	% Diff	Static Pressure (psi)	% Diff	Demand Applied at Node (gpm)
1	Rocky Terrace Dr.	Low Side	102	65	100	46	1,138	105	2.9%	76.4	14.9%	102.8	2.7%	1,138
2	Glenwood Dr.	Low Side	82	70	84	40	1,061	84.8	3.3%	66.3	-5.6%	80.9	-3.8%	1,061
3	Lassen Way	High Side	75	69	80	42	1,087	77.9	3.7%	67.5	-2.2%	76.1	-5.1%	1,087
4	Rancho Rd.	High Side	75	66	80	42	1,087	79.2	5.3%	69.9	5.6%	77.5	-3.2%	1,087
5	Kyndal Way	High Side	95	87	100	62	1,321	96.4	1.5%	80.9	-7.5%	99.0	-1.0%	1,321

[1] Fire hydrant flow tests performed 4/5/2017.

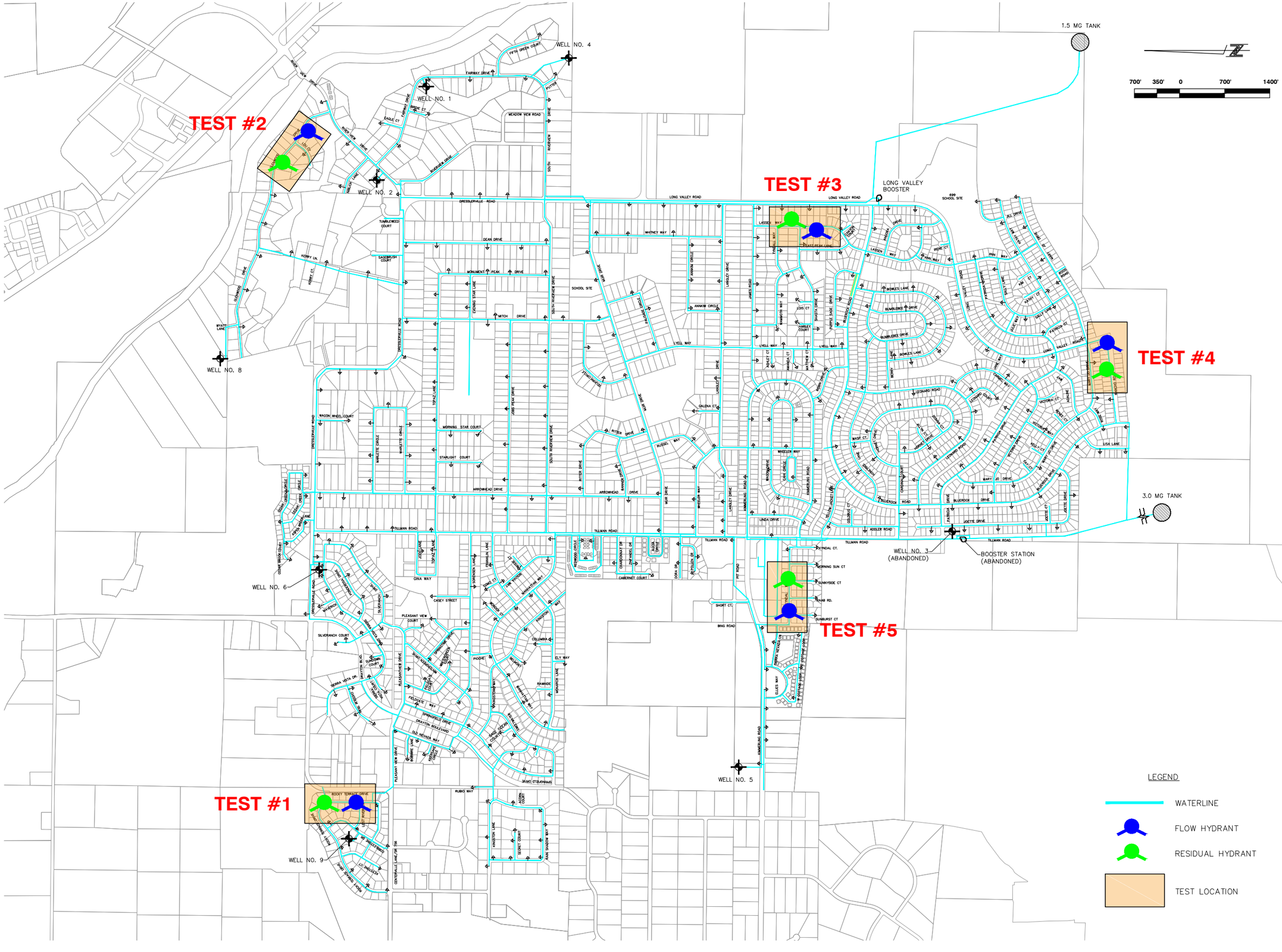
[2] Pumps ON in model: Long Valley Booster, Well 4, Well 6 to match day of test.

Greater than 10% difference

Equation for calculating Hydrant Flow, AWWA Standard M17

$$Q = 29.83cd^2\sqrt{P}$$

Hydrant Flow, Q (gpm)	
Pitot-Gauge Pressure (psi)	
Coefficient of Discharge, c	0.9
Hydrant Outlet Diameter, d (in)	2.5



LUMOS & ASSOCIATES
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GRGID

GRGID WATER MASTER PLAN
FIRE HYDRANT TEST LOCATIONS - 4/5/17

DOUGLAS COUNTY NEVADA

GARDNERVILLE

REV	DATE	DESCRIPTION	BY

DATE:	JULY 2017
DRAWN BY:	KT
DESIGNED BY:	-
CHECKED BY:	MB
JOB NO.:	8989.005

L:\LAP-cp\8989.005 - Water Master Plan\DWG\Civil3D\8989005_FH Test Locations.dwg,System Map_11x17, 07/25/2017 03:57 pm ktolnheim

Appendix I

Fire Flow Requirements per IFC

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
FIRE FLOW REQUIREMENTS PER INTERNATIONAL FIRE CODE

Properties	Location	Approx. Building Area (SF)	IFC Bldg. Type	Unadjusted Fire Flow per IFC (gpm)	50% Reduction for Sprinklers (gpm)	Estimated Sprinkler Demand (gpm)	Adjusted Fire Flow (gpm)	Duration (hrs)
Commercial/Community								
Carson Valley Senior Living	1189 Kimmerling Rd.	45,000	IIA	3,000	1,500	800	2,300	3
Dollar General	1257 Pit Road	14,000	IIA	1,750	875	600	1,500	2
Elks Lodge	1227 Kimmerling Rd.	11,000	V-B	2,750	1,375	600	2,000	3
Langtree Square	1302 Langley Drive	11,000	V-B	2,750	1,375	600	2,000	2
NuSystems	1266 Dresslerville Road	9,000	V-B	2,500	1,250	400	1,700	2
Misc. Commercial	811 Short Court	15,000	V-B	3,250	1,625	400	2,100	3
Post Office	1271 Kimmerling Rd.	8,600	V-B	2,500	1,250	400	1,700	2
Tillman Center	1281 Kimmerling Rd.	65,000	IIA	3,750	1,875	800	2,700	3
Calvary Chapel	1004 Dresslerville Road	14,500	V-B	3,250	1,625	400	2,100	3
Schools								
CC Meneley Elementary School	Muir Drive	56,000	IIA	3,500	1,750	800	2,600	3
Gene Scarselli Elementary School	Long Valley Road	66,000	IIA	3,750	1,875	800	2,700	3
Pau Wa Lu Middle School	Long Valley Road	115,000	IIA	5,000	2,500	1,000	3,500	4
Apartments								
Clock Tower Center Apartments (Senior Housing)	806 Tillman Lane	38,500	V-B	5,250	2,625	800	3,500	4

Appendix J

Water Model Output – Existing Conditions

Existing System - Scenario 1: MDD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
572	J-422	4,886.00	High Side	0.0	4,998.78	48.8
162	J-1	4,870.00	Low Side	33.4	4,997.86	55.3
224	J-63	4,866.00	Low Side	32.4	4,997.86	57.1
167	J-6	4,864.00	Low Side	2.3	4,997.95	58.0
165	J-4	4,863.00	Low Side	15.9	4,997.84	58.3
166	J-5	4,863.00	Low Side	27.3	4,997.87	58.4
202	J-41	4,862.00	Low Side	12.5	4,997.79	58.7
164	J-3	4,862.00	Low Side	26.7	4,997.81	58.8
201	J-40	4,857.00	Low Side	14.4	4,997.80	60.9
163	J-2	4,854.00	Low Side	28.1	4,997.81	62.2
501	J-423	4,845.00	High Side	89.6	4,991.48	63.4
406	J-249	4,903.00	High Side	11.1	5,050.83	64.0
176	J-15	4,849.00	Low Side	0.0	4,997.67	64.3
492	J-339	4,849.00	Low Side	0.0	4,997.68	64.3
417	J-260	4,902.00	High Side	4.4	5,050.85	64.4
418	J-261	4,902.00	High Side	4.4	5,050.85	64.4
555	J-405	4,902.00	High Side	18.9	5,050.93	64.4
175	J-14	4,848.00	Low Side	8.5	4,997.65	64.7
177	J-16	4,848.00	Low Side	0.0	4,997.67	64.8
178	J-17	4,848.00	Low Side	15.9	4,997.67	64.8
416	J-259	4,901.00	High Side	8.9	5,050.85	64.8
200	J-39	4,847.00	Low Side	35.6	4,997.79	65.2
191	J-30	4,846.00	Low Side	4.5	4,997.15	65.4
405	J-248	4,899.00	High Side	14.4	5,050.85	65.7
556	J-406	4,899.00	High Side	0.0	5,050.91	65.7
183	J-22	4,844.00	Low Side	32.3	4,997.79	66.5
409	J-252	4,897.00	High Side	18.9	5,050.91	66.6
408	J-251	4,897.00	High Side	12.2	5,050.99	66.6
424	J-267	4,896.00	High Side	24.4	5,050.58	66.9
179	J-18	4,843.00	Low Side	22.7	4,997.68	66.9
410	J-253	4,896.00	High Side	11.1	5,050.86	67.0
396	J-240	4,896.00	High Side	31.1	5,051.09	67.1
395	J-239	4,896.00	High Side	15.6	5,051.12	67.1
421	J-264	4,896.00	High Side	10.0	5,051.16	67.1
394	J-238	4,896.00	High Side	44.4	5,051.18	67.1
393	J-237	4,896.00	High Side	66.9	5,051.28	67.2
480	J-323	4,894.00	High Side	17.8	5,050.84	67.9
479	J-322	4,894.00	High Side	13.3	5,050.84	67.9
411	J-254	4,894.00	High Side	6.7	5,050.85	67.9
466	J-309	4,894.00	High Side	12.2	5,050.91	67.9
407	J-250	4,894.00	High Side	16.7	5,050.96	67.9
420	J-263	4,894.00	High Side	18.9	5,051.19	68.0
226	J-65	4,840.00	Low Side	12.2	4,998.05	68.4
422	J-265	4,893.00	High Side	8.9	5,051.16	68.4
181	J-20	4,839.00	Low Side	0.0	4,997.68	68.7
182	J-21	4,839.00	Low Side	2.3	4,997.68	68.7
190	J-29	4,837.00	Low Side	2.3	4,997.52	69.4
427	J-270	4,890.00	High Side	26.7	5,050.57	69.5
414	J-257	4,890.00	High Side	10.0	5,050.82	69.6

Existing System - Scenario 1: MDD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
412	J-255	4,890.00	High Side	6.7	5,050.85	69.6
413	J-256	4,890.00	High Side	15.6	5,050.86	69.6
403	J-247	4,890.00	High Side	13.3	5,050.87	69.6
423	J-266	4,889.00	High Side	16.7	5,050.65	69.9
419	J-262	4,889.00	High Side	7.8	5,051.17	70.2
397	J-241	4,888.00	High Side	7.8	5,051.04	70.5
220	J-59	4,835.00	Low Side	10.0	4,998.07	70.6
354	J-195	4,887.00	High Side	8.9	5,050.74	70.8
216	J-55	4,834.00	Low Side	28.9	4,998.43	71.1
415	J-258	4,886.00	High Side	14.4	5,050.80	71.3
225	J-64	4,833.00	Low Side	18.9	4,998.16	71.5
351	J-192	4,886.00	High Side	13.3	5,051.17	71.5
389	J-233	4,886.00	High Side	5.6	5,051.17	71.5
350	J-191	4,886.00	High Side	11.1	5,051.18	71.5
428	J-271	4,885.00	High Side	13.3	5,050.55	71.6
388	J-232	4,886.00	High Side	10.0	5,051.78	71.7
487	J-334	4,886.00	High Side	11.1	5,051.79	71.7
398	J-242	4,885.00	High Side	17.8	5,051.06	71.8
352	J-193	4,885.00	High Side	4.4	5,051.17	71.9
217	J-56	4,832.00	Low Side	26.7	4,998.45	72.0
426	J-269	4,884.00	High Side	34.4	5,050.55	72.1
493	J-340	4,884.00	High Side	25.6	5,051.70	72.6
446	J-289	4,883.00	High Side	15.6	5,050.96	72.7
399	J-243	4,883.00	High Side	4.4	5,051.10	72.7
318	J-159	4,883.00	High Side	26.7	5,051.79	73.0
349	J-190	4,882.00	High Side	8.9	5,051.22	73.2
356	J-197	4,881.00	High Side	10.0	5,050.72	73.4
425	J-268	4,880.00	High Side	17.8	5,050.55	73.8
199	J-38	4,827.00	Low Side	18.2	4,997.56	73.8
447	J-290	4,880.00	High Side	17.8	5,050.79	73.9
365	J-206	4,880.00	High Side	13.3	5,051.17	74.1
219	J-58	4,827.00	Low Side	13.3	4,998.18	74.1
448	J-291	4,879.00	High Side	14.4	5,050.75	74.3
1184	J-8	4,879.00	High Side	13.3	5,051.16	74.5
171	J-10	4,825.00	Low Side	15.9	4,997.57	74.7
172	J-11	4,824.00	Low Side	11.4	4,997.57	75.1
357	J-198	4,877.00	High Side	13.3	5,050.59	75.1
333	J-174	4,878.00	High Side	22.2	5,051.78	75.2
373	J-215	4,877.00	High Side	6.7	5,050.93	75.2
374	J-216	4,877.00	High Side	6.7	5,050.99	75.3
198	J-37	4,823.00	Low Side	9.1	4,997.57	75.5
232	J-72	4,824.00	Low Side	11.1	4,998.60	75.5
355	J-196	4,876.00	High Side	18.9	5,050.73	75.6
332	J-173	4,878.00	High Side	25.6	5,052.78	75.6
353	J-194	4,876.00	High Side	17.8	5,050.86	75.7
372	J-214	4,876.00	High Side	10.0	5,050.93	75.7
390	J-234	4,876.00	High Side	8.9	5,050.94	75.7
367	J-208	4,876.00	High Side	11.1	5,050.99	75.7
366	J-207	4,876.00	High Side	13.3	5,051.15	75.8

Existing System - Scenario 1: MDD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
334	J-175	4,876.00	High Side	17.8	5,051.15	75.8
371	J-213	4,876.00	High Side	17.8	5,051.17	75.8
348	J-189	4,876.00	High Side	14.4	5,051.34	75.9
221	J-60	4,823.00	Low Side	36.4	4,998.36	75.9
430	J-273	4,875.00	High Side	45.6	5,050.56	76.0
465	J-308	4,875.00	High Side	14.4	5,050.62	76.0
392	J-236	4,875.00	High Side	6.7	5,050.88	76.1
368	J-209	4,875.00	High Side	11.1	5,050.88	76.1
391	J-235	4,875.00	High Side	6.7	5,050.90	76.1
369	J-211	4,875.00	High Side	3.3	5,050.90	76.1
370	J-212	4,875.00	High Side	11.1	5,050.94	76.1
335	J-176	4,875.00	High Side	8.9	5,050.99	76.1
364	J-205	4,875.00	High Side	8.9	5,051.04	76.2
319	J-160	4,875.00	High Side	7.8	5,051.12	76.2
297	J-138	4,875.00	High Side	63.1	5,051.58	76.4
483	J-326	4,822.00	Low Side	6.7	4,998.69	76.4
469	J-312	4,874.00	High Side	14.4	5,050.74	76.5
468	J-311	4,874.00	High Side	15.6	5,050.80	76.5
317	J-158	4,876.00	High Side	24.4	5,052.84	76.5
467	J-310	4,874.00	High Side	10.0	5,050.91	76.5
454	J-297	4,874.00	High Side	12.2	5,050.99	76.6
316	J-157	4,876.00	High Side	11.1	5,053.18	76.7
218	J-57	4,821.00	Low Side	12.2	4,998.38	76.7
486	J-333	4,873.00	High Side	24.6	5,050.47	76.8
358	J-199	4,873.00	High Side	24.4	5,050.55	76.8
185	J-24	4,820.00	Low Side	8.0	4,997.57	76.8
174	J-13	4,820.00	Low Side	0.0	4,997.61	76.8
188	J-27	4,820.00	Low Side	2.3	4,997.63	76.9
189	J-28	4,820.00	Low Side	0.0	4,997.68	76.9
455	J-298	4,873.00	High Side	6.7	5,050.93	77.0
298	J-139	4,873.00	High Side	20.0	5,051.35	77.2
208	J-47	4,820.00	Low Side	0.0	4,998.42	77.2
429	J-272	4,872.00	High Side	23.3	5,050.55	77.3
214	J-53	4,820.00	Low Side	10.0	4,998.57	77.3
478	J-321	4,872.00	High Side	12.2	5,050.60	77.3
233	J-73	4,820.00	Low Side	8.9	4,998.64	77.3
320	J-161	4,871.00	High Side	10.0	5,050.52	77.7
491	J-338	4,818.00	Low Side	9.1	4,997.59	77.7
173	J-12	4,818.00	Low Side	9.1	4,997.59	77.7
249	J-89	4,819.00	Low Side	5.6	4,998.60	77.7
460	J-303	4,871.00	High Side	14.4	5,050.82	77.8
453	J-296	4,871.00	High Side	13.3	5,051.05	77.9
345	J-186	4,870.00	High Side	28.8	5,050.52	78.1
184	J-23	4,817.00	Low Side	18.2	4,997.59	78.1
248	J-88	4,818.00	Low Side	7.8	4,998.61	78.1
456	J-299	4,870.00	High Side	11.1	5,050.88	78.3
331	J-172	4,872.00	High Side	20.0	5,052.94	78.3
330	J-171	4,870.00	High Side	8.9	5,051.11	78.4
337	J-178	4,869.00	High Side	32.1	5,050.18	78.4

Existing System - Scenario 1: MDD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
315	J-156	4,870.00	High Side	24.7	5,051.30	78.4
223	J-62	4,817.00	Low Side	32.2	4,998.55	78.6
253	J-93	4,817.00	Low Side	8.9	4,998.64	78.6
471	J-314	4,869.00	High Side	14.4	5,051.14	78.8
400	J-244	4,869.00	High Side	21.1	5,051.27	78.9
436	J-279	4,868.00	High Side	15.6	5,050.29	78.9
439	J-282	4,868.00	High Side	10.0	5,050.34	78.9
434	J-277	4,868.00	High Side	14.4	5,050.35	78.9
437	J-280	4,868.00	High Side	12.2	5,050.35	78.9
401	J-245	4,869.00	High Side	15.6	5,051.49	79.0
186	J-25	4,815.00	Low Side	13.4	4,997.56	79.0
203	J-42	4,815.00	Low Side	0.0	4,997.59	79.0
464	J-307	4,868.00	High Side	22.2	5,050.61	79.0
213	J-52	4,816.00	Low Side	17.8	4,998.64	79.0
252	J-92	4,816.00	Low Side	10.0	4,998.65	79.0
470	J-313	4,868.00	High Side	12.2	5,050.75	79.1
457	J-300	4,868.00	High Side	11.1	5,050.78	79.1
472	J-315	4,868.00	High Side	12.2	5,051.01	79.2
402	J-246	4,870.00	High Side	0.0	5,053.17	79.2
215	J-54	4,815.00	Low Side	5.6	4,998.57	79.4
230	J-70	4,815.00	Low Side	0.0	4,998.57	79.4
231	J-71	4,815.00	Low Side	8.9	4,998.58	79.4
336	J-177	4,867.00	High Side	32.1	5,050.71	79.5
262	J-102	4,815.00	Low Side	8.9	4,998.85	79.5
475	J-318	4,867.00	High Side	12.2	5,051.00	79.6
359	J-200	4,865.00	High Side	14.4	5,050.47	80.2
204	J-43	4,812.00	Low Side	20.2	4,997.54	80.3
222	J-61	4,813.00	Low Side	34.5	4,998.60	80.3
458	J-301	4,865.00	High Side	11.1	5,050.73	80.4
234	J-74	4,813.00	Low Side	8.9	4,998.78	80.4
473	J-316	4,865.00	High Side	14.4	5,050.84	80.4
296	J-137	4,868.00	High Side	20.0	5,054.15	80.5
435	J-278	4,864.00	High Side	14.4	5,050.35	80.6
212	J-51	4,812.00	Low Side	3.3	4,998.66	80.8
247	J-87	4,812.00	Low Side	0.0	4,998.67	80.8
477	J-320	4,864.00	High Side	14.4	5,050.70	80.8
229	J-68	4,812.00	Low Side	4.4	4,998.72	80.8
459	J-302	4,864.00	High Side	30.0	5,050.72	80.8
211	J-50	4,812.00	Low Side	19.2	4,998.74	80.8
254	J-94	4,812.00	Low Side	12.2	4,998.85	80.8
432	J-275	4,863.00	High Side	16.7	5,050.42	81.1
205	J-44	4,810.00	Low Side	12.8	4,997.56	81.1
180	J-19	4,810.00	Low Side	18.2	4,997.68	81.2
246	J-86	4,811.00	Low Side	0.0	4,998.68	81.2
209	J-48	4,811.00	Low Side	15.9	4,998.88	81.3
433	J-276	4,862.00	High Side	8.9	5,050.41	81.5
329	J-170	4,862.00	High Side	11.1	5,050.51	81.6
300	J-141	4,862.00	High Side	17.9	5,050.87	81.7
299	J-140	4,862.00	High Side	14.4	5,051.05	81.8

Existing System - Scenario 1: MDD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
343	J-184	4,861.00	High Side	62.0	5,050.14	81.8
344	J-185	4,861.00	High Side	25.7	5,050.15	81.8
431	J-274	4,861.00	High Side	24.4	5,050.45	82.0
251	J-91	4,809.00	Low Side	6.7	4,998.67	82.1
255	J-95	4,809.00	Low Side	6.7	4,998.87	82.1
547	J-392	4,809.00	Low Side	13.3	4,998.91	82.2
342	J-183	4,860.00	High Side	45.0	5,050.14	82.3
278	J-402	4,809.00	Low Side	8.9	4,999.17	82.3
438	J-281	4,860.00	High Side	20.0	5,050.43	82.4
476	J-319	4,860.00	High Side	23.3	5,050.68	82.5
235	J-75	4,808.00	Low Side	3.3	4,998.82	82.6
1181	J-7	4,806.00	<None>	0.0	4,997.57	82.9
295	J-136	4,865.00	High Side	20.3	5,057.07	83.1
328	J-169	4,858.00	High Side	6.7	5,050.20	83.2
321	J-162	4,858.00	High Side	30.6	5,050.22	83.2
360	J-201	4,858.00	High Side	14.4	5,050.46	83.3
440	J-283	4,858.00	High Side	12.2	5,050.48	83.3
210	J-49	4,807.00	Low Side	25.9	4,999.49	83.3
474	J-317	4,858.00	High Side	14.4	5,050.80	83.4
301	J-142	4,857.00	High Side	109.0	5,050.00	83.5
544	J-389	4,806.00	Low Side	8.9	4,999.20	83.6
187	J-26	4,804.00	Low Side	36.3	4,997.57	83.7
461	J-304	4,857.00	High Side	42.2	5,050.72	83.8
302	J-143	4,856.00	High Side	11.1	5,049.98	83.9
514	J-358	4,806.00	Low Side	4.1	5,000.48	84.1
193	J-32	4,803.00	Low Side	8.9	4,997.57	84.2
194	J-33	4,803.00	Low Side	6.8	4,997.57	84.2
227	J-66	4,806.00	Low Side	0.0	5,000.59	84.2
250	J-90	4,804.00	Low Side	8.9	4,998.93	84.3
236	J-76	4,804.00	Low Side	12.2	4,998.94	84.3
314	J-155	4,854.00	High Side	18.9	5,049.86	84.7
256	J-96	4,803.00	Low Side	7.8	4,998.93	84.8
289	J-128	4,803.00	Low Side	10.0	4,999.10	84.8
259	J-99	4,803.00	Low Side	7.8	4,999.10	84.8
500	J-403	4,803.00	Low Side	0.0	4,999.17	84.9
441	J-284	4,854.00	High Side	13.3	5,050.53	85.0
462	J-305	4,854.00	High Side	22.2	5,050.60	85.1
450	J-293	4,854.00	High Side	22.2	5,050.71	85.1
449	J-292	4,854.00	High Side	24.4	5,050.72	85.1
451	J-294	4,854.00	High Side	13.3	5,050.80	85.1
346	J-187	4,853.00	High Side	33.4	5,050.15	85.3
488	J-335	4,862.00	High Side	11.4	5,059.35	85.4
260	J-100	4,801.00	Low Side	12.2	4,998.92	85.6
245	J-85	4,801.00	Low Side	5.6	4,999.50	85.9
442	J-285	4,852.00	High Side	15.6	5,050.56	85.9
463	J-306	4,852.00	High Side	13.3	5,050.75	86.0
261	J-101	4,800.00	Low Side	6.7	4,998.87	86.0
546	J-391	4,800.00	Low Side	3.3	4,998.97	86.1
258	J-98	4,800.00	Low Side	13.3	4,999.07	86.1

Existing System - Scenario 1: MDD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
257	J-97	4,800.00	Low Side	11.1	4,999.07	86.1
237	J-77	4,800.00	Low Side	4.4	4,999.21	86.2
238	J-78	4,800.00	Low Side	5.6	4,999.23	86.2
520	J-364	4,800.00	Low Side	10.0	4,999.36	86.3
499	J-400	4,800.00	Low Side	11.1	4,999.37	86.3
445	J-288	4,851.00	High Side	7.8	5,050.43	86.3
443	J-286	4,851.00	High Side	10.0	5,050.44	86.3
244	J-84	4,800.00	Low Side	5.6	4,999.50	86.3
554	J-401	4,800.00	Low Side	8.9	4,999.56	86.3
444	J-287	4,851.00	High Side	0.0	5,050.62	86.4
452	J-295	4,851.00	High Side	25.6	5,050.89	86.5
239	J-79	4,800.00	Low Side	6.7	5,000.08	86.6
265	J-105	4,800.00	Low Side	6.7	5,000.14	86.6
263	J-103	4,800.00	Low Side	5.6	5,000.14	86.6
347	J-188	4,850.00	High Side	14.1	5,050.15	86.6
272	J-112	4,800.00	Low Side	3.3	5,000.29	86.7
361	J-202	4,850.00	High Side	13.3	5,050.42	86.7
517	J-361	4,800.00	Low Side	25.6	5,000.47	86.7
290	J-129	4,800.00	Low Side	11.1	5,000.47	86.7
519	J-363	4,800.00	Low Side	10.0	5,000.48	86.7
515	J-359	4,800.00	Low Side	13.3	5,000.48	86.7
518	J-362	4,800.00	Low Side	13.3	5,000.48	86.7
228	J-67	4,800.00	Low Side	5.2	5,000.57	86.8
168	J-7	4,858.00	High Side	0.0	5,060.03	87.4
341	J-182	4,848.00	High Side	46.3	5,050.12	87.4
561	J-411	4,848.00	High Side	24.5	5,050.13	87.5
563	J-413	4,848.00	High Side	0.0	5,050.13	87.5
560	J-410	4,848.00	High Side	4.7	5,050.14	87.5
338	J-179	4,848.00	High Side	38.5	5,050.14	87.5
387	J-230	4,848.00	High Side	5.6	5,050.15	87.5
558	J-408	4,848.00	High Side	0.7	5,050.15	87.5
322	J-163	4,848.00	High Side	27.4	5,050.16	87.5
375	J-217	4,848.00	High Side	0.7	5,050.16	87.5
363	J-204	4,848.00	High Side	0.0	5,050.18	87.5
240	J-80	4,798.00	Low Side	0.0	5,000.31	87.5
362	J-203	4,848.00	High Side	18.9	5,050.40	87.6
557	J-407	4,848.00	High Side	5.6	5,050.41	87.6
303	J-144	4,847.00	High Side	7.8	5,049.82	87.7
340	J-181	4,847.00	High Side	10.1	5,050.13	87.9
339	J-180	4,847.00	High Side	1.4	5,050.14	87.9
376	J-218	4,847.00	High Side	8.9	5,050.15	87.9
241	J-81	4,797.00	Low Side	10.0	5,000.35	88.0
242	J-82	4,797.00	Low Side	3.3	5,000.40	88.0
271	J-111	4,797.00	Low Side	2.2	5,000.48	88.0
195	J-34	4,855.00	High Side	4.5	5,059.56	88.5
545	J-390	4,794.00	Low Side	4.4	4,999.03	88.7
386	J-229	4,845.00	High Side	5.6	5,050.11	88.7
312	J-153	4,843.00	High Side	23.3	5,049.82	89.5
385	J-228	4,843.00	High Side	5.6	5,050.10	89.6

Existing System - Scenario 1: MDD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
270	J-110	4,792.00	Low Side	7.8	4,999.57	89.8
377	J-219	4,842.00	High Side	10.0	5,050.11	90.0
291	J-130	4,791.00	Low Side	3.3	4,999.57	90.2
292	J-133	4,790.00	Low Side	17.8	4,998.65	90.3
264	J-104	4,791.50	Low Side	3.3	5,000.21	90.3
498	J-345	4,791.50	Low Side	5.6	5,000.21	90.3
324	J-165	4,841.00	High Side	6.4	5,049.91	90.4
494	J-341	4,791.00	Low Side	8.9	5,000.27	90.5
564	J-414	4,791.00	Low Side	10.0	5,000.29	90.6
310	J-151	4,840.00	High Side	20.6	5,049.78	90.8
304	J-145	4,840.00	High Side	10.0	5,049.78	90.8
325	J-166	4,840.00	High Side	7.7	5,049.89	90.8
497	J-344	4,790.30	Low Side	5.6	5,000.21	90.8
548	J-393	4,789.00	Low Side	0.0	4,999.03	90.9
266	J-106	4,790.00	Low Side	6.7	5,000.05	90.9
286	J-125	4,790.00	Low Side	8.9	5,000.09	90.9
384	J-227	4,840.00	High Side	5.6	5,050.09	90.9
323	J-164	4,840.00	High Side	10.0	5,050.16	90.9
516	J-360	4,790.00	Low Side	5.6	5,000.49	91.1
277	J-117	4,790.00	Low Side	7.8	5,000.49	91.1
279	J-118	4,790.00	Low Side	13.3	5,000.52	91.1
280	J-119	4,790.00	Low Side	0.0	5,000.54	91.1
281	J-120	4,790.00	Low Side	0.0	5,000.54	91.1
284	J-123	4,790.00	Low Side	6.7	5,000.54	91.1
282	J-121	4,790.00	Low Side	6.7	5,000.55	91.1
283	J-122	4,790.00	Low Side	4.4	5,000.57	91.1
510	J-354	4,790.00	Low Side	8.9	5,000.65	91.1
509	J-353	4,790.00	Low Side	1.1	5,000.65	91.1
495	J-342	4,789.50	Low Side	5.6	5,000.22	91.2
513	J-357	4,790.00	Low Side	11.4	5,000.75	91.2
512	J-356	4,790.00	Low Side	11.4	5,000.75	91.2
511	J-355	4,790.00	Low Side	13.6	5,000.76	91.2
508	J-352	4,790.00	Low Side	11.4	5,000.77	91.2
327	J-168	4,839.00	High Side	14.1	5,049.88	91.2
243	J-83	4,789.00	Low Side	8.9	5,000.05	91.3
268	J-108	4,789.00	Low Side	4.4	5,000.09	91.3
267	J-107	4,789.00	Low Side	7.8	5,000.10	91.3
378	J-220	4,839.00	High Side	10.0	5,050.10	91.3
404	J-404	4,839.00	High Side	5.6	5,050.10	91.3
496	J-343	4,789.00	Low Side	6.7	5,000.23	91.4
1133	J-423	4,838.00	High Side	7.7	5,049.73	91.6
326	J-167	4,838.00	High Side	11.6	5,049.89	91.7
549	J-395	4,838.00	High Side	15.4	5,050.10	91.8
562	J-412	4,838.00	High Side	0.0	5,050.13	91.8
559	J-409	4,838.00	High Side	0.0	5,050.15	91.8
288	J-127	4,788.00	Low Side	13.3	5,000.48	91.9
309	J-150	4,837.00	High Side	9.0	5,049.71	92.0
306	J-147	4,837.00	High Side	9.0	5,049.71	92.0
308	J-149	4,837.00	High Side	19.2	5,049.71	92.0

Existing System - Scenario 1: MDD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
313	J-154	4,837.00	High Side	11.1	5,049.82	92.1
269	J-109	4,787.00	Low Side	7.8	5,000.09	92.2
383	J-226	4,837.00	High Side	4.4	5,050.09	92.2
571	J-421	4,787.00	Low Side	6.8	5,000.29	92.3
293	J-134	4,787.00	Low Side	5.6	5,000.33	92.3
551	J-397	4,836.00	High Side	24.4	5,049.71	92.5
307	J-148	4,836.00	High Side	18.0	5,049.71	92.5
379	J-221	4,836.00	High Side	10.0	5,050.09	92.6
565	J-415	4,786.00	Low Side	0.0	5,000.29	92.7
276	J-116	4,786.00	Low Side	5.6	5,000.49	92.8
553	J-399	4,835.00	High Side	6.4	5,049.71	92.9
285	J-124	4,785.00	Low Side	10.0	5,000.33	93.2
275	J-115	4,785.00	Low Side	5.6	5,000.49	93.2
552	J-398	4,834.00	High Side	6.4	5,049.71	93.3
566	J-416	4,784.00	Low Side	0.0	5,000.29	93.6
567	J-417	4,784.00	Low Side	0.0	5,000.29	93.6
550	J-396	4,833.00	High Side	24.4	5,049.71	93.8
380	J-222	4,833.00	High Side	8.9	5,050.09	93.9
274	J-114	4,783.00	Low Side	6.7	5,000.52	94.1
196	J-35	4,844.00	High Side	0.0	5,061.82	94.2
484	J-327	4,843.00	High Side	15.9	5,061.13	94.4
169	J-8	4,843.00	High Side	1.1	5,061.14	94.4
273	J-113	4,781.00	Low Side	8.9	5,000.58	95.0
197	J-36	4,842.00	High Side	22.7	5,061.84	95.1
538	J-383	4,830.00	High Side	0.0	5,050.09	95.2
287	J-126	4,780.00	Low Side	0.0	5,000.84	95.5
507	J-351	4,780.00	Low Side	0.0	5,001.02	95.6
506	J-350	4,780.00	Low Side	5.6	5,001.05	95.6
543	J-388	4,829.00	High Side	0.0	5,050.09	95.7
502	J-346	4,780.00	Low Side	5.6	5,001.15	95.7
505	J-349	4,780.00	Low Side	4.4	5,001.15	95.7
503	J-347	4,780.00	Low Side	0.0	5,001.65	95.9
504	J-348	4,780.00	Low Side	4.4	5,001.65	95.9
537	J-382	4,780.00	Low Side	3.3	5,001.99	96.0
381	J-223	4,828.00	High Side	0.0	5,050.10	96.1
1307	J-36	4,828.00	High Side	0.0	5,050.10	96.1
485	J-328	4,838.00	High Side	11.4	5,061.43	96.7
482	J-325	4,825.00	High Side	9.4	5,050.09	97.4
170	J-9	4,836.00	High Side	13.6	5,061.85	97.7
539	J-384	4,824.00	High Side	0.0	5,050.09	97.8
540	J-385	4,823.00	High Side	1.1	5,050.08	98.2
542	J-387	4,823.00	High Side	0.0	5,050.08	98.2
541	J-386	4,822.00	High Side	8.9	5,050.08	98.7
570	J-420	4,772.00	Low Side	0.0	5,000.28	98.8
481	J-324	4,820.00	High Side	0.0	5,050.07	99.5
521	J-366	4,775.00	Low Side	0.0	5,005.34	99.7
522	J-367	4,775.00	Low Side	0.0	5,005.89	99.9
1283	J-33	4,816.00	High Side	24.4	5,050.06	101.3
568	J-418	4,766.00	Low Side	15.9	5,000.28	101.4

Existing System - Scenario 1: MDD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
207	J-46	4,827.00	High Side	13.5	5,062.89	102.1
523	J-368	4,770.00	Low Side	5.6	5,006.35	102.3
569	J-419	4,763.00	Low Side	0.0	5,000.28	102.7
382	J-224	4,809.00	High Side	4.0	5,050.06	104.3
524	J-369	4,765.00	Low Side	4.4	5,007.04	104.7
536	J-381	4,765.00	Low Side	0.0	5,007.29	104.8
531	J-376	4,765.00	Low Side	5.6	5,007.59	105.0
526	J-371	4,765.00	Low Side	2.2	5,007.75	105.0
533	J-378	4,765.00	Low Side	4.4	5,008.13	105.2
534	J-379	4,765.00	Low Side	0.0	5,009.70	105.9
535	J-380	4,760.00	Low Side	4.4	5,007.29	107.0
532	J-377	4,760.00	Low Side	0.0	5,007.59	107.1
525	J-370	4,755.00	Low Side	7.8	5,007.55	109.3
527	J-372	4,750.00	Low Side	11.1	5,007.56	111.4
530	J-375	4,750.00	Low Side	0.0	5,007.56	111.4
528	J-373	4,750.00	Low Side	5.6	5,007.57	111.4
529	J-374	4,750.00	Low Side	4.4	5,007.57	111.4

Existing System - Scenario 1: MDD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-68	High Side	10	PVC	140.0	1,306.8	5.34	0.49	0.009	137
P-69	High Side	10	PVC	140.0	1,306.8	5.34	0.49	0.009	137
P-519	Low Side	8	PVC	140.0	800.0	5.11	1.57	0.011	149
P-76	Low Side	8	PVC	140.0	800.0	5.11	0.50	0.011	87
P-77	Low Side	8	PVC	140.0	800.0	5.11	0.61	0.011	87
P-171	High Side	8	PVC	140.0	571.8	3.65	2.92	0.006	517
P-314	High Side	12	PVC	140.0	-1,221.0	3.46	11.83	0.003	3,700
P-448	High Side	14	PVC	140.0	-1,512.5	3.15	2.27	0.002	1,013
P-503	Low Side	10	PVC	140.0	-744.4	3.04	0.56	0.003	179
P-504	Low Side	10	PVC	140.0	-744.4	3.04	0.45	0.003	173
P-525	Low Side	10	PVC	140.0	744.4	3.04	3.35	0.003	1,076
P-524	Low Side	8	PVC	140.0	475.9	3.04	0.94	0.004	234
P-72	Low Side	10	PVC	140.0	700.0	2.86	0.17	0.003	87
P-73	Low Side	10	PVC	140.0	-700.0	2.86	0.11	0.003	87
P-505	Low Side	8	PVC	140.0	-441.7	2.82	0.70	0.004	201
P-518	Low Side	8	PVC	140.0	434.0	2.77	0.38	0.003	111
P-198	High Side	12	PVC	140.0	920.5	2.61	3.89	0.002	2,055
P-221	High Side	8	PVC	140.0	404.3	2.58	1.00	0.003	337
P-491	Low Side	10	PVC	140.0	-627.3	2.56	0.11	0.002	41
P-436	High Side	16	PVC	140.0	-1,545.5	2.47	0.29	0.001	237
P-490	Low Side	10	PVC	140.0	-598.2	2.44	0.99	0.002	487
P-7	High Side	16	PVC	140.0	-1,528.4	2.44	1.11	0.001	928
P-447	High Side	16	PVC	140.0	-1,523.9	2.43	0.68	0.001	576
P-517	Low Side	8	PVC	140.0	361.5	2.31	0.54	0.002	223
P-602	Low Side	4	PVC	140.0	89.6	2.29	6.31	0.005	1,180
P-172	High Side	8	PVC	140.0	354.9	2.27	2.57	0.002	1,098
P-158	Low Side	8	PVC	140.0	-344.6	2.20	0.26	0.002	117
P-482	Low Side	8	PVC	140.0	344.6	2.20	0.21	0.002	94
P-599	Low Side	12	PVC	140.0	-745.3	2.11	6.22	0.001	4,850
P-56	High Side	16	PVC	140.0	-1,293.2	2.06	1.04	0.001	1,183
P-437	High Side	16	PVC	140.0	-1,256.8	2.01	0.42	0.001	508
P-516	Low Side	8	PVC	140.0	308.3	1.97	1.25	0.002	668
P-313	High Side	12	PVC	140.0	-689.1	1.95	1.67	0.001	1,511
P-547	Low Side	8	PVC	140.0	304.4	1.94	0.29	0.002	167
P-60	High Side	8	PVC	140.0	300.0	1.91	0.10	0.002	83
P-61	High Side	8	PVC	140.0	300.0	1.91	0.12	0.002	83
P-312	High Side	12	PVC	140.0	-673.6	1.91	0.22	0.001	204
P-508	Low Side	8	PVC	140.0	293.8	1.88	0.71	0.002	406
P-201	High Side	10	PVC	140.0	444.2	1.81	0.67	0.001	550
P-523	Low Side	8	PVC	140.0	-265.2	1.69	0.34	0.001	251
P-474	High Side	12	PVC	140.0	590.9	1.68	0.40	0.001	480
P-476	Low Side	8	PVC	140.0	-260.8	1.66	0.50	0.001	376
P-475	Low Side	8	PVC	140.0	-250.8	1.60	0.67	0.001	589
P-200	High Side	10	PVC	140.0	384.9	1.57	1.05	0.001	1,151
P-242	High Side	8	PVC	140.0	244.3	1.56	0.43	0.001	371
P-455	High Side	12	Asbestos Cement	130.0	-531.9	1.51	2.28	0.001	2,705

Existing System - Scenario 1: MDD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-173	High Side	8	PVC	140.0	235.1	1.50	0.23	0.001	211
P-565	Low Side	8	PVC	140.0	-228.5	1.46	0.52	0.001	504
P-464	High Side	8	PVC	140.0	-227.4	1.45	0.08	0.001	79
P-176	High Side	8	PVC	140.0	223.0	1.42	0.87	0.001	882
P-598	Low Side	12	PVC	140.0	500.0	1.42	0.06	0.001	99
P-9	High Side	12	PVC	140.0	500.0	1.42	0.03	0.001	112
P-10	High Side	12	PVC	140.0	-500.0	1.42	0.04	0.001	112
P-564	Low Side	8	Ductile Iron	100.0	-219.6	1.40	0.19	0.002	108
P-563	Low Side	8	PVC	140.0	-208.5	1.33	0.14	0.001	160
P-247	High Side	8	PVC	140.0	204.7	1.31	0.31	0.001	370
P-199	High Side	10	PVC	140.0	318.5	1.30	0.33	0.001	519
P-463	High Side	8	PVC	140.0	-201.8	1.29	0.53	0.001	645
P-406	High Side	12	Asbestos Cement	130.0	444.9	1.26	0.13	0.001	235
P-202	High Side	10	PVC	140.0	308.2	1.26	0.60	0.001	1,002
P-220	High Side	8	PVC	140.0	196.8	1.26	1.21	0.001	1,540
P-438	High Side	10	PVC	140.0	300.0	1.23	0.39	0.001	671
P-206	High Side	6	PVC	140.0	106.9	1.21	0.24	0.001	234
P-548	Low Side	8	PVC	140.0	189.7	1.21	0.32	0.001	434
P-175	High Side	8	PVC	140.0	188.2	1.20	0.18	0.001	253
P-203	High Side	10	PVC	140.0	287.1	1.17	0.30	0.001	562
P-138	Low Side	6	PVC	140.0	103.2	1.17	0.52	0.001	541
P-426	High Side	12	Asbestos Cement	130.0	412.5	1.17	0.51	0.000	1,037
P-500	Low Side	6	PVC	140.0	102.8	1.17	0.14	0.001	148
P-257	High Side	8	PVC	140.0	181.4	1.16	0.22	0.001	346
P-157	Low Side	6	PVC	140.0	101.4	1.15	0.40	0.001	425
P-104	Low Side	6	PVC	140.0	100.4	1.14	0.55	0.001	603
P-62	Low Side	10	PVC	140.0	267.9	1.09	0.76	0.000	1,615
P-501	Low Side	6	PVC	140.0	92.8	1.05	0.15	0.001	186
P-419	High Side	12	Asbestos Cement	130.0	366.5	1.04	0.27	0.000	676
P-601	High Side	8	PVC	140.0	161.0	1.03	1.00	0.001	1,843
P-159	Low Side	8	PVC	140.0	159.6	1.02	0.22	0.001	421
P-248	High Side	8	PVC	140.0	157.6	1.01	0.12	0.001	225
P-521	Low Side	8	PVC	140.0	-156.7	1.00	0.26	0.001	478
P-218	High Side	6	PVC	140.0	-86.0	0.98	1.15	0.001	1,670
P-520	Low Side	8	PVC	140.0	-152.3	0.97	0.25	0.000	502
P-97	Low Side	8	PVC	140.0	-150.5	0.96	0.27	0.000	574
P-71	Low Side	8	PVC	140.0	148.9	0.95	0.28	0.000	593
P-224	High Side	8	PVC	140.0	148.3	0.95	0.29	0.000	622
P-154	Low Side	6	PVC	140.0	83.1	0.94	0.19	0.001	293
P-140	Low Side	8	PVC	140.0	-144.6	0.92	0.08	0.000	133
P-102	Low Side	10	PVC	140.0	-225.0	0.92	0.05	0.000	136
P-251	High Side	8	PVC	140.0	143.7	0.92	0.13	0.000	286
P-223	High Side	8	PVC	140.0	143.7	0.92	0.16	0.000	359
P-103	Low Side	6	PVC	140.0	79.0	0.90	0.35	0.001	591

Existing System - Scenario 1: MDD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-378	High Side	8	PVC	140.0	-139.8	0.89	0.08	0.000	201
P-564	Low Side	6	Asbestos Cement	130.0	78.6	0.89	0.33	0.001	499
P-60	Low Side	8	PVC	140.0	-139.0	0.89	0.46	0.000	1,121
P-484	Low Side	6	PVC	140.0	78.0	0.89	0.12	0.001	208
P-507	Low Side	8	PVC	140.0	-138.0	0.88	0.20	0.000	497
P-222	High Side	8	PVC	140.0	137.8	0.88	0.62	0.000	1,541
P-174	High Side	8	PVC	140.0	137.7	0.88	0.30	0.000	739
P-101	Low Side	10	PVC	140.0	-215.0	0.88	0.05	0.000	149
P-72	Low Side	8	PVC	140.0	136.7	0.87	0.20	0.000	502
P-407	High Side	8	PVC	140.0	136.5	0.87	0.13	0.000	318
P-381	High Side	12	Asbestos Cement	130.0	300.9	0.85	0.06	0.000	201
P-332	High Side	8	PVC	140.0	132.7	0.85	0.13	0.000	338
P-373	High Side	8	PVC	140.0	132.4	0.85	0.17	0.000	450
P-225	High Side	6	PVC	140.0	74.4	0.84	0.53	0.001	990
P-415	High Side	12	Asbestos Cement	130.0	-294.0	0.83	0.09	0.000	350
P-305	High Side	12	Asbestos Cement	130.0	291.8	0.83	0.10	0.000	397
P-96	Low Side	8	PVC	140.0	-129.4	0.83	0.12	0.000	333
P-243	High Side	8	PVC	140.0	129.3	0.83	0.13	0.000	350
P-372	High Side	8	PVC	140.0	128.4	0.82	0.09	0.000	244
P-63	Low Side	10	PVC	140.0	200.3	0.82	0.07	0.000	268
P-235	High Side	6	PVC	140.0	-71.1	0.81	0.37	0.000	772
P-483	Low Side	8	PVC	140.0	125.8	0.80	0.25	0.000	819
P-526	Low Side	8	PVC	140.0	-125.8	0.80	0.03	0.000	90
P-566	Low Side	6	Asbestos Cement	130.0	69.6	0.79	0.53	0.001	996
P-125	Low Side	6	PVC	140.0	68.6	0.78	0.13	0.000	285
P-392	High Side	8	PVC	140.0	121.6	0.78	0.11	0.000	343
P-486	Low Side	6	PVC	140.0	68.0	0.77	0.08	0.000	181
P-341	High Side	8	PVC	140.0	120.9	0.77	0.09	0.000	288
P-155	Low Side	6	PVC	140.0	67.6	0.77	0.23	0.000	524
P-382	High Side	12	Asbestos Cement	130.0	269.1	0.76	0.06	0.000	274
P-76	Low Side	8	PVC	140.0	119.4	0.76	0.28	0.000	897
P-207	High Side	6	PVC	140.0	67.1	0.76	0.13	0.000	306
P-370	High Side	8	PVC	140.0	-117.9	0.75	0.06	0.000	196
P-595	High Side	8	PVC	140.0	117.8	0.75	0.02	0.000	50
P-439	High Side	8	PVC	140.0	115.5	0.74	0.16	0.000	545
P-5	Low Side	8	PVC	140.0	-112.7	0.72	0.08	0.000	285
P-383	High Side	12	Asbestos Cement	130.0	252.4	0.72	0.06	0.000	285
P-408	High Side	8	PVC	140.0	112.0	0.71	0.17	0.000	631
P-107	Low Side	6	PVC	140.0	62.8	0.71	0.14	0.000	353
P-259	High Side	8	PVC	140.0	111.2	0.71	0.08	0.000	282
P-143	Low Side	10	PVC	140.0	172.9	0.71	0.06	0.000	310

Existing System - Scenario 1: MDD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-576	High Side	12	Asbestos Cement	130.0	248.6	0.71	0.21	0.000	1,092
P-377	High Side	8	PVC	140.0	-109.9	0.70	0.09	0.000	337
P-600	Low Side	12	PVC	140.0	-245.3	0.70	0.84	0.000	4,397
P-263	High Side	8	PVC	140.0	108.9	0.70	0.15	0.000	585
P-541	Low Side	8	PVC	140.0	105.8	0.68	0.17	0.000	678
P-306	High Side	12	Asbestos Cement	130.0	237.4	0.67	0.06	0.000	335
P-384	High Side	6	PVC	140.0	59.1	0.67	0.10	0.000	290
P-73	Low Side	8	PVC	140.0	104.5	0.67	0.12	0.000	488
P-142	Low Side	10	PVC	140.0	-162.8	0.67	0.18	0.000	984
P-597	Low Side	8	PVC	140.0	104.0	0.66	0.18	0.000	786
P-393	High Side	8	PVC	140.0	103.9	0.66	0.07	0.000	309
P-59	Low Side	8	PVC	140.0	-102.6	0.66	0.63	0.000	2,691
P-260	High Side	8	PVC	140.0	102.3	0.65	0.05	0.000	203
P-542	Low Side	8	PVC	140.0	101.3	0.65	0.06	0.000	281
P-217	High Side	6	PVC	140.0	-56.8	0.64	0.47	0.000	1,490
P-271	High Side	8	PVC	140.0	-100.5	0.64	0.17	0.000	776
P-67	Low Side	8	PVC	140.0	100.0	0.64	0.13	0.000	589
P-320	High Side	8	PVC	140.0	99.8	0.64	0.08	0.000	366
P-194	High Side	6	PVC	140.0	-56.0	0.64	0.14	0.000	437
P-374	High Side	12	Asbestos Cement	130.0	223.6	0.63	0.03	0.000	206
P-94	Low Side	8	PVC	140.0	-98.4	0.63	0.14	0.000	656
P-81	Low Side	8	PVC	140.0	97.7	0.62	0.58	0.000	2,718
P-70	Low Side	8	PVC	140.0	-97.3	0.62	0.13	0.000	590
P-346	High Side	6	PVC	140.0	-54.7	0.62	0.08	0.000	284
P-93	Low Side	8	PVC	140.0	-97.3	0.62	0.04	0.000	174
P-68	Low Side	8	PVC	140.0	96.7	0.62	0.57	0.000	2,719
P-578	High Side	8	PVC	140.0	-96.1	0.61	0.27	0.000	1,301
P-21	Low Side	8	PVC	140.0	-96.0	0.61	0.11	0.000	513
P-336	High Side	6	PVC	140.0	-53.8	0.61	0.09	0.000	317
P-197	High Side	6	PVC	140.0	52.7	0.60	0.42	0.000	1,530
P-413	High Side	4	PVC	140.0	23.3	0.60	0.12	0.000	274
P-178	High Side	8	PVC	140.0	93.1	0.59	0.17	0.000	848
P-3	High Side	10	PVC	140.0	145.1	0.59	0.00	0.000	0
P-16	High Side	12	Asbestos Cement	130.0	-207.6	0.59	0.12	0.000	1,331
P-139	Low Side	8	PVC	140.0	92.1	0.59	0.07	0.000	346
P-273	High Side	8	PVC	140.0	91.2	0.58	0.06	0.000	346
P-219	High Side	8	PVC	140.0	90.9	0.58	0.10	0.000	520
P-126	Low Side	6	PVC	140.0	50.9	0.58	0.25	0.000	943
P-318	High Side	6	PVC	140.0	50.3	0.57	0.08	0.000	321
P-268	High Side	8	PVC	140.0	-88.8	0.57	0.06	0.000	309
P-132	Low Side	8	PVC	140.0	-87.8	0.56	0.07	0.000	372
P-111	Low Side	10	PVC	140.0	135.6	0.55	0.03	0.000	230
P-15	High Side	12	Asbestos Cement	130.0	-194.2	0.55	0.06	0.000	1,331

Existing System - Scenario 1: MDD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-92	Low Side	8	PVC	140.0	-86.2	0.55	0.03	0.000	167
P-366	High Side	8	PVC	140.0	85.4	0.55	0.10	0.000	605
P-315	High Side	6	PVC	140.0	48.0	0.55	0.19	0.000	828
P-4	Low Side	8	PVC	140.0	-85.4	0.54	0.03	0.000	185
P-122	Low Side	6	PVC	140.0	-47.7	0.54	0.14	0.000	614
P-545	Low Side	8	PVC	140.0	84.7	0.54	0.03	0.000	187
P-310	High Side	12	Asbestos Cement	130.0	-189.8	0.54	0.04	0.000	319
P-14	Low Side	10	PVC	140.0	-130.6	0.53	0.02	0.000	190
P-461	Low Side	10	PVC	140.0	-130.3	0.53	0.01	0.000	55
P-462	Low Side	10	PVC	140.0	-130.3	0.53	0.27	0.000	2,180
P-74	Low Side	8	PVC	140.0	82.2	0.52	0.27	0.000	1,731
P-213	High Side	6	PVC	140.0	46.2	0.52	0.22	0.000	992
P-404	High Side	12	Asbestos Cement	130.0	-182.2	0.52	0.05	0.000	496
P-417	High Side	12	Asbestos Cement	130.0	-180.7	0.51	0.14	0.000	1,295
P-228	High Side	10	PVC	140.0	124.8	0.51	0.01	0.000	43
P-2	High Side	10	PVC	140.0	-124.5	0.51	0.05	0.000	626
P-321	High Side	8	PVC	140.0	78.9	0.50	0.05	0.000	369
P-119	Low Side	6	PVC	140.0	-44.1	0.50	0.07	0.000	352
P-13	Low Side	10	PVC	140.0	-122.1	0.50	0.04	0.000	342
P-12	Low Side	10	PVC	140.0	-122.1	0.50	0.02	0.000	165
P-196	High Side	8	PVC	140.0	-77.4	0.49	0.06	0.000	416
P-91	Low Side	8	PVC	140.0	-77.3	0.49	0.00	0.000	20
P-110	Low Side	10	PVC	140.0	119.4	0.49	0.04	0.000	337
P-131	Low Side	8	PVC	140.0	-75.5	0.48	0.06	0.000	441
P-277	High Side	8	PVC	140.0	74.7	0.48	0.02	0.000	146
P-274	High Side	8	PVC	140.0	74.5	0.48	0.05	0.000	385
P-236	High Side	6	PVC	140.0	-41.8	0.47	0.18	0.000	1,012
P-229	High Side	10	PVC	140.0	114.8	0.47	0.01	0.000	158
P-261	High Side	8	PVC	140.0	72.8	0.46	0.04	0.000	358
P-31	Low Side	2	Steel	100.0	4.5	0.46	0.52	0.001	447
P-36	High Side	2	Steel	100.0	4.5	0.46	0.47	0.001	400
P-252	High Side	8	PVC	140.0	72.3	0.46	0.04	0.000	334
P-123	Low Side	8	PVC	140.0	-72.1	0.46	0.16	0.000	1,296
P-79	Low Side	8	PVC	140.0	-71.4	0.46	0.08	0.000	631
P-594	Low Side	8	PVC	140.0	71.2	0.45	0.02	0.000	377
P-212	High Side	12	PVC	140.0	-158.0	0.45	0.02	0.000	258
P-467	Low Side	8	PVC	140.0	70.2	0.45	0.07	0.000	564
P-369	High Side	6	PVC	140.0	-39.2	0.44	0.12	0.000	733
P-3	Low Side	8	PVC	140.0	-69.4	0.44	0.03	0.000	264
P-267	High Side	8	PVC	140.0	-68.8	0.44	0.04	0.000	335
P-365	High Side	8	PVC	140.0	-68.4	0.44	0.04	0.000	410
P-147	Low Side	8	PVC	140.0	-67.9	0.43	0.03	0.000	254
P-149	Low Side	8	PVC	140.0	-67.5	0.43	0.02	0.000	222
P-135	Low Side	6	PVC	140.0	-36.9	0.42	0.05	0.000	322

Existing System - Scenario 1: MDD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-577	High Side	12	Asbestos Cement	130.0	147.0	0.42	0.01	0.000	104
P-232	High Side	8	PVC	140.0	65.1	0.42	0.04	0.000	358
P-215	High Side	8	PVC	140.0	-64.9	0.41	0.06	0.000	548
P-494	Low Side	6	PVC	140.0	-36.5	0.41	0.03	0.000	243
P-75	Low Side	6	PVC	140.0	36.4	0.41	0.06	0.000	435
P-108	Low Side	6	PVC	140.0	36.2	0.41	0.01	0.000	93
P-385	High Side	6	PVC	140.0	35.8	0.41	0.04	0.000	327
P-152	Low Side	8	PVC	140.0	-63.6	0.41	0.02	0.000	234
P-258	High Side	8	PVC	140.0	63.6	0.41	0.03	0.000	273
P-95	Low Side	8	PVC	140.0	-63.2	0.40	0.03	0.000	342
P-367	High Side	8	PVC	140.0	63.2	0.40	0.03	0.000	331
P-262	High Side	8	PVC	140.0	63.2	0.40	0.03	0.000	280
P-412	High Side	8	PVC	140.0	-63.0	0.40	0.12	0.000	1,215
P-355	High Side	4	PVC	140.0	15.6	0.40	0.06	0.000	302
P-98	Low Side	8	PVC	140.0	-62.1	0.40	0.02	0.000	188
P-77	Low Side	8	PVC	140.0	62.0	0.40	0.05	0.000	501
P-402	High Side	12	Asbestos Cement	130.0	-138.9	0.39	0.03	0.000	396
P-356	High Side	6	PVC	140.0	34.6	0.39	0.06	0.000	463
P-362	High Side	6	PVC	140.0	-34.1	0.39	0.10	0.000	821
P-278	High Side	8	PVC	140.0	60.2	0.38	0.03	0.000	379
P-253	High Side	8	PVC	140.0	59.7	0.38	0.08	0.000	957
P-208	High Side	6	PVC	140.0	33.4	0.38	0.02	0.000	167
P-231	High Side	8	PVC	140.0	59.3	0.38	0.04	0.000	446
P-270	High Side	8	PVC	140.0	59.1	0.38	0.02	0.000	292
P-427	High Side	8	PVC	140.0	58.8	0.38	0.02	0.000	294
P-301	High Side	8	PVC	140.0	-58.1	0.37	0.07	0.000	847
P-177	High Side	8	PVC	140.0	58.0	0.37	0.02	0.000	202
P-360	High Side	8	PVC	140.0	58.0	0.37	0.02	0.000	214
P-544	Low Side	8	PVC	140.0	-57.9	0.37	0.05	0.000	669
P-327	High Side	4	PVC	140.0	14.4	0.37	0.04	0.000	240
P-354	High Side	4	PVC	140.0	14.4	0.37	0.06	0.000	336
P-403	High Side	4	PVC	140.0	14.4	0.37	0.05	0.000	295
P-414	High Side	4	PVC	140.0	14.4	0.37	0.03	0.000	171
P-1	Low Side	8	PVC	140.0	57.2	0.37	0.06	0.000	697
P-397	High Side	12	Asbestos Cement	130.0	127.3	0.36	0.06	0.000	1,014
P-179	High Side	10	PVC	140.0	88.0	0.36	0.04	0.000	587
P-1	High Side	10	PVC	140.0	-86.9	0.36	0.01	0.000	626
P-141	Low Side	8	PVC	140.0	55.4	0.35	0.02	0.000	225
P-165	Low Side	10	PVC	140.0	85.3	0.35	0.01	0.000	266
P-394	High Side	4	PVC	140.0	13.3	0.34	0.06	0.000	378
P-256	High Side	8	PVC	140.0	53.3	0.34	0.02	0.000	293
P-144	Low Side	10	PVC	140.0	83.1	0.34	0.03	0.000	612
P-78	Low Side	8	PVC	140.0	52.7	0.34	0.11	0.000	1,602
P-109	Low Side	6	PVC	140.0	29.5	0.34	0.06	0.000	596
P-466	Low Side	8	PVC	140.0	52.1	0.33	0.02	0.000	312

Existing System - Scenario 1: MDD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-302	High Side	6	PVC	140.0	-29.3	0.33	0.13	0.000	1,391
P-389	High Side	6	PVC	140.0	28.9	0.33	0.10	0.000	1,081
P-307	High Side	12	Asbestos Cement	130.0	114.0	0.32	0.03	0.000	610
P-151	Low Side	8	PVC	140.0	-50.3	0.32	0.03	0.000	415
P-28	Low Side	10	PVC	140.0	-77.7	0.32	0.05	0.000	999
P-342	High Side	8	PVC	140.0	49.5	0.32	0.07	0.000	1,177
P-90	Low Side	10	PVC	140.0	-77.3	0.32	0.01	0.000	142
P-121	Low Side	6	PVC	140.0	-27.7	0.31	0.06	0.000	701
P-398	High Side	4	PVC	140.0	12.2	0.31	0.05	0.000	351
P-405	High Side	4	PVC	140.0	-12.2	0.31	0.03	0.000	200
P-401	High Side	12	Asbestos Cement	130.0	-108.9	0.31	0.01	0.000	270
P-434	Low Side	8	PVC	140.0	-48.3	0.31	0.02	0.000	295
P-27	Low Side	10	PVC	140.0	-75.4	0.31	0.06	0.000	1,316
P-43	Low Side	8	PVC	140.0	-47.9	0.31	0.13	0.000	2,281
P-353	High Side	6	PVC	140.0	26.8	0.30	0.03	0.000	315
P-513	Low Side	8	PVC	140.0	-47.7	0.30	0.02	0.000	306
P-244	High Side	8	PVC	140.0	47.6	0.30	0.04	0.000	674
P-84	High Side	8	PVC	140.0	47.5	0.30	0.00	0.000	0
P-117	Low Side	6	PVC	140.0	-26.6	0.30	0.04	0.000	449
P-211	High Side	12	PVC	140.0	-105.2	0.30	0.04	0.000	1,282
P-309	High Side	12	Asbestos Cement	130.0	-103.7	0.29	0.02	0.000	501
P-255	High Side	8	PVC	140.0	45.2	0.29	0.04	0.000	743
P-573	High Side	6	PVC	140.0	-25.2	0.29	0.05	0.000	641
P-279	High Side	8	PVC	140.0	44.7	0.29	0.01	0.000	264
P-470	Low Side	8	PVC	140.0	-44.2	0.28	0.04	0.000	897
P-340	High Side	6	PVC	140.0	24.8	0.28	0.04	0.000	627
P-432	Low Side	8	PVC	140.0	43.9	0.28	0.03	0.000	656
P-166	Low Side	10	PVC	140.0	67.5	0.28	0.01	0.000	288
P-480	Low Side	10	PVC	140.0	67.5	0.28	0.03	0.000	839
P-580	High Side	8	PVC	140.0	-42.5	0.27	0.01	0.000	305
P-583	High Side	8	PVC	140.0	-41.8	0.27	0.01	0.000	203
P-575	High Side	6	PVC	140.0	23.3	0.26	0.02	0.000	324
P-460	Low Side	10	PVC	140.0	-63.7	0.26	0.00	0.000	60
P-136	Low Side	6	PVC	140.0	22.9	0.26	0.00	0.000	87
P-422	High Side	6	PVC	140.0	22.8	0.26	0.02	0.000	385
P-543	Low Side	8	PVC	140.0	40.1	0.26	0.05	0.000	1,317
P-326	High Side	4	PVC	140.0	10.0	0.26	0.03	0.000	315
P-337	High Side	4	PVC	140.0	10.0	0.26	0.01	0.000	143
P-361	High Side	4	PVC	140.0	10.0	0.26	0.01	0.000	154
P-400	High Side	4	PVC	140.0	10.0	0.26	0.02	0.000	229
P-555	High Side	10	PVC	140.0	61.7	0.25	0.01	0.000	262
P-338	High Side	6	PVC	140.0	22.1	0.25	0.03	0.000	494
P-204	High Side	8	PVC	140.0	39.2	0.25	0.05	0.000	1,385
P-396	High Side	8	PVC	140.0	-39.0	0.25	0.01	0.000	238
P-364	High Side	8	PVC	140.0	39.0	0.25	0.02	0.000	574

Existing System - Scenario 1: MDD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-112	Low Side	6	PVC	140.0	21.8	0.25	0.01	0.000	186
P-324	High Side	6	PVC	140.0	-21.6	0.24	0.02	0.000	306
P-250	High Side	8	PVC	140.0	38.2	0.24	0.01	0.000	330
P-571	High Side	6	PVC	140.0	21.5	0.24	0.03	0.000	617
P-368	High Side	6	PVC	140.0	-21.4	0.24	0.02	0.000	382
P-510	Low Side	8	PVC	140.0	-37.7	0.24	0.01	0.000	337
P-469	Low Side	8	PVC	140.0	-37.5	0.24	0.01	0.000	320
P-433	Low Side	8	PVC	140.0	37.2	0.24	0.02	0.000	672
P-193	High Side	6	PVC	140.0	20.8	0.24	0.05	0.000	946
P-572	High Side	6	PVC	140.0	-20.7	0.24	0.06	0.000	1,261
P-308	High Side	12	Asbestos Cement	130.0	82.9	0.24	0.05	0.000	1,912
P-226	High Side	8	PVC	140.0	36.5	0.23	0.04	0.000	1,043
P-30	Low Side	2	Steel	100.0	2.3	0.23	0.16	0.000	480
P-487	Low Side	8	PVC	140.0	36.4	0.23	0.01	0.000	234
P-53	Low Side	6	PVC	140.0	20.2	0.23	0.02	0.000	446
P-459	Low Side	10	PVC	140.0	-54.6	0.22	0.02	0.000	664
P-399	High Side	6	PVC	140.0	-19.6	0.22	0.04	0.000	874
P-409	High Side	8	PVC	140.0	34.5	0.22	0.04	0.000	1,166
P-496	Low Side	6	PVC	140.0	-19.3	0.22	0.01	0.000	276
P-234	High Side	8	PVC	140.0	-34.0	0.22	0.01	0.000	321
P-425	High Side	12	PVC	140.0	-76.4	0.22	0.00	0.000	93
P-328	High Side	8	PVC	140.0	-33.8	0.22	0.01	0.000	303
P-83	Low Side	6	PVC	140.0	18.9	0.21	0.03	0.000	702
P-347	High Side	6	PVC	140.0	18.4	0.21	0.02	0.000	455
P-350	High Side	12	Asbestos Cement	130.0	-73.7	0.21	0.01	0.000	378
P-41	Low Side	6	PVC	140.0	18.2	0.21	0.01	0.000	276
P-87	Low Side	12	PVC	140.0	72.7	0.21	0.02	0.000	880
P-472	Low Side	8	PVC	140.0	-32.0	0.20	0.01	0.000	300
P-23	Low Side	10	PVC	140.0	49.3	0.20	0.00	0.000	166
P-358	High Side	6	PVC	140.0	-17.6	0.20	0.07	0.000	1,997
P-371	High Side	4	PVC	140.0	7.8	0.20	0.01	0.000	259
P-24	Low Side	8	PVC	140.0	31.1	0.20	0.02	0.000	941
P-245	High Side	8	PVC	140.0	30.9	0.20	0.01	0.000	225
P-162	Low Side	6	PVC	140.0	17.3	0.20	0.02	0.000	576
P-569	High Side	12	PVC	140.0	-68.5	0.19	0.02	0.000	1,111
P-363	High Side	6	PVC	140.0	-17.1	0.19	0.04	0.000	1,030
P-239	High Side	8	PVC	140.0	-29.9	0.19	0.01	0.000	287
P-181	High Side	8	PVC	140.0	29.9	0.19	0.01	0.000	610
P-280	High Side	8	PVC	140.0	29.1	0.19	0.01	0.000	270
P-192	High Side	6	PVC	140.0	-16.3	0.19	0.05	0.000	1,463
P-322	High Side	6	PVC	140.0	16.2	0.18	0.01	0.000	322
P-534	High Side	8	PVC	140.0	28.4	0.18	0.01	0.000	307
P-65	High Side	8	PVC	140.0	28.4	0.18	0.01	0.000	1,430
P-375	High Side	8	PVC	140.0	28.4	0.18	0.04	0.000	1,642
P-435	High Side	6	PVC	140.0	15.9	0.18	0.01	0.000	220
P-249	High Side	8	PVC	140.0	27.8	0.18	0.01	0.000	624

Existing System - Scenario 1: MDD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-146	Low Side	10	PVC	140.0	-42.8	0.17	0.01	0.000	379
P-344	High Side	6	PVC	140.0	15.3	0.17	0.01	0.000	307
P-48	Low Side	8	PVC	140.0	26.9	0.17	0.01	0.000	490
P-509	Low Side	8	PVC	140.0	-26.5	0.17	0.01	0.000	493
P-538	High Side	8	PVC	140.0	-25.8	0.16	0.00	0.000	117
P-45	Low Side	8	PVC	140.0	-25.6	0.16	0.01	0.000	558
P-530	High Side	8	PVC	140.0	-25.6	0.16	0.01	0.000	316
P-69	Low Side	8	PVC	140.0	-25.6	0.16	0.01	0.000	598
P-120	Low Side	6	PVC	140.0	-14.4	0.16	0.01	0.000	587
P-210	High Side	6	PVC	140.0	14.1	0.16	0.01	0.000	582
P-343	High Side	8	PVC	140.0	25.1	0.16	0.02	0.000	1,436
P-584	High Side	8	PVC	140.0	24.5	0.16	0.01	0.000	454
P-532	High Side	8	PVC	140.0	24.3	0.15	0.00	0.000	181
P-44	Low Side	8	PVC	140.0	24.0	0.15	0.02	0.000	1,226
P-498	Low Side	8	PVC	140.0	-23.9	0.15	0.01	0.000	511
P-160	Low Side	6	PVC	140.0	13.3	0.15	0.01	0.000	286
P-269	High Side	8	PVC	140.0	-23.6	0.15	0.02	0.000	1,192
P-82	Low Side	8	PVC	140.0	22.9	0.15	0.05	0.000	3,156
P-54	Low Side	6	PVC	140.0	12.8	0.15	0.00	0.000	176
P-335	High Side	6	PVC	140.0	-12.8	0.15	0.02	0.000	908
P-39	High Side	8	PVC	140.0	22.7	0.15	0.01	0.000	971
P-587	Low Side	8	PVC	140.0	22.7	0.15	0.00	0.000	568
P-588	Low Side	8	PVC	140.0	22.7	0.15	0.00	0.000	189
P-533	High Side	8	PVC	140.0	22.3	0.14	0.01	0.000	400
P-296	High Side	4	PVC	140.0	5.6	0.14	0.01	0.000	174
P-429	High Side	8	PVC	140.0	22.0	0.14	0.01	0.000	664
P-10	Low Side	10	PVC	140.0	-34.1	0.14	0.00	0.000	285
P-84	Low Side	6	PVC	140.0	12.2	0.14	0.01	0.000	694
P-128	Low Side	6	PVC	140.0	12.2	0.14	0.00	0.000	235
P-411	High Side	6	PVC	140.0	12.2	0.14	0.01	0.000	757
P-418	High Side	6	PVC	140.0	12.2	0.14	0.01	0.000	537
P-82	High Side	12	PVC	140.0	-47.5	0.13	0.00	0.000	2,968
P-421	High Side	6	PVC	140.0	-11.9	0.13	0.01	0.000	295
P-471	Low Side	8	PVC	140.0	-20.9	0.13	0.00	0.000	112
P-205	High Side	6	PVC	140.0	11.7	0.13	0.01	0.000	452
P-17	Low Side	8	PVC	140.0	-20.7	0.13	0.00	0.000	369
P-339	High Side	6	PVC	140.0	-11.6	0.13	0.01	0.000	532
P-391	High Side	8	PVC	140.0	20.6	0.13	0.01	0.000	833
P-254	High Side	8	PVC	140.0	20.6	0.13	0.01	0.000	523
P-209	High Side	6	PVC	140.0	11.6	0.13	0.01	0.000	506
P-380	High Side	8	PVC	140.0	20.3	0.13	0.01	0.000	1,014
P-488	Low Side	6	PVC	140.0	11.4	0.13	0.01	0.000	643
P-489	Low Side	6	PVC	140.0	11.4	0.13	0.01	0.000	665
P-233	High Side	8	PVC	140.0	19.9	0.13	0.00	0.000	325
P-214	High Side	6	PVC	140.0	11.1	0.13	0.01	0.000	332
P-317	High Side	6	PVC	140.0	11.1	0.13	0.01	0.000	771
P-560	High Side	10	PVC	140.0	30.7	0.13	0.00	0.000	119

Existing System - Scenario 1: MDD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-240	High Side	8	PVC	140.0	19.5	0.12	0.01	0.000	867
P-386	High Side	6	PVC	140.0	10.2	0.12	0.01	0.000	611
P-66	Low Side	10	PVC	140.0	28.3	0.12	0.00	0.000	598
P-161	Low Side	6	PVC	140.0	10.0	0.11	0.00	0.000	202
P-329	High Side	8	PVC	140.0	17.8	0.11	0.01	0.000	621
P-424	High Side	8	PVC	140.0	17.8	0.11	0.00	0.000	179
P-499	Low Side	6	PVC	140.0	10.0	0.11	0.00	0.000	194
P-227	High Side	8	PVC	140.0	17.5	0.11	0.00	0.000	345
P-345	High Side	6	PVC	140.0	-9.6	0.11	0.02	0.000	1,736
P-216	High Side	8	PVC	140.0	-17.0	0.11	0.01	0.000	977
P-137	Low Side	6	PVC	140.0	9.6	0.11	0.00	0.000	370
P-348	High Side	6	PVC	140.0	9.5	0.11	0.00	0.000	226
P-387	High Side	6	PVC	140.0	9.3	0.11	0.01	0.000	626
P-40	Low Side	6	PVC	140.0	9.1	0.10	0.00	0.000	305
P-492	Low Side	10	PVC	140.0	25.1	0.10	0.00	0.000	170
P-19	Low Side	8	PVC	140.0	-16.0	0.10	0.00	0.000	420
P-20	Low Side	8	PVC	140.0	-16.0	0.10	0.00	0.000	43
P-590	Low Side	8	PVC	140.0	15.9	0.10	0.01	0.000	1,050
P-113	Low Side	6	PVC	140.0	8.9	0.10	0.00	0.000	282
P-118	Low Side	6	PVC	140.0	8.9	0.10	0.00	0.000	252
P-130	Low Side	6	PVC	140.0	8.9	0.10	0.00	0.000	364
P-156	Low Side	6	PVC	140.0	8.9	0.10	0.00	0.000	178
P-297	High Side	6	PVC	140.0	8.9	0.10	0.00	0.000	234
P-485	Low Side	6	PVC	140.0	8.9	0.10	0.00	0.000	229
P-303	High Side	10	PVC	140.0	24.6	0.10	0.00	0.000	121
P-570	High Side	8	PVC	140.0	-15.4	0.10	0.00	0.000	581
P-145	Low Side	10	PVC	140.0	-23.9	0.10	0.00	0.000	191
P-47	Low Side	8	PVC	140.0	-15.3	0.10	0.01	0.000	1,191
P-535	High Side	8	PVC	140.0	-15.0	0.10	0.01	0.000	836
P-13	Low Side	10	PVC	140.0	-23.3	0.10	0.00	0.000	1,811
P-14	Low Side	10	PVC	140.0	-23.3	0.10	0.01	0.000	1,811
P-351	High Side	6	PVC	140.0	8.0	0.09	0.00	0.000	483
P-539	High Side	8	PVC	140.0	-14.1	0.09	0.01	0.000	875
P-246	High Side	8	PVC	140.0	13.9	0.09	0.00	0.000	288
P-116	Low Side	6	PVC	140.0	-7.7	0.09	0.00	0.000	545
P-281	High Side	8	PVC	140.0	13.5	0.09	0.00	0.000	262
P-359	High Side	6	PVC	140.0	-7.4	0.08	0.00	0.000	658
P-376	High Side	8	PVC	140.0	13.2	0.08	0.00	0.000	576
P-582	High Side	8	PVC	140.0	-12.7	0.08	0.00	0.000	278
P-531	High Side	8	PVC	140.0	12.6	0.08	0.00	0.000	113
P-493	Low Side	6	PVC	140.0	-7.0	0.08	0.01	0.000	1,228
P-561	High Side	10	PVC	140.0	19.3	0.08	0.00	0.000	218
P-182	High Side	8	PVC	140.0	11.9	0.08	0.00	0.000	249
P-114	Low Side	6	PVC	140.0	6.7	0.08	0.00	0.000	185
P-129	Low Side	6	PVC	140.0	6.7	0.08	0.00	0.000	230
P-153	Low Side	6	PVC	140.0	6.7	0.08	0.00	0.000	150
P-275	High Side	6	PVC	140.0	6.7	0.08	0.00	0.000	203

Existing System - Scenario 1: MDD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-276	High Side	6	PVC	140.0	6.7	0.08	0.00	0.000	202
P-298	High Side	6	PVC	140.0	6.7	0.08	0.00	0.000	223
P-440	High Side	6	PVC	140.0	6.7	0.08	0.00	0.000	199
P-334	High Side	6	PVC	140.0	6.6	0.08	0.00	0.000	293
P-537	High Side	8	PVC	140.0	-11.7	0.07	0.00	0.000	538
P-559	High Side	10	PVC	140.0	17.8	0.07	0.00	0.000	121
P-241	High Side	8	PVC	140.0	-11.4	0.07	0.00	0.000	871
P-495	Low Side	6	PVC	140.0	6.2	0.07	0.01	0.000	1,146
P-168	Low Side	6	PVC	140.0	5.6	0.06	0.00	0.000	139
P-185	High Side	8	PVC	140.0	9.0	0.06	0.00	0.000	252
P-323	High Side	6	PVC	140.0	-4.9	0.06	0.00	0.000	303
P-124	Low Side	10	PVC	140.0	13.3	0.05	0.00	0.000	258
P-423	High Side	8	PVC	140.0	-8.3	0.05	0.00	0.000	546
P-357	High Side	6	PVC	140.0	4.6	0.05	0.00	0.000	307
P-237	High Side	8	PVC	140.0	8.1	0.05	0.00	0.000	1,699
P-105	Low Side	8	PVC	140.0	-8.0	0.05	0.00	0.000	404
P-330	High Side	6	PVC	140.0	4.4	0.05	0.00	0.000	271
P-238	High Side	8	PVC	140.0	-7.9	0.05	0.00	0.000	1,303
P-349	High Side	6	PVC	140.0	-4.4	0.05	0.00	0.000	909
P-33	Low Side	12	PVC	140.0	15.8	0.04	0.00	0.000	1,215
P-593	Low Side	8	PVC	140.0	6.8	0.04	0.00	0.000	669
P-133	Low Side	8	PVC	140.0	6.7	0.04	0.00	0.000	167
P-134	Low Side	8	PVC	140.0	6.7	0.04	0.00	0.000	190
P-50	Low Side	6	PVC	140.0	-3.7	0.04	0.00	0.000	701
P-557	High Side	8	PVC	140.0	-6.6	0.04	0.00	0.000	1,485
P-25	Low Side	10	PVC	140.0	10.3	0.04	0.00	0.000	777
P-272	High Side	6	PVC	140.0	-3.7	0.04	0.00	0.000	801
P-183	High Side	8	PVC	140.0	-6.1	0.04	0.00	0.000	590
P-80	Low Side	8	PVC	140.0	-6.1	0.04	0.00	0.000	601
P-289	High Side	8	PVC	140.0	5.6	0.04	0.00	0.000	379
P-290	High Side	8	PVC	140.0	5.6	0.04	0.00	0.000	378
P-291	High Side	8	PVC	140.0	5.6	0.04	0.00	0.000	384
P-292	High Side	8	PVC	140.0	5.6	0.04	0.00	0.000	256
P-473	Low Side	8	PVC	140.0	5.6	0.04	0.00	0.000	132
P-352	High Side	12	Asbestos Cement	130.0	-11.8	0.03	0.00	0.000	299
P-190	High Side	8	PVC	140.0	-5.2	0.03	0.00	0.000	657
P-2	Low Side	8	PVC	140.0	5.1	0.03	0.00	0.000	487
P-562	High Side	8	PVC	140.0	-5.0	0.03	0.00	0.000	1,001
P-395	High Side	8	PVC	140.0	-4.6	0.03	0.00	0.000	2,024
P-18	Low Side	8	PVC	140.0	4.4	0.03	0.00	0.000	204
P-288	High Side	8	PVC	140.0	4.4	0.03	0.00	0.000	366
P-331	High Side	8	PVC	140.0	4.4	0.03	0.00	0.000	574
P-478	Low Side	8	PVC	140.0	4.4	0.03	0.00	0.000	313
P-479	Low Side	8	PVC	140.0	4.4	0.03	0.00	0.000	166
P-511	Low Side	8	PVC	140.0	4.4	0.03	0.00	0.000	299
P-66	High Side	8	PVC	140.0	4.0	0.03	0.00	0.000	1,430
P-574	High Side	6	PVC	140.0	-1.9	0.02	0.00	0.000	925

Existing System - Scenario 1: MDD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-163	Low Side	8	PVC	140.0	3.3	0.02	0.00	0.000	321
P-410	High Side	8	PVC	140.0	-3.2	0.02	0.00	0.000	1,687
P-35	Low Side	12	PVC	140.0	6.8	0.02	0.00	0.000	517
P-189	High Side	8	PVC	140.0	-2.7	0.02	0.00	0.000	513
P-536	High Side	8	PVC	140.0	-0.9	0.01	0.00	0.000	302
P-497	Low Side	8	PVC	140.0	-0.6	0.00	0.00	0.000	618
P-390	High Side	6	PVC	140.0	-0.2	0.00	0.00	0.000	321
P-529	High Side	8	PVC	140.0	0.2	0.00	0.00	0.000	331
P-16	Low Side	10	PVC	140.0	-0.2	0.00	0.00	0.000	131
P-15	Low Side	10	PVC	140.0	-0.2	0.00	0.00	0.000	259
P-71	Low Side	10	PVC	140.0	0.0	0.00	0.00	0.000	111
P-74	Low Side	12	PVC	140.0	0.0	0.00	0.00	0.000	777
P-70	Low Side	10	PVC	140.0	0.0	0.00	0.00	0.000	111
P-75	Low Side	12	PVC	140.0	0.0	0.00	0.00	0.000	777
P-81	High Side	12	PVC	140.0	0.0	0.00	0.00	0.000	2,968
P-591	Low Side	8	PVC	140.0	0.0	0.00	0.00	0.000	105
P-589	Low Side	8	PVC	140.0	0.0	0.00	0.00	0.000	394
P-514	Low Side	8	PVC	140.0	0.0	0.00	0.00	0.000	283
P-546	Low Side	8	PVC	140.0	0.0	0.00	0.00	0.000	296
P-586	High Side	8	PVC	140.0	0.0	0.00	0.00	0.000	249
P-150	Low Side	6	PVC	140.0	0.0	0.00	0.00	0.000	303
P-522	Low Side	8	PVC	140.0	0.0	0.00	0.00	0.000	282
P-585	High Side	8	PVC	140.0	0.0	0.00	0.00	0.000	738
P-52	Low Side	6	PVC	140.0	0.0	0.00	0.00	0.000	686
P-581	High Side	8	PVC	140.0	0.0	0.00	0.00	0.000	1,198
P-567	Low Side	6	PVC	140.0	0.0	0.00	0.00	0.000	531
P-592	Low Side	8	PVC	140.0	0.0	0.00	0.00	0.000	370
P-29	Low Side	6	Steel	100.0	0.0	0.00	0.00	0.000	991
P-512	Low Side	8	PVC	140.0	0.0	0.00	0.00	0.000	979
P-57	Low Side	10	PVC	140.0	0.0	0.00	0.00	0.000	563
P-191	High Side	8	PVC	140.0	0.0	0.00	0.00	0.000	570
P-195	High Side	8	PVC	140.0	0.0	0.00	0.00	0.000	546
P-230	High Side	10	PVC	140.0	0.0	0.00	0.00	0.000	1,187
P-446	High Side	16	PVC	140.0	0.0	0.00	0.00	0.000	256
P-552	High Side	8	PVC	140.0	0.0	0.00	0.00	0.000	1,214
P-554	High Side	10	PVC	140.0	0.0	0.00	0.00	0.000	255

Existing System - Scenario 2: PHD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
406	J-249	4,903.00	High Side	16.7	4,996.59	40.5
417	J-260	4,902.00	High Side	6.7	4,996.61	40.9
418	J-261	4,902.00	High Side	6.7	4,996.61	40.9
555	J-405	4,902.00	High Side	28.3	4,996.77	41.0
416	J-259	4,901.00	High Side	13.3	4,996.61	41.4
405	J-248	4,899.00	High Side	21.7	4,996.61	42.2
556	J-406	4,899.00	High Side	0.0	4,996.72	42.3
424	J-267	4,896.00	High Side	36.7	4,995.60	43.1
409	J-252	4,897.00	High Side	28.3	4,996.69	43.1
408	J-251	4,897.00	High Side	18.3	4,996.77	43.2
410	J-253	4,896.00	High Side	16.7	4,996.62	43.5
421	J-264	4,896.00	High Side	15.0	4,996.85	43.6
394	J-238	4,896.00	High Side	66.6	4,996.87	43.6
395	J-239	4,896.00	High Side	23.3	4,996.87	43.6
393	J-237	4,896.00	High Side	100.4	4,996.88	43.6
396	J-240	4,896.00	High Side	46.7	4,996.97	43.7
480	J-323	4,894.00	High Side	26.7	4,996.61	44.4
411	J-254	4,894.00	High Side	10.0	4,996.61	44.4
479	J-322	4,894.00	High Side	20.0	4,996.62	44.4
420	J-263	4,894.00	High Side	28.3	4,996.64	44.4
466	J-309	4,894.00	High Side	18.3	4,996.94	44.5
407	J-250	4,894.00	High Side	25.0	4,997.04	44.6
422	J-265	4,893.00	High Side	13.3	4,996.63	44.8
427	J-270	4,890.00	High Side	40.0	4,995.58	45.7
414	J-257	4,890.00	High Side	15.0	4,996.56	46.1
423	J-266	4,889.00	High Side	25.0	4,995.62	46.1
412	J-255	4,890.00	High Side	10.0	4,996.62	46.1
413	J-256	4,890.00	High Side	23.3	4,996.68	46.2
403	J-247	4,890.00	High Side	20.0	4,996.73	46.2
419	J-262	4,889.00	High Side	11.7	4,996.42	46.5
354	J-195	4,887.00	High Side	13.3	4,995.67	47.0
397	J-241	4,888.00	High Side	11.7	4,997.38	47.3
389	J-233	4,886.00	High Side	8.3	4,996.04	47.6
350	J-191	4,886.00	High Side	16.7	4,996.05	47.6
351	J-192	4,886.00	High Side	20.0	4,996.07	47.6
415	J-258	4,886.00	High Side	21.7	4,996.52	47.8
428	J-271	4,885.00	High Side	20.0	4,995.58	47.8
388	J-232	4,886.00	High Side	15.0	4,997.08	48.1
487	J-334	4,886.00	High Side	16.7	4,997.09	48.1
352	J-193	4,885.00	High Side	6.7	4,996.16	48.1
426	J-269	4,884.00	High Side	51.7	4,995.57	48.3
398	J-242	4,885.00	High Side	26.7	4,997.74	48.8
493	J-340	4,884.00	High Side	38.3	4,996.95	48.9
318	J-159	4,883.00	High Side	40.0	4,996.11	48.9
349	J-190	4,882.00	High Side	13.3	4,996.02	49.3
446	J-289	4,883.00	High Side	23.3	4,997.31	49.5
356	J-197	4,881.00	High Side	15.0	4,995.57	49.6
399	J-243	4,883.00	High Side	6.7	4,998.00	49.8
425	J-268	4,880.00	High Side	26.7	4,995.60	50.0

Existing System - Scenario 2: PHD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
365	J-206	4,880.00	High Side	20.0	4,995.94	50.2
572	J-422	4,886.00	High Side	0.0	5,002.87	50.6
447	J-290	4,880.00	High Side	26.7	4,997.04	50.6
448	J-291	4,879.00	High Side	21.7	4,996.94	51.0
333	J-174	4,878.00	High Side	33.3	4,996.41	51.2
357	J-198	4,877.00	High Side	20.0	4,995.57	51.3
373	J-215	4,877.00	High Side	10.0	4,995.60	51.3
374	J-216	4,877.00	High Side	10.0	4,995.67	51.3
332	J-173	4,878.00	High Side	38.3	4,997.35	51.6
1184	J-8	4,879.00	High Side	20.0	4,998.39	51.7
390	J-234	4,876.00	High Side	13.3	4,995.48	51.7
372	J-214	4,876.00	High Side	15.0	4,995.60	51.7
355	J-196	4,876.00	High Side	28.3	4,995.61	51.7
367	J-208	4,876.00	High Side	16.7	4,995.67	51.8
334	J-175	4,876.00	High Side	26.7	4,995.73	51.8
353	J-194	4,876.00	High Side	26.7	4,995.79	51.8
366	J-207	4,876.00	High Side	20.0	4,995.85	51.9
371	J-213	4,876.00	High Side	26.7	4,995.86	51.9
348	J-189	4,876.00	High Side	21.7	4,996.07	51.9
297	J-138	4,875.00	High Side	94.6	4,995.39	52.1
319	J-160	4,875.00	High Side	11.7	4,995.45	52.1
364	J-205	4,875.00	High Side	13.3	4,995.47	52.1
335	J-176	4,875.00	High Side	13.3	4,995.48	52.1
370	J-212	4,875.00	High Side	16.7	4,995.49	52.1
391	J-235	4,875.00	High Side	10.0	4,995.52	52.1
369	J-211	4,875.00	High Side	5.0	4,995.52	52.1
392	J-236	4,875.00	High Side	10.0	4,995.56	52.2
368	J-209	4,875.00	High Side	16.7	4,995.56	52.2
430	J-273	4,875.00	High Side	68.3	4,995.83	52.3
317	J-158	4,876.00	High Side	36.7	4,997.21	52.4
465	J-308	4,875.00	High Side	21.7	4,996.29	52.5
316	J-157	4,876.00	High Side	16.7	4,997.65	52.6
298	J-139	4,873.00	High Side	30.0	4,995.14	52.8
486	J-333	4,873.00	High Side	36.9	4,995.72	53.1
358	J-199	4,873.00	High Side	36.7	4,995.72	53.1
469	J-312	4,874.00	High Side	21.7	4,996.99	53.2
468	J-311	4,874.00	High Side	23.3	4,997.10	53.3
467	J-310	4,874.00	High Side	15.0	4,997.57	53.5
320	J-161	4,871.00	High Side	15.0	4,994.69	53.5
429	J-272	4,872.00	High Side	35.0	4,995.75	53.5
454	J-297	4,874.00	High Side	18.3	4,997.82	53.6
478	J-321	4,872.00	High Side	18.3	4,996.27	53.8
455	J-298	4,873.00	High Side	10.0	4,997.62	53.9
315	J-156	4,870.00	High Side	37.1	4,995.06	54.1
330	J-171	4,870.00	High Side	13.3	4,995.15	54.1
345	J-186	4,870.00	High Side	43.2	4,995.20	54.2
331	J-172	4,872.00	High Side	30.0	4,997.26	54.2
337	J-178	4,869.00	High Side	48.2	4,994.40	54.3
460	J-303	4,871.00	High Side	21.7	4,997.22	54.6

Existing System - Scenario 2: PHD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
453	J-296	4,871.00	High Side	20.0	4,998.02	55.0
456	J-299	4,870.00	High Side	16.7	4,997.42	55.1
436	J-279	4,868.00	High Side	23.3	4,995.53	55.2
439	J-282	4,868.00	High Side	15.0	4,995.63	55.2
437	J-280	4,868.00	High Side	18.3	4,995.66	55.2
434	J-277	4,868.00	High Side	21.7	4,995.69	55.2
336	J-177	4,867.00	High Side	48.2	4,995.20	55.5
464	J-307	4,868.00	High Side	33.3	4,996.30	55.5
470	J-313	4,868.00	High Side	18.3	4,997.13	55.9
457	J-300	4,868.00	High Side	16.7	4,997.19	55.9
471	J-314	4,869.00	High Side	21.7	4,998.53	56.0
400	J-244	4,869.00	High Side	31.7	4,999.13	56.3
472	J-315	4,868.00	High Side	18.3	4,998.14	56.3
296	J-137	4,868.00	High Side	30.0	4,998.27	56.4
359	J-200	4,865.00	High Side	21.7	4,995.72	56.6
475	J-318	4,867.00	High Side	18.3	4,998.11	56.7
401	J-245	4,869.00	High Side	23.3	5,000.21	56.8
435	J-278	4,864.00	High Side	21.7	4,995.67	57.0
458	J-301	4,865.00	High Side	16.7	4,997.07	57.1
162	J-1	4,870.00	Low Side	50.0	5,002.15	57.2
473	J-316	4,865.00	High Side	21.7	4,997.57	57.4
300	J-141	4,862.00	High Side	26.8	4,994.61	57.4
329	J-170	4,862.00	High Side	16.7	4,994.68	57.4
432	J-275	4,863.00	High Side	25.0	4,995.75	57.4
299	J-140	4,862.00	High Side	21.7	4,994.91	57.5
477	J-320	4,864.00	High Side	21.7	4,997.01	57.5
459	J-302	4,864.00	High Side	45.0	4,997.04	57.6
343	J-184	4,861.00	High Side	93.0	4,994.39	57.7
344	J-185	4,861.00	High Side	38.5	4,994.45	57.7
433	J-276	4,862.00	High Side	13.3	4,995.82	57.9
342	J-183	4,860.00	High Side	67.4	4,994.39	58.1
431	J-274	4,861.00	High Side	36.7	4,995.75	58.3
438	J-281	4,860.00	High Side	30.0	4,995.86	58.8
224	J-63	4,866.00	Low Side	48.6	5,002.13	58.9
328	J-169	4,858.00	High Side	10.0	4,994.27	59.0
321	J-162	4,858.00	High Side	45.9	4,994.33	59.0
295	J-136	4,865.00	High Side	30.4	5,001.33	59.0
301	J-142	4,857.00	High Side	163.4	4,993.34	59.0
476	J-319	4,860.00	High Side	35.0	4,997.25	59.4
302	J-143	4,856.00	High Side	16.7	4,993.33	59.4
360	J-201	4,858.00	High Side	21.7	4,995.76	59.6
440	J-283	4,858.00	High Side	18.3	4,995.94	59.7
402	J-246	4,870.00	High Side	0.0	5,008.44	59.9
167	J-6	4,864.00	Low Side	3.4	5,002.98	60.1
314	J-155	4,854.00	High Side	28.3	4,993.12	60.2
474	J-317	4,858.00	High Side	21.7	4,997.51	60.4
165	J-4	4,863.00	Low Side	23.9	5,002.79	60.5
166	J-5	4,863.00	Low Side	40.9	5,002.84	60.5
461	J-304	4,857.00	High Side	63.3	4,997.06	60.6

Existing System - Scenario 2: PHD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
202	J-41	4,862.00	Low Side	18.8	5,002.14	60.6
164	J-3	4,862.00	Low Side	40.0	5,002.74	60.9
346	J-187	4,853.00	High Side	50.1	4,994.46	61.2
488	J-335	4,862.00	High Side	17.1	5,003.59	61.3
441	J-284	4,854.00	High Side	20.0	4,996.20	61.5
462	J-305	4,854.00	High Side	33.3	4,996.45	61.6
449	J-292	4,854.00	High Side	36.7	4,996.97	61.9
450	J-293	4,854.00	High Side	33.3	4,996.98	61.9
451	J-294	4,854.00	High Side	20.0	4,997.51	62.1
501	J-423	4,845.00	High Side	134.4	4,988.78	62.2
442	J-285	4,852.00	High Side	23.3	4,996.39	62.5
347	J-188	4,850.00	High Side	21.2	4,994.54	62.5
445	J-288	4,851.00	High Side	11.7	4,995.84	62.7
443	J-286	4,851.00	High Side	15.0	4,995.87	62.7
201	J-40	4,857.00	Low Side	21.7	5,002.34	62.9
463	J-306	4,852.00	High Side	20.0	4,997.38	62.9
444	J-287	4,851.00	High Side	0.0	4,996.68	63.0
361	J-202	4,850.00	High Side	20.0	4,995.73	63.1
303	J-144	4,847.00	High Side	11.7	4,993.06	63.2
322	J-163	4,848.00	High Side	41.1	4,994.18	63.2
168	J-7	4,858.00	High Side	0.0	5,004.27	63.3
338	J-179	4,848.00	High Side	57.8	4,994.51	63.4
341	J-182	4,848.00	High Side	69.4	4,994.52	63.4
561	J-411	4,848.00	High Side	36.7	4,994.56	63.4
563	J-413	4,848.00	High Side	0.0	4,994.56	63.4
560	J-410	4,848.00	High Side	7.0	4,994.58	63.4
558	J-408	4,848.00	High Side	1.0	4,994.62	63.4
387	J-230	4,848.00	High Side	8.3	4,994.63	63.4
375	J-217	4,848.00	High Side	1.0	4,994.68	63.5
363	J-204	4,848.00	High Side	0.0	4,994.72	63.5
452	J-295	4,851.00	High Side	38.3	4,997.93	63.6
340	J-181	4,847.00	High Side	15.1	4,994.55	63.8
339	J-180	4,847.00	High Side	2.1	4,994.56	63.8
376	J-218	4,847.00	High Side	13.3	4,994.63	63.9
362	J-203	4,848.00	High Side	28.3	4,995.68	63.9
557	J-407	4,848.00	High Side	8.3	4,995.72	63.9
195	J-34	4,855.00	High Side	6.8	5,003.28	64.2
163	J-2	4,854.00	Low Side	42.1	5,002.34	64.2
386	J-229	4,845.00	High Side	8.3	4,994.54	64.7
312	J-153	4,843.00	High Side	35.0	4,993.06	64.9
385	J-228	4,843.00	High Side	8.3	4,994.50	65.5
324	J-165	4,841.00	High Side	9.6	4,993.46	66.0
377	J-219	4,842.00	High Side	15.0	4,994.54	66.0
310	J-151	4,840.00	High Side	30.8	4,993.00	66.2
304	J-145	4,840.00	High Side	15.0	4,993.01	66.2
325	J-166	4,840.00	High Side	11.6	4,993.42	66.4
323	J-164	4,840.00	High Side	15.0	4,994.15	66.7
327	J-168	4,839.00	High Side	21.2	4,993.39	66.8
384	J-227	4,840.00	High Side	8.3	4,994.48	66.8

Existing System - Scenario 2: PHD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
492	J-339	4,849.00	Low Side	0.0	5,003.81	67.0
176	J-15	4,849.00	Low Side	0.0	5,003.83	67.0
1133	J-423	4,838.00	High Side	11.6	4,992.90	67.0
200	J-39	4,847.00	Low Side	53.3	5,002.27	67.2
326	J-167	4,838.00	High Side	17.3	4,993.40	67.2
404	J-404	4,839.00	High Side	8.3	4,994.49	67.3
378	J-220	4,839.00	High Side	15.0	4,994.51	67.3
177	J-16	4,848.00	Low Side	0.0	5,003.83	67.4
178	J-17	4,848.00	Low Side	23.9	5,003.83	67.4
309	J-150	4,837.00	High Side	13.5	4,992.87	67.4
308	J-149	4,837.00	High Side	28.7	4,992.87	67.4
306	J-147	4,837.00	High Side	13.5	4,992.87	67.4
175	J-14	4,848.00	Low Side	12.8	5,003.91	67.5
313	J-154	4,837.00	High Side	16.7	4,993.06	67.5
549	J-395	4,838.00	High Side	23.1	4,994.48	67.7
562	J-412	4,838.00	High Side	0.0	4,994.56	67.7
559	J-409	4,838.00	High Side	0.0	4,994.62	67.8
191	J-30	4,846.00	Low Side	6.8	5,002.73	67.8
551	J-397	4,836.00	High Side	36.6	4,992.85	67.9
307	J-148	4,836.00	High Side	27.0	4,992.87	67.9
383	J-226	4,837.00	High Side	6.7	4,994.48	68.1
553	J-399	4,835.00	High Side	9.6	4,992.85	68.3
379	J-221	4,836.00	High Side	15.0	4,994.49	68.6
552	J-398	4,834.00	High Side	9.6	4,992.85	68.7
183	J-22	4,844.00	Low Side	48.4	5,003.09	68.8
550	J-396	4,833.00	High Side	36.6	4,992.85	69.2
179	J-18	4,843.00	Low Side	34.1	5,003.84	69.6
380	J-222	4,833.00	High Side	13.3	4,994.48	69.9
196	J-35	4,844.00	High Side	0.0	5,006.07	70.1
226	J-65	4,840.00	Low Side	18.3	5,002.17	70.2
484	J-327	4,843.00	High Side	23.9	5,005.37	70.3
169	J-8	4,843.00	High Side	1.7	5,005.39	70.3
197	J-36	4,842.00	High Side	34.1	5,006.08	71.0
538	J-383	4,830.00	High Side	0.0	4,994.48	71.2
543	J-388	4,829.00	High Side	0.0	4,994.47	71.6
181	J-20	4,839.00	Low Side	0.0	5,004.52	71.6
182	J-21	4,839.00	Low Side	3.4	5,004.57	71.6
381	J-223	4,828.00	High Side	0.0	4,994.48	72.0
1307	J-36	4,828.00	High Side	0.0	4,994.49	72.0
190	J-29	4,837.00	Low Side	3.4	5,003.70	72.1
220	J-59	4,835.00	Low Side	15.0	5,002.20	72.3
485	J-328	4,838.00	High Side	17.1	5,005.68	72.5
216	J-55	4,834.00	Low Side	43.3	5,002.11	72.7
225	J-64	4,833.00	Low Side	28.3	5,002.13	73.2
482	J-325	4,825.00	High Side	14.1	4,994.47	73.3
170	J-9	4,836.00	High Side	20.5	5,006.11	73.6
217	J-56	4,832.00	Low Side	40.0	5,002.12	73.6
539	J-384	4,824.00	High Side	0.0	4,994.47	73.8
540	J-385	4,823.00	High Side	1.7	4,994.46	74.2

Existing System - Scenario 2: PHD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
542	J-387	4,823.00	High Side	0.0	4,994.46	74.2
541	J-386	4,822.00	High Side	13.3	4,994.45	74.6
481	J-324	4,820.00	High Side	0.0	4,994.44	75.5
219	J-58	4,827.00	Low Side	20.0	5,002.19	75.8
199	J-38	4,827.00	Low Side	27.3	5,004.05	76.6
232	J-72	4,824.00	Low Side	16.7	5,002.10	77.1
1283	J-33	4,816.00	High Side	36.6	4,994.41	77.2
171	J-10	4,825.00	Low Side	23.9	5,004.08	77.5
221	J-60	4,823.00	Low Side	54.6	5,002.51	77.7
172	J-11	4,824.00	Low Side	17.1	5,004.08	77.9
207	J-46	4,827.00	High Side	20.3	5,007.21	78.0
483	J-326	4,822.00	Low Side	10.0	5,002.24	78.0
198	J-37	4,823.00	Low Side	13.6	5,004.08	78.3
218	J-57	4,821.00	Low Side	18.3	5,002.20	78.4
233	J-73	4,820.00	Low Side	13.3	5,002.09	78.8
214	J-53	4,820.00	Low Side	15.0	5,002.12	78.8
208	J-47	4,820.00	Low Side	0.0	5,002.64	79.0
249	J-89	4,819.00	Low Side	8.3	5,002.13	79.2
174	J-13	4,820.00	Low Side	0.0	5,004.05	79.6
248	J-88	4,818.00	Low Side	11.7	5,002.12	79.7
189	J-28	4,820.00	Low Side	0.0	5,004.52	79.8
253	J-93	4,817.00	Low Side	13.3	5,002.08	80.1
223	J-62	4,817.00	Low Side	48.3	5,002.19	80.1
382	J-224	4,809.00	High Side	6.0	4,994.41	80.2
252	J-92	4,816.00	Low Side	15.0	5,002.08	80.5
491	J-338	4,818.00	Low Side	13.6	5,004.12	80.5
173	J-12	4,818.00	Low Side	13.6	5,004.12	80.5
213	J-52	4,816.00	Low Side	26.7	5,002.16	80.5
185	J-24	4,820.00	Low Side	12.0	5,006.89	80.9
188	J-27	4,820.00	Low Side	3.4	5,006.96	80.9
262	J-102	4,815.00	Low Side	13.3	5,002.06	80.9
231	J-71	4,815.00	Low Side	13.3	5,002.10	80.9
230	J-70	4,815.00	Low Side	0.0	5,002.10	81.0
215	J-54	4,815.00	Low Side	8.3	5,002.11	81.0
184	J-23	4,817.00	Low Side	27.3	5,004.26	81.0
234	J-74	4,813.00	Low Side	13.3	5,002.09	81.8
222	J-61	4,813.00	Low Side	51.8	5,002.24	81.9
203	J-42	4,815.00	Low Side	0.0	5,004.26	81.9
254	J-94	4,812.00	Low Side	18.3	5,002.07	82.2
247	J-87	4,812.00	Low Side	0.0	5,002.10	82.2
212	J-51	4,812.00	Low Side	5.0	5,002.22	82.3
229	J-68	4,812.00	Low Side	6.7	5,002.26	82.3
211	J-50	4,812.00	Low Side	28.8	5,002.27	82.3
246	J-86	4,811.00	Low Side	0.0	5,002.10	82.7
209	J-48	4,811.00	Low Side	23.9	5,002.61	82.9
186	J-25	4,815.00	Low Side	20.1	5,007.74	83.4
255	J-95	4,809.00	Low Side	10.0	5,002.04	83.5
251	J-91	4,809.00	Low Side	10.0	5,002.10	83.5
278	J-402	4,809.00	Low Side	13.4	5,002.30	83.6

Existing System - Scenario 2: PHD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
547	J-392	4,809.00	Low Side	20.0	5,002.62	83.8
180	J-19	4,810.00	Low Side	27.3	5,004.03	83.9
235	J-75	4,808.00	Low Side	5.0	5,002.11	84.0
204	J-43	4,812.00	Low Side	30.3	5,007.69	84.7
210	J-49	4,807.00	Low Side	38.9	5,002.83	84.7
544	J-389	4,806.00	Low Side	13.3	5,002.72	85.1
205	J-44	4,810.00	Low Side	19.3	5,006.89	85.2
514	J-358	4,806.00	Low Side	6.1	5,003.40	85.4
227	J-66	4,806.00	Low Side	0.0	5,003.50	85.4
250	J-90	4,804.00	Low Side	13.3	5,002.13	85.7
236	J-76	4,804.00	Low Side	18.3	5,002.13	85.7
256	J-96	4,803.00	Low Side	11.7	5,002.04	86.1
289	J-128	4,803.00	Low Side	15.0	5,002.15	86.2
259	J-99	4,803.00	Low Side	11.7	5,002.15	86.2
500	J-403	4,803.00	Low Side	0.0	5,002.30	86.2
260	J-100	4,801.00	Low Side	18.3	5,002.03	87.0
245	J-85	4,801.00	Low Side	8.3	5,002.43	87.1
261	J-101	4,800.00	Low Side	10.0	5,002.04	87.4
258	J-98	4,800.00	Low Side	20.0	5,002.10	87.4
257	J-97	4,800.00	Low Side	16.7	5,002.10	87.4
1181	J-7	4,806.00	<None>	0.0	5,008.21	87.5
237	J-77	4,800.00	Low Side	6.7	5,002.24	87.5
238	J-78	4,800.00	Low Side	8.3	5,002.24	87.5
499	J-400	4,800.00	Low Side	16.7	5,002.32	87.5
520	J-364	4,800.00	Low Side	15.0	5,002.33	87.5
244	J-84	4,800.00	Low Side	8.3	5,002.43	87.6
554	J-401	4,800.00	Low Side	13.3	5,002.44	87.6
546	J-391	4,800.00	Low Side	5.0	5,002.63	87.7
239	J-79	4,800.00	Low Side	10.0	5,002.79	87.7
265	J-105	4,800.00	Low Side	10.0	5,002.82	87.8
263	J-103	4,800.00	Low Side	8.3	5,002.82	87.8
272	J-112	4,800.00	Low Side	5.0	5,002.95	87.8
290	J-129	4,800.00	Low Side	16.7	5,003.26	87.9
517	J-361	4,800.00	Low Side	38.3	5,003.30	88.0
519	J-363	4,800.00	Low Side	15.0	5,003.34	88.0
518	J-362	4,800.00	Low Side	20.0	5,003.35	88.0
515	J-359	4,800.00	Low Side	20.0	5,003.38	88.0
228	J-67	4,800.00	Low Side	7.8	5,003.46	88.0
240	J-80	4,798.00	Low Side	0.0	5,002.97	88.7
241	J-81	4,797.00	Low Side	15.0	5,003.02	89.1
242	J-82	4,797.00	Low Side	5.0	5,003.07	89.2
271	J-111	4,797.00	Low Side	3.3	5,003.13	89.2
187	J-26	4,804.00	Low Side	54.4	5,010.13	89.2
545	J-390	4,794.00	Low Side	6.7	5,002.66	90.3
270	J-110	4,792.00	Low Side	11.7	5,002.47	91.1
193	J-32	4,803.00	Low Side	13.4	5,013.88	91.2
194	J-33	4,803.00	Low Side	10.2	5,013.88	91.2
264	J-104	4,791.50	Low Side	5.0	5,002.86	91.4
498	J-345	4,791.50	Low Side	8.3	5,002.86	91.4

Existing System - Scenario 2: PHD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
291	J-130	4,791.00	Low Side	5.0	5,002.47	91.5
494	J-341	4,791.00	Low Side	13.3	5,002.92	91.7
564	J-414	4,791.00	Low Side	15.0	5,002.94	91.7
292	J-133	4,790.00	Low Side	26.7	5,002.19	91.8
497	J-344	4,790.30	Low Side	8.3	5,002.86	92.0
266	J-106	4,790.00	Low Side	10.0	5,002.79	92.1
286	J-125	4,790.00	Low Side	13.3	5,002.83	92.1
277	J-117	4,790.00	Low Side	11.7	5,003.26	92.3
284	J-123	4,790.00	Low Side	10.0	5,003.33	92.3
279	J-118	4,790.00	Low Side	20.0	5,003.33	92.3
282	J-121	4,790.00	Low Side	10.0	5,003.34	92.3
283	J-122	4,790.00	Low Side	6.7	5,003.34	92.3
516	J-360	4,790.00	Low Side	8.3	5,003.34	92.3
510	J-354	4,790.00	Low Side	13.3	5,003.36	92.3
509	J-353	4,790.00	Low Side	1.7	5,003.37	92.3
495	J-342	4,789.50	Low Side	8.3	5,002.87	92.3
513	J-357	4,790.00	Low Side	17.1	5,003.38	92.3
512	J-356	4,790.00	Low Side	17.1	5,003.38	92.3
280	J-119	4,790.00	Low Side	0.0	5,003.39	92.3
281	J-120	4,790.00	Low Side	0.0	5,003.39	92.3
511	J-355	4,790.00	Low Side	20.5	5,003.40	92.3
508	J-352	4,790.00	Low Side	17.1	5,003.42	92.3
548	J-393	4,789.00	Low Side	0.0	5,002.66	92.4
243	J-83	4,789.00	Low Side	13.3	5,002.79	92.5
268	J-108	4,789.00	Low Side	6.7	5,002.83	92.5
267	J-107	4,789.00	Low Side	11.7	5,002.84	92.5
496	J-343	4,789.00	Low Side	10.0	5,002.88	92.5
288	J-127	4,788.00	Low Side	20.0	5,003.22	93.1
269	J-109	4,787.00	Low Side	11.7	5,002.83	93.4
571	J-421	4,787.00	Low Side	10.2	5,002.92	93.4
293	J-134	4,787.00	Low Side	8.3	5,003.03	93.5
565	J-415	4,786.00	Low Side	0.0	5,002.93	93.9
276	J-116	4,786.00	Low Side	8.3	5,003.24	94.0
285	J-124	4,785.00	Low Side	15.0	5,003.03	94.3
275	J-115	4,785.00	Low Side	8.3	5,003.23	94.4
566	J-416	4,784.00	Low Side	0.0	5,002.92	94.7
567	J-417	4,784.00	Low Side	0.0	5,002.93	94.7
274	J-114	4,783.00	Low Side	10.0	5,003.23	95.3
273	J-113	4,781.00	Low Side	13.3	5,003.27	96.2
287	J-126	4,780.00	Low Side	0.0	5,003.50	96.7
507	J-351	4,780.00	Low Side	0.0	5,003.66	96.8
506	J-350	4,780.00	Low Side	8.3	5,003.69	96.8
505	J-349	4,780.00	Low Side	6.7	5,003.74	96.8
502	J-346	4,780.00	Low Side	8.3	5,003.74	96.8
504	J-348	4,780.00	Low Side	6.7	5,004.21	97.0
503	J-347	4,780.00	Low Side	0.0	5,004.21	97.0
537	J-382	4,780.00	Low Side	5.0	5,004.54	97.1
570	J-420	4,772.00	Low Side	0.0	5,002.91	99.9
521	J-366	4,775.00	Low Side	0.0	5,007.66	100.7

Existing System - Scenario 2: PHD

ID	Label	Elevation (ft)	Zone	Demand (gal/min)	Hydraulic Grade (ft)	Pressure (psi)
522	J-367	4,775.00	Low Side	0.0	5,008.18	100.9
568	J-418	4,766.00	Low Side	23.9	5,002.91	102.5
523	J-368	4,770.00	Low Side	8.3	5,008.60	103.2
569	J-419	4,763.00	Low Side	0.0	5,002.91	103.8
524	J-369	4,765.00	Low Side	6.7	5,009.25	105.7
536	J-381	4,765.00	Low Side	0.0	5,009.48	105.8
531	J-376	4,765.00	Low Side	8.3	5,009.77	105.9
526	J-371	4,765.00	Low Side	3.3	5,009.94	106.0
533	J-378	4,765.00	Low Side	6.7	5,010.31	106.1
534	J-379	4,765.00	Low Side	0.0	5,011.88	106.8
535	J-380	4,760.00	Low Side	6.7	5,009.48	107.9
532	J-377	4,760.00	Low Side	0.0	5,009.77	108.1
525	J-370	4,755.00	Low Side	11.7	5,009.73	110.2
527	J-372	4,750.00	Low Side	16.7	5,009.74	112.4
530	J-375	4,750.00	Low Side	0.0	5,009.74	112.4
529	J-374	4,750.00	Low Side	6.7	5,009.75	112.4
528	J-373	4,750.00	Low Side	8.3	5,009.75	112.4

Existing System - Scenario 2: PHD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-68	High Side	10	PVC	140.0	1,350.0	5.51	0.52	0.009	137
P-69	High Side	10	PVC	140.0	1,350.0	5.51	0.52	0.009	137
P-519	Low Side	8	PVC	140.0	800.0	5.11	1.57	0.011	149
P-76	Low Side	8	PVC	140.0	800.0	5.11	0.50	0.011	87
P-77	Low Side	8	PVC	140.0	800.0	5.11	0.61	0.011	87
P-313	High Side	12	PVC	140.0	-1,627.2	4.62	8.23	0.005	1,511
P-312	High Side	12	PVC	140.0	-1,603.9	4.55	1.08	0.005	204
P-171	High Side	8	PVC	140.0	585.9	3.74	3.06	0.006	517
P-455	High Side	12	Asbestos Cement	130.0	-1,214.5	3.45	10.51	0.004	2,705
P-602	Low Side	4	PVC	140.0	134.4	3.43	13.36	0.011	1,180
P-74	Low Side	12	PVC	140.0	1,200.0	3.40	1.94	0.003	777
P-75	Low Side	12	PVC	140.0	1,200.0	3.40	0.47	0.003	777
P-33	Low Side	12	PVC	140.0	-1,176.4	3.34	3.75	0.003	1,215
P-448	High Side	14	PVC	140.0	-1,508.6	3.14	2.26	0.002	1,013
P-503	Low Side	10	PVC	140.0	-716.7	2.93	0.52	0.003	179
P-504	Low Side	10	PVC	140.0	-716.7	2.93	0.42	0.003	173
P-525	Low Side	10	PVC	140.0	716.7	2.93	3.12	0.003	1,076
P-524	Low Side	8	PVC	140.0	451.9	2.88	0.86	0.004	234
P-406	High Side	12	Asbestos Cement	130.0	1,009.4	2.86	0.61	0.003	235
P-72	Low Side	10	PVC	140.0	700.0	2.86	0.17	0.003	87
P-73	Low Side	10	PVC	140.0	-700.0	2.86	0.10	0.003	87
P-518	Low Side	8	PVC	140.0	431.9	2.76	0.37	0.003	111
P-505	Low Side	8	PVC	140.0	-426.6	2.72	0.65	0.003	201
P-27	Low Side	10	PVC	140.0	649.2	2.65	3.17	0.002	1,316
P-28	Low Side	10	PVC	140.0	645.8	2.64	2.39	0.002	999
P-257	High Side	8	PVC	140.0	398.3	2.54	0.96	0.003	346
P-21	Low Side	8	PVC	140.0	397.5	2.54	1.48	0.003	513
P-198	High Side	12	PVC	140.0	892.4	2.53	3.68	0.002	2,055
P-24	Low Side	8	PVC	140.0	-391.1	2.50	2.63	0.003	941
P-221	High Side	8	PVC	140.0	390.2	2.49	0.94	0.003	337
P-436	High Side	16	PVC	140.0	-1,558.0	2.49	0.29	0.001	237
P-7	High Side	16	PVC	140.0	-1,532.5	2.45	1.11	0.001	928
P-447	High Side	16	PVC	140.0	-1,525.7	2.43	0.69	0.001	576
P-172	High Side	8	PVC	140.0	377.5	2.41	2.88	0.003	1,098
P-491	Low Side	10	PVC	140.0	-585.7	2.39	0.10	0.002	41
P-419	High Side	12	Asbestos Cement	130.0	842.1	2.39	1.25	0.002	676
P-517	Low Side	8	PVC	140.0	361.5	2.31	0.54	0.002	223
P-206	High Side	6	PVC	140.0	189.1	2.15	0.69	0.003	234
P-378	High Side	8	PVC	140.0	-334.1	2.13	0.42	0.002	201
P-56	High Side	16	PVC	140.0	-1,329.7	2.12	1.09	0.001	1,183
P-415	High Side	12	Asbestos Cement	130.0	-739.2	2.10	0.51	0.001	350
P-158	Low Side	8	PVC	140.0	-321.3	2.05	0.23	0.002	117
P-482	Low Side	8	PVC	140.0	321.3	2.05	0.18	0.002	94
P-437	High Side	16	PVC	140.0	-1,275.1	2.03	0.43	0.001	508

Existing System - Scenario 2: PHD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-13	Low Side	10	PVC	140.0	-472.8	1.93	0.48	0.001	1,811
P-14	Low Side	10	PVC	140.0	-472.8	1.93	1.92	0.001	1,811
P-60	High Side	8	PVC	140.0	300.0	1.91	0.10	0.002	83
P-61	High Side	8	PVC	140.0	300.0	1.91	0.12	0.002	83
P-516	Low Side	8	PVC	140.0	298.4	1.90	1.17	0.002	668
P-464	High Side	8	PVC	140.0	-289.3	1.85	0.13	0.002	79
P-508	Low Side	8	PVC	140.0	287.8	1.84	0.68	0.002	406
P-377	High Side	8	PVC	140.0	-285.9	1.82	0.53	0.002	337
P-392	High Side	8	PVC	140.0	285.3	1.82	0.54	0.002	343
P-490	Low Side	10	PVC	140.0	-445.1	1.82	0.57	0.001	487
P-201	High Side	10	PVC	140.0	439.5	1.80	0.66	0.001	550
P-370	High Side	8	PVC	140.0	-277.1	1.77	0.29	0.001	196
P-176	High Side	8	PVC	140.0	273.1	1.74	1.27	0.001	882
P-25	Low Side	10	PVC	140.0	-422.4	1.73	0.85	0.001	777
P-381	High Side	12	Asbestos Cement	130.0	607.8	1.72	0.20	0.001	201
P-45	Low Side	8	PVC	140.0	263.8	1.68	0.75	0.001	558
P-523	Low Side	8	PVC	140.0	-259.7	1.66	0.33	0.001	251
P-476	Low Side	8	PVC	140.0	-253.1	1.62	0.47	0.001	376
P-200	High Side	10	PVC	140.0	393.6	1.61	1.10	0.001	1,151
P-576	High Side	12	Asbestos Cement	130.0	565.0	1.60	0.96	0.001	1,092
P-463	High Side	8	PVC	140.0	-250.9	1.60	0.79	0.001	645
P-16	High Side	12	Asbestos Cement	130.0	-562.8	1.60	0.75	0.001	1,331
P-407	High Side	8	PVC	140.0	248.5	1.59	0.38	0.001	318
P-175	High Side	8	PVC	140.0	245.1	1.56	0.30	0.001	253
P-20	Low Side	8	PVC	140.0	-244.8	1.56	0.05	0.001	43
P-19	Low Side	8	PVC	140.0	-244.8	1.56	0.49	0.001	420
P-173	High Side	8	PVC	140.0	243.6	1.56	0.25	0.001	211
P-15	High Side	12	Asbestos Cement	130.0	-542.8	1.54	0.39	0.001	1,331
P-310	High Side	12	Asbestos Cement	130.0	-536.1	1.52	0.25	0.001	319
P-475	Low Side	8	PVC	140.0	-238.1	1.52	0.61	0.001	589
P-199	High Side	10	PVC	140.0	367.8	1.50	0.44	0.001	519
P-23	Low Side	10	PVC	140.0	-363.8	1.49	0.14	0.001	166
P-207	High Side	6	PVC	140.0	129.4	1.47	0.45	0.001	306
P-382	High Side	12	Asbestos Cement	130.0	511.4	1.45	0.20	0.001	274
P-474	High Side	12	PVC	140.0	507.9	1.44	0.30	0.001	480
P-202	High Side	10	PVC	140.0	351.0	1.43	0.76	0.001	1,002
P-309	High Side	12	Asbestos Cement	130.0	-503.7	1.43	0.36	0.001	501
P-247	High Side	8	PVC	140.0	223.7	1.43	0.37	0.001	370
P-598	Low Side	12	PVC	140.0	500.0	1.42	0.06	0.001	99
P-9	High Side	12	PVC	140.0	500.0	1.42	0.03	0.001	112
P-10	High Side	12	PVC	140.0	-500.0	1.42	0.04	0.001	112

Existing System - Scenario 2: PHD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-595	High Side	8	PVC	140.0	218.8	1.40	0.05	0.001	50
P-383	High Side	12	Asbestos Cement	130.0	486.4	1.38	0.19	0.001	285
P-18	Low Side	8	PVC	140.0	-214.1	1.37	0.19	0.001	204
P-242	High Side	8	PVC	140.0	212.9	1.36	0.34	0.001	371
P-408	High Side	8	PVC	140.0	211.8	1.35	0.57	0.001	631
P-578	High Side	8	PVC	140.0	-211.0	1.35	1.16	0.001	1,301
P-315	High Side	6	PVC	140.0	117.2	1.33	1.01	0.001	828
P-203	High Side	10	PVC	140.0	319.4	1.30	0.36	0.001	562
P-2	Low Side	8	PVC	140.0	-200.8	1.28	0.40	0.001	487
P-393	High Side	8	PVC	140.0	196.8	1.26	0.24	0.001	309
P-318	High Side	6	PVC	140.0	110.2	1.25	0.35	0.001	321
P-438	High Side	10	PVC	140.0	300.0	1.23	0.39	0.001	671
P-599	Low Side	12	PVC	140.0	-417.9	1.19	2.13	0.000	4,850
P-235	High Side	6	PVC	140.0	-104.0	1.18	0.76	0.001	772
P-417	High Side	12	Asbestos Cement	130.0	-415.8	1.18	0.65	0.000	1,295
P-565	Low Side	8	PVC	140.0	-184.3	1.18	0.35	0.001	504
P-223	High Side	8	PVC	140.0	184.0	1.17	0.25	0.001	359
P-374	High Side	12	Asbestos Cement	130.0	412.8	1.17	0.10	0.000	206
P-213	High Side	6	PVC	140.0	102.0	1.16	0.93	0.001	992
P-157	Low Side	6	PVC	140.0	101.0	1.15	0.39	0.001	425
P-258	High Side	8	PVC	140.0	179.5	1.15	0.18	0.001	273
P-547	Low Side	8	PVC	140.0	179.0	1.14	0.11	0.001	167
P-365	High Side	8	PVC	140.0	-178.4	1.14	0.27	0.001	410
P-220	High Side	8	PVC	140.0	178.4	1.14	1.01	0.001	1,540
P-334	High Side	6	PVC	140.0	-100.0	1.14	0.27	0.001	293
P-397	High Side	12	Asbestos Cement	130.0	397.6	1.13	0.47	0.000	1,014
P-564	Low Side	8	Ductile Iron	100.0	-171.0	1.09	0.12	0.001	108
P-373	High Side	8	PVC	140.0	170.4	1.09	0.27	0.001	450
P-384	High Side	6	PVC	140.0	94.4	1.07	0.24	0.001	290
P-404	High Side	12	Asbestos Cement	130.0	-375.3	1.06	0.20	0.000	496
P-225	High Side	6	PVC	140.0	93.7	1.06	0.81	0.001	990
P-367	High Side	8	PVC	140.0	166.0	1.06	0.19	0.001	331
P-366	High Side	8	PVC	140.0	164.3	1.05	0.34	0.001	605
P-12	Low Side	10	PVC	140.0	254.7	1.04	0.07	0.000	165
P-13	Low Side	10	PVC	140.0	254.7	1.04	0.15	0.000	342
P-248	High Side	8	PVC	140.0	162.1	1.03	0.12	0.001	225
P-336	High Side	6	PVC	140.0	-90.3	1.02	0.24	0.001	317
P-369	High Side	6	PVC	140.0	-87.8	1.00	0.52	0.001	733
P-14	Low Side	10	PVC	140.0	241.9	0.99	0.07	0.000	190
P-563	Low Side	8	PVC	140.0	-154.3	0.98	0.08	0.001	160
P-5	Low Side	8	PVC	140.0	-154.2	0.98	0.14	0.000	285

Existing System - Scenario 2: PHD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-577	High Side	12	Asbestos Cement	130.0	345.6	0.98	0.04	0.000	104
P-461	Low Side	10	PVC	140.0	239.7	0.98	0.02	0.000	55
P-462	Low Side	10	PVC	140.0	239.7	0.98	0.83	0.000	2,180
P-218	High Side	6	PVC	140.0	-85.8	0.97	1.15	0.001	1,670
P-500	Low Side	6	PVC	140.0	85.8	0.97	0.10	0.001	148
P-154	Low Side	6	PVC	140.0	85.7	0.97	0.20	0.001	293
P-521	Low Side	8	PVC	140.0	-152.1	0.97	0.25	0.000	478
P-138	Low Side	6	PVC	140.0	85.3	0.97	0.37	0.001	541
P-43	Low Side	8	PVC	140.0	151.5	0.97	1.10	0.000	2,281
P-102	Low Side	10	PVC	140.0	-228.2	0.93	0.05	0.000	136
P-224	High Side	8	PVC	140.0	145.6	0.93	0.28	0.000	622
P-520	Low Side	8	PVC	140.0	-145.5	0.93	0.23	0.000	502
P-62	Low Side	10	PVC	140.0	227.2	0.93	0.56	0.000	1,615
P-215	High Side	8	PVC	140.0	-145.0	0.93	0.24	0.000	548
P-252	High Side	8	PVC	140.0	-144.1	0.92	0.15	0.000	334
P-222	High Side	8	PVC	140.0	144.0	0.92	0.68	0.000	1,541
P-301	High Side	8	PVC	140.0	-143.6	0.92	0.37	0.000	847
P-104	Low Side	6	PVC	140.0	80.6	0.91	0.37	0.001	603
P-159	Low Side	8	PVC	140.0	142.9	0.91	0.18	0.000	421
P-412	High Side	8	PVC	140.0	-141.7	0.90	0.52	0.000	1,215
P-76	Low Side	8	PVC	140.0	140.8	0.90	0.38	0.000	897
P-507	Low Side	8	PVC	140.0	-140.7	0.90	0.21	0.000	497
P-413	High Side	4	PVC	140.0	35.0	0.89	0.26	0.001	274
P-402	High Side	12	Asbestos Cement	130.0	-314.0	0.89	0.12	0.000	396
P-3	High Side	10	PVC	140.0	217.6	0.89	0.01	0.000	0
P-399	High Side	6	PVC	140.0	-78.1	0.89	0.50	0.001	874
P-48	Low Side	8	PVC	140.0	136.6	0.87	0.20	0.000	490
P-101	Low Side	10	PVC	140.0	-213.2	0.87	0.05	0.000	149
P-212	High Side	12	PVC	140.0	-291.1	0.83	0.06	0.000	258
P-194	High Side	6	PVC	140.0	-72.6	0.82	0.22	0.001	437
P-140	Low Side	8	PVC	140.0	-127.8	0.82	0.06	0.000	133
P-501	Low Side	6	PVC	140.0	70.8	0.80	0.09	0.000	186
P-351	High Side	6	PVC	140.0	69.8	0.79	0.23	0.000	483
P-277	High Side	8	PVC	140.0	123.3	0.79	0.05	0.000	146
P-103	Low Side	6	PVC	140.0	69.2	0.79	0.27	0.000	591
P-178	High Side	8	PVC	140.0	122.4	0.78	0.28	0.000	848
P-483	Low Side	8	PVC	140.0	122.3	0.78	0.24	0.000	819
P-526	Low Side	8	PVC	140.0	-122.3	0.78	0.03	0.000	90
P-174	High Side	8	PVC	140.0	121.8	0.78	0.24	0.000	739
P-246	High Side	8	PVC	140.0	-120.6	0.77	0.09	0.000	288
P-263	High Side	8	PVC	140.0	120.1	0.77	0.18	0.000	585
P-262	High Side	8	PVC	140.0	120.1	0.77	0.09	0.000	280
P-401	High Side	12	Asbestos Cement	130.0	-269.0	0.76	0.06	0.000	270
P-2	High Side	10	PVC	140.0	-186.8	0.76	0.10	0.000	626
P-332	High Side	8	PVC	140.0	119.3	0.76	0.10	0.000	338

Existing System - Scenario 2: PHD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-216	High Side	8	PVC	140.0	-119.0	0.76	0.30	0.000	977
P-571	High Side	6	PVC	140.0	66.9	0.76	0.27	0.000	617
P-364	High Side	8	PVC	140.0	118.5	0.76	0.18	0.000	574
P-308	High Side	12	Asbestos Cement	130.0	-266.2	0.76	0.42	0.000	1,912
P-239	High Side	8	PVC	140.0	-117.2	0.75	0.09	0.000	287
P-372	High Side	8	PVC	140.0	115.6	0.74	0.07	0.000	244
P-350	High Side	12	Asbestos Cement	130.0	-259.4	0.74	0.08	0.000	378
P-426	High Side	12	Asbestos Cement	130.0	258.5	0.73	0.21	0.000	1,037
P-271	High Side	8	PVC	140.0	-113.4	0.72	0.22	0.000	776
P-4	Low Side	8	PVC	140.0	-113.2	0.72	0.05	0.000	185
P-147	Low Side	8	PVC	140.0	-112.7	0.72	0.07	0.000	254
P-228	High Side	10	PVC	140.0	175.9	0.72	0.01	0.000	43
P-339	High Side	6	PVC	140.0	63.1	0.72	0.21	0.000	532
P-340	High Side	6	PVC	140.0	-63.1	0.72	0.24	0.000	627
P-142	Low Side	10	PVC	140.0	-174.6	0.71	0.21	0.000	984
P-380	High Side	8	PVC	140.0	-111.4	0.71	0.28	0.000	1,014
P-155	Low Side	6	PVC	140.0	62.4	0.71	0.20	0.000	524
P-1	Low Side	8	PVC	140.0	-110.9	0.71	0.19	0.000	697
P-31	Low Side	2	Steel	100.0	6.8	0.70	1.11	0.002	447
P-36	High Side	2	Steel	100.0	6.8	0.70	0.99	0.002	400
P-368	High Side	6	PVC	140.0	-61.2	0.69	0.14	0.000	382
P-597	Low Side	8	PVC	140.0	106.9	0.68	0.19	0.000	786
P-149	Low Side	8	PVC	140.0	-106.5	0.68	0.06	0.000	222
P-385	High Side	6	PVC	140.0	59.4	0.67	0.11	0.000	327
P-356	High Side	6	PVC	140.0	58.5	0.66	0.16	0.000	463
P-548	Low Side	8	PVC	140.0	103.7	0.66	0.10	0.000	434
P-229	High Side	10	PVC	140.0	160.8	0.66	0.03	0.000	158
P-278	High Side	8	PVC	140.0	101.6	0.65	0.08	0.000	379
P-261	High Side	8	PVC	140.0	101.3	0.65	0.08	0.000	358
P-63	Low Side	10	PVC	140.0	156.5	0.64	0.05	0.000	268
P-320	High Side	8	PVC	140.0	100.1	0.64	0.08	0.000	366
P-425	High Side	12	PVC	140.0	-224.9	0.64	0.01	0.000	93
P-422	High Side	6	PVC	140.0	55.1	0.63	0.12	0.000	385
P-125	Low Side	6	PVC	140.0	54.9	0.62	0.09	0.000	285
P-307	High Side	12	Asbestos Cement	130.0	-219.5	0.62	0.09	0.000	610
P-197	High Side	6	PVC	140.0	54.8	0.62	0.46	0.000	1,530
P-75	Low Side	6	PVC	140.0	54.6	0.62	0.13	0.000	435
P-496	Low Side	6	PVC	140.0	-53.9	0.61	0.08	0.000	276
P-580	High Side	8	PVC	140.0	-94.5	0.60	0.06	0.000	305
P-273	High Side	8	PVC	140.0	93.5	0.60	0.07	0.000	346
P-360	High Side	8	PVC	140.0	93.5	0.60	0.04	0.000	214
P-583	High Side	8	PVC	140.0	-93.4	0.60	0.04	0.000	203
P-355	High Side	4	PVC	140.0	23.3	0.60	0.13	0.000	302
P-196	High Side	8	PVC	140.0	-91.9	0.59	0.08	0.000	416

Existing System - Scenario 2: PHD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-484	Low Side	6	PVC	140.0	50.6	0.57	0.05	0.000	208
P-3	Low Side	8	PVC	140.0	-89.4	0.57	0.05	0.000	264
P-208	High Side	6	PVC	140.0	50.1	0.57	0.04	0.000	167
P-97	Low Side	8	PVC	140.0	-88.6	0.57	0.10	0.000	574
P-321	High Side	8	PVC	140.0	88.1	0.56	0.07	0.000	369
P-234	High Side	8	PVC	140.0	-87.3	0.56	0.06	0.000	321
P-341	High Side	8	PVC	140.0	87.2	0.56	0.05	0.000	288
P-327	High Side	4	PVC	140.0	21.7	0.55	0.09	0.000	240
P-354	High Side	4	PVC	140.0	21.7	0.55	0.13	0.000	336
P-403	High Side	4	PVC	140.0	21.7	0.55	0.11	0.000	295
P-414	High Side	4	PVC	140.0	21.7	0.55	0.07	0.000	171
P-335	High Side	6	PVC	140.0	-48.6	0.55	0.22	0.000	908
P-165	Low Side	10	PVC	140.0	134.7	0.55	0.03	0.000	266
P-492	Low Side	10	PVC	140.0	134.5	0.55	0.02	0.000	170
P-143	Low Side	10	PVC	140.0	133.4	0.55	0.04	0.000	310
P-59	Low Side	8	PVC	140.0	85.3	0.54	0.45	0.000	2,691
P-231	High Side	8	PVC	140.0	-83.8	0.53	0.07	0.000	446
P-1	High Side	10	PVC	140.0	-130.4	0.53	0.03	0.000	626
P-564	Low Side	6	Asbestos Cement	130.0	46.8	0.53	0.13	0.000	499
P-227	High Side	8	PVC	140.0	-82.8	0.53	0.05	0.000	345
P-352	High Side	12	Asbestos Cement	130.0	-182.4	0.52	0.03	0.000	299
P-256	High Side	8	PVC	140.0	81.0	0.52	0.04	0.000	293
P-394	High Side	4	PVC	140.0	20.0	0.51	0.13	0.000	378
P-211	High Side	12	PVC	140.0	-179.2	0.51	0.12	0.000	1,282
P-601	High Side	8	PVC	140.0	79.4	0.51	0.27	0.000	1,843
P-279	High Side	8	PVC	140.0	78.3	0.50	0.04	0.000	264
P-243	High Side	8	PVC	140.0	77.8	0.50	0.05	0.000	350
P-349	High Side	6	PVC	140.0	-42.9	0.49	0.17	0.000	909
P-427	High Side	8	PVC	140.0	-75.5	0.48	0.04	0.000	294
P-50	Low Side	6	PVC	140.0	-42.1	0.48	0.13	0.000	701
P-421	High Side	6	PVC	140.0	-42.0	0.48	0.05	0.000	295
P-324	High Side	6	PVC	140.0	-41.7	0.47	0.06	0.000	306
P-363	High Side	6	PVC	140.0	-41.6	0.47	0.18	0.000	1,030
P-110	Low Side	10	PVC	140.0	114.8	0.47	0.03	0.000	337
P-398	High Side	4	PVC	140.0	18.3	0.47	0.10	0.000	351
P-405	High Side	4	PVC	140.0	-18.3	0.47	0.06	0.000	200
P-359	High Side	6	PVC	140.0	-40.8	0.46	0.11	0.000	658
P-389	High Side	6	PVC	140.0	39.6	0.45	0.18	0.000	1,081
P-141	Low Side	8	PVC	140.0	70.3	0.45	0.03	0.000	225
P-575	High Side	6	PVC	140.0	39.4	0.45	0.05	0.000	324
P-217	High Side	6	PVC	140.0	-39.3	0.45	0.24	0.000	1,490
P-132	Low Side	8	PVC	140.0	-69.7	0.45	0.04	0.000	372
P-166	Low Side	10	PVC	140.0	108.0	0.44	0.02	0.000	288
P-272	High Side	6	PVC	140.0	-38.8	0.44	0.13	0.000	801
P-139	Low Side	8	PVC	140.0	68.7	0.44	0.04	0.000	346
P-274	High Side	8	PVC	140.0	68.5	0.44	0.04	0.000	385

Existing System - Scenario 2: PHD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-480	Low Side	10	PVC	140.0	106.5	0.44	0.07	0.000	839
P-250	High Side	8	PVC	140.0	68.1	0.43	0.04	0.000	330
P-269	High Side	8	PVC	140.0	-66.7	0.43	0.13	0.000	1,192
P-346	High Side	6	PVC	140.0	-37.4	0.42	0.04	0.000	284
P-123	Low Side	8	PVC	140.0	-66.5	0.42	0.14	0.000	1,296
P-226	High Side	8	PVC	140.0	-66.1	0.42	0.11	0.000	1,043
P-179	High Side	10	PVC	140.0	103.3	0.42	0.05	0.000	587
P-204	High Side	8	PVC	140.0	66.1	0.42	0.14	0.000	1,385
P-467	Low Side	8	PVC	140.0	66.0	0.42	0.06	0.000	564
P-466	Low Side	8	PVC	140.0	65.3	0.42	0.03	0.000	312
P-77	Low Side	8	PVC	140.0	65.0	0.41	0.05	0.000	501
P-146	Low Side	10	PVC	140.0	-100.0	0.41	0.03	0.000	379
P-486	Low Side	6	PVC	140.0	35.6	0.40	0.02	0.000	181
P-219	High Side	8	PVC	140.0	62.5	0.40	0.05	0.000	520
P-302	High Side	6	PVC	140.0	-34.9	0.40	0.18	0.000	1,391
P-541	Low Side	8	PVC	140.0	62.0	0.40	0.06	0.000	678
P-245	High Side	8	PVC	140.0	-61.8	0.39	0.02	0.000	225
P-135	Low Side	6	PVC	140.0	-34.7	0.39	0.04	0.000	322
P-249	High Side	8	PVC	140.0	61.5	0.39	0.06	0.000	624
P-460	Low Side	10	PVC	140.0	-95.5	0.39	0.00	0.000	60
P-391	High Side	8	PVC	140.0	60.7	0.39	0.07	0.000	833
P-267	High Side	8	PVC	140.0	60.5	0.39	0.03	0.000	335
P-326	High Side	4	PVC	140.0	15.0	0.38	0.06	0.000	315
P-337	High Side	4	PVC	140.0	15.0	0.38	0.03	0.000	143
P-361	High Side	4	PVC	140.0	15.0	0.38	0.03	0.000	154
P-400	High Side	4	PVC	140.0	15.0	0.38	0.04	0.000	229
P-84	High Side	8	PVC	140.0	60.0	0.38	0.00	0.000	0
P-566	Low Side	6	Asbestos Cement	130.0	33.4	0.38	0.14	0.000	996
P-387	High Side	6	PVC	140.0	33.4	0.38	0.07	0.000	626
P-555	High Side	10	PVC	140.0	92.5	0.38	0.02	0.000	262
P-74	Low Side	8	PVC	140.0	-57.9	0.37	0.14	0.000	1,731
P-594	Low Side	8	PVC	140.0	57.8	0.37	0.01	0.000	377
P-96	Low Side	8	PVC	140.0	-57.0	0.36	0.03	0.000	333
P-254	High Side	8	PVC	140.0	-57.0	0.36	0.04	0.000	523
P-344	High Side	6	PVC	140.0	31.3	0.36	0.03	0.000	307
P-260	High Side	8	PVC	140.0	-55.6	0.35	0.02	0.000	203
P-542	Low Side	8	PVC	140.0	55.3	0.35	0.02	0.000	281
P-395	High Side	8	PVC	140.0	55.2	0.35	0.15	0.000	2,024
P-280	High Side	8	PVC	140.0	55.0	0.35	0.02	0.000	270
P-513	Low Side	8	PVC	140.0	-54.7	0.35	0.02	0.000	306
P-30	Low Side	2	Steel	100.0	3.4	0.35	0.33	0.001	480
P-487	Low Side	8	PVC	140.0	54.6	0.35	0.02	0.000	234
P-53	Low Side	6	PVC	140.0	30.3	0.34	0.04	0.000	446
P-122	Low Side	6	PVC	140.0	-29.8	0.34	0.06	0.000	614
P-459	Low Side	10	PVC	140.0	-81.9	0.33	0.03	0.000	664
P-91	Low Side	8	PVC	140.0	51.6	0.33	0.00	0.000	20
P-131	Low Side	8	PVC	140.0	-51.4	0.33	0.03	0.000	441

Existing System - Scenario 2: PHD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-111	Low Side	10	PVC	140.0	79.8	0.33	0.01	0.000	230
P-87	Low Side	12	PVC	140.0	114.3	0.32	0.04	0.000	880
P-83	Low Side	6	PVC	140.0	28.3	0.32	0.06	0.000	702
P-126	Low Side	6	PVC	140.0	28.3	0.32	0.08	0.000	943
P-582	High Side	8	PVC	140.0	-49.8	0.32	0.02	0.000	278
P-41	Low Side	6	PVC	140.0	27.3	0.31	0.02	0.000	276
P-409	High Side	8	PVC	140.0	48.5	0.31	0.07	0.000	1,166
P-44	Low Side	8	PVC	140.0	47.8	0.31	0.07	0.000	1,226
P-47	Low Side	8	PVC	140.0	-47.6	0.30	0.07	0.000	1,191
P-112	Low Side	6	PVC	140.0	-26.7	0.30	0.01	0.000	186
P-371	High Side	4	PVC	140.0	11.7	0.30	0.03	0.000	259
P-145	Low Side	10	PVC	140.0	-71.6	0.29	0.01	0.000	191
P-497	Low Side	8	PVC	140.0	45.4	0.29	0.03	0.000	618
P-238	High Side	8	PVC	140.0	-45.3	0.29	0.07	0.000	1,303
P-181	High Side	8	PVC	140.0	44.8	0.29	0.03	0.000	610
P-205	High Side	6	PVC	140.0	24.9	0.28	0.03	0.000	452
P-193	High Side	6	PVC	140.0	24.7	0.28	0.06	0.000	946
P-470	Low Side	8	PVC	140.0	-43.8	0.28	0.04	0.000	897
P-534	High Side	8	PVC	140.0	42.6	0.27	0.01	0.000	307
P-65	High Side	8	PVC	140.0	42.6	0.27	0.02	0.000	1,430
P-435	High Side	6	PVC	140.0	23.9	0.27	0.01	0.000	220
P-259	High Side	8	PVC	140.0	-42.2	0.27	0.01	0.000	282
P-71	Low Side	8	PVC	140.0	42.1	0.27	0.03	0.000	593
P-434	Low Side	8	PVC	140.0	-42.0	0.27	0.01	0.000	295
P-119	Low Side	6	PVC	140.0	23.6	0.27	0.02	0.000	352
P-240	High Side	8	PVC	140.0	41.1	0.26	0.04	0.000	867
P-538	High Side	8	PVC	140.0	-41.1	0.26	0.01	0.000	117
P-573	High Side	6	PVC	140.0	-23.0	0.26	0.04	0.000	641
P-78	Low Side	8	PVC	140.0	40.7	0.26	0.07	0.000	1,602
P-569	High Side	12	PVC	140.0	-91.4	0.26	0.03	0.000	1,111
P-255	High Side	8	PVC	140.0	39.9	0.25	0.03	0.000	743
P-510	Low Side	8	PVC	140.0	-39.7	0.25	0.01	0.000	337
P-95	Low Side	8	PVC	140.0	-39.7	0.25	0.01	0.000	342
P-92	Low Side	8	PVC	140.0	38.2	0.24	0.01	0.000	167
P-210	High Side	6	PVC	140.0	21.2	0.24	0.03	0.000	582
P-386	High Side	6	PVC	140.0	21.1	0.24	0.03	0.000	611
P-177	High Side	8	PVC	140.0	37.1	0.24	0.01	0.000	202
P-244	High Side	8	PVC	140.0	-36.8	0.24	0.02	0.000	674
P-584	High Side	8	PVC	140.0	36.7	0.23	0.02	0.000	454
P-600	Low Side	12	PVC	140.0	82.1	0.23	0.11	0.000	4,397
P-80	Low Side	8	PVC	140.0	-36.2	0.23	0.02	0.000	601
P-120	Low Side	6	PVC	140.0	20.2	0.23	0.03	0.000	587
P-532	High Side	8	PVC	140.0	35.7	0.23	0.01	0.000	181
P-160	Low Side	6	PVC	140.0	20.0	0.23	0.01	0.000	286
P-358	High Side	6	PVC	140.0	-19.9	0.23	0.09	0.000	1,997
P-432	Low Side	8	PVC	140.0	35.3	0.23	0.02	0.000	656
P-192	High Side	6	PVC	140.0	-19.5	0.22	0.06	0.000	1,463

Existing System - Scenario 2: PHD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-54	Low Side	6	PVC	140.0	19.3	0.22	0.01	0.000	176
P-39	High Side	8	PVC	140.0	34.1	0.22	0.03	0.000	971
P-587	Low Side	8	PVC	140.0	34.1	0.22	0.01	0.000	568
P-588	Low Side	8	PVC	140.0	34.1	0.22	0.01	0.000	189
P-66	Low Side	10	PVC	140.0	53.1	0.22	0.01	0.000	598
P-469	Low Side	8	PVC	140.0	-33.8	0.22	0.01	0.000	320
P-439	High Side	8	PVC	140.0	-33.6	0.21	0.02	0.000	545
P-533	High Side	8	PVC	140.0	33.4	0.21	0.01	0.000	400
P-296	High Side	4	PVC	140.0	8.3	0.21	0.01	0.000	174
P-90	Low Side	10	PVC	140.0	51.6	0.21	0.00	0.000	142
P-10	Low Side	10	PVC	140.0	-51.2	0.21	0.01	0.000	285
P-84	Low Side	6	PVC	140.0	18.3	0.21	0.03	0.000	694
P-128	Low Side	6	PVC	140.0	18.3	0.21	0.01	0.000	235
P-411	High Side	6	PVC	140.0	18.3	0.21	0.03	0.000	757
P-418	High Side	6	PVC	140.0	18.3	0.21	0.02	0.000	537
P-281	High Side	8	PVC	140.0	31.6	0.20	0.01	0.000	262
P-390	High Side	6	PVC	140.0	-17.6	0.20	0.01	0.000	321
P-209	High Side	6	PVC	140.0	17.3	0.20	0.02	0.000	506
P-117	Low Side	6	PVC	140.0	-17.3	0.20	0.02	0.000	449
P-60	Low Side	8	PVC	140.0	30.7	0.20	0.03	0.000	1,121
P-494	Low Side	6	PVC	140.0	17.2	0.20	0.01	0.000	243
P-429	High Side	8	PVC	140.0	30.5	0.19	0.02	0.000	664
P-268	High Side	8	PVC	140.0	30.5	0.19	0.01	0.000	309
P-488	Low Side	6	PVC	140.0	17.1	0.19	0.02	0.000	643
P-489	Low Side	6	PVC	140.0	17.1	0.19	0.02	0.000	665
P-545	Low Side	8	PVC	140.0	30.3	0.19	0.00	0.000	187
P-305	High Side	12	Asbestos Cement	130.0	67.8	0.19	0.01	0.000	397
P-328	High Side	8	PVC	140.0	-29.9	0.19	0.01	0.000	303
P-323	High Side	6	PVC	140.0	-16.7	0.19	0.01	0.000	303
P-544	Low Side	8	PVC	140.0	-29.7	0.19	0.02	0.000	669
P-214	High Side	6	PVC	140.0	16.7	0.19	0.01	0.000	332
P-317	High Side	6	PVC	140.0	16.7	0.19	0.03	0.000	771
P-530	High Side	8	PVC	140.0	-29.5	0.19	0.01	0.000	316
P-560	High Side	10	PVC	140.0	46.0	0.19	0.00	0.000	119
P-574	High Side	6	PVC	140.0	16.4	0.19	0.03	0.000	925
P-152	Low Side	8	PVC	140.0	-28.9	0.18	0.01	0.000	234
P-348	High Side	6	PVC	140.0	16.2	0.18	0.01	0.000	226
P-17	Low Side	8	PVC	140.0	-28.5	0.18	0.01	0.000	369
P-136	Low Side	6	PVC	140.0	16.0	0.18	0.00	0.000	87
P-376	High Side	8	PVC	140.0	-28.0	0.18	0.01	0.000	576
P-232	High Side	8	PVC	140.0	27.9	0.18	0.01	0.000	358
P-495	Low Side	6	PVC	140.0	-15.6	0.18	0.03	0.000	1,146
P-493	Low Side	6	PVC	140.0	15.1	0.17	0.03	0.000	1,228
P-109	Low Side	6	PVC	140.0	-15.0	0.17	0.02	0.000	596
P-161	Low Side	6	PVC	140.0	15.0	0.17	0.01	0.000	202
P-329	High Side	8	PVC	140.0	26.7	0.17	0.01	0.000	621
P-424	High Side	8	PVC	140.0	26.7	0.17	0.00	0.000	179

Existing System - Scenario 2: PHD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-499	Low Side	6	PVC	140.0	15.0	0.17	0.01	0.000	194
P-82	High Side	12	PVC	140.0	-60.0	0.17	0.00	0.000	2,968
P-322	High Side	6	PVC	140.0	15.0	0.17	0.01	0.000	322
P-79	Low Side	8	PVC	140.0	25.6	0.16	0.01	0.000	631
P-69	Low Side	8	PVC	140.0	-25.5	0.16	0.01	0.000	598
P-472	Low Side	8	PVC	140.0	-25.5	0.16	0.01	0.000	300
P-433	Low Side	8	PVC	140.0	25.3	0.16	0.01	0.000	672
P-342	High Side	8	PVC	140.0	24.8	0.16	0.02	0.000	1,177
P-375	High Side	8	PVC	140.0	-24.7	0.16	0.03	0.000	1,642
P-68	Low Side	8	PVC	140.0	-24.6	0.16	0.05	0.000	2,719
P-73	Low Side	8	PVC	140.0	-24.6	0.16	0.01	0.000	488
P-98	Low Side	8	PVC	140.0	-24.5	0.16	0.00	0.000	188
P-40	Low Side	6	PVC	140.0	13.6	0.15	0.01	0.000	305
P-144	Low Side	10	PVC	140.0	37.7	0.15	0.01	0.000	612
P-82	Low Side	8	PVC	140.0	24.0	0.15	0.05	0.000	3,156
P-357	High Side	6	PVC	140.0	13.5	0.15	0.01	0.000	307
P-590	Low Side	8	PVC	140.0	23.9	0.15	0.01	0.000	1,050
P-72	Low Side	8	PVC	140.0	23.8	0.15	0.01	0.000	502
P-338	High Side	6	PVC	140.0	13.4	0.15	0.01	0.000	494
P-113	Low Side	6	PVC	140.0	13.3	0.15	0.01	0.000	282
P-118	Low Side	6	PVC	140.0	13.3	0.15	0.01	0.000	252
P-130	Low Side	6	PVC	140.0	13.3	0.15	0.01	0.000	364
P-156	Low Side	6	PVC	140.0	13.3	0.15	0.00	0.000	178
P-297	High Side	6	PVC	140.0	13.3	0.15	0.00	0.000	234
P-485	Low Side	6	PVC	140.0	13.3	0.15	0.00	0.000	229
P-303	High Side	10	PVC	140.0	36.9	0.15	0.00	0.000	121
P-570	High Side	8	PVC	140.0	-23.1	0.15	0.01	0.000	581
P-509	Low Side	8	PVC	140.0	-23.1	0.15	0.01	0.000	493
P-535	High Side	8	PVC	140.0	-22.5	0.14	0.01	0.000	836
P-539	High Side	8	PVC	140.0	-21.9	0.14	0.01	0.000	875
P-107	Low Side	6	PVC	140.0	12.3	0.14	0.01	0.000	353
P-241	High Side	8	PVC	140.0	21.8	0.14	0.01	0.000	871
P-93	Low Side	8	PVC	140.0	21.6	0.14	0.00	0.000	174
P-543	Low Side	8	PVC	140.0	20.6	0.13	0.02	0.000	1,317
P-270	High Side	8	PVC	140.0	20.0	0.13	0.00	0.000	292
P-116	Low Side	6	PVC	140.0	11.0	0.13	0.01	0.000	545
P-251	High Side	8	PVC	140.0	19.5	0.12	0.00	0.000	286
P-537	High Side	8	PVC	140.0	-19.2	0.12	0.01	0.000	538
P-561	High Side	10	PVC	140.0	29.2	0.12	0.00	0.000	218
P-182	High Side	8	PVC	140.0	17.8	0.11	0.00	0.000	249
P-114	Low Side	6	PVC	140.0	10.0	0.11	0.00	0.000	185
P-129	Low Side	6	PVC	140.0	10.0	0.11	0.00	0.000	230
P-153	Low Side	6	PVC	140.0	10.0	0.11	0.00	0.000	150
P-275	High Side	6	PVC	140.0	10.0	0.11	0.00	0.000	203
P-276	High Side	6	PVC	140.0	10.0	0.11	0.00	0.000	202
P-298	High Side	6	PVC	140.0	10.0	0.11	0.00	0.000	223
P-440	High Side	6	PVC	140.0	10.0	0.11	0.00	0.000	199

Existing System - Scenario 2: PHD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-559	High Side	10	PVC	140.0	26.7	0.11	0.00	0.000	121
P-531	High Side	8	PVC	140.0	16.5	0.11	0.00	0.000	113
P-168	Low Side	6	PVC	140.0	8.3	0.09	0.00	0.000	139
P-185	High Side	8	PVC	140.0	13.5	0.09	0.00	0.000	252
P-105	Low Side	8	PVC	140.0	-13.5	0.09	0.00	0.000	404
P-81	Low Side	8	PVC	140.0	-13.2	0.08	0.01	0.000	2,718
P-124	Low Side	10	PVC	140.0	20.0	0.08	0.00	0.000	258
P-347	High Side	6	PVC	140.0	-6.7	0.08	0.00	0.000	455
P-343	High Side	8	PVC	140.0	-11.9	0.08	0.01	0.000	1,436
P-330	High Side	6	PVC	140.0	6.7	0.08	0.00	0.000	271
P-529	High Side	8	PVC	140.0	11.6	0.07	0.00	0.000	331
P-70	Low Side	8	PVC	140.0	-11.6	0.07	0.00	0.000	590
P-498	Low Side	8	PVC	140.0	10.4	0.07	0.00	0.000	511
P-593	Low Side	8	PVC	140.0	10.2	0.07	0.00	0.000	669
P-133	Low Side	8	PVC	140.0	10.0	0.06	0.00	0.000	167
P-134	Low Side	8	PVC	140.0	10.0	0.06	0.00	0.000	190
P-557	High Side	8	PVC	140.0	-9.9	0.06	0.00	0.000	1,485
P-183	High Side	8	PVC	140.0	-9.2	0.06	0.00	0.000	590
P-151	Low Side	8	PVC	140.0	-8.9	0.06	0.00	0.000	415
P-108	Low Side	6	PVC	140.0	-5.0	0.06	0.00	0.000	93
P-471	Low Side	8	PVC	140.0	-8.8	0.06	0.00	0.000	112
P-423	High Side	8	PVC	140.0	8.5	0.05	0.00	0.000	546
P-289	High Side	8	PVC	140.0	8.3	0.05	0.00	0.000	379
P-290	High Side	8	PVC	140.0	8.3	0.05	0.00	0.000	378
P-291	High Side	8	PVC	140.0	8.3	0.05	0.00	0.000	384
P-292	High Side	8	PVC	140.0	8.3	0.05	0.00	0.000	256
P-473	Low Side	8	PVC	140.0	8.3	0.05	0.00	0.000	132
P-410	High Side	8	PVC	140.0	-8.2	0.05	0.00	0.000	1,687
P-189	High Side	8	PVC	140.0	7.4	0.05	0.00	0.000	513
P-345	High Side	6	PVC	140.0	-4.1	0.05	0.00	0.000	1,736
P-353	High Side	6	PVC	140.0	4.0	0.05	0.00	0.000	315
P-562	High Side	8	PVC	140.0	-7.2	0.05	0.00	0.000	1,001
P-137	Low Side	6	PVC	140.0	-4.0	0.05	0.00	0.000	370
P-67	Low Side	8	PVC	140.0	-6.8	0.04	0.00	0.000	589
P-288	High Side	8	PVC	140.0	6.7	0.04	0.00	0.000	366
P-331	High Side	8	PVC	140.0	6.7	0.04	0.00	0.000	574
P-478	Low Side	8	PVC	140.0	6.7	0.04	0.00	0.000	313
P-479	Low Side	8	PVC	140.0	6.7	0.04	0.00	0.000	166
P-511	Low Side	8	PVC	140.0	6.7	0.04	0.00	0.000	299
P-236	High Side	6	PVC	140.0	-3.6	0.04	0.00	0.000	1,012
P-306	High Side	12	Asbestos Cement	130.0	-13.8	0.04	0.00	0.000	335
P-66	High Side	8	PVC	140.0	6.0	0.04	0.00	0.000	1,430
P-163	Low Side	8	PVC	140.0	5.0	0.03	0.00	0.000	321
P-35	Low Side	12	PVC	140.0	10.2	0.03	0.00	0.000	517
P-233	High Side	8	PVC	140.0	3.9	0.03	0.00	0.000	325
P-396	High Side	8	PVC	140.0	3.5	0.02	0.00	0.000	238
P-190	High Side	8	PVC	140.0	-2.8	0.02	0.00	0.000	657

Existing System - Scenario 2: PHD

Label	Zone	Diameter (in)	Material	Hazen-Williams C	Flow (gal/min)	Velocity (ft/s)	Headloss (ft)	Headloss Gradient (ft/ft)	Length (User Defined) (ft)
P-94	Low Side	8	PVC	140.0	-2.8	0.02	0.00	0.000	656
P-162	Low Side	6	PVC	140.0	1.1	0.01	0.00	0.000	576
P-237	High Side	8	PVC	140.0	1.8	0.01	0.00	0.000	1,699
P-253	High Side	8	PVC	140.0	1.6	0.01	0.00	0.000	957
P-362	High Side	6	PVC	140.0	0.9	0.01	0.00	0.000	821
P-572	High Side	6	PVC	140.0	-0.8	0.01	0.00	0.000	1,261
P-15	Low Side	10	PVC	140.0	2.2	0.01	0.00	0.000	259
P-16	Low Side	10	PVC	140.0	2.2	0.01	0.00	0.000	131
P-536	High Side	8	PVC	140.0	-0.6	0.00	0.00	0.000	302
P-121	Low Side	6	PVC	140.0	0.2	0.00	0.00	0.000	701
P-29	Low Side	6	Steel	100.0	0.0	0.00	0.00	0.000	991
P-522	Low Side	8	PVC	140.0	0.0	0.00	0.00	0.000	282
P-71	Low Side	10	PVC	140.0	0.0	0.00	0.00	0.000	111
P-70	Low Side	10	PVC	140.0	0.0	0.00	0.00	0.000	111
P-81	High Side	12	PVC	140.0	0.0	0.00	0.00	0.000	2,968
P-591	Low Side	8	PVC	140.0	0.0	0.00	0.00	0.000	105
P-586	High Side	8	PVC	140.0	0.0	0.00	0.00	0.000	249
P-589	Low Side	8	PVC	140.0	0.0	0.00	0.00	0.000	394
P-514	Low Side	8	PVC	140.0	0.0	0.00	0.00	0.000	283
P-546	Low Side	8	PVC	140.0	0.0	0.00	0.00	0.000	296
P-585	High Side	8	PVC	140.0	0.0	0.00	0.00	0.000	738
P-512	Low Side	8	PVC	140.0	0.0	0.00	0.00	0.000	979
P-150	Low Side	6	PVC	140.0	0.0	0.00	0.00	0.000	303
P-52	Low Side	6	PVC	140.0	0.0	0.00	0.00	0.000	686
P-581	High Side	8	PVC	140.0	0.0	0.00	0.00	0.000	1,198
P-567	Low Side	6	PVC	140.0	0.0	0.00	0.00	0.000	531
P-592	Low Side	8	PVC	140.0	0.0	0.00	0.00	0.000	370
P-57	Low Side	10	PVC	140.0	0.0	0.00	0.00	0.000	563
P-191	High Side	8	PVC	140.0	0.0	0.00	0.00	0.000	570
P-195	High Side	8	PVC	140.0	0.0	0.00	0.00	0.000	546
P-230	High Side	10	PVC	140.0	0.0	0.00	0.00	0.000	1,187
P-446	High Side	16	PVC	140.0	0.0	0.00	0.00	0.000	256
P-552	High Side	8	PVC	140.0	0.0	0.00	0.00	0.000	1,214
P-554	High Side	10	PVC	140.0	0.0	0.00	0.00	0.000	255

Existing System - Scenario 3: MDD + Fire Flow

Label	Zone	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gal/min)	Fire Flow (Available) (gal/min)	Flow (Total Needed) (gal/min)	Flow (Total Available) (gal/min)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)
J-249	High Side	False	1,500.0	1,247.9	1,511.1	1,259.0	20.0	54.8	J-248	54.8
J-1	Low Side	True	1,500.0	3,462.0	1,533.4	3,495.4	20.0	27.8	J-63	27.8
J-2	Low Side	True	1,500.0	3,908.7	1,528.1	3,936.8	22.5	20.0	J-1	20.0
J-3	Low Side	True	1,500.0	4,000.0	1,526.7	4,026.7	27.2	30.5	J-1	30.5
J-4	Low Side	True	1,500.0	4,000.0	1,515.9	4,015.9	29.1	34.6	J-5	34.6
J-5	Low Side	True	1,500.0	4,000.0	1,527.3	4,027.3	32.9	35.8	J-4	35.8
J-6	Low Side	True	1,500.0	4,000.0	1,502.3	4,002.3	42.9	45.8	J-5	41.2
J-7	High Side	True	1,500.0	3,741.2	1,500.0	3,741.2	25.7	20.0	J-249	20.0
J-8	High Side	True	1,500.0	3,741.1	1,501.1	3,742.2	31.3	20.0	J-249	20.0
J-9	High Side	True	1,500.0	3,741.1	1,513.6	3,754.7	33.5	20.0	J-249	20.0
J-10	Low Side	True	1,500.0	3,935.5	1,515.9	3,951.4	20.9	20.0	J-38	20.0
J-11	Low Side	True	1,500.0	4,000.0	1,511.4	4,011.4	27.6	26.3	J-38	26.3
J-12	Low Side	True	1,500.0	4,000.0	1,509.1	4,009.1	52.6	39.3	J-1	39.3
J-13	Low Side	True	1,500.0	4,000.0	1,500.0	4,000.0	54.5	39.5	J-1	39.5
J-14	Low Side	True	1,500.0	4,000.0	1,508.5	4,008.5	43.5	39.8	J-1	39.8
J-15	Low Side	True	1,500.0	4,000.0	1,500.0	4,000.0	44.0	40.0	J-1	40.0
J-16	Low Side	True	1,500.0	4,000.0	1,500.0	4,000.0	41.8	39.3	J-1	39.3
J-17	Low Side	True	1,500.0	4,000.0	1,515.9	4,015.9	40.7	39.0	J-1	39.0
J-18	Low Side	True	1,500.0	4,000.0	1,522.7	4,022.7	39.1	36.0	J-1	36.0
J-19	Low Side	True	1,500.0	4,000.0	1,518.2	4,018.2	49.8	34.8	J-1	34.8
J-20	Low Side	True	1,500.0	4,000.0	1,500.0	4,000.0	37.7	31.6	J-1	31.6
J-21	Low Side	True	1,500.0	4,000.0	1,502.3	4,002.3	38.3	31.2	J-1	31.2
J-22	Low Side	True	2,100.0	4,000.0	2,132.3	4,032.3	24.4	21.8	J-1	21.8
J-23	Low Side	True	1,500.0	4,000.0	1,518.2	4,018.2	50.7	39.1	J-1	39.1
J-24	Low Side	True	1,500.0	4,000.0	1,508.0	4,008.0	32.0	36.4	J-44	36.4
J-25	Low Side	True	1,500.0	4,000.0	1,513.4	4,013.4	34.4	35.7	J-43	35.7
J-26	Low Side	True	1,500.0	4,000.0	1,536.3	4,036.3	47.3	35.4	J-1	35.4
J-27	Low Side	True	1,500.0	4,000.0	1,502.3	4,002.3	41.5	33.4	J-1	33.4
J-28	Low Side	True	0.0	1,220.1	0.0	1,220.1	20.0	72.8	J-1	55.2
J-29	Low Side	True	0.0	105.6	2.3	107.8	20.0	87.2	J-6	60.8
J-30	Low Side	True	0.0	104.9	4.5	109.4	20.0	87.2	J-6	60.8
J-32	Low Side	True	1,500.0	4,000.0	1,508.9	4,008.9	39.6	35.4	J-1	35.4
J-33	Low Side	True	1,500.0	4,000.0	1,506.8	4,006.8	33.1	35.4	J-1	35.4
J-34	High Side	True	0.0	104.4	4.5	108.9	20.0	61.3	J-422	61.3
J-35	High Side	True	1,500.0	3,622.7	1,500.0	3,622.7	20.0	22.5	J-249	22.5
J-36	High Side	True	1,500.0	2,656.5	1,522.7	2,679.2	20.0	40.6	J-249	40.6
J-37	Low Side	True	1,500.0	2,510.4	1,509.1	2,519.5	20.0	58.9	J-1	51.0

Existing System - Scenario 3: MDD + Fire Flow

Label	Zone	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gal/min)	Fire Flow (Available) (gal/min)	Flow (Total Needed) (gal/min)	Flow (Total Available) (gal/min)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)
J-38	Low Side	True	1,500.0	2,484.4	1,518.2	2,502.6	20.0	59.0	J-1	51.0
J-39	Low Side	True	1,500.0	3,638.0	1,535.6	3,673.5	20.0	26.9	J-1	26.9
J-40	Low Side	True	1,500.0	3,806.2	1,514.4	3,820.7	20.0	20.8	J-41	20.8
J-41	Low Side	True	1,500.0	3,545.9	1,512.5	3,558.4	20.0	25.3	J-63	24.6
J-42	Low Side	True	1,500.0	1,935.6	1,500.0	1,935.6	20.0	63.2	J-1	51.9
J-43	Low Side	True	1,500.0	2,258.3	1,520.2	2,278.5	20.0	59.6	J-1	51.5
J-44	Low Side	True	1,500.0	3,161.6	1,512.8	3,174.5	20.0	52.5	J-1	47.2
J-46	High Side	True	1,500.0	3,741.1	1,513.5	3,754.6	36.0	20.0	J-249	20.0
J-47	Low Side	True	1,500.0	3,293.5	1,500.0	3,293.5	21.3	20.0	J-60	20.0
J-48	Low Side	True	1,500.0	3,804.7	1,515.9	3,820.6	20.2	20.0	J-1	20.0
J-49	Low Side	True	1,500.0	3,781.2	1,525.9	3,807.2	26.7	20.0	J-1	20.0
J-50	Low Side	True	1,500.0	3,776.4	1,519.2	3,795.6	23.5	20.0	J-1	20.0
J-51	Low Side	True	1,500.0	3,776.8	1,503.3	3,780.1	24.8	20.0	J-1	20.0
J-52	Low Side	True	1,500.0	3,769.4	1,517.8	3,787.2	23.3	20.0	J-1	20.0
J-53	Low Side	True	1,500.0	3,758.8	1,510.0	3,768.8	23.0	20.0	J-1	20.0
J-54	Low Side	True	1,500.0	3,754.9	1,505.6	3,760.4	23.4	20.0	J-1	20.0
J-55	Low Side	True	1,500.0	3,613.3	1,528.9	3,642.2	20.0	23.2	J-1	23.2
J-56	Low Side	True	1,500.0	3,699.7	1,526.7	3,726.4	20.0	21.2	J-1	21.2
J-57	Low Side	True	1,500.0	3,477.5	1,512.2	3,489.7	20.0	20.0	J-64	20.0
J-58	Low Side	True	1,500.0	3,257.5	1,513.3	3,270.8	22.6	20.0	J-64	20.0
J-59	Low Side	True	1,500.0	3,168.3	1,510.0	3,178.3	22.2	20.0	J-65	20.0
J-60	Low Side	True	1,500.0	1,989.7	1,536.4	2,026.1	20.0	58.5	J-1	51.8
J-61	Low Side	True	1,500.0	3,370.5	1,534.5	3,405.0	20.0	22.0	J-62	22.0
J-62	Low Side	True	1,500.0	3,305.3	1,532.2	3,337.5	20.0	27.2	J-61	27.2
J-63	Low Side	True	1,500.0	3,462.2	1,532.4	3,494.6	20.0	26.1	J-1	26.1
J-64	Low Side	True	1,500.0	1,658.3	1,518.9	1,677.2	20.1	63.8	J-1	53.0
J-65	Low Side	True	1,500.0	1,628.8	1,512.2	1,641.0	20.0	64.3	J-1	53.1
J-66	Low Side	True	1,500.0	3,776.9	1,500.0	3,776.9	24.2	20.0	J-1	20.0
J-67	Low Side	True	1,700.0	3,776.7	1,705.2	3,781.9	22.6	20.0	J-1	20.0
J-68	Low Side	True	1,500.0	3,609.9	1,504.4	3,614.4	20.0	21.4	J-326	21.4
J-70	Low Side	True	1,500.0	3,722.6	1,500.0	3,722.6	22.8	20.0	J-72	20.0
J-71	Low Side	True	1,500.0	3,702.0	1,508.9	3,710.9	22.9	20.0	J-72	20.0
J-72	Low Side	True	1,500.0	3,578.0	1,511.1	3,589.1	20.0	23.5	J-73	23.5
J-73	Low Side	True	1,500.0	3,562.3	1,508.9	3,571.2	20.0	22.9	J-72	22.9
J-74	Low Side	True	1,500.0	3,526.6	1,508.9	3,535.5	20.0	22.8	J-102	22.8
J-75	Low Side	True	1,500.0	3,568.5	1,503.3	3,571.8	20.0	22.9	J-74	22.9
J-76	Low Side	True	1,500.0	3,513.0	1,512.2	3,525.2	20.0	20.0	J-90	20.0

Existing System - Scenario 3: MDD + Fire Flow

Label	Zone	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gal/min)	Fire Flow (Available) (gal/min)	Flow (Total Needed) (gal/min)	Flow (Total Available) (gal/min)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)
J-77	Low Side	True	1,500.0	3,640.8	1,504.4	3,645.3	20.6	20.0	J-102	20.0
J-78	Low Side	True	1,500.0	3,605.5	1,505.6	3,611.0	21.3	20.0	J-102	20.0
J-79	Low Side	True	1,500.0	3,592.2	1,506.7	3,598.9	20.0	22.1	J-105	22.1
J-80	Low Side	True	1,500.0	3,671.5	1,500.0	3,671.5	20.2	20.0	J-112	20.0
J-81	Low Side	True	1,500.0	3,693.4	1,510.0	3,703.4	20.4	20.0	J-112	20.0
J-82	Low Side	True	1,500.0	3,713.0	1,503.3	3,716.3	20.7	20.0	J-112	20.0
J-83	Low Side	True	1,500.0	3,441.4	1,508.9	3,450.3	20.5	20.0	J-106	20.0
J-84	Low Side	True	1,500.0	3,487.2	1,505.6	3,492.7	20.0	24.2	J-85	24.2
J-85	Low Side	True	1,500.0	3,421.3	1,505.6	3,426.9	20.0	25.4	J-402	25.4
J-86	Low Side	True	1,500.0	3,304.5	1,500.0	3,304.5	20.0	22.3	J-87	22.3
J-87	Low Side	True	1,500.0	3,180.2	1,500.0	3,180.2	20.0	21.3	J-91	21.3
J-88	Low Side	True	1,500.0	3,256.9	1,507.8	3,264.7	20.0	34.5	J-1	34.5
J-89	Low Side	True	1,500.0	3,764.0	1,505.6	3,769.5	22.8	20.0	J-1	20.0
J-90	Low Side	True	1,500.0	2,451.8	1,508.9	2,460.7	20.0	50.6	J-1	50.6
J-91	Low Side	True	1,500.0	2,530.1	1,506.7	2,536.8	20.0	47.7	J-87	47.7
J-92	Low Side	True	1,500.0	2,896.1	1,510.0	2,906.1	20.4	20.0	J-93	20.0
J-93	Low Side	True	1,500.0	2,191.9	1,508.9	2,200.8	20.0	50.8	J-92	50.8
J-94	Low Side	True	1,500.0	3,033.8	1,512.2	3,046.0	21.3	20.0	J-102	20.0
J-95	Low Side	True	1,500.0	2,448.1	1,506.7	2,454.8	20.0	23.9	J-101	23.9
J-96	Low Side	True	1,500.0	2,423.0	1,507.8	2,430.8	20.0	20.9	J-100	20.9
J-97	Low Side	True	1,500.0	2,836.8	1,511.1	2,847.9	20.0	20.0	J-98	20.0
J-98	Low Side	True	1,500.0	2,762.9	1,513.3	2,776.2	20.0	24.0	J-97	24.0
J-99	Low Side	True	1,500.0	2,984.5	1,507.8	2,992.2	20.0	20.0	J-128	20.0
J-100	Low Side	True	1,500.0	2,018.4	1,512.2	2,030.6	20.0	43.5	J-96	43.5
J-101	Low Side	True	1,500.0	2,071.3	1,506.7	2,078.0	20.0	41.0	J-95	41.0
J-102	Low Side	True	1,500.0	2,063.9	1,508.9	2,072.8	20.0	56.4	J-1	51.6
J-103	Low Side	True	1,500.0	3,438.9	1,505.6	3,444.4	20.0	20.0	J-105	20.0
J-104	Low Side	True	1,500.0	3,520.5	1,503.3	3,523.9	20.0	20.6	J-345	20.6
J-105	Low Side	True	1,500.0	3,254.8	1,506.7	3,261.5	20.0	29.5	J-103	29.5
J-106	Low Side	True	1,500.0	3,225.8	1,506.7	3,232.5	20.0	31.9	J-83	31.9
J-107	Low Side	True	1,500.0	3,432.1	1,507.8	3,439.8	20.0	22.7	J-125	22.7
J-108	Low Side	True	1,500.0	3,339.0	1,504.4	3,343.5	20.5	20.0	J-125	20.0
J-109	Low Side	True	1,500.0	3,483.8	1,507.8	3,491.6	20.0	28.1	J-1	28.1
J-110	Low Side	True	1,500.0	3,358.5	1,507.8	3,366.2	20.0	20.4	J-130	20.4
J-111	Low Side	True	1,500.0	3,658.5	1,502.2	3,660.7	20.0	22.7	J-112	22.7
J-112	Low Side	True	1,500.0	3,543.3	1,503.3	3,546.6	20.0	25.3	J-105	25.3
J-113	Low Side	True	1,500.0	3,771.3	1,508.9	3,780.2	27.2	20.0	J-1	20.0

Existing System - Scenario 3: MDD + Fire Flow

Label	Zone	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gal/min)	Fire Flow (Available) (gal/min)	Flow (Total Needed) (gal/min)	Flow (Total Available) (gal/min)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)
J-114	Low Side	True	1,500.0	3,771.1	1,506.7	3,777.8	26.2	20.0	J-1	20.0
J-115	Low Side	True	1,500.0	3,771.8	1,505.6	3,777.4	25.9	20.0	J-1	20.0
J-116	Low Side	True	1,500.0	3,772.1	1,505.6	3,777.7	25.3	20.0	J-1	20.0
J-117	Low Side	True	1,500.0	3,773.1	1,507.8	3,780.9	24.2	20.0	J-1	20.0
J-402	Low Side	True	1,500.0	2,729.3	1,508.9	2,738.2	20.0	22.6	J-403	22.6
J-118	Low Side	True	1,500.0	3,774.0	1,513.3	3,787.3	26.7	20.0	J-1	20.0
J-119	Low Side	True	1,500.0	2,597.9	1,500.0	2,597.9	20.0	48.5	J-1	48.5
J-120	Low Side	True	1,500.0	3,775.1	1,500.0	3,775.1	24.3	20.0	J-1	20.0
J-121	Low Side	True	1,500.0	3,572.1	1,506.7	3,578.7	20.0	20.0	J-123	20.0
J-122	Low Side	True	1,500.0	3,470.5	1,504.4	3,474.9	20.0	26.5	J-354	26.5
J-123	Low Side	True	1,500.0	2,922.7	1,506.7	2,929.4	20.0	42.7	J-1	42.7
J-124	Low Side	True	1,500.0	3,266.2	1,510.0	3,276.2	20.9	20.0	J-134	20.0
J-125	Low Side	True	1,500.0	2,684.6	1,508.9	2,693.5	20.0	47.0	J-1	47.0
J-126	Low Side	True	1,500.0	3,771.3	1,500.0	3,771.3	25.5	20.0	J-1	20.0
J-127	Low Side	True	1,500.0	2,641.5	1,513.3	2,654.8	20.0	47.7	J-1	47.7
J-128	Low Side	True	1,500.0	2,376.7	1,510.0	2,386.7	20.0	48.3	J-99	48.3
J-129	Low Side	True	1,500.0	2,763.0	1,511.1	2,774.1	20.0	45.8	J-1	45.8
J-130	Low Side	True	1,500.0	3,031.2	1,503.3	3,034.6	20.0	36.8	J-110	36.8
J-133	Low Side	True	1,500.0	3,773.5	1,517.8	3,791.3	34.0	20.0	J-1	20.0
J-134	Low Side	True	1,500.0	2,761.3	1,505.6	2,766.8	20.0	45.8	J-1	45.8
J-136	High Side	True	1,500.0	3,741.1	1,520.3	3,761.4	25.2	20.0	J-249	20.0
J-137	High Side	True	1,500.0	3,627.1	1,520.0	3,647.1	20.0	22.3	J-138	22.3
J-138	High Side	True	2,600.0	3,180.4	2,663.1	3,243.4	20.0	23.2	J-139	23.2
J-139	High Side	True	1,500.0	3,176.6	1,520.0	3,196.6	20.0	21.7	J-156	21.7
J-140	High Side	True	1,500.0	3,388.2	1,514.4	3,402.7	20.2	20.0	J-139	20.0
J-141	High Side	True	1,500.0	3,311.2	1,517.9	3,329.1	20.0	23.7	J-139	23.7
J-142	High Side	True	1,500.0	3,181.0	1,609.0	3,289.9	20.0	22.8	J-143	22.8
J-143	High Side	True	1,500.0	3,174.6	1,511.1	3,185.7	20.0	22.6	J-142	22.6
J-144	High Side	True	1,500.0	3,128.1	1,507.8	3,135.9	20.0	22.7	J-155	22.7
J-145	High Side	True	1,500.0	3,151.0	1,510.0	3,161.0	20.0	20.0	J-151	20.0
J-147	High Side	True	1,500.0	2,747.8	1,509.0	2,756.8	20.0	20.0	J-150	20.0
J-148	High Side	True	1,500.0	2,750.7	1,518.0	2,768.7	20.0	22.4	J-150	22.4
J-149	High Side	True	1,500.0	2,895.4	1,519.2	2,914.6	20.0	20.4	J-397	20.4
J-150	High Side	True	1,500.0	2,534.6	1,509.0	2,543.6	20.0	29.8	J-147	29.8
J-151	High Side	True	1,500.0	3,135.9	1,520.6	3,156.4	20.0	20.6	J-145	20.6
J-153	High Side	True	1,500.0	2,886.0	1,523.3	2,909.3	20.0	23.4	J-154	23.4
J-154	High Side	True	1,500.0	2,611.4	1,511.1	2,622.5	20.0	31.3	J-155	31.3

Existing System - Scenario 3: MDD + Fire Flow

Label	Zone	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gal/min)	Fire Flow (Available) (gal/min)	Flow (Total Needed) (gal/min)	Flow (Total Available) (gal/min)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)
J-155	High Side	True	1,500.0	2,611.9	1,518.9	2,630.8	20.0	39.1	J-153	39.1
J-156	High Side	True	1,500.0	2,844.5	1,524.7	2,869.2	20.0	31.7	J-139	31.7
J-157	High Side	True	1,500.0	3,735.8	1,511.1	3,747.0	23.4	20.0	J-249	20.0
J-158	High Side	True	1,500.0	3,743.2	1,524.4	3,767.6	20.3	20.0	J-249	20.0
J-159	High Side	True	1,500.0	3,583.4	1,526.7	3,610.1	20.0	23.5	J-249	23.5
J-160	High Side	True	1,500.0	3,753.0	1,507.8	3,760.7	21.4	20.0	J-159	20.0
J-161	High Side	True	1,500.0	3,663.6	1,510.0	3,673.6	20.0	22.2	J-249	22.2
J-162	High Side	True	1,500.0	3,775.5	1,530.6	3,806.2	23.4	20.0	J-249	20.0
J-163	High Side	True	2,000.0	3,102.1	2,027.4	3,129.5	20.0	33.3	J-249	33.3
J-164	High Side	True	1,500.0	3,773.7	1,510.0	3,783.7	23.0	20.0	J-249	20.0
J-165	High Side	True	1,500.0	3,196.9	1,506.4	3,203.3	20.0	20.4	J-166	20.4
J-166	High Side	True	1,500.0	2,495.4	1,507.7	2,503.1	20.0	20.4	J-168	20.4
J-167	High Side	True	1,500.0	1,686.0	1,511.6	1,697.5	20.0	55.2	J-249	55.2
J-168	High Side	True	1,500.0	1,612.5	1,514.1	1,626.6	20.0	56.1	J-249	56.1
J-169	High Side	True	1,500.0	3,774.7	1,506.7	3,781.4	21.8	20.0	J-249	20.0
J-170	High Side	True	1,500.0	2,182.6	1,511.1	2,193.7	20.0	48.4	J-249	48.4
J-171	High Side	True	1,500.0	3,300.4	1,508.9	3,309.3	20.0	25.9	J-138	25.9
J-172	High Side	True	1,500.0	3,454.1	1,520.0	3,474.1	20.0	26.0	J-249	26.0
J-173	High Side	True	1,500.0	3,730.4	1,525.6	3,756.0	22.5	20.0	J-249	20.0
J-174	High Side	True	1,500.0	3,707.5	1,522.2	3,729.7	20.0	20.5	J-249	20.5
J-175	High Side	True	1,500.0	3,646.2	1,517.8	3,664.0	20.0	22.0	J-249	22.0
J-176	High Side	True	1,500.0	3,753.2	1,508.9	3,762.1	22.4	20.0	J-249	20.0
J-177	High Side	True	1,500.0	3,498.6	1,532.1	3,530.8	20.0	25.6	J-249	25.6
J-178	High Side	True	1,500.0	3,810.2	1,532.1	3,842.3	22.6	20.0	J-249	20.0
J-179	High Side	True	1,500.0	3,855.8	1,538.5	3,894.4	30.6	20.0	J-249	20.0
J-180	High Side	True	1,500.0	3,867.2	1,501.4	3,868.6	36.2	20.0	J-249	20.0
J-181	High Side	True	1,500.0	3,867.6	1,510.1	3,877.7	36.0	20.0	J-249	20.0
J-182	High Side	True	3,500.0	3,870.7	3,546.3	3,917.0	35.3	20.0	J-249	20.0
J-183	High Side	True	1,500.0	3,824.8	1,545.0	3,869.7	21.9	20.0	J-249	20.0
J-184	High Side	True	1,500.0	3,754.5	1,562.0	3,816.5	20.0	21.5	J-249	21.5
J-185	High Side	True	1,500.0	3,729.7	1,525.7	3,755.4	20.0	22.0	J-249	22.0
J-186	High Side	True	1,500.0	3,432.0	1,528.8	3,460.8	20.0	27.2	J-249	27.2
J-187	High Side	True	1,500.0	3,842.3	1,533.4	3,875.7	25.0	20.0	J-249	20.0
J-188	High Side	True	1,500.0	3,854.8	1,514.1	3,868.9	31.1	20.0	J-249	20.0
J-189	High Side	True	1,500.0	3,696.0	1,514.4	3,710.4	20.0	20.7	J-249	20.7
J-190	High Side	True	1,500.0	3,573.4	1,508.9	3,582.3	20.0	22.7	J-233	22.7
J-191	High Side	True	1,500.0	3,369.0	1,511.1	3,380.1	20.0	20.0	J-233	20.0

Existing System - Scenario 3: MDD + Fire Flow

Label	Zone	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gal/min)	Fire Flow (Available) (gal/min)	Flow (Total Needed) (gal/min)	Flow (Total Available) (gal/min)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)
J-192	High Side	True	1,500.0	3,506.9	1,513.3	3,520.2	20.0	21.6	J-233	21.6
J-193	High Side	True	1,500.0	3,692.6	1,504.4	3,697.0	20.8	20.0	J-249	20.0
J-194	High Side	True	1,500.0	3,590.7	1,517.8	3,608.5	23.2	20.0	J-267	20.0
J-195	High Side	True	1,500.0	3,489.3	1,508.9	3,498.2	20.8	20.0	J-267	20.0
J-196	High Side	True	1,500.0	3,645.6	1,518.9	3,664.5	20.1	20.0	J-267	20.0
J-197	High Side	True	1,500.0	3,737.3	1,510.0	3,747.3	20.4	20.0	J-267	20.0
J-198	High Side	True	1,500.0	3,775.8	1,513.3	3,789.1	22.1	20.0	J-267	20.0
J-199	High Side	True	1,500.0	3,766.4	1,524.4	3,790.8	27.1	20.0	J-267	20.0
J-200	High Side	True	1,500.0	3,510.0	1,514.4	3,524.5	23.5	20.0	J-333	20.0
J-201	High Side	True	1,500.0	3,849.1	1,514.4	3,863.6	25.2	20.0	J-249	20.0
J-202	High Side	True	1,500.0	3,862.8	1,513.3	3,876.2	30.6	20.0	J-249	20.0
J-203	High Side	True	1,500.0	3,867.2	1,518.9	3,886.1	38.0	20.0	J-249	20.0
J-204	High Side	True	1,500.0	3,863.8	1,500.0	3,863.8	35.2	20.0	J-249	20.0
J-205	High Side	True	1,500.0	3,734.3	1,508.9	3,743.2	20.0	20.4	J-249	20.4
J-206	High Side	True	1,500.0	3,557.6	1,513.3	3,570.9	20.0	23.6	J-249	23.6
J-207	High Side	True	1,500.0	3,659.4	1,513.3	3,672.7	20.0	21.5	J-249	21.5
J-208	High Side	True	1,500.0	3,369.0	1,511.1	3,380.1	20.4	20.0	J-216	20.0
J-209	High Side	True	1,500.0	3,691.0	1,511.1	3,702.1	20.0	20.0	J-236	20.0
J-211	High Side	True	1,500.0	3,555.6	1,503.3	3,558.9	20.0	20.0	J-235	20.0
J-212	High Side	True	1,500.0	3,575.1	1,511.1	3,586.2	20.4	20.0	J-234	20.0
J-213	High Side	True	1,500.0	3,623.1	1,517.8	3,640.9	20.0	22.3	J-249	22.3
J-214	High Side	True	1,500.0	3,409.1	1,510.0	3,419.1	20.4	20.0	J-215	20.0
J-215	High Side	True	1,500.0	2,350.2	1,506.7	2,356.9	20.0	45.7	J-249	45.7
J-216	High Side	True	1,500.0	2,340.2	1,506.7	2,346.9	20.0	45.8	J-249	45.8
J-217	High Side	True	1,500.0	3,865.9	1,500.7	3,866.6	34.2	20.0	J-249	20.0
J-218	High Side	True	1,500.0	3,870.4	1,508.9	3,879.3	28.0	20.0	J-249	20.0
J-219	High Side	True	1,500.0	3,860.9	1,510.0	3,870.9	21.3	20.0	J-229	20.0
J-220	High Side	True	1,500.0	3,804.2	1,510.0	3,814.2	21.7	20.0	J-228	20.0
J-221	High Side	True	1,500.0	3,839.0	1,510.0	3,849.0	21.7	20.0	J-227	20.0
J-222	High Side	True	1,500.0	3,889.9	1,508.9	3,898.8	23.8	20.0	J-249	20.0
J-223	High Side	True	1,500.0	3,911.8	1,500.0	3,911.8	37.9	20.0	J-249	20.0
J-224	High Side	True	1,500.0	2,227.1	1,504.0	2,231.1	20.0	46.7	J-33	46.7
J-226	High Side	True	1,500.0	3,236.8	1,504.4	3,241.3	20.0	32.6	J-249	32.6
J-227	High Side	True	1,500.0	3,144.4	1,505.6	3,149.9	20.0	34.1	J-249	34.1
J-228	High Side	True	1,500.0	3,115.9	1,505.6	3,121.5	20.0	34.6	J-249	34.6
J-229	High Side	True	1,500.0	3,131.7	1,505.6	3,137.3	20.0	34.3	J-249	34.3
J-230	High Side	True	1,500.0	3,460.4	1,505.6	3,465.9	20.0	28.2	J-249	28.2

Existing System - Scenario 3: MDD + Fire Flow

Label	Zone	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gal/min)	Fire Flow (Available) (gal/min)	Flow (Total Needed) (gal/min)	Flow (Total Available) (gal/min)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)
J-232	High Side	True	1,500.0	3,618.1	1,510.0	3,628.1	22.5	20.0	J-249	20.0
J-233	High Side	True	0.0	1,155.1	5.6	1,160.7	20.0	60.8	J-249	60.8
J-234	High Side	True	1,500.0	2,313.6	1,508.9	2,322.5	20.0	46.3	J-249	46.3
J-235	High Side	True	1,500.0	2,346.0	1,506.7	2,352.7	20.0	45.8	J-249	45.8
J-236	High Side	True	1,500.0	2,463.7	1,506.7	2,470.4	20.0	44.0	J-249	44.0
J-237	High Side	True	3,500.0	3,563.5	3,566.9	3,630.4	20.0	20.0	J-249	20.0
J-238	High Side	True	2,700.0	3,540.5	2,744.4	3,584.9	20.7	20.0	J-249	20.0
J-239	High Side	True	1,500.0	3,516.9	1,515.6	3,532.4	21.9	20.0	J-249	20.0
J-240	High Side	True	1,500.0	3,558.8	1,531.1	3,589.9	20.1	20.0	J-249	20.0
J-241	High Side	True	1,500.0	3,670.5	1,507.8	3,678.2	25.2	20.0	J-249	20.0
J-242	High Side	True	1,500.0	3,678.6	1,517.8	3,696.4	26.9	20.0	J-249	20.0
J-243	High Side	True	1,500.0	3,706.6	1,504.4	3,711.1	26.7	20.0	J-249	20.0
J-244	High Side	True	1,500.0	3,812.8	1,521.1	3,833.9	34.2	20.0	J-249	20.0
J-245	High Side	True	1,500.0	3,847.6	1,515.6	3,863.1	33.9	20.0	J-249	20.0
J-246	High Side	True	0.0	4,000.0	0.0	4,000.0	38.3	23.9	J-249	23.9
J-247	High Side	True	1,500.0	2,732.5	1,513.3	2,745.8	20.0	23.8	J-249	23.8
J-404	High Side	True	2,100.0	3,904.7	2,105.6	3,910.3	35.9	20.0	J-249	20.0
J-248	High Side	True	1,500.0	2,519.8	1,514.4	2,534.3	21.7	20.0	J-249	20.0
J-250	High Side	True	1,500.0	2,625.2	1,516.7	2,641.9	20.0	20.0	J-309	20.0
J-251	High Side	True	1,500.0	3,169.3	1,512.2	3,181.6	20.7	20.0	J-249	20.0
J-252	High Side	True	1,500.0	2,924.5	1,518.9	2,943.4	20.9	20.0	J-249	20.0
J-253	High Side	True	1,500.0	2,697.9	1,511.1	2,709.0	22.6	20.0	J-260	20.0
J-254	High Side	True	1,500.0	2,318.6	1,506.7	2,325.3	20.0	23.4	J-258	23.4
J-255	High Side	True	1,500.0	2,334.2	1,506.7	2,340.9	20.0	20.0	J-257	20.0
J-256	High Side	True	1,500.0	2,639.9	1,515.6	2,655.4	20.0	23.9	J-257	23.9
J-257	High Side	True	0.0	813.6	10.0	823.6	20.0	61.3	J-422	61.3
J-258	High Side	True	0.0	934.8	14.4	949.2	20.0	59.8	J-249	59.8
J-259	High Side	True	1,500.0	2,085.6	1,508.9	2,094.5	20.4	20.0	J-260	20.0
J-260	High Side	True	1,500.0	1,590.8	1,504.4	1,595.2	20.0	38.0	J-261	38.0
J-261	High Side	True	1,500.0	1,779.7	1,504.4	1,784.2	20.0	31.6	J-260	31.6
J-262	High Side	True	1,500.0	3,002.4	1,507.8	3,010.1	20.0	29.0	J-265	29.0
J-263	High Side	True	1,500.0	2,912.8	1,518.9	2,931.7	20.0	30.7	J-265	30.7
J-264	High Side	True	0.0	1,220.8	10.0	1,230.8	20.0	59.4	J-249	59.4
J-265	High Side	True	1,500.0	2,854.7	1,508.9	2,863.5	20.0	31.5	J-263	31.5
J-266	High Side	True	1,500.0	3,256.9	1,516.7	3,273.5	20.4	20.0	J-267	20.0
J-267	High Side	True	1,500.0	2,625.0	1,524.4	2,649.5	20.0	38.7	J-270	38.7
J-268	High Side	True	1,500.0	3,107.9	1,517.8	3,125.7	20.0	21.0	J-267	21.0

Existing System - Scenario 3: MDD + Fire Flow

Label	Zone	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gal/min)	Fire Flow (Available) (gal/min)	Flow (Total Needed) (gal/min)	Flow (Total Available) (gal/min)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)
J-269	High Side	True	1,500.0	2,867.7	1,534.4	2,902.2	20.0	28.0	J-271	28.0
J-270	High Side	True	1,500.0	2,771.9	1,526.7	2,798.6	20.0	32.7	J-271	32.7
J-271	High Side	True	1,500.0	2,875.4	1,513.3	2,888.7	20.0	27.1	J-270	27.1
J-272	High Side	True	1,500.0	3,758.2	1,523.3	3,781.5	28.1	20.0	J-267	20.0
J-273	High Side	True	1,500.0	3,759.9	1,545.6	3,805.5	26.7	20.0	J-267	20.0
J-274	High Side	True	1,500.0	3,173.7	1,524.4	3,198.2	20.0	29.6	J-275	29.6
J-275	High Side	True	1,500.0	2,950.7	1,516.7	2,967.4	20.0	31.6	J-282	31.6
J-276	High Side	True	1,500.0	3,005.2	1,508.9	3,014.1	22.6	20.0	J-277	20.0
J-277	High Side	True	0.0	877.7	14.4	892.1	20.0	61.3	J-422	61.3
J-278	High Side	True	1,500.0	2,186.9	1,514.4	2,201.4	21.8	20.0	J-279	20.0
J-279	High Side	True	0.0	879.8	15.6	895.4	20.0	61.3	J-422	61.3
J-280	High Side	True	1,500.0	2,023.5	1,512.2	2,035.8	20.0	20.0	J-282	20.0
J-281	High Side	True	1,500.0	3,272.4	1,520.0	3,292.4	23.4	20.0	J-277	20.0
J-282	High Side	True	0.0	1,134.3	10.0	1,144.3	20.0	59.8	J-280	59.8
J-283	High Side	True	1,500.0	3,852.3	1,512.2	3,864.5	24.7	20.0	J-249	20.0
J-284	High Side	True	1,500.0	3,856.3	1,513.3	3,869.6	33.0	20.0	J-249	20.0
J-285	High Side	True	1,500.0	3,871.2	1,515.6	3,886.8	33.6	20.0	J-249	20.0
J-286	High Side	True	1,500.0	3,107.4	1,510.0	3,117.4	20.0	20.0	J-288	20.0
J-287	High Side	True	1,500.0	3,881.7	1,500.0	3,881.7	38.1	20.0	J-249	20.0
J-288	High Side	True	0.0	1,062.3	7.8	1,070.1	20.0	61.3	J-422	61.3
J-289	High Side	True	1,500.0	3,734.1	1,515.6	3,749.7	23.0	20.0	J-249	20.0
J-290	High Side	True	1,500.0	3,792.2	1,517.8	3,810.0	26.4	20.0	J-249	20.0
J-291	High Side	True	1,500.0	3,796.4	1,514.4	3,810.8	26.4	20.0	J-249	20.0
J-292	High Side	True	1,500.0	3,833.3	1,524.4	3,857.7	25.0	20.0	J-249	20.0
J-293	High Side	True	1,500.0	3,850.5	1,522.2	3,872.7	34.8	20.0	J-249	20.0
J-294	High Side	True	1,500.0	3,877.9	1,513.3	3,891.2	34.1	20.0	J-249	20.0
J-295	High Side	True	1,500.0	3,912.3	1,525.6	3,937.8	38.8	20.0	J-249	20.0
J-296	High Side	True	1,500.0	3,795.6	1,513.3	3,809.0	31.9	20.0	J-249	20.0
J-297	High Side	True	1,500.0	3,793.2	1,512.2	3,805.4	30.0	20.0	J-249	20.0
J-298	High Side	True	1,500.0	3,793.5	1,506.7	3,800.1	29.6	20.0	J-249	20.0
J-299	High Side	True	1,500.0	3,793.9	1,511.1	3,805.0	30.5	20.0	J-249	20.0
J-300	High Side	True	1,500.0	2,983.5	1,511.1	2,994.7	20.0	20.0	J-313	20.0
J-301	High Side	True	1,500.0	2,787.4	1,511.1	2,798.6	20.0	20.4	J-320	20.4
J-302	High Side	True	1,500.0	3,692.4	1,530.0	3,722.4	20.0	22.7	J-249	22.7
J-303	High Side	True	1,500.0	3,793.7	1,514.4	3,808.2	29.7	20.0	J-249	20.0
J-304	High Side	True	1,500.0	3,842.1	1,542.2	3,884.4	23.2	20.0	J-249	20.0
J-305	High Side	True	1,500.0	3,847.9	1,522.2	3,870.2	32.3	20.0	J-249	20.0

Existing System - Scenario 3: MDD + Fire Flow

Label	Zone	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gal/min)	Fire Flow (Available) (gal/min)	Flow (Total Needed) (gal/min)	Flow (Total Available) (gal/min)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)
J-306	High Side	True	0.0	902.7	13.3	916.0	20.0	61.3	J-422	61.3
J-307	High Side	True	1,500.0	3,717.2	1,522.2	3,739.4	21.7	20.0	J-321	20.0
J-308	High Side	True	1,500.0	3,809.0	1,514.4	3,823.4	26.0	20.0	J-249	20.0
J-309	High Side	True	0.0	772.2	12.2	784.4	20.0	61.3	J-422	61.3
J-310	High Side	True	0.0	1,076.0	10.0	1,086.0	20.0	61.3	J-422	61.3
J-311	High Side	True	1,500.0	3,793.5	1,515.6	3,809.0	28.4	20.0	J-249	20.0
J-312	High Side	True	0.0	943.5	14.4	957.9	20.0	61.3	J-422	61.3
J-313	High Side	True	0.0	1,123.4	12.2	1,135.6	20.0	61.2	J-249	61.2
J-314	High Side	True	1,500.0	3,806.5	1,514.4	3,820.9	33.4	20.0	J-249	20.0
J-315	High Side	True	1,500.0	3,822.9	1,512.2	3,835.2	21.8	20.0	J-249	20.0
J-316	High Side	True	1,500.0	3,790.9	1,514.4	3,805.3	20.0	21.0	J-249	21.0
J-317	High Side	True	1,500.0	3,289.0	1,514.4	3,303.5	20.9	20.0	J-319	20.0
J-318	High Side	True	1,500.0	1,574.0	1,512.2	1,586.2	20.0	56.6	J-249	56.6
J-319	High Side	True	0.0	999.1	23.3	1,022.4	20.0	61.3	J-422	61.3
J-320	High Side	True	0.0	1,201.7	14.4	1,216.1	20.0	60.5	J-249	60.5
J-321	High Side	True	1,500.0	1,766.2	1,512.2	1,778.4	20.0	54.3	J-249	54.3
J-322	High Side	True	1,500.0	2,496.1	1,513.3	2,509.5	20.0	20.0	J-323	20.0
J-323	High Side	True	1,500.0	2,323.4	1,517.8	2,341.2	20.0	26.0	J-322	26.0
J-324	High Side	True	1,500.0	3,193.0	1,500.0	3,193.0	20.0	21.7	J-33	21.7
J-325	High Side	True	2,000.0	3,907.4	2,009.4	3,916.8	25.6	20.0	J-249	20.0
J-326	Low Side	True	1,500.0	3,415.1	1,506.7	3,421.8	20.0	30.3	J-1	30.3
J-327	High Side	True	1,500.0	2,723.1	1,515.9	2,739.0	20.0	39.5	J-249	39.5
J-328	High Side	True	1,500.0	3,741.1	1,511.4	3,752.5	33.3	20.0	J-249	20.0
J-333	High Side	True	1,500.0	3,415.2	1,524.6	3,439.8	20.0	26.2	J-200	26.2
J-334	High Side	True	1,500.0	3,614.2	1,511.1	3,625.3	22.7	20.0	J-249	20.0
J-335	High Side	True	1,500.0	3,741.2	1,511.4	3,752.5	24.6	20.0	J-249	20.0
J-338	Low Side	True	1,500.0	4,000.0	1,509.1	4,009.1	50.8	39.3	J-1	39.3
J-339	Low Side	True	1,500.0	4,000.0	1,500.0	4,000.0	43.6	40.2	J-1	40.2
J-340	High Side	True	1,500.0	3,627.5	1,525.6	3,653.1	21.2	20.0	J-249	20.0
J-341	Low Side	True	1,500.0	3,618.8	1,508.9	3,627.7	20.0	20.0	J-112	20.0
J-342	Low Side	True	1,500.0	3,364.7	1,505.6	3,370.2	20.0	23.9	J-343	23.9
J-343	Low Side	True	1,500.0	3,339.6	1,506.7	3,346.3	20.0	25.4	J-342	25.4
J-344	Low Side	True	1,500.0	3,435.1	1,505.6	3,440.6	20.6	20.0	J-345	20.0
J-345	Low Side	True	1,500.0	3,282.5	1,505.6	3,288.0	20.0	28.8	J-344	28.8
J-400	Low Side	True	1,500.0	3,578.8	1,511.1	3,589.9	20.0	22.6	J-102	22.6
J-403	Low Side	True	1,500.0	1,825.0	1,500.0	1,825.0	20.0	60.4	J-1	52.3
J-423	High Side	True	0.0	442.1	89.6	531.7	20.1	59.0	J-422	59.0

Existing System - Scenario 3: MDD + Fire Flow

Label	Zone	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gal/min)	Fire Flow (Available) (gal/min)	Flow (Total Needed) (gal/min)	Flow (Total Available) (gal/min)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)
J-346	Low Side	True	1,500.0	3,644.9	1,505.6	3,650.4	20.0	20.0	J-349	20.0
J-347	Low Side	True	1,500.0	3,683.6	1,500.0	3,683.6	20.0	20.0	J-348	20.0
J-348	Low Side	True	1,500.0	3,299.1	1,504.4	3,303.5	20.0	33.5	J-1	33.5
J-349	Low Side	True	1,500.0	3,429.6	1,504.4	3,434.0	20.0	29.7	J-1	29.7
J-350	Low Side	True	1,500.0	3,771.4	1,505.6	3,776.9	24.8	20.0	J-1	20.0
J-351	Low Side	True	1,500.0	3,771.3	1,500.0	3,771.3	21.1	20.0	J-1	20.0
J-352	Low Side	True	1,500.0	3,390.1	1,511.4	3,401.5	20.0	20.0	J-357	20.0
J-353	Low Side	True	1,500.0	3,332.6	1,501.1	3,333.7	20.0	20.0	J-354	20.0
J-354	Low Side	True	1,500.0	2,545.5	1,508.9	2,554.4	20.0	49.2	J-1	49.2
J-355	Low Side	True	1,500.0	3,133.3	1,513.6	3,147.0	20.0	20.0	J-357	20.0
J-356	Low Side	True	1,500.0	1,844.4	1,511.4	1,855.8	20.0	60.1	J-1	52.2
J-357	Low Side	True	1,500.0	1,824.4	1,511.4	1,835.8	20.0	60.5	J-1	52.3
J-358	Low Side	True	1,500.0	3,777.1	1,504.1	3,781.2	24.6	20.0	J-1	20.0
J-359	Low Side	True	1,500.0	3,776.6	1,513.3	3,789.9	24.6	20.0	J-1	20.0
J-360	Low Side	True	1,500.0	3,666.1	1,505.6	3,671.6	20.0	22.6	J-363	22.6
J-361	Low Side	True	1,500.0	3,069.8	1,525.6	3,095.4	20.0	39.5	J-1	39.5
J-362	Low Side	True	1,500.0	3,546.9	1,513.3	3,560.2	20.0	20.0	J-363	20.0
J-363	Low Side	True	1,500.0	2,735.7	1,510.0	2,745.7	20.0	46.3	J-1	46.3
J-364	Low Side	True	1,500.0	3,435.2	1,510.0	3,445.2	20.0	29.5	J-1	29.5
J-366	Low Side	True	1,500.0	3,495.2	1,500.0	3,495.2	20.0	20.3	J-367	20.3
J-367	Low Side	True	1,500.0	3,453.6	1,500.0	3,453.6	20.0	22.4	J-368	22.4
J-368	Low Side	True	1,500.0	3,453.6	1,505.6	3,459.1	20.0	20.0	J-367	20.0
J-369	Low Side	True	1,500.0	3,407.7	1,504.4	3,412.1	20.0	21.0	J-381	21.0
J-370	Low Side	True	1,500.0	3,371.1	1,507.8	3,378.9	20.6	20.0	J-381	20.0
J-371	Low Side	True	1,500.0	3,375.5	1,502.2	3,377.7	20.0	21.7	J-378	21.7
J-372	Low Side	True	1,500.0	3,329.7	1,511.1	3,340.8	20.0	20.0	J-375	20.0
J-373	Low Side	True	1,500.0	3,359.1	1,505.6	3,364.7	20.0	20.0	J-374	20.0
J-374	Low Side	True	1,500.0	3,108.5	1,504.4	3,112.9	20.0	36.9	J-373	36.9
J-375	Low Side	True	1,500.0	2,650.4	1,500.0	2,650.4	20.0	47.6	J-1	47.6
J-376	Low Side	True	1,500.0	3,367.1	1,505.6	3,372.7	20.0	22.2	J-377	22.2
J-377	Low Side	True	1,500.0	3,147.3	1,500.0	3,147.3	20.0	34.1	J-376	34.1
J-378	Low Side	True	1,500.0	3,370.7	1,504.4	3,375.1	20.0	20.7	J-379	20.7
J-379	Low Side	True	1,500.0	3,287.5	1,500.0	3,287.5	20.0	25.6	J-378	25.6
J-380	Low Side	True	1,500.0	3,266.1	1,504.4	3,270.5	22.2	20.0	J-381	20.0
J-381	Low Side	True	1,500.0	3,057.8	1,500.0	3,057.8	20.0	35.7	J-380	35.7
J-382	Low Side	True	1,500.0	3,771.2	1,503.3	3,774.6	20.6	20.0	J-1	20.0
J-383	High Side	True	1,500.0	3,902.6	1,500.0	3,902.6	32.1	20.0	J-249	20.0

Existing System - Scenario 3: MDD + Fire Flow

Label	Zone	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gal/min)	Fire Flow (Available) (gal/min)	Flow (Total Needed) (gal/min)	Flow (Total Available) (gal/min)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)
J-384	High Side	True	1,500.0	3,906.5	1,500.0	3,906.5	26.8	20.0	J-249	20.0
J-385	High Side	True	1,500.0	3,905.9	1,501.1	3,907.1	21.6	20.0	J-249	20.0
J-386	High Side	True	1,500.0	3,641.5	1,508.9	3,650.4	20.0	20.9	J-324	20.9
J-387	High Side	True	1,500.0	3,876.4	1,500.0	3,876.4	20.0	20.6	J-249	20.6
J-388	High Side	True	1,500.0	3,904.3	1,500.0	3,904.3	28.7	20.0	J-249	20.0
J-389	Low Side	True	1,500.0	3,791.7	1,508.9	3,800.6	24.2	20.0	J-1	20.0
J-390	Low Side	True	1,500.0	3,686.3	1,504.4	3,690.8	20.0	22.2	J-393	22.2
J-391	Low Side	True	1,500.0	3,661.6	1,503.3	3,665.0	20.0	23.4	J-392	23.4
J-392	Low Side	True	1,500.0	3,677.3	1,513.3	3,690.6	20.0	23.5	J-1	23.5
J-393	Low Side	True	1,500.0	3,328.8	1,500.0	3,328.8	20.0	33.3	J-1	33.3
J-395	High Side	True	2,100.0	3,162.1	2,115.4	3,177.5	20.0	34.1	J-249	34.1
J-396	High Side	True	1,500.0	2,757.2	1,524.4	2,781.6	20.0	20.8	J-398	20.8
J-397	High Side	True	1,500.0	2,812.7	1,524.4	2,837.1	20.0	20.4	J-399	20.4
J-398	High Side	True	1,500.0	2,768.9	1,506.4	2,775.3	20.0	20.5	J-396	20.5
J-399	High Side	True	1,500.0	2,789.8	1,506.4	2,796.2	20.0	20.5	J-398	20.5
J-401	Low Side	True	1,500.0	3,543.3	1,508.9	3,552.2	20.0	24.5	J-400	24.5
J-405	High Side	True	1,500.0	2,559.8	1,518.9	2,578.7	20.0	30.5	J-406	30.5
J-406	High Side	True	1,500.0	2,576.6	1,500.0	2,576.6	20.0	28.9	J-405	28.9
J-407	High Side	True	1,500.0	3,868.1	1,505.6	3,873.6	38.1	20.0	J-249	20.0
J-408	High Side	True	1,500.0	3,866.2	1,500.7	3,866.8	28.4	20.0	J-249	20.0
J-409	High Side	True	1,500.0	2,511.2	1,500.0	2,511.2	20.0	44.4	J-249	44.4
J-410	High Side	True	2,700.0	3,866.5	2,704.7	3,871.2	28.7	20.0	J-249	20.0
J-411	High Side	True	1,500.0	3,165.2	1,524.5	3,189.7	20.0	20.0	J-413	20.0
J-412	High Side	True	1,500.0	2,512.5	1,500.0	2,512.5	20.0	43.7	J-413	43.7
J-413	High Side	True	1,500.0	2,850.5	1,500.0	2,850.5	20.0	31.9	J-411	31.9
J-414	Low Side	True	1,500.0	3,556.4	1,510.0	3,566.4	20.0	21.7	J-421	21.7
J-415	Low Side	True	1,500.0	3,257.7	1,500.0	3,257.7	20.5	20.0	J-421	20.0
J-416	Low Side	True	1,500.0	3,047.7	1,500.0	3,047.7	21.3	20.0	J-421	20.0
J-417	Low Side	True	1,500.0	3,009.9	1,500.0	3,009.9	20.0	33.5	J-421	33.5
J-418	Low Side	True	1,500.0	2,480.6	1,515.9	2,496.5	22.6	20.0	J-420	20.0
J-419	Low Side	True	1,500.0	2,480.3	1,500.0	2,480.3	20.2	20.0	J-420	20.0
J-420	Low Side	True	1,500.0	2,363.2	1,500.0	2,363.2	20.1	30.8	J-418	30.8
J-421	Low Side	True	1,500.0	2,619.1	1,506.8	2,625.9	20.0	43.7	J-416	43.7
J-422	High Side	True	0.0	4,000.0	0.0	4,000.0	39.8	66.4	J-249	66.4
J-423	High Side	True	1,500.0	2,955.7	1,507.7	2,963.5	20.0	20.4	J-150	20.4
J-7	<None>	True	1,500.0	4,000.0	1,500.0	4,000.0	39.1	39.1	J-7	37.0
J-8	High Side	True	1,500.0	3,743.0	1,513.3	3,756.3	27.8	20.0	J-249	20.0

Existing System - Scenario 3: MDD + Fire Flow

Label	Zone	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gal/min)	Fire Flow (Available) (gal/min)	Flow (Total Needed) (gal/min)	Flow (Total Available) (gal/min)	Pressure (Calculated Residual) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (Calculated System Lower Limit) (psi)
J-33	High Side	True	2,300.0	2,750.0	2,324.4	2,774.4	20.0	23.0	J-224	23.0
J-36	High Side	True	1,500.0	3,916.5	1,500.0	3,916.5	40.0	20.0	J-249	20.0

Appendix K

Asset Management Plan – System Replacement Costs

GARDNERVILLE RANCHOS GENERAL IMPROVEMENT DISTRICT
WATER MASTER PLAN
ASSET MANAGEMENT PLAN - SYSTEM REPLACEMENT COSTS

Components	Quantity	Unit Cost		Current Cost of Replacement	Age (Years)	Cost of Replacement End of Useful Life, 2% Inflation	Annual Cost of Replacement, 2% Inflation
Remaining Useful Life 0-9 Years, Replace 2018-2027						F=P(F/P,2%,5 Years)	F=(A/P,2%,5)
Well 4	1	$ 1,000,000	LS	$ 1,000,000	39	$ 1,000,000	$ 1,000,000
3.0 MG Tank Interior Recoating	1	$ 350,000	LS	$ 350,000	25	$ 364,100	$ 180,300
Long Valley Booster (New Station and Generator)	1	$ 500,000	LS	$ 500,000	19	$ 552,000	$ 106,100
		Totals		**$ 1,850,000**		**$ 1,916,100**	**$ 1,286,400**
Remaining Useful Life 10-19 Years, Replace 2028-2037						F=P(F/P,2%,15 Years)	F=(A/P,2%,15)
Waterline, 6"	7,246	$ 70	LF	$ 507,200	40-50	$ 682,600	$ 39,500
Waterline, 8"	404	$ 80	LF	$ 32,300	40-50	$ 43,500	$ 2,500
Waterline, 10"	69	$ 90	LF	$ 6,200	40-50	$ 8,300	$ 500
Fire Hydrants	12	$ 7,500	EA	$ 90,000	40-50	$ 121,100	$ 7,000
Well 5	1	$ 1,000,000	LS	$ 1,000,000	33	$ 1,345,900	$ 77,800
Well 6	1	$ 1,000,000	LS	$ 1,000,000	28	$ 1,345,900	$ 77,800
1.5 MG Tank Interior/Exterior Recoating	1	$ 425,000	LS	$ 425,000	1	$ 572,000	$ 33,100
3.0 MG Tank Interior/Exterior Recoating	1	$ 600,000	LS	$ 600,000	25	$ 807,500	$ 46,700
		Totals		**$ 3,660,700**		**$ 4,926,800**	**$ 284,900**
Remaining Useful Life 20-29 Years, Replace 2038-2047						F=P(F/P,2%,25 Years)	F=(A/P,2%,25)
Waterline, 2" (Replace w/6")	1,870	$ 70	LF	$ 130,900	30-40	$ 214,800	$ 6,700
Waterline, 4" (Replace w/6")	1,225	$ 70	LF	$ 85,800	30-40	$ 140,800	$ 4,400
Waterline, 6"	16,200	$ 70	LF	$ 1,134,000	30-40	$ 1,860,400	$ 58,100
Waterline, 8"	28,967	$ 80	LF	$ 2,317,400	30-40	$ 3,801,900	$ 118,700
Waterline, 10"	7,961	$ 90	LF	$ 716,500	30-40	$ 1,175,500	$ 36,700
Waterline, 12"	18,822	$ 100	LF	$ 1,882,200	30-40	$ 3,087,900	$ 96,400
Waterline, 16"	1,573	$ 140	LF	$ 220,200	30-40	$ 361,300	$ 11,300
Fire Hydrants	76	$ 7,500	EA	$ 570,000	30-40	$ 935,100	$ 29,200
1.5 MG Tank	1	$ 1,500,000	LS	$ 1,500,000	33	$ 2,460,900	$ 76,800
Well 8	1	$ 1,000,000	LS	$ 1,000,000	20	$ 1,640,600	$ 51,200
Long Valley Booster (Pumps Only)	1	$ 80,000	LS	$ 80,000	-	$ 131,200	$ 4,100
		Totals		**$ 9,637,000**		**$ 15,810,400**	**$ 493,600**
Remaining Useful Life 30-39 Years, Replace 2048-2057						F=P(F/P,2%,35 Years)	F=(A/P,2%,35)
Waterline, 2" (Replace w/6")	364	$ 70	LF	$ 25,500	20-30	$ 51,000	$ 1,000
Waterline, 4" (Replace w/6")	2,596	$ 70	LF	$ 181,700	20-30	$ 363,400	$ 7,300
Waterline, 6"	35,245	$ 70	LF	$ 2,467,200	20-30	$ 4,934,100	$ 98,700
Waterline, 8"	48,937	$ 80	LF	$ 3,915,000	20-30	$ 7,829,600	$ 156,600
Waterline, 10"	12,341	$ 90	LF	$ 1,110,700	20-30	$ 2,221,300	$ 44,400
Waterline, 12"	19,095	$ 100	LF	$ 1,909,500	20-30	$ 3,818,800	$ 76,400
Fire Hydrants	191	$ 7,500	EA	$ 1,432,500	20-30	$ 2,864,800	$ 57,300
3.0 MG Tank	1	$ 3,000,000	LS	$ 3,000,000	25	$ 5,999,700	$ 120,000
Water Meters	1,000	$ 600	EA	$ 600,000	1	$ 1,199,900	$ 24,000
Well 1	1	$ 1,000,000	LS	$ 1,000,000	10	$ 1,999,900	$ 40,000
Well 2	1	$ 1,000,000	LS	$ 1,000,000	13	$ 1,999,900	$ 40,000
Well 9	1	$ 1,000,000	LS	$ 1,000,000	12	$ 1,999,900	$ 40,000
		Totals		**$ 17,642,100**		**$ 35,282,300**	**$ 705,700**
Remaining Useful Life 40-49 Years, Replace 2058-2067						F=P(F/P,2%,45 Years)	F=(A/P,2%,45)
Waterline, 6"	9,328	$ 70	LF	$ 653,000	10-20	$ 1,591,900	$ 22,100
Waterline, 8"	64,073	$ 80	LF	$ 5,125,800	10-20	$ 12,496,000	$ 173,800
Waterline, 10"	7,807	$ 90	LF	$ 702,600	10-20	$ 1,712,800	$ 23,800
Waterline, 12"	4,870	$ 100	LF	$ 487,000	10-20	$ 1,187,200	$ 16,500
Waterline, 14"	758	$ 120	LF	$ 91,000	10-20	$ 221,800	$ 3,100
Waterline, 16"	2,114	$ 140	LF	$ 296,000	10-20	$ 721,600	$ 10,000
Fire Hydrants	144	$ 7,500	EA	$ 1,080,000	10-20	$ 2,632,900	$ 36,600
1.5 MG Tank Interior Recoating	1	$ 250,000	LS	$ 250,000	-	$ 609,500	$ 8,500
3.0 MG Tank Interior Recoating	1	$ 350,000	LS	$ 350,000	-	$ 853,200	$ 11,900
Long Valley Booster (Pumps Only)	1	$ 80,000	LS	$ 80,000	-	$ 195,000	$ 2,700
Well 4	1	$ 1,000,000	LS	$ 1,000,000	-	$ 2,437,900	$ 33,900
		Totals		**$ 10,115,400**		**$ 24,659,800**	**$ 342,900**
Remaining Useful Life 50-59 Years, Replace 2068-2077						F=P(F/P,2%,55 Years)	F=(A/P,2%,55)
Waterline, 6"	2,094	$ 70	LF	$ 146,580	0-10	$ 435,600	$ 4,400
Waterline, 8"	10,305	$ 80	LF	$ 824,400	0-10	$ 2,449,900	$ 24,900
Fire Hydrants	30	$ 7,500	EA	$ 225,000	0-10	$ 668,600	$ 6,800
Well 5	1	$ 1,000,000	LS	$ 1,000,000	-	$ 2,971,700	$ 30,100
		Totals		**$ 2,195,980**		**$ 6,525,800**	**$ 66,200**

TOTAL COST TO REPLACE SYSTEM AT CURRENT YEAR
$ 45,100,000

TOTAL COST TO REPLACE SYSTEM AT END OF USEFUL LIFE
$ 89,200,000

TOTAL TO BE SAVED EACH YEAR TO REPLACE SYSTEM AT END OF USEFUL LIFE (WITHOUT CONSIDERING WATER FUND RESERVES)
$ 3,180,000