DEXTER WILSON ENGINEERING, INC.

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CONSULTING ENGINEERS

WATER SYSTEM ANALYSIS
FOR THE SOUTHWEST VILLAGE
VTM 1 PROJECT
IN THE CITY OF SAN DIEGO
PTS# 614791

June 14, 2024

2234 FARADAY AVENUE • CARLSBAD, CA • (760) 438-4422

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June 14, 2024

6-14-2024

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Job No. 648-031

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June 14, 2024 648-031

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San Diego, CA 92128

Attention: Allen Kashani, P.E., Senior Project Manager

Subject: Water System Analysis for the Southwest Village VTM 1 Project in the City of San Diego

Introduction

This report provides a public water system analysis for the Southwest Village Vesting Tentative Map (VTM) 1 project in the City of San Diego and is a supplement to the overall "Southwest Village Specific Plan Water Study" which has been concurrently submitted to the City. This report addresses the public water system improvements specifically within and contingent to the VTM 1 area.

A total of 920 dwelling units are planned for VTM 1 which are fewer than what was stated in the Southwest Village Specific Plan sewer study. The "Southwest Village Specific Plan Water Study" planned for 1,315 units for the VTM 1 area.

The Southwest Village VTM 1 is located in the future Southwest Village Specific Plan area within the Otay Mesa neighborhood along an extension of Beyer Boulevard and west of a future extension of Caliente Avenue. Figure 1 provides a location map for the project.

Purpose of Study

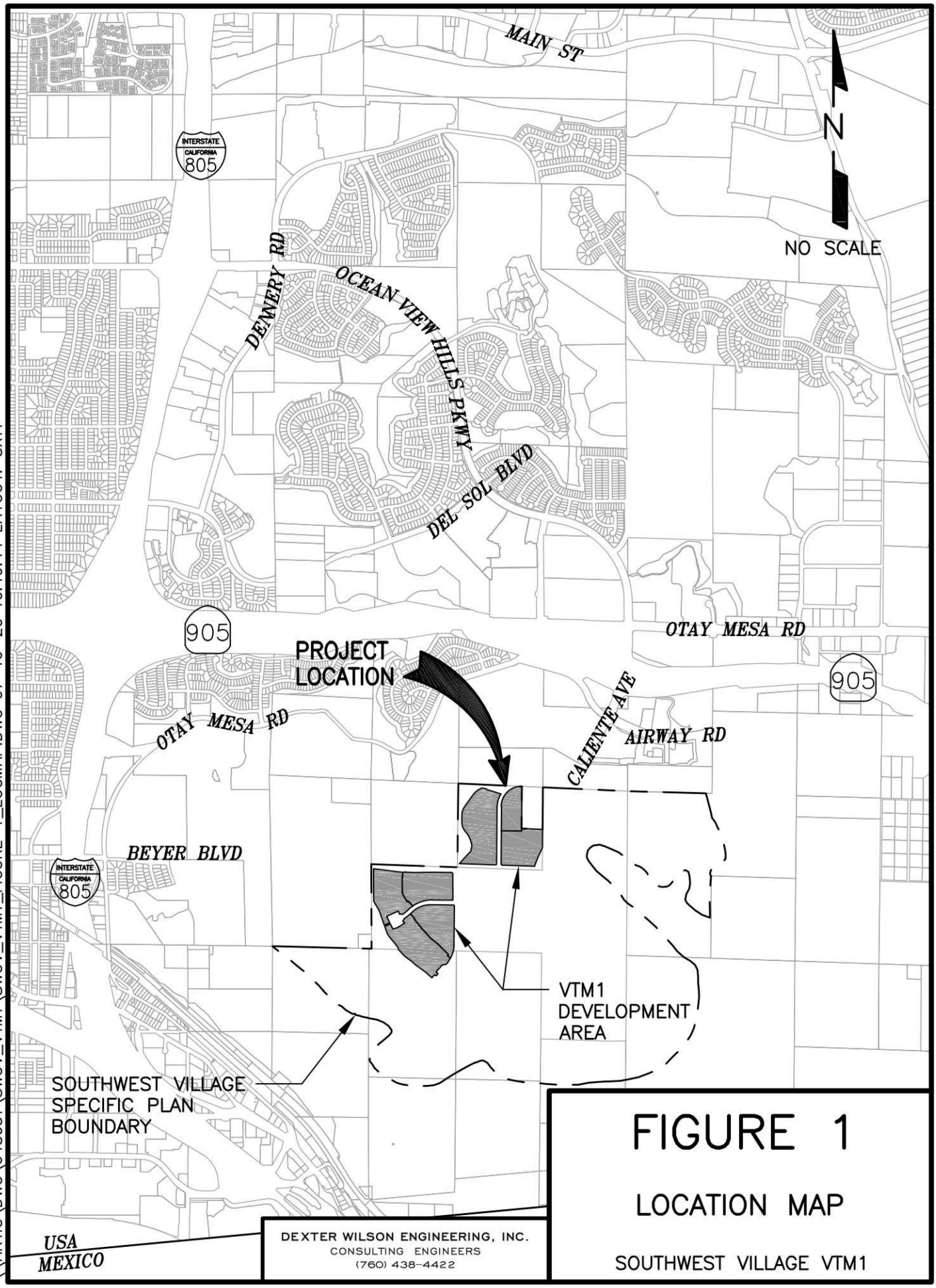
The purpose of this study is to confirm the recommended public water system improvements for the Southwest Village VTM 1 project. These improvements include the extension of existing public water lines from existing terminuses to ensure that VTM 1 will have adequate domestic and fire protection service. This report will verify that the recommended public improvements comply with the City of San Diego Water Department water system design standards.

As mentioned earlier, a concurrent water study was prepared for the overall Southwest Village Specific Plan area titled "Southwest Village Specific Plan Water Study." Feedback and comments from the City on the "Southwest Village Specific Plan Water Study" are incorporated into this VTM 1 study and are reflected in the recommended water facilities.

Study Area

The study area for this report is the boundary of the Southwest Village VTM 1 project minus select private streets that will contain private water lines. These streets are mainly internal within the individual residential areas of the VTM 1 project.

The extent of the existing water system which was incorporated into the analysis of the project site was based on the existing Otay Mesa 680 Zone distribution system that serves the area. Adjacent water mains up to the 680 Zone pump station(s) were included in the computer model to ensure that the dynamics of the existing water system were analyzed as closely as possible. The nearest water sources for the project are pump stations which feed the Otay Mesa 680 Zone from the South San Diego Reservoir 490 Zone.



\\ARTIC\DWG\648031\SWOV_VTM1\SWOV_VTM1_FIGURE-1_LOCMAP.DWG 07-16-20 10:19:14 LAYOUT: 8X11

FIGURE 1

LOCATION MAP

SOUTHWEST VILLAGE VTM1

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The project encompasses approximately 60 acres and proposes to develop the site to incorporate 920 residential units. Pad elevations on the project range from 476 feet to 495 feet. Maximum static pressures in the 680 Zone will range from 80 psi to 88 psi.

This report is an update of the previous "Southwest Village VTM 1 Water Study" dated December 16, 2022 and incorporates previous City comments that were issued. The specific City comments and responses (if any) are included in Appendix C of this report.

Southwest Village VTM 1 Project Water Demands

The water demands and corresponding proposed public water facilities were developed in accordance with the City of San Diego Design Guidelines and Standards.

Residential water demand is estimated based on density and a unit water demand of 150 gpd/person. Dwelling unit density and net area information for VTM 1, along with Table 2-1 in the Water Facility Design Guidelines, was used to determine the population for each residential area within VTM 1. Unit density and dwelling unit information was used to estimate population.

Table 1 presents the projected potable water demand for the Southwest Village VTM 1 project.

TABLE 1
SOUTHWEST VILLAGE VTM 1 PROJECT
AVERAGE WATER DEMAND

Residential Planning Area	Dwelling Units	Dwelling Unit Density, DU/net-ac	Unit Density, Pop./DU	Total Population	Average Water Demand, gpd
8	185	26.1	3.0	555	83,250
9	95	21.6	3.1	295	44,250
10	130	10.7	3.4	442	66,300
11	168	17.1	3.2	538	80,700
12	76	11.2	3.1	236	35,400
13	170	17.0	3.2	544	81,600
14	96	10.5	3.4	326	48,900
TOTAL	**920**	--	--	**2,936**	**440,400**

From the City of San Diego Guidelines and Standards, Figure 2-2, the maximum day demand to average annual demand ratio is approximately 1.6 and the peak hour demand to average annual demand ratio is approximately 2.6 resulting in an estimated maximum day demand of 704,640 gpd (489 gpm) and a peak hour demand of 1,145,040 gpd (795 gpm).

Appendix B of this report presents the backup data for determining these peaking factors.

City of San Diego Design Criteria

Book 2 of the City of San Diego Guidelines and Standards was used to analyze and layout the proposed water system.

A summary of the design criteria from Book 2 is presented as Table 2.

TABLE 2 SOUTHWEST VILLAGE VTM 1 PROJECT WATER SYSTEM DESIGN CRITERIA	
Criteria	**Design Requirement**
Single Family Residential Fire Flow	2,000 gpm
Multi-Family Residential Fire Flow	3,000 gpm
Minimum Static Pressure	65 psi
Maximum Static Pressure	120 psi
Maximum Pressure Drop – Peak Hour & Max Day plus Fire	25 psi
Minimum Pressure – Peak Hour	40 psi
Minimum Pressure – Max Day plus Fire	20 psi
Maximum Pipeline Velocity (Fire Flow)[1]	15 fps
Maximum Pipeline Velocity (Normal Operating Conditions)[2]	5 fps

Water System

There are existing public water facilities in the vicinity of the Southwest Village VTM 1 project site. The existing facilities are part of the Otay Mesa 680 Zone. There are existing parallel 16-inch water lines in Caliente Avenue adjacent to the project. The existing and proposed water facilities in the vicinity of the project are shown on Figure 2 and Exhibit A, and a Pressure Zone is presented on Figure 3. The Pressure Zone Map shows existing water service areas and pressure zones in the vicinity of the proposed project.

Note that the alignment for the northern proposed water lines is partially within an improved street by an adjacent project to the north (Candlelight). The VTM 1 water improvements will extend the 16-inch water line only from this location in lieu of the complete proposed alignment from the current southern terminus of Caliente Avenue.

PRINCESS PARK PUMP STATION

INTERSTATE CALIFORNIA 805

16"

EX.30"

EX.24"

OTAY MESA RD

OTAY MESA RD

16"

BEYER BLVD

16"

PROPOSED BEYER BLVD

16"

NOTE:
PROPOSE PUBLIC WATER INDICATED AS RED IN THIS FIGURE WILL BE ABANDONED UPON BEYER BLVD COMPLETION/SPECIFIC PLAN BUILDOUT AND THERE WILL BE NO CONNECTIONS ON THIS TEMPORARY LINE.

CANDLELIGHT PROJECT

EX.12"

EX.12"

AIRWAY RD

EX.16"

EX.16"

16"

16"

16"

16" CENTRAL AVE

OFFSITE WATER IN CENTRAL AVE. TO BE CONSTRUCTED BY OTHERS

PROPOSED CALIENTE AVE

SOUTHWIND PROJECT

PA-9

PA-10

PA-8

PA-12

PA-11

PA-13

PA-14

STREET 'A'

WEST AVE

16"

N

0 600 FEET

LEGEND

- PROJECT BOUNDARY
- EXISTING PUBLIC WATER
- PROPOSED PUBLIC WATER
- PROPOSED PUBLIC WATER (TO BE ABANDONED)
- PROPOSED PRIVATE WATER
- PROPOSED FIRE HYDRANT
- D PRIVATE DOMESTIC CONNECTION/SERVICE
- F PRIVATE FIRE CONNECTION/SERVICE

FIGURE 2

PROPOSED WATER SYSTEM VTM1 ULTIMATE BUILDOUT

SOUTHWEST VILLAGE VTM1

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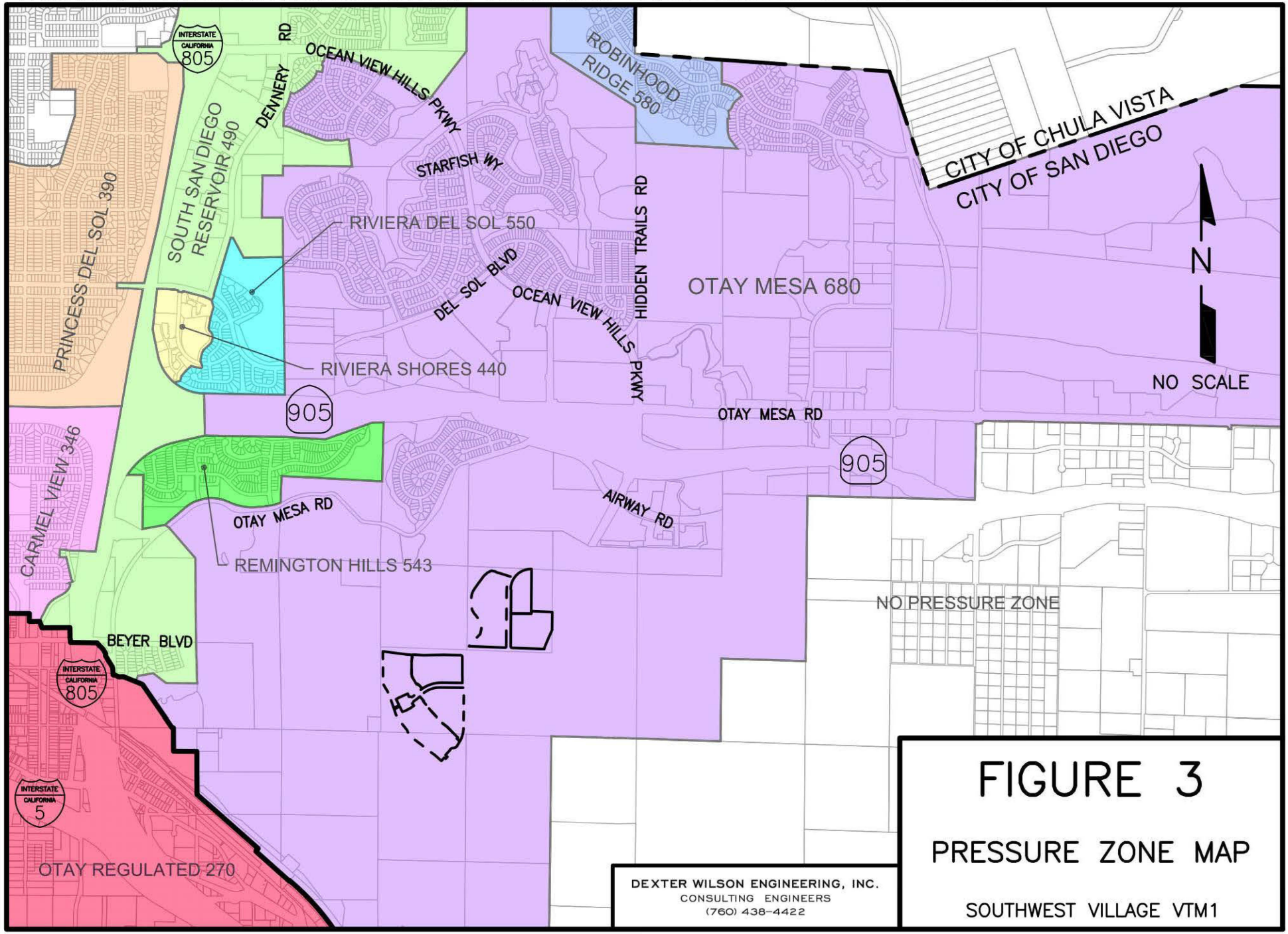

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FIGURE 3

PRESSURE ZONE MAP

SOUTHWEST VILLAGE VTM1

Additional Southwest Village VTM 1 offsite improvements to the public water system will include an upgrade at Princess Park Pump Station and a corresponding 16-inch diameter water line in Otay Mesa Road/Place and Beyer Boulevard into the proposed project.

Phase 1 Water System. Phase 1 of VTM 1 is comprised of its first 800 units. Phase 1 is analyzed under a separate study titled "Addendum No. 1 to the Water System Analysis for the Southwest Village VTM 1 Water Study in the City of San Diego (City), PTS# 614791.".

Water System Computer Model

The University of Kentucky KYPIPE computer program was used to conduct a hydraulic model of the proposed water system within the study area. This computer program utilizes the Hazen-Williams equation for determining headloss in pipes; the Hazen-Williams "C" value used for all pipes is 120.

The model for this analysis includes proposed and existing public water lines in the near vicinity of the project site. The existing Ocean View Hills Pump Station was inputted as the source for the computer model. Presently the 680 Zone is only supplied by one water booster pump station. Ocean View Hills Pump Station, located along Ocean View Hills Parkway approximately a half mile east of Dennery Road, is the sole pump station currently providing 680 Zone water service. This location was entered as a source of the water model.

Otay Mesa Pump Station in the 680 Zone is not in operation currently and is included in the model only for reference. Princess Park Pump Station is currently not in operation as well but is proposed to be brought into 680 Zone service as a part of overall Southwest Village improvements. Ocean View Hills Pump Station and Princess Park Pump Station are the only sources in the computer hydraulic model.

Existing 680 Zone water demands were incorporated into the computer model as well. Appendix B contains the Ocean View Hills Pump Station flow meter data which was utilized to determine current water demands in the pressure zone.

Water Service Overview

The project proposes to receive water through a 16-inch diameter water line in Caliente Avenue as well as a proposed 16-inch diameter water line in Beyer Boulevard. The connections will be in public streets. All of these lines are within the Otay Mesa 680 Zone. The pad elevations on-site result in maximum static pressures that are between 78 and 85 psi.

To supply water to the new residential pads and areas, the 16-inch water lines in Caliente Avenue will extend into the VTM 1 project area via a new public street (Central Avenue). The proposed water line in Beyer Boulevard will provide water supply from the Princess Park Pump Station. The proposed parallel water line in Caliente Avenue will provide a redundant water supply in the initial phase of the project (Addendum No.1 study). Having two connections to the public water system will ensure redundancy even during a pipe break scenario.

Internal portions of the Southwest Village VTM 1 project will be served with private water systems. The private water systems will consist of dual piping including a private domestic water line and a private fire protection water line. Domestic water services will be connected to a public water line with a water lateral, water meter, and reduced pressure principle backflow preventer. Private fire protection systems will be connected to public water mains at two locations with a fire service lateral and detector check backflow preventer. The locations of these connections are shown on Figure 2. Fire flow modeling scenarios were performed at the proposed private fire connection points on the public water system.

Sizing of the private water systems within the VTM 1 individual planning areas will be ultimately determined in a separate report. A preliminary overview of the private domestic water systems for Southwest Village VTM 1 is presented in the next section

Preliminary Private Domestic Water Service. An estimated water fixture unit (WFU) count based on expected unit type was performed to estimate the water meter size. By utilizing the 2022 California Plumbing Code, a WFU count can be equated to a peak flow rate in gpm which, in turn, can be used to recommend a water meter size. Note that the water meter sizing provided herein is a preliminary estimate. Once architectural and mechanical plumbing plans are finalized for each area, the WFU count should be confirmed.

TABLE 3
SOUTHWEST VILLAGE VTM 1 PROJECT
PRELIMINARY WFU SUMMARY

Planning Area	Units	Estimated WFUs per Unit	WFUs	Peak Flow Rate	Water Meter Size
8	185	33	6,105	753 gpm	6-inch
9	95	33	3,135	442 gpm	4-inch
10	130	40.5	5,265	665 gpm	6-inch
11	168	40.5	6,804	826 gpm	6-inch
12	76	40.5	3,078	436 gpm	4-inch
13	170	40.5	6,885	834 gpm	6-inch
14	96	40.5	3,888	521 gpm	6-inch

The peak flow rate in Table 3 differs with the peak hour demand presented after Table 1 earlier in this report as the WFU method is primarily reserved for meter sizing and takes a more conservative approach in calculating peak domestic water demand.

The private water information and background for Southwest Village VTM 1 is included in Appendix D of this report.

Princess Park Pump Station. The Princess Park Pump Station was constructed approximately 20 years ago with the purpose of supplying and booster pumping 490 Zone water into the 543 Zone and 680 Zone. The 680 Zone aspect has never been fully implemented in the operational history of the pump station for the City. Per City correspondence, upgrades will be required in order to provide 680 Zone service for the project and bring the lift station back to its intended designed condition. The exact scope of these upgrades is unknown at the time of this report but is expected to include primarily electrical, controls, and telemetry improvements. Southwest Village will perform a condition assessment report for the Princess Park Pump Station and execute upgrades determined by the findings of the condition assessment report in order to provide a redundant water supply.

Water System Analysis and Results

Appendix B presents the computer modeling results for VTM 1. The fire flow requirement of 2,000 gpm (single-family) and 3,000 gpm (multi-family) were modeled at several fire service connection locations onsite. Pipe break scenarios were modeled by only including one of the two 16-inch water lines proposed to be installed within the VTM 1 project and vicinity.

Under all cases the fire flow requirement is being met with greater than 20 psi residual pressure. Minimum residual pressures onsite are greater than 50 psi under any demand condition with only one 16-inch water main modeled in Caliente Avenue, Central Avenue, Beyer Boulevard, and West Avenue within the VTM 1 project site and vicinity.

The results of the computer hydraulic analysis indicate that the proposed water system for the project can achieve greater than 20 psi residual pressure under a maximum day demand plus 2,000 gpm (single-family) or 3,000 gpm (multi-family) fire flow demand scenario by connecting to the existing system at Caliente Avenue and Princess Park Pump Station and constructing 16-inch diameter piping into the VTM 1 project area as shown on Figure 2. The fire flow analyses included fire flow scenarios at the proposed fire service connection points for the individual private fire protection systems.

Water System Analysis and Results – Phase 1. Scenario 5 within the Appendix B computer modeling results simulates the Phase 1 condition (only one 16-inch diameter water supply via Caliente Avenue). The results indicate sufficient residual pressures for both domestic and fire protection service.

Reimbursement Agreement for Backbone Water Facilities

To provide water service to the build-out of the Southwest Village Specific Plan project, backbone water infrastructure (e.g. Beyer Boulevard, Otay Mesa Road, and Princess Park Pump Station upgrades) is needed as outlined in this water study. To accommodate build-out conditions, VTM 1 of the Southwest Village project will entail the installation of water facilities that will be oversized in comparison to the needs of VTM 1. In addition, the Southwest Village Specific Plan area encompasses several property owners. In order that VTM 1 is not burdened with the full cost of improvements which benefit the entire Specific

Plan project, those who construct any portion of the ultimate water system infrastructure will be able to enter into a reimbursement agreement administered by the City of San Diego to receive pro-rata cost shares from future builders. The reimbursement agreement is awaiting legal determination from the City's Attorney's Office at the time of this report.

Conclusions and Recommendations

The following conclusions and recommendations are summarized based on the water system analysis prepared for the Southwest Village VTM 1 project.

1. The Southwest Village VTM 1 project will be supplied from the Otay Mesa 680 Zone system.

2. Maximum static pressures within the residential project will range between 80 psi and 88 psi.

3. Two connections to the existing 680 Zone will be made. One connection will be in Caliente Avenue and one connection will be made at the Princess Park Pump Station.

4. Southwest Village will perform a condition assessment report and complete upgrades for the Princess Park Pump Station prior to the completion of VTM 1 Phase 1 and the 680 Zone reaching its capacity threshold. The upgrades to the Princess Park Pump station will be determined based on the findings of the condition assessment report.

5. A maximum day demand plus 2,000 (single-family) or 3,000 (multi-family) gpm fire flow can be met throughout the project site with all residual pressures greater than 20 psi and pipeline velocities less than 15 fps under all operating scenarios.

6. Figure 2 provides the recommended public potable water system improvements for the Southwest Village VTM 1 project.

7. Phase 1 of VTM 1 is comprised of its first 800 units. Phase 1 is analyzed under a separate study titled "Addendum No. 1 to the Water System Analysis for the Southwest Village VTM 1 Water Study in the City of San Diego (City), PTS# 614791."

8. Private water systems proposed in the individual residential areas will be sized in a separate report.

9. Individual pressure regulators must be installed for services to pad elevations at or below 496 feet elevation in order to comply with the California Plumbing Code which limits pressure inside a dwelling unit to a maximum of 80 psi.

10. New piping to be installed as part of the public water system outlined in this report shall conform to AWWA C900 DR18 Class 235 for pipe sizes 16-inch diameter and smaller.

11. If any water lines to be constructed by this development are metallic, a California Licensed Corrosion Engineer will be required to perform a soil corrosivity study and to design a Corrosion Control System.

If you have any questions regarding the information or conclusions and recommendations presented in this report, please do not hesitate to call.

Dexter Wilson Engineering, Inc.

Steven Henderson, P.E.

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Attachments

APPENDIX A

CITY DESIGN CRITERIA
AND
EXISTING OTAY MESA 680 ZONE DEMANDS

Chapter 2

WATER DEMANDS AND SERVICE CRITERIA

2.1 General

This chapter outlines planning procedures to estimate water demands and fire flows. Water system service requirements are also defined in terms of water pressure and reservoir storage.

2.2 Service Area

The DESIGN CONSULTANT defines the project's service area and identifies the pressure zones in which it is located. The Senior Civil Engineer in charge of either Water Planning or new development approves the service area boundaries.

2.3 Land Use and Residential Population

The DESIGN CONSULTANT develops present and future land use maps for the service area to define the following land use categories: residential (by zone in accordance with **Table 2-1**), central business district, commercial and institutional, parks, hospitals, hotels, industrial, office, and schools.

The DESIGN CONSULTANT estimates the residential population in the service area based on present and future allowable land use. Unless more accurate population density estimates are available, the residential population in the service area is estimated based on the figures presented in **Table 2-1**.

Table 2-1
Residential Population Density

Zone	Dwelling Unit Density (dwelling unit/ net acre)	Unit Density (persons/ dwelling unit)	Population Density (persons/ net acre)
AR-1-1	0.1	3.5	0.4
AR-1-1	0.2	3.5	0.7
AR-1-2	1	3.5	3.5
RS-1-1/RS-1-8	1	3.5	3.5
RS-1-2/RS-1-9	2	3.5	7.0
RS-1-4/RS-1-11	4	3.5	14

Zone	Dwelling Unit Density (dwelling unit/ net acre)	Unit Density (persons/ dwelling unit)	Population Density (persons/ net acre)
RS-1-7/RS-1-14	9	3.5	32
RM-1-1	14	3.2	45
RM-2-5	29	3.0	87
RM-3-7	43	2.6	112
RM-3-9	73	2.2	161
RM-4-10	109	1.8	196
RM-4-11	218	1.5	327

Dwelling unit density in **Table 2-1** is based on net area. The net area is measured in acres, and is 80% of the gross area for each residential zone.

2.4 Average Annual Water Demands

For most projects, average annual water demands are determined based on the unit water demand criteria presented in **Table 2-2**.

Table 2-2
Unit Water Demands

Land Use Category	Unit Water Demand
Residential	150 gallons/person-day
Central Business District	6000 gallons/net acre-day
Commercial and Institutional	5000 gallons/net acre-day
Fully Landscaped Park	4000 gallons/net acre-day
Hospitals	22500 gallons/net acre-day
Hotels	6555 gallons/net acre-day
Industrial	6250 gallons/net acre-day
Office	5730 gallons/net acre-day
Schools	4680 gallons/net acre-day

Average annual water demands are calculated as the sum of: (1) the residential water demand, and (2) other water demands for each land use category as follows:

Residential Water Demand (gallons/day) = Residential Population x 150 gallons/person-day

Other Water Demand (gallons/day) = Land Use Area by Category (net acres) x Unit Water Demand for Each Land Use Category (gallons/net acre-day)

Average Annual Water Demand (gallons/day) = Residential Water Demand + Other Water Demands

On some projects, particularly large residential developments, using the unit water demands in **Table 2-2** may generate unrealistically high estimates of water requirements. For these large projects, the DESIGN CONSULTANT or developer may request that the Senior Civil Engineer consider an alternative approach, making use of the City's water demand distribution data developed for macroscale planning purposes. Similarly, the Senior Civil Engineer may also consider alternative unit water demand estimates for specific land use types where such estimates are based on detailed demand evaluations. Recent projects of similar size, nearby location and similar character may be used for comparative demand analysis.

2.5 Peak Water Demands

Unless the project involves a large development that calls for an alternative approach, peak hour and maximum day water demands are estimated using the peaking factors presented in **Figures 2-1 and 2-2**. Peaking day factors correspond to the zones identified in the Public Utilities Department Water System HGL Zones.

Peak water demands are estimated as follows:

Peak Hour Demand = Average Annual Water Demand * Peak Day Factor * 1.5

Maximum Day Demand = Average Annual Water Demand * Peak Day Factor

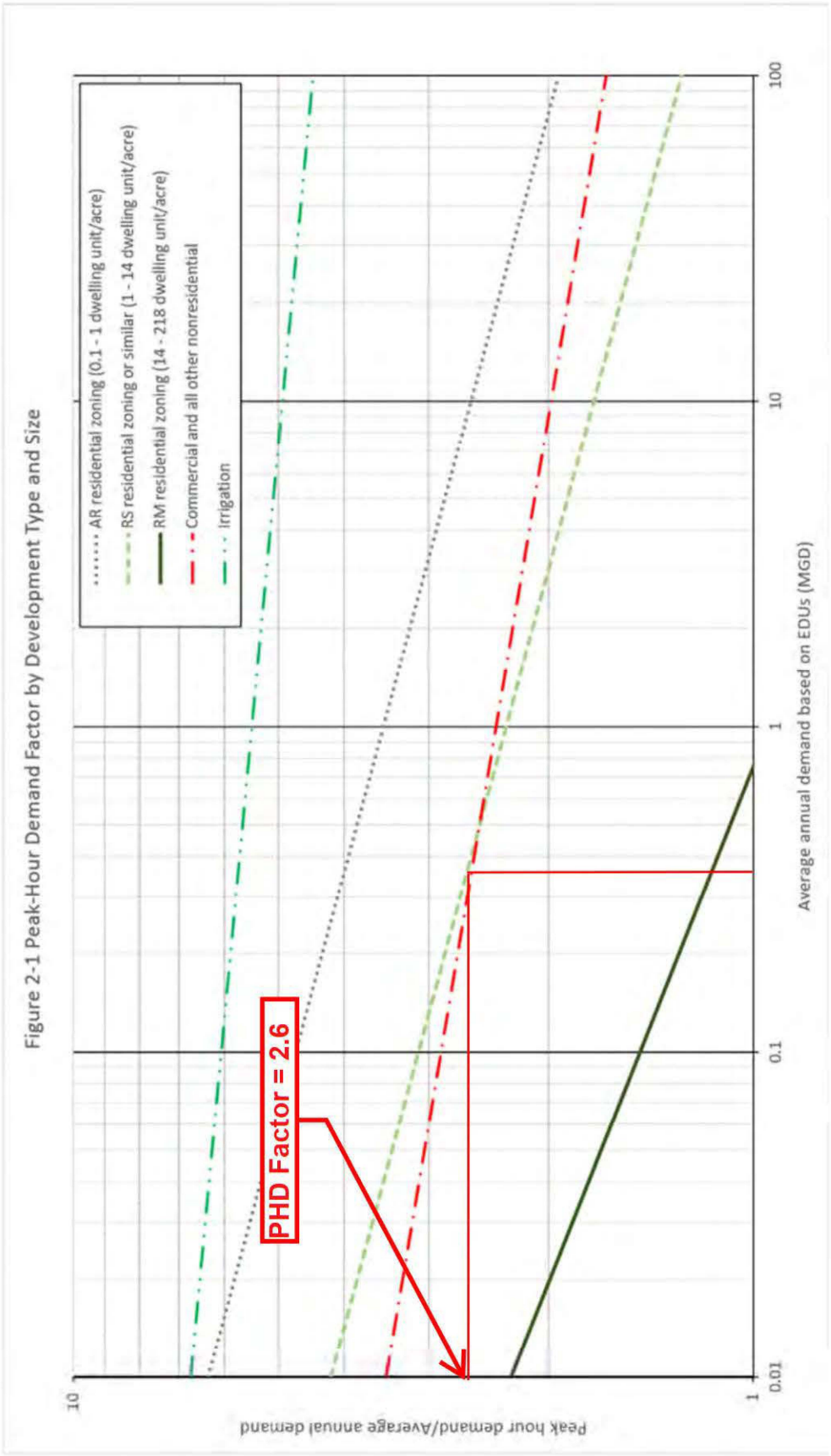


Figure 2-1 Peak-Hour Demand Factor by Development Type and Size

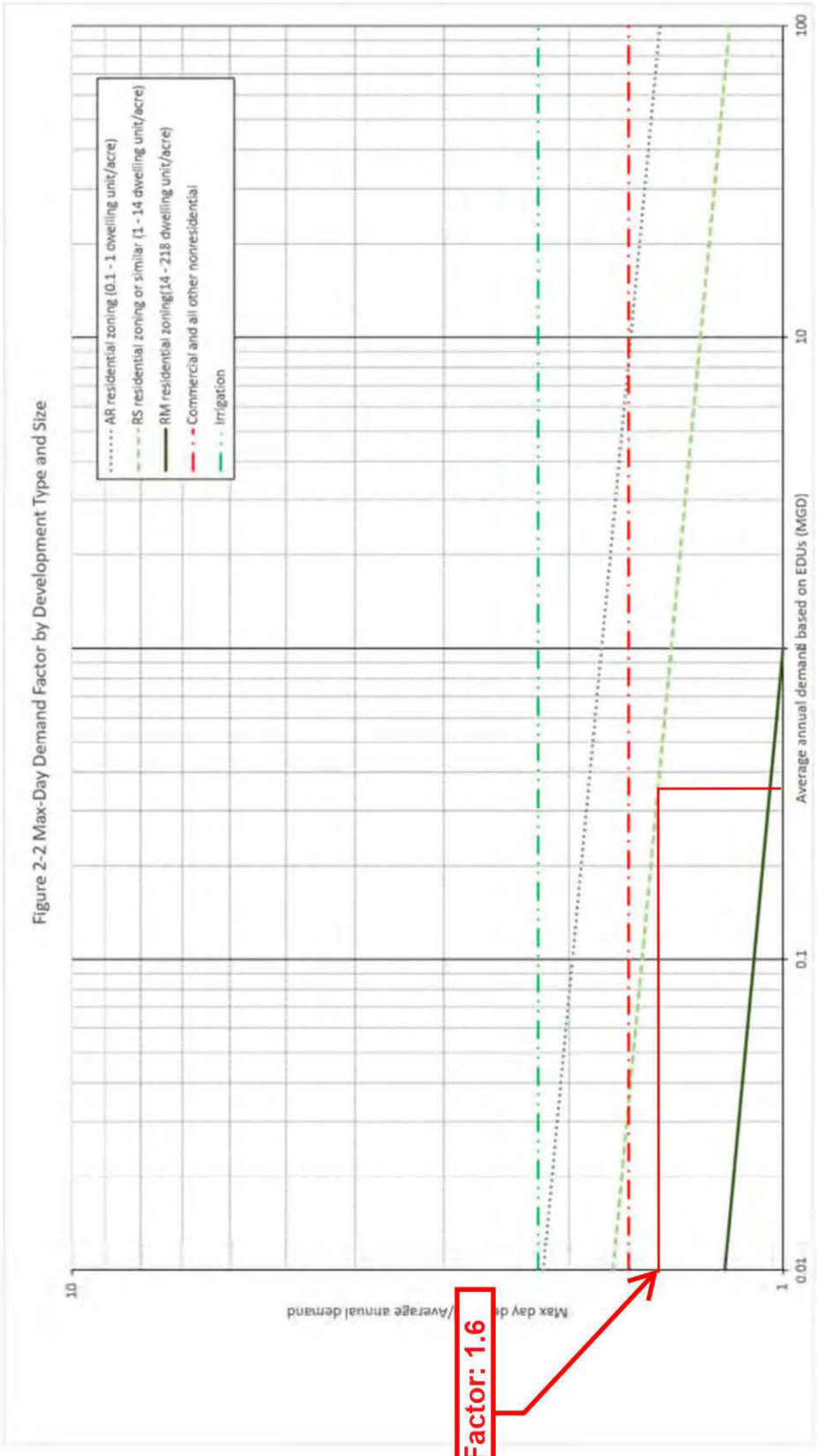


Figure 2-2 Max-Day Demand Factor by Development Type and Size
AR residential zoning (0.1 - 1 dwelling unit/acre)
RS residential zoning or similar (1 - 14 dwelling unit/acre)
RM residential zoning(14 - 218 dwelling unit/acre)
Commercial and all other nonresidential
Irrigation
Average annual demand based on EDUs (MGD)
100
10
0.1
0.01
10
1
MDD Factor: 1.6

2.6 Fire Demands

The DESIGN CONSULTANT shall use the minimum required fire demands for design shown in **Table 2-3**. The fire flow duration for planning purposes is at least five hours. Note that the values in **Table 2-3** are the minimum design criteria for public infrastructure. Privately owned facilities shall follow the guidelines described in Appendix B of the California Fire Code (CFC).

Table 2-3
Fire Demands for Design Purposes

Development Type	Fire Demand (gpm)
Single family residential up to Fourplexes	1,500
Condominiums and apartments	3,000
Commercial	4,000
Industrial	6,000

Should application of the CFC Appendix B result in figures lower than those shown in **Table 2-3**, the firm or Civil Engineer, in consultation with the fire department, CIP City Project Manager may approve the CFC figures on a case-by-case basis following submittal of supporting calculations. In no case shall the approved fire flow rate and flow duration be less than the flow rate and duration values required by Appendix B of the CFC based on the anticipated or proposed type of building construction and total building floor area.

The required fire demand must be supplied from public and private on-site fire hydrants located as required by CFC Appendix C.

2.7 Pressure Criteria

2.7.1 Design Pressures

Water systems must be designed to provide the minimum residual pressures under:

- Maximum day demands plus fire demand conditions, or
- Peak hour demand conditions.

In analyzing the supply to a pressure zone, the minimum hydraulic grade line elevation available from the water source is used, a level that typically occurs during dry weather conditions. A water supply source is defined as a treatment plant clearwell, flow control facility, pump station, pressure regulating station or reservoir. Supply sources occur at discrete points in a system of

water mains and control both flow and pressure at the supply point. Water mains are not supply sources but rather conveyance facilities. The maximum static pressure in gravity systems is determined from reservoir overflow elevations and/or the discharge control setting on pressure reducing valves, whichever is greater. The maximum static pressure in pumped systems is determined from reservoir overflow elevations or pump shutoff levels, whichever is greater. There are two important pressure criteria used in water system design: Domestic Pressure and Fire Pressure. For systems supplying only domestic demand, only the Domestic Pressure criteria will apply. Similarly, for systems providing only fire demand, only the Fire Pressure criteria will apply. Systems supplying both types of demand, both criteria will apply and must be independently checked.

2.7.2 Domestic Pressure Criteria

The domestic pressure criteria for water system design are shown in **Figure 2-3**. Every water main in each pressure zone must be capable of supplying a minimum static pressure of 65 psi. Domestic pressures must fall no more than 25 psi below the static pressure, and residual water main pressure must be at least 40 psi. Domestic pressures are determined in the distribution system pipelines, excluding losses through service connections and building plumbing, and are measured relative to adjacent building pad elevations.

When analyzing a system with one source of supply out of service, domestic pressures may fall more than 25 psi below static pressure, but the domestic pressure shall not fall below 40 psi.

2.7.3 Pressure Requirements During Fires

For the simulation of fire conditions, a minimum operating pressure of 20 psi is required at the fire hydrant locations.. The residual pressure is determined given the fire demand among one or more hydrants and with the simultaneous water consumption occurring at the maximum day demand. The hydrants considered in this simulation must be sufficiently near to the fire location to be classified as "available" to that location as defined by the California Fire Code.

For water systems with available storage, the residual pressures in the distribution system during a fire are maintained given the following conditions:

- The water level in the storage facility at the time of the fire is at or near the minimum operating level
- The prescribed fire duration set by the California Fire Code, occurring under maximum day conditions.

2.8 System Reliability

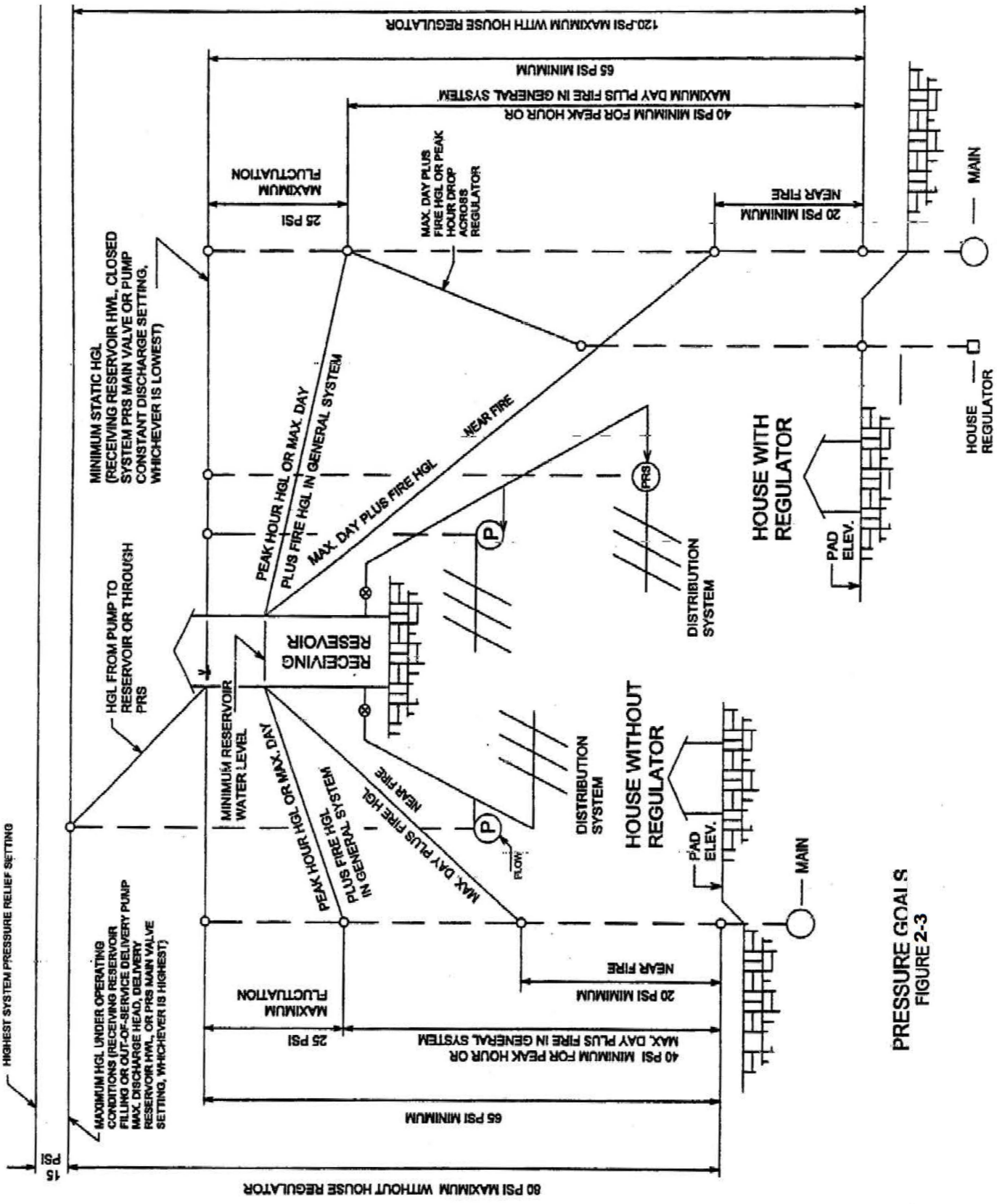
Water systems must be designed to meet the operating pressure criteria with one critical source

out of service. Water mains must be designed so that no more than one, average-sized city block (approximately 30 homes) is out of service at any time, and no more than two fire hydrants (excluding fire services) are on a dead end or are out of service at any time. These provisions do not apply under earthquake conditions.

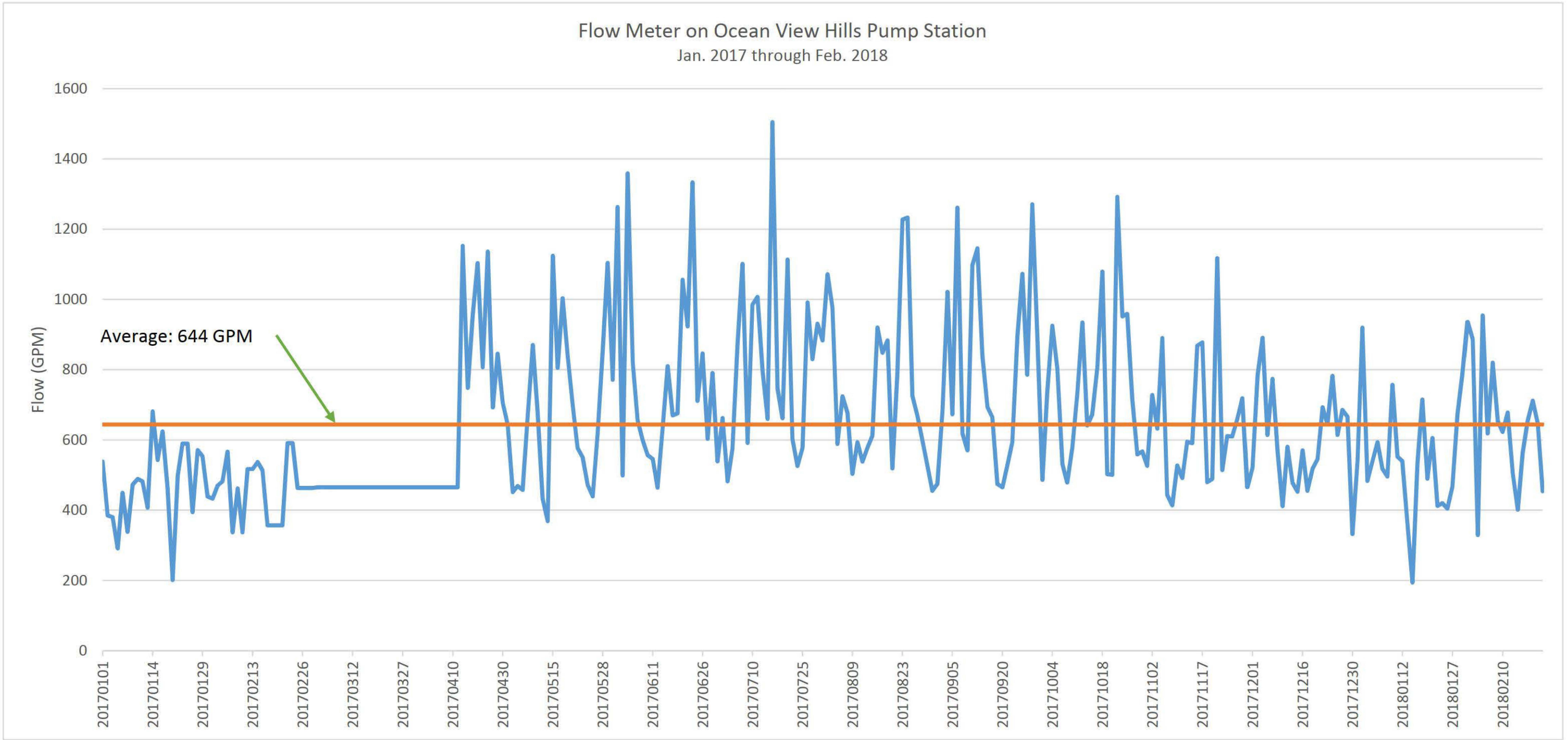
Water mains serving more than two hydrants or more than 30 homes must be looped, fed from two sources, or provided with a reservoir of sufficient capacity to supply the emergency needs (contingency and fire storage) as described below in **subsection 2.9**.

All water mains relied upon for looping and source redundancy shall be in separate streets. Dual mains in the same street or alignment require the DESIGN ENGINEER to prepare a request for deviation using the format of ATTACHMENT 1, which is included as a part of this document. Where dual mains are relied upon for looping or source redundancy, the mains shall be spaced at least 10 feet apart from outer edge to outer edge.

For City CIP work in already-built-out areas, where looping of mains or connection to two sources of supply is not feasible, water mains may be constructed require the DESIGN ENGINEER to prepare a request for deviation using the format of ATTACHMENT 1, which is included as a part of this document. Additional design considerations shall be made to minimize the chance of pipe breakage, such as use of a higher class of pipe.



PRESSURE GOALS
FIGURE 2-3


Flow Meter on Ocean View Hills Pump Station
Jan. 2017 through Feb. 2018
Flow (GPM)
Average: 644 GPM
1600
1400
1200
1000
800
600
400
200
0
20170101
20170114
20170129
20170213
20170226
20170312
20170327
20170410
20170430
20170515
20170528
20170611
20170626
20170710
20170725
20170809
20170823
20170905
20170920
20171004
20171018
20171102
20171117
20171201
20171216
20171230
20180112
20180127
20180210

APPENDIX B

COMPUTER MODELING OUTPUT
SOUTHWEST VILLAGE VTM 1

The following conditions were modeled:

0. Average Day Demand

1. Peak Hour Demand

2. Maximum Day Demand plus 1,500 gpm Fire Flow at Node 43

3. Maximum Day Demand plus 3,000 gpm Fire Flow at Node 36

4. Maximum Day Demand plus 3,000 gpm Fire Flow at Node 41

5. Maximum Day Demand plus 3,000 gpm Fire Flow at Node 43, Pipe Break (Pipe 4 Closed), Phase 1 Condition

6. Maximum Day Demand plus 3,000 gpm Fire Flow at Node 43, Pipe Break (Pipe 63 Closed)

Project: Southwest Village Project - VTM 1
Date: 12/16/2022
Job Number: 648-031

Scenario: Average Day Demand

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi	Delta P from Static
J-1	170	680	220.97	220.98	-0.01
J-4	521	680	68.89	68.89	0.00
J-5	470	680	90.99	90.95	0.04
J-8	534	680	63.26	63.24	0.02
J-10	517	680	70.62	70.6	0.02
J-12	516	680	71.06	71.03	0.03
J-16	333	680	150.35	150.32	0.03
J-20	322	680	155.11	155.13	-0.02
J-22	466	680	92.72	92.71	0.01
J-24	550	680	56.33	56.3	0.03
J-28	488	680	83.19	83.15	0.04
J-29	483	680	85.36	85.32	0.04
J-32	516	680	71.06	71.03	0.03
J-36	482	680	85.79	85.75	0.04
J-40	475	680	88.82	88.78	0.04
J-41	483	680	85.36	85.31	0.05
J-42	490	680	82.32	82.27	0.05
J-43	495	680	80.16	80.11	0.05
J-202	322	680	155.11	155.13	-0.02

Project: Southwest Village Project - VTM 1
Date: 12/16/2022
Job Number: 648-031

Scenario: Peak Hour Demand

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi	Delta P from Static
J-1	170	680	220.97	220.9	0.07
J-4	521	680	68.89	68.85	0.04
J-5	470	680	90.99	90.7	0.29
J-8	534	680	63.26	63.09	0.17
J-10	517	680	70.62	70.41	0.21
J-12	516	680	71.06	70.83	0.23
J-16	333	680	150.35	150.12	0.23
J-20	322	680	155.11	155.09	0.02
J-22	466	680	92.72	92.62	0.10
J-24	550	680	56.33	56.16	0.17
J-28	488	680	83.19	82.93	0.26
J-29	483	680	85.36	85.07	0.29
J-32	516	680	71.06	70.87	0.19
J-36	482	680	85.79	85.5	0.29
J-40	475	680	88.82	88.53	0.29
J-41	483	680	85.36	85.04	0.32
J-42	490	680	82.32	81.99	0.33
J-43	495	680	80.16	79.82	0.34
J-202	322	680	155.11	155.13	-0.02

Project: Southwest Village Project - VTM 1
Date: 12/16/2022
Job Number: 648-031

Scenario: Maximum Day Demand plus 1,500 gpm Single Family Fire Flow at Node 43

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi	Delta P from Static
J-1	170	680	220.97	220.47	0.50
J-4	521	680	68.89	68.85	0.04
J-5	470	680	90.99	89.41	1.58
J-8	534	680	63.26	63.06	0.20
J-10	517	680	70.62	70.4	0.22
J-12	516	680	71.06	70.83	0.23
J-16	333	680	150.35	150.13	0.22
J-20	322	680	155.11	155.08	0.03
J-22	466	680	92.72	92.6	0.12
J-24	550	680	56.33	56.09	0.24
J-28	488	680	83.19	82.24	0.95
J-29	483	680	85.36	84.18	1.18
J-32	516	680	71.06	70.69	0.37
J-36	482	680	85.79	84.41	1.38
J-40	475	680	88.82	87.45	1.37
J-41	483	680	85.36	83.28	2.08
J-42	490	680	82.32	79.56	2.76
J-43	495	680	80.16	77.06	3.10
J-202	322	680	155.11	155.12	-0.01

Project: Southwest Village Project - VTM 1
Date: 12/16/2022
Job Number: 648-031

Scenario: Maximum Day Demand plus 3,000 gpm Multi Family Fire Flow at Node 36

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi	Delta P from Static
J-1	170	680	220.97	219.61	1.36
J-4	521	680	68.89	68.79	0.10
J-5	470	680	90.99	86.84	4.15
J-8	534	680	63.26	62.83	0.43
J-10	517	680	70.62	70.17	0.45
J-12	516	680	71.06	70.6	0.46
J-16	333	680	150.35	149.9	0.45
J-20	322	680	155.11	155.03	0.08
J-22	466	680	92.72	92.43	0.29
J-24	550	680	56.33	55.76	0.57
J-28	488	680	83.19	80.27	2.92
J-29	483	680	85.36	81.65	3.71
J-32	516	680	71.06	70.05	1.01
J-36	482	680	85.79	80.38	5.41
J-40	475	680	88.82	84.38	4.44
J-41	483	680	85.36	81.2	4.16
J-42	490	680	82.32	78.15	4.17
J-43	495	680	80.16	75.99	4.17
J-202	322	680	155.11	155.1	0.01

Project: Southwest Village Project - VTM 1
Date: 12/16/2022
Job Number: 648-031

Scenario: Maximum Day Demand plus 3,000 gpm Multi Family Fire Flow at Node 41

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi	Delta P from Static
J-1	170	680	220.97	219.4	1.57
J-4	521	680	68.89	68.8	0.09
J-5	470	680	90.99	86.21	4.78
J-8	534	680	63.26	62.85	0.41
J-10	517	680	70.62	70.2	0.42
J-12	516	680	71.06	70.63	0.43
J-16	333	680	150.35	149.92	0.43
J-20	322	680	155.11	155.03	0.08
J-22	466	680	92.72	92.45	0.27
J-24	550	680	56.33	55.8	0.53
J-28	488	680	83.19	80.52	2.67
J-29	483	680	85.36	81.97	3.39
J-32	516	680	71.06	70.13	0.93
J-36	482	680	85.79	81.74	4.05
J-40	475	680	88.82	84.77	4.05
J-41	483	680	85.36	78.93	6.43
J-42	490	680	82.32	75.89	6.43
J-43	495	680	80.16	73.72	6.44
J-202	322	680	155.11	155.1	0.01

Project: Southwest Village Project - VTM 1
Date: 12/16/2022
Job Number: 648-031

Scenario: Maximum Day Demand plus 3,000 gpm Multi Family Fire Flow at Node 43
Pipe Break (Pipe 4 Closed)

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi
J-1	170	680	220.97	220.98
J-4	521	680	68.89	68.7
J-5	470	680	90.99	77.97
J-8	534	680	63.26	62.43
J-10	517	680	70.62	69.77
J-12	516	680	71.06	70.2
J-16	333	680	150.35	149.5
J-20	322	680	155.11	154.96
J-22	466	680	92.72	92.15
J-24	550	680	56.33	55.16
J-28	488	680	83.19	76.21
J-29	483	680	85.36	76.39
J-32	516	680	71.06	68.79
J-36	482	680	85.79	74.91
J-40	475	680	88.82	77.95
J-41	483	680	85.36	70.69
J-42	490	680	82.32	65.27
J-43	495	680	80.16	61.91
J-202	322	680	155.11	155.12

Project: Southwest Village Project - VTM 1
Date: 12/16/2022
Job Number: 648-031

Scenario: Maximum Day Demand plus 3,000 gpm Multi Family Fire Flow at Node 43
Pipe Break (Pipe 63 Closed)

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi
J-1	170	680	220.97	212.99
J-4	521	680	68.89	68.88
J-5	470	680	90.99	66.79
J-8	534	680	63.26	63.2
J-10	517	680	70.62	70.54
J-12	516	680	71.06	70.97
J-16	333	680	150.35	150.27
J-20	322	680	155.11	155.08
J-22	466	680	92.72	92.67
J-24	550	680	56.33	56.26
J-28	488	680	83.19	58.96
J-29	483	680	85.36	61.13
J-32	516	680	71.06	71
J-36	482	680	85.79	61.57
J-40	475	680	88.82	64.6
J-41	483	680	85.36	59.5
J-42	490	680	82.32	54.09
J-43	495	680	80.16	50.72
J-202	322	680	155.11	155.08

Project: Southwest Village Project - VTM 1
Date: 12/16/2022
Job Number: 648-031

Scenario: Average Day Demand

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
P-1	30	413.13	0.19
P-2	16	118.91	0.19
P-3	24	0	0
P-4	16	118.91	0.19
P-6	16	132	0.21
P-7	30	374.96	0.17
P-11	24	332.63	0.24
P-15	24	241.5	0.17
P-19	24	-123.85	0.09
P-23	16	37.15	0.06
P-27	24	-80.5	0.06
P-31	12	2.66	0.01
P-35	12	2.66	0.01
P-39	12	2.66	0.01
P-43	12	2.66	0.01
P-47	24	213.96	0.15
P-50	24	0	0
P-51	16	72.05	0.11
P-55	16	72.05	0.11
P-62	16	101.09	0.16
P-63	16	144.09	0.23
P-65	16	13.09	0.02
P-66	16	57.09	0.09
P-67	16	88	0.14
P-68	16	44	0.07
P-85	16	44	0.07
P-101	24	294.46	0.21
P-201	30	493.87	0.22

Project: Southwest Village Project - VTM 1
Date: 12/16/2022
Job Number: 648-031

Scenario: Peak Hour Demand

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
P-1	30	1074.13	0.49
P-2	16	309.16	0.49
P-3	24	0	0
P-4	16	309.16	0.49
P-6	16	343.2	0.55
P-7	30	974.91	0.44
P-11	24	864.83	0.61
P-15	24	627.9	0.45
P-19	24	-322.01	0.23
P-23	16	96.59	0.15
P-27	24	-209.3	0.15
P-31	12	6.91	0.02
P-35	12	6.91	0.02
P-39	12	6.91	0.02
P-43	12	6.91	0.02
P-47	24	556.31	0.39
P-50	24	0	0
P-51	16	187.32	0.3
P-55	16	187.32	0.3
P-62	16	262.84	0.42
P-63	16	374.64	0.6
P-65	16	34.04	0.05
P-66	16	148.44	0.24
P-67	16	228.8	0.37
P-68	16	114.4	0.18
P-85	16	114.4	0.18
P-101	24	765.61	0.54
P-201	30	1284.07	0.58

Project: Southwest Village Project - VTM 1
Date: 12/16/2022
Job Number: 648-031

Scenario: Maximum Day Demand plus 1,500 gpm Single Family Fire Flow at Node 43

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
P-1	30	1111.95	0.5
P-2	16	766.93	1.22
P-3	24	0	0
P-4	16	766.93	1.22
P-6	16	1640.8	2.62
P-7	30	1001.92	0.45
P-11	24	983.15	0.7
P-15	24	386.4	0.27
P-19	24	-198.16	0.14
P-23	16	59.44	0.09
P-27	24	-128.8	0.09
P-31	12	116.99	0.33
P-35	12	116.99	0.33
P-39	12	116.99	0.33
P-43	12	116.99	0.33
P-47	24	744.32	0.53
P-50	24	0	0
P-51	16	541.73	0.86
P-55	16	541.73	0.86
P-62	16	1014.67	1.62
P-63	16	1083.47	1.73
P-65	16	873.87	1.39
P-66	16	944.27	1.51
P-67	16	1570.4	2.51
P-68	16	1500	2.39
P-85	16	70.4	0.11
P-101	24	873.12	0.62
P-201	30	1768.85	0.8

Project: Southwest Village Project - VTM 1
Date: 12/16/2022
Job Number: 648-031

Scenario: Maximum Day Demand plus 3,000 gpm Multi Family Fire Flow at Node 36

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
P-1	30	1608.4	0.73
P-2	16	1290.86	2.06
P-3	24	0	0
P-4	16	1290.86	2.06
P-6	16	211.2	0.34
P-7	30	1481.54	0.67
P-11	24	1479.6	1.05
P-15	24	386.4	0.27
P-19	24	-198.16	0.14
P-23	16	59.44	0.09
P-27	24	-128.8	0.09
P-31	12	241.1	0.68
P-35	12	241.1	0.68
P-39	12	241.1	0.68
P-43	12	241.1	0.68
P-47	24	1223.94	0.87
P-50	24	0	0
P-51	16	1029.77	1.64
P-55	16	1029.77	1.64
P-62	16	1990.74	3.18
P-63	16	2059.54	3.29
P-65	16	-1079.66	1.72
P-66	16	1920.34	3.06
P-67	16	140.8	0.22
P-68	16	70.4	0.11
P-85	16	3000	4.79
P-101	24	1352.74	0.96
P-201	30	2772.4	1.26

Project: Southwest Village Project - VTM 1
Date: 12/16/2022
Job Number: 648-031

Scenario: Maximum Day Demand plus 3,000 gpm Multi Family Fire Flow at Node 41

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
P-1	30	1558.72	0.71
P-2	16	1392.91	2.22
P-3	24	0	0
P-4	16	1392.91	2.22
P-6	16	3140.8	5.01
P-7	30	1429.17	0.65
P-11	24	1429.92	1.01
P-15	24	386.4	0.27
P-19	24	-198.16	0.14
P-23	16	59.44	0.09
P-27	24	-128.8	0.09
P-31	12	228.68	0.65
P-35	12	228.68	0.65
P-39	12	228.68	0.65
P-43	12	228.68	0.65
P-47	24	1171.57	0.83
P-50	24	0	0
P-51	16	978.74	1.56
P-55	16	978.74	1.56
P-62	16	1888.69	3.01
P-63	16	1957.49	3.12
P-65	16	1747.89	2.79
P-66	16	1818.29	2.9
P-67	16	140.8	0.22
P-68	16	70.4	0.11
P-85	16	70.4	0.11
P-101	24	1300.37	0.92
P-201	30	2822.08	1.28

Project: Southwest Village Project - VTM 1
Date: 12/16/2022
Job Number: 648-031

Scenario: Maximum Day Demand plus 3,000 gpm Multi Family Fire Flow at Node 43
Pipe Break (Pipe 4 Closed)

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
P-1	30	2240.65	1.02
P-2	16	0	0
P-3	24	0	0
P-4	16		PIPE CLOSED
P-6	16	3140.8	5.01
P-7	30	2140.15	0.97
P-11	24	2111.85	1.5
P-15	24	386.4	0.27
P-19	24	-198.16	0.14
P-23	16	59.44	0.09
P-27	24	-128.8	0.09
P-31	12	399.16	1.13
P-35	12	399.16	1.13
P-39	12	399.16	1.13
P-43	12	399.16	1.13
P-47	24	1882.55	1.34
P-50	24	0	0
P-51	16	1675.2	2.67
P-55	16	1675.2	2.67
P-62	16	3281.6	5.24
P-63	16	3350.4	5.35
P-65	16	3140.8	5.01
P-66	16	3211.2	5.12
P-67	16	3070.4	4.9
P-68	16	3000	4.79
P-85	16	70.4	0.11
P-101	24	2011.35	1.43
P-201	30	2140.15	0.97

Project: Southwest Village Project - VTM 1
Date: 12/16/2022
Job Number: 648-031

Scenario: Maximum Day Demand plus 3,000 gpm Multi Family Fire Flow at Node 43 Pipe Break (Pipe 63 Closed)

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
P-1	30	653.01	0.3
P-2	16	3350.4	5.35
P-3	24	0	0
P-4	16	3350.4	5.35
P-6	16	3140.8	5.01
P-7	30	377.39	0.17
P-11	24	524.21	0.37
P-15	24	386.4	0.27
P-19	24	-198.16	0.14
P-23	16	59.44	0.09
P-27	24	-128.8	0.09
P-31	12	2.25	0.01
P-35	12	2.25	0.01
P-39	12	2.25	0.01
P-43	12	2.25	0.01
P-47	24	119.79	0.08
P-50	24	0	0
P-51	16	0	0
P-55	16	0	0
P-62	16	-68.8	0.11
P-63	16		PIPE CLOSED
P-65	16	-209.6	0.33
P-66	16	-139.2	0.22
P-67	16	3070.4	4.9
P-68	16	3000	4.79
P-85	16	70.4	0.11
P-101	24	248.59	0.18
P-201	30	3727.79	1.69

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* * * * * * * * * * * * K Y P I P E * * * * * * * * * * * *
*                                                           *
*  Pipe Network Modeling Software                           *
*                                                           *
*  CopyRighted by KYPIPE LLC (www.kypipe.com)               *
*  Version: 10.009  10/01/2019                              *
*  Company:  Dexter        Serial #:  592169                *
*  Interface:  Classic                                      *
*  Licensed for Pipe2018                                    *
*                                                           *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
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Date & Time: Wed Dec 21 15:52:03 2022

Master File : \\artic\eng\648031\dec 2022 sw village vtm 1 680 zone.KYP\dec 2022 sw village vtm 1 680 zone.P2K

****
S U M M A R Y O F O R I G I N A L D A T A
****

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

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

P I P E L I N E D A T A

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

P I P E N A M E	NODE NAMES #1	#2	LENGTH (ft)	DIAMETER (in)	ROUGHNESS COEFF.	MINOR LOSS COEFF.
P-1	Ocean View	J-4	3000.00	30.00	120.0000	0.00
P-2	J-202	J-1	2700.00	16.00	120.0000	0.00
P-3	Otay Mesa	J-16	2200.00	24.00	120.0000	0.00
P-4	J-1	J-5	5500.00	16.00	120.0000	0.00
P-6	J-5	J-41	630.00	16.00	120.0000	0.00
P-7	J-202	J-20	2600.00	30.00	120.0000	0.00
P-11	J-4	J-8	3700.00	24.00	120.0000	0.00
P-15	J-8	J-10	2700.00	24.00	120.0000	0.00
P-19	J-12	J-10	2750.00	24.00	120.0000	0.00
P-23	J-10	J-12	3550.00	16.00	120.0000	0.00
P-27	J-16	J-12	4900.00	24.00	120.0000	0.00
P-31	J-8	J-24	1450.00	12.00	120.0000	0.00
P-35	J-8	J-24	1450.00	12.00	120.0000	0.00
P-39	J-8	J-24	1450.00	12.00	120.0000	0.00
P-43	J-8	J-24	1450.00	12.00	120.0000	0.00
P-47	J-22	J-24	4250.00	24.00	120.0000	0.00
P-50	OWD Interc	J-12	33.00	24.00	120.0000	0.00
P-51	J-24	J-32	1350.00	16.00	120.0000	0.00
P-55	J-24	J-32	1350.00	16.00	120.0000	0.00
P-62	J-28	J-29	700.00	16.00	120.0000	0.00
P-63	J-32	J-28	1600.00	16.00	120.0000	0.00
P-65	J-40	J-5	820.00	16.00	120.0000	0.00
P-66	J-29	J-40	700.00	16.00	120.0000	0.00
P-67	J-41	J-42	950.00	16.00	120.0000	0.00
P-68	J-42	J-43	500.00	16.00	120.0000	0.00
P-85	J-40	J-36	400.00	16.00	120.0000	0.00
P-101	J-20	J-22	2550.00	24.00	120.0000	0.00
P-201	Princess P	J-202	300.00	30.00	120.0000	0.00

N O D E D A T A

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	EXTERNAL GRADE (ft)
Ocean View		----	0.00	680.00
Otay Mesa		0.00	0.00	
OWD Interc		0.00	0.00	
Princess P		----	0.00	680.00
J-1		0.00	170.00	
J-4		80.50	521.00	
J-5		0.00	470.00	
J-8		80.50	534.00	
J-10		80.50	517.00	
J-12		80.50	516.00	
J-16		80.50	333.00	
J-20		80.50	322.00	
J-22		80.50	466.00	
J-24		80.50	550.00	
J-28		43.00	488.00	
J-29		44.00	483.00	
J-32		0.00	516.00	
J-36		44.00	482.00	
J-40		0.00	475.00	
J-41		44.00	483.00	
J-42		44.00	490.00	
J-43		44.00	495.00	
J-202		0.00	322.00	

O U T P U T O P T I O N D A T A

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT
MAXIMUM AND MINIMUM PRESSURES = 3
MAXIMUM AND MINIMUM VELOCITIES = 3

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

NUMBER OF PIPES .....(P) = 28
NUMBER OF END NODES .....(J) = 21
NUMBER OF PRIMARY LOOPS .....(L) = 6
NUMBER OF SUPPLY NODES .....(F) = 2
NUMBER OF SUPPLY ZONES .....(Z) = 1

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Case: 0

RESULTS OBTAINED AFTER 8 TRIALS: ACCURACY = 0.90141E-04

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

AVERAGE DAY DEMAND

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	Ocean View	J-4	413.13	0.02	0.00	0.19	0.01	0.01
P-2	J-202	J-1	118.91	0.04	0.00	0.19	0.01	0.01
P-3	Otay Mesa	J-16	0.00	0.00	0.00	0.00	0.00	0.00
P-4	J-1	J-5	118.91	0.08	0.00	0.19	0.01	0.01
P-6	J-5	J-41	132.00	0.01	0.00	0.21	0.02	0.02
P-7	J-202	J-20	374.96	0.01	0.00	0.17	0.01	0.01
P-11	J-4	J-8	332.63	0.05	0.00	0.24	0.01	0.01
P-15	J-8	J-10	241.50	0.02	0.00	0.17	0.01	0.01
P-19	J-12	J-10	-123.85	0.01	0.00	0.09	0.00	0.00
P-23	J-10	J-12	37.15	0.01	0.00	0.06	0.00	0.00
P-27	J-16	J-12	-80.50	0.00	0.00	0.06	0.00	0.00
P-31	J-8	J-24	2.66	0.00	0.00	0.01	0.00	0.00
P-35	J-8	J-24	2.66	0.00	0.00	0.01	0.00	0.00
P-39	J-8	J-24	2.66	0.00	0.00	0.01	0.00	0.00
P-43	J-8	J-24	2.66	0.00	0.00	0.01	0.00	0.00
P-47	J-22	J-24	213.96	0.02	0.00	0.15	0.01	0.01
P-50	OWD Interc	J-12	0.00	0.00	0.00	0.00	0.00	0.00
P-51	J-24	J-32	72.05	0.01	0.00	0.11	0.01	0.01
P-55	J-24	J-32	72.05	0.01	0.00	0.11	0.01	0.01
P-62	J-28	J-29	101.09	0.01	0.00	0.16	0.01	0.01
P-63	J-32	J-28	144.09	0.03	0.00	0.23	0.02	0.02
P-65	J-40	J-5	13.09	0.00	0.00	0.02	0.00	0.00
P-66	J-29	J-40	57.09	0.00	0.00	0.09	0.00	0.00
P-67	J-41	J-42	88.00	0.01	0.00	0.14	0.01	0.01
P-68	J-42	J-43	44.00	0.00	0.00	0.07	0.00	0.00
P-85	J-40	J-36	44.00	0.00	0.00	0.07	0.00	0.00
P-101	J-20	J-22	294.46	0.03	0.00	0.21	0.01	0.01
P-201	Princess P	J-202	493.87	0.00	0.00	0.22	0.01	0.01

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
Ocean View		----	680.00			
Otay Mesa		0.00	679.90			
OWD Interc		0.00	679.91			
Princess P		----	680.00			
J-1		0.00	679.96	170.00	509.96	220.98
J-4		80.50	679.98	521.00	158.98	68.89

J-5	0.00	679.88	470.00	209.88	90.95
J-8	80.50	679.93	534.00	145.93	63.24
J-10	80.50	679.91	517.00	162.91	70.60
J-12	80.50	679.91	516.00	163.91	71.03
J-16	80.50	679.90	333.00	346.90	150.32
J-20	80.50	679.98	322.00	357.98	155.13
J-22	80.50	679.96	466.00	213.96	92.71
J-24	80.50	679.93	550.00	129.93	56.30
J-28	43.00	679.89	488.00	191.89	83.15
J-29	44.00	679.88	483.00	196.88	85.32
J-32	0.00	679.92	516.00	163.92	71.03
J-36	44.00	679.88	482.00	197.88	85.75
J-40	0.00	679.88	475.00	204.88	88.78
J-41	44.00	679.87	483.00	196.87	85.31
J-42	44.00	679.86	490.00	189.86	82.27
J-43	44.00	679.86	495.00	184.86	80.11
J-202	0.00	680.00	322.00	358.00	155.13

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
J-1	220.98	J-24	56.30
J-202	155.13	J-8	63.24
J-20	155.13	J-4	68.89

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-11	0.24	P-31	0.01
P-63	0.23	P-35	0.01
P-201	0.22	P-39	0.01

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

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

NODE NAME	FLOWRATE gpm	NODE TITLE
Ocean View	413.13	
Princess Pa	493.87	

NET SYSTEM INFLOW = 907.00
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 907.00

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Case: 1

C H A N G E S F O R N E X T S I M U L A T I O N (Change Number = 1)

Peak Hour Demand

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 3 TRIALS: ACCURACY = 0.59926E-07

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	Ocean View	J-4	1074.13	0.12	0.00	0.49	0.04	0.04
P-2	J-202	J-1	309.16	0.22	0.00	0.49	0.08	0.08
P-3	Otay Mesa	J-16	0.00	0.00	0.00	0.00	0.00	0.00
P-4	J-1	J-5	309.16	0.45	0.00	0.49	0.08	0.08
P-6	J-5	J-41	343.20	0.06	0.00	0.55	0.10	0.10
P-7	J-202	J-20	974.91	0.08	0.00	0.44	0.03	0.03
P-11	J-4	J-8	864.83	0.28	0.00	0.61	0.08	0.08
P-15	J-8	J-10	627.90	0.11	0.00	0.45	0.04	0.04
P-19	J-12	J-10	-322.01	0.03	0.00	0.23	0.01	0.01
P-23	J-10	J-12	96.59	0.03	0.00	0.15	0.01	0.01
P-27	J-16	J-12	-209.30	0.03	0.00	0.15	0.01	0.01
P-31	J-8	J-24	6.91	0.00	0.00	0.02	0.00	0.00
P-35	J-8	J-24	6.91	0.00	0.00	0.02	0.00	0.00
P-39	J-8	J-24	6.91	0.00	0.00	0.02	0.00	0.00
P-43	J-8	J-24	6.91	0.00	0.00	0.02	0.00	0.00
P-47	J-22	J-24	556.31	0.14	0.00	0.39	0.03	0.03
P-50	OWD Interc	J-12	0.00	0.00	0.00	0.00	0.00	0.00
P-51	J-24	J-32	187.32	0.04	0.00	0.30	0.03	0.03
P-55	J-24	J-32	187.32	0.04	0.00	0.30	0.03	0.03
P-62	J-28	J-29	262.84	0.04	0.00	0.42	0.06	0.06
P-63	J-32	J-28	374.64	0.19	0.00	0.60	0.12	0.12
P-65	J-40	J-5	34.04	0.00	0.00	0.05	0.00	0.00
P-66	J-29	J-40	148.44	0.01	0.00	0.24	0.02	0.02
P-67	J-41	J-42	228.80	0.04	0.00	0.37	0.05	0.05
P-68	J-42	J-43	114.40	0.01	0.00	0.18	0.01	0.01
P-85	J-40	J-36	114.40	0.01	0.00	0.18	0.01	0.01
P-101	J-20	J-22	765.61	0.16	0.00	0.54	0.06	0.06
P-201	Princess P	J-202	1284.07	0.02	0.00	0.58	0.05	0.05

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
Ocean View		----	680.00			
Otay Mesa		0.00	679.42			
OWD Interc		0.00	679.45			
Princess P		----	680.00			
J-1		0.00	679.76	170.00	509.76	220.90
J-4		209.30(2.60)	679.88	521.00	158.88	68.85

J-5	0.00	679.31	470.00	209.31	90.70
J-8	209.30(2.60)	679.60	534.00	145.60	63.09
J-10	209.30(2.60)	679.48	517.00	162.48	70.41
J-12	209.30(2.60)	679.45	516.00	163.45	70.83
J-16	209.30(2.60)	679.42	333.00	346.42	150.12
J-20	209.30(2.60)	679.90	322.00	357.90	155.09
J-22	209.30(2.60)	679.74	466.00	213.74	92.62
J-24	209.30(2.60)	679.60	550.00	129.60	56.16
J-28	111.80(2.60)	679.37	488.00	191.37	82.93
J-29	114.40(2.60)	679.32	483.00	196.32	85.07
J-32	0.00	679.56	516.00	163.56	70.87
J-36	114.40(2.60)	679.30	482.00	197.30	85.50
J-40	0.00	679.31	475.00	204.31	88.53
J-41	114.40(2.60)	679.25	483.00	196.25	85.04
J-42	114.40(2.60)	679.20	490.00	189.20	81.99
J-43	114.40(2.60)	679.19	495.00	184.19	79.82
J-202	0.00	679.98	322.00	357.98	155.13

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
J-1	220.90	J-24	56.16
J-202	155.13	J-8	63.09
J-20	155.09	J-4	68.85

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-11	0.61	P-31	0.02
P-63	0.60	P-35	0.02
P-201	0.58	P-39	0.02

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

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

NODE NAME	FLOWRATE gpm	NODE TITLE
Ocean View	1074.13	
Princess Pa	1284.07	

NET SYSTEM INFLOW = 2358.20
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 2358.20

==========

Case: 2

C H A N G E S F O R N E X T S I M U L A T I O N (Change Number = 2)

Maximum Day Demand plus 1,500 gpm Fire Flow at Node 43

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 4 TRIALS: ACCURACY = 0.34480E-06

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	Ocean View	J-4	1111.95	0.12	0.00	0.50	0.04	0.04
P-2	J-202	J-1	766.93	1.20	0.00	1.22	0.44	0.44
P-3	Otay Mesa	J-16	0.00	0.00	0.00	0.00	0.00	0.00
P-4	J-1	J-5	766.93	2.44	0.00	1.22	0.44	0.44
P-6	J-5	J-41	1640.80	1.14	0.00	2.62	1.81	1.81
P-7	J-202	J-20	1001.92	0.09	0.00	0.45	0.03	0.03
P-11	J-4	J-8	983.15	0.36	0.00	0.70	0.10	0.10
P-15	J-8	J-10	386.40	0.05	0.00	0.27	0.02	0.02
P-19	J-12	J-10	-198.16	0.01	0.00	0.14	0.01	0.01
P-23	J-10	J-12	59.44	0.01	0.00	0.09	0.00	0.00
P-27	J-16	J-12	-128.80	0.01	0.00	0.09	0.00	0.00
P-31	J-8	J-24	116.99	0.08	0.00	0.33	0.06	0.06
P-35	J-8	J-24	116.99	0.08	0.00	0.33	0.06	0.06
P-39	J-8	J-24	116.99	0.08	0.00	0.33	0.06	0.06
P-43	J-8	J-24	116.99	0.08	0.00	0.33	0.06	0.06
P-47	J-22	J-24	744.32	0.25	0.00	0.53	0.06	0.06
P-50	OWD Interc	J-12	0.00	0.00	0.00	0.00	0.00	0.00
P-51	J-24	J-32	541.73	0.31	0.00	0.86	0.23	0.23
P-55	J-24	J-32	541.73	0.31	0.00	0.86	0.23	0.23
P-62	J-28	J-29	1014.67	0.52	0.00	1.62	0.74	0.74
P-63	J-32	J-28	1083.47	1.34	0.00	1.73	0.84	0.84
P-65	J-40	J-5	873.87	0.46	0.00	1.39	0.56	0.56
P-66	J-29	J-40	944.27	0.46	0.00	1.51	0.65	0.65
P-67	J-41	J-42	1570.40	1.59	0.00	2.51	1.67	1.67
P-68	J-42	J-43	1500.00	0.77	0.00	2.39	1.54	1.54
P-85	J-40	J-36	70.40	0.00	0.00	0.11	0.01	0.01
P-101	J-20	J-22	873.12	0.20	0.00	0.62	0.08	0.08
P-201	Princess P	J-202	1768.85	0.03	0.00	0.80	0.10	0.10

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
Ocean View		----	680.00			
Otay Mesa		0.00	679.44			
OWD Interc		0.00	679.46			
Princess P		----	680.00			
J-1		0.00	678.77	170.00	508.77	220.47
J-4		128.80(1.60)	679.88	521.00	158.88	68.85

J-5	0.00	676.34	470.00	206.34	89.41
J-8	128.80(1.60)	679.52	534.00	145.52	63.06
J-10	128.80(1.60)	679.47	517.00	162.47	70.40
J-12	128.80(1.60)	679.46	516.00	163.46	70.83
J-16	128.80(1.60)	679.44	333.00	346.44	150.13
J-20	128.80(1.60)	679.88	322.00	357.88	155.08
J-22	128.80(1.60)	679.68	466.00	213.68	92.60
J-24	128.80(1.60)	679.44	550.00	129.44	56.09
J-28	68.80(1.60)	677.78	488.00	189.78	82.24
J-29	70.40(1.60)	677.26	483.00	194.26	84.18
J-32	0.00	679.12	516.00	163.12	70.69
J-36	70.40(1.60)	676.80	482.00	194.80	84.41
J-40	0.00	676.80	475.00	201.80	87.45
J-41	70.40(1.60)	675.19	483.00	192.19	83.28
J-42	70.40(1.60)	673.61	490.00	183.61	79.56
J-43	1500.00(**)	672.84	495.00	177.84	77.06
J-202	0.00	679.97	322.00	357.97	155.12

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
J-1	220.47	J-24	56.09
J-202	155.12	J-8	63.06
J-20	155.08	J-4	68.85

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-6	2.62	P-27	0.09
P-67	2.51	P-23	0.09
P-68	2.39	P-85	0.11

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

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

NODE NAME	FLOWRATE gpm	NODE TITLE
Ocean View	1111.95	
Princess Pa	1768.85	

NET SYSTEM INFLOW = 2880.80
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 2880.80

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Case: 3

C H A N G E S F O R N E X T S I M U L A T I O N (Change Number = 3)

Maximum Day Demand plus 3,000 gpm Fire Flow at Node 36

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 4 TRIALS: ACCURACY = 0.62268E-07

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	Ocean View	J-4	1608.40	0.25	0.00	0.73	0.08	0.08
P-2	J-202	J-1	1290.86	3.14	0.00	2.06	1.16	1.16
P-3	Otay Mesa	J-16	0.00	0.00	0.00	0.00	0.00	0.00
P-4	J-1	J-5	1290.86	6.39	0.00	2.06	1.16	1.16
P-6	J-5	J-41	211.20	0.03	0.00	0.34	0.04	0.04
P-7	J-202	J-20	1481.54	0.18	0.00	0.67	0.07	0.07
P-11	J-4	J-8	1479.60	0.77	0.00	1.05	0.21	0.21
P-15	J-8	J-10	386.40	0.05	0.00	0.27	0.02	0.02
P-19	J-12	J-10	-198.16	0.01	0.00	0.14	0.01	0.01
P-23	J-10	J-12	59.44	0.01	0.00	0.09	0.00	0.00
P-27	J-16	J-12	-128.80	0.01	0.00	0.09	0.00	0.00
P-31	J-8	J-24	241.10	0.31	0.00	0.68	0.21	0.21
P-35	J-8	J-24	241.10	0.31	0.00	0.68	0.21	0.21
P-39	J-8	J-24	241.10	0.31	0.00	0.68	0.21	0.21
P-43	J-8	J-24	241.10	0.31	0.00	0.68	0.21	0.21
P-47	J-22	J-24	1223.94	0.62	0.00	0.87	0.15	0.15
P-50	OWD Interc	J-12	0.00	0.00	0.00	0.00	0.00	0.00
P-51	J-24	J-32	1029.77	1.03	0.00	1.64	0.76	0.76
P-55	J-24	J-32	1029.77	1.03	0.00	1.64	0.76	0.76
P-62	J-28	J-29	1990.74	1.82	0.00	3.18	2.59	2.59
P-63	J-32	J-28	2059.54	4.42	0.00	3.29	2.76	2.76
P-65	J-40	J-5	-1079.66	0.68	0.00	1.72	0.84	0.84
P-66	J-29	J-40	1920.34	1.70	0.00	3.06	2.43	2.43
P-67	J-41	J-42	140.80	0.02	0.00	0.22	0.02	0.02
P-68	J-42	J-43	70.40	0.00	0.00	0.11	0.01	0.01
P-85	J-40	J-36	3000.00	2.22	0.00	4.79	5.54	5.54
P-101	J-20	J-22	1352.74	0.45	0.00	0.96	0.18	0.18
P-201	Princess P	J-202	2772.40	0.07	0.00	1.26	0.22	0.22

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
Ocean View		----	680.00			
Otay Mesa		0.00	678.91			
OWD Interc		0.00	678.93			
Princess P		----	680.00			
J-1		0.00	676.79	170.00	506.79	219.61
J-4		128.80(1.60)	679.75	521.00	158.75	68.79

J-5	0.00	670.40	470.00	200.40	86.84
J-8	128.80(1.60)	678.99	534.00	144.99	62.83
J-10	128.80(1.60)	678.94	517.00	161.94	70.17
J-12	128.80(1.60)	678.93	516.00	162.93	70.60
J-16	128.80(1.60)	678.91	333.00	345.91	149.90
J-20	128.80(1.60)	679.75	322.00	357.75	155.03
J-22	128.80(1.60)	679.30	466.00	213.30	92.43
J-24	128.80(1.60)	678.68	550.00	128.68	55.76
J-28	68.80(1.60)	673.23	488.00	185.23	80.27
J-29	70.40(1.60)	671.41	483.00	188.41	81.65
J-32	0.00	677.65	516.00	161.65	70.05
J-36	3000.00(**)	667.50	482.00	185.50	80.38
J-40	0.00	669.72	475.00	194.72	84.38
J-41	70.40(1.60)	670.37	483.00	187.37	81.20
J-42	70.40(1.60)	670.36	490.00	180.36	78.15
J-43	70.40(1.60)	670.35	495.00	175.35	75.99
J-202	0.00	679.93	322.00	357.93	155.10

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
J-1	219.61	J-24	55.76
J-202	155.10	J-8	62.83
J-20	155.03	J-4	68.79

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-85	4.79	P-27	0.09
P-63	3.29	P-23	0.09
P-62	3.18	P-68	0.11

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

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

NODE NAME	FLOWRATE gpm	NODE TITLE
Ocean View	1608.40	
Princess Pa	2772.40	

NET SYSTEM INFLOW = 4380.80
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 4380.80

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Case: 4

C H A N G E S F O R N E X T S I M U L A T I O N (Change Number = 4)

Maximum Day Demand plus 3,000 gpm at Node 41

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 3 TRIALS: ACCURACY = 0.52635E-04

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	Ocean View	J-4	1558.72	0.23	0.00	0.71	0.08	0.08
P-2	J-202	J-1	1392.91	3.61	0.00	2.22	1.34	1.34
P-3	Otay Mesa	J-16	0.00	0.00	0.00	0.00	0.00	0.00
P-4	J-1	J-5	1392.91	7.36	0.00	2.22	1.34	1.34
P-6	J-5	J-41	3140.80	3.80	0.00	5.01	6.03	6.03
P-7	J-202	J-20	1429.17	0.17	0.00	0.65	0.07	0.07
P-11	J-4	J-8	1429.92	0.72	0.00	1.01	0.20	0.20
P-15	J-8	J-10	386.40	0.05	0.00	0.27	0.02	0.02
P-19	J-12	J-10	-198.16	0.01	0.00	0.14	0.01	0.01
P-23	J-10	J-12	59.44	0.01	0.00	0.09	0.00	0.00
P-27	J-16	J-12	-128.80	0.01	0.00	0.09	0.00	0.00
P-31	J-8	J-24	228.68	0.28	0.00	0.65	0.19	0.19
P-35	J-8	J-24	228.68	0.28	0.00	0.65	0.19	0.19
P-39	J-8	J-24	228.68	0.28	0.00	0.65	0.19	0.19
P-43	J-8	J-24	228.68	0.28	0.00	0.65	0.19	0.19
P-47	J-22	J-24	1171.57	0.57	0.00	0.83	0.13	0.13
P-50	OWD Interc	J-12	0.00	0.00	0.00	0.00	0.00	0.00
P-51	J-24	J-32	978.74	0.94	0.00	1.56	0.70	0.70
P-55	J-24	J-32	978.74	0.94	0.00	1.56	0.70	0.70
P-62	J-28	J-29	1888.69	1.65	0.00	3.01	2.35	2.35
P-63	J-32	J-28	1957.49	4.02	0.00	3.12	2.51	2.51
P-65	J-40	J-5	1747.89	1.67	0.00	2.79	2.04	2.04
P-66	J-29	J-40	1818.29	1.53	0.00	2.90	2.19	2.19
P-67	J-41	J-42	140.80	0.02	0.00	0.22	0.02	0.02
P-68	J-42	J-43	70.40	0.00	0.00	0.11	0.01	0.01
P-85	J-40	J-36	70.40	0.00	0.00	0.11	0.01	0.01
P-101	J-20	J-22	1300.37	0.42	0.00	0.92	0.16	0.16
P-201	Princess P	J-202	2822.08	0.07	0.00	1.28	0.23	0.23

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
Ocean View		----	680.00			
Otay Mesa		0.00	678.98			
OWD Interc		0.00	678.99			
Princess P		----	680.00			
J-1		0.00	676.32	170.00	506.32	219.40
J-4		128.80(1.60)	679.77	521.00	158.77	68.80

J-5	0.00	668.96	470.00	198.96	86.21
J-8	128.80(1.60)	679.05	534.00	145.05	62.85
J-10	128.80(1.60)	679.00	517.00	162.00	70.20
J-12	128.80(1.60)	678.99	516.00	162.99	70.63
J-16	128.80(1.60)	678.98	333.00	345.98	149.92
J-20	128.80(1.60)	679.76	322.00	357.76	155.03
J-22	128.80(1.60)	679.34	466.00	213.34	92.45
J-24	128.80(1.60)	678.77	550.00	128.77	55.80
J-28	68.80(1.60)	673.81	488.00	185.81	80.52
J-29	70.40(1.60)	672.16	483.00	189.16	81.97
J-32	0.00	677.83	516.00	161.83	70.13
J-36	70.40(1.60)	670.62	482.00	188.62	81.74
J-40	0.00	670.63	475.00	195.63	84.77
J-41	3000.00(**)	665.15	483.00	182.15	78.93
J-42	70.40(1.60)	665.14	490.00	175.14	75.89
J-43	70.40(1.60)	665.13	495.00	170.13	73.72
J-202	0.00	679.93	322.00	357.93	155.10

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
J-1	219.40	J-24	55.80
J-202	155.10	J-8	62.85
J-20	155.03	J-4	68.80

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-6	5.01	P-27	0.09
P-63	3.12	P-23	0.09
P-62	3.01	P-68	0.11

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

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

NODE NAME	FLOWRATE gpm	NODE TITLE
Ocean View	1558.72	
Princess Pa	2822.08	

NET SYSTEM INFLOW = 4380.80
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 4380.80

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Case: 5

C H A N G E S F O R N E X T S I M U L A T I O N (Change Number = 5)

Maximum Day Demand plus 3,000 gpm at Node 43
Pipe Break (Pipe 4 Closed)

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

Pipe P-4 is CLOSED

RESULTS OBTAINED AFTER 3 TRIALS: ACCURACY = 0.16091E-07

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	Ocean View	J-4	2240.65	0.45	0.00	1.02	0.15	0.15
P-2	J-202	J-1	0.00	0.00	0.00	0.00	0.00	0.00
P-3	Otay Mesa	J-16	0.00	0.00	0.00	0.00	0.00	0.00
P-4-XX	J-1	J-5						
P-6	J-5	J-41	3140.80	3.80	0.00	5.01	6.03	6.03
P-7	J-202	J-20	2140.15	0.36	0.00	0.97	0.14	0.14
P-11	J-4	J-8	2111.85	1.49	0.00	1.50	0.40	0.40
P-15	J-8	J-10	386.40	0.05	0.00	0.27	0.02	0.02
P-19	J-12	J-10	-198.16	0.01	0.00	0.14	0.01	0.01
P-23	J-10	J-12	59.44	0.01	0.00	0.09	0.00	0.00
P-27	J-16	J-12	-128.80	0.01	0.00	0.09	0.00	0.00
P-31	J-8	J-24	399.16	0.78	0.00	1.13	0.54	0.54
P-35	J-8	J-24	399.16	0.78	0.00	1.13	0.54	0.54
P-39	J-8	J-24	399.16	0.78	0.00	1.13	0.54	0.54
P-43	J-8	J-24	399.16	0.78	0.00	1.13	0.54	0.54
P-47	J-22	J-24	1882.55	1.38	0.00	1.34	0.32	0.32
P-50	OWD Interc	J-12	0.00	0.00	0.00	0.00	0.00	0.00
P-51	J-24	J-32	1675.20	2.54	0.00	2.67	1.88	1.88
P-55	J-24	J-32	1675.20	2.54	0.00	2.67	1.88	1.88
P-62	J-28	J-29	3281.60	4.58	0.00	5.24	6.54	6.54
P-63	J-32	J-28	3350.40	10.88	0.00	5.35	6.80	6.80
P-65	J-40	J-5	3140.80	4.95	0.00	5.01	6.03	6.03
P-66	J-29	J-40	3211.20	4.40	0.00	5.12	6.29	6.29
P-67	J-41	J-42	3070.40	5.50	0.00	4.90	5.79	5.79
P-68	J-42	J-43	3000.00	2.77	0.00	4.79	5.54	5.54
P-85	J-40	J-36	70.40	0.00	0.00	0.11	0.01	0.01
P-101	J-20	J-22	2011.35	0.94	0.00	1.43	0.37	0.37
P-201	Princess P	J-202	2140.15	0.04	0.00	0.97	0.14	0.14

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
Ocean View		----	680.00			
Otay Mesa		0.00	677.99			
OWD Interc		0.00	678.00			
Princess P		----	680.00			
J-1		0.00	679.96	170.00	509.96	220.98

J-4	128.80(1.60)	679.55	521.00	158.55	68.70
J-5	0.00	649.93	470.00	179.93	77.97
J-8	128.80(1.60)	678.06	534.00	144.06	62.43
J-10	128.80(1.60)	678.01	517.00	161.01	69.77
J-12	128.80(1.60)	678.00	516.00	162.00	70.20
J-16	128.80(1.60)	677.99	333.00	344.99	149.50
J-20	128.80(1.60)	679.60	322.00	357.60	154.96
J-22	128.80(1.60)	678.66	466.00	212.66	92.15
J-24	128.80(1.60)	677.28	550.00	127.28	55.16
J-28	68.80(1.60)	663.86	488.00	175.86	76.21
J-29	70.40(1.60)	659.28	483.00	176.28	76.39
J-32	0.00	674.74	516.00	158.74	68.79
J-36	70.40(1.60)	654.88	482.00	172.88	74.91
J-40	0.00	654.88	475.00	179.88	77.95
J-41	70.40(1.60)	646.13	483.00	163.13	70.69
J-42	70.40(1.60)	640.63	490.00	150.63	65.27
J-43	3000.00(**)	637.86	495.00	142.86	61.91
J-202	0.00	679.96	322.00	357.96	155.12

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
J-1	220.98	J-24	55.16
J-202	155.12	J-43	61.91
J-20	154.96	J-8	62.43

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-63	5.35	P-27	0.09
P-62	5.24	P-23	0.09
P-66	5.12	P-85	0.11

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

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

NODE NAME	FLOWRATE gpm	NODE TITLE
Ocean View	2240.65	
Princess Pa	2140.15	

NET SYSTEM INFLOW = 4380.80
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 4380.80

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Case: 6

C H A N G E S F O R N E X T S I M U L A T I O N (Change Number = 6)

Maximum Day Demand plus 3,000 gpm at Node 43
Pipe Break (Pipe 63 Closed)

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

Pipe P-4 is OPENED
Pipe P-63 is CLOSED

RESULTS OBTAINED AFTER 4 TRIALS: ACCURACY = 0.37806E-06

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	Ocean View	J-4	653.01	0.05	0.00	0.30	0.02	0.02
P-2	J-202	J-1	3350.40	18.36	0.00	5.35	6.80	6.80
P-3	Otay Mesa	J-16	0.00	0.00	0.00	0.00	0.00	0.00
P-4	J-1	J-5	3350.40	37.40	0.00	5.35	6.80	6.80
P-6	J-5	J-41	3140.80	3.80	0.00	5.01	6.03	6.03
P-7	J-202	J-20	377.39	0.01	0.00	0.17	0.01	0.01
P-11	J-4	J-8	524.21	0.11	0.00	0.37	0.03	0.03
P-15	J-8	J-10	386.40	0.05	0.00	0.27	0.02	0.02
P-19	J-12	J-10	-198.16	0.01	0.00	0.14	0.01	0.01
P-23	J-10	J-12	59.44	0.01	0.00	0.09	0.00	0.00
P-27	J-16	J-12	-128.80	0.01	0.00	0.09	0.00	0.00
P-31	J-8	J-24	2.25	0.00	0.00	0.01	0.00	0.00
P-35	J-8	J-24	2.25	0.00	0.00	0.01	0.00	0.00
P-39	J-8	J-24	2.25	0.00	0.00	0.01	0.00	0.00
P-43	J-8	J-24	2.25	0.00	0.00	0.01	0.00	0.00
P-47	J-22	J-24	119.79	0.01	0.00	0.08	0.00	0.00
P-50	OWD Interc	J-12	0.00	0.00	0.00	0.00	0.00	0.00
P-51	J-24	J-32	0.00	0.00	0.00	0.00	0.00	0.00
P-55	J-24	J-32	0.00	0.00	0.00	0.00	0.00	0.00
P-62	J-28	J-29	-68.80	0.00	0.00	0.11	0.01	0.01
P-63-XX	J-32	J-28						
P-65	J-40	J-5	-209.60	0.03	0.00	0.33	0.04	0.04
P-66	J-29	J-40	-139.20	0.01	0.00	0.22	0.02	0.02
P-67	J-41	J-42	3070.40	5.50	0.00	4.90	5.79	5.79
P-68	J-42	J-43	3000.00	2.77	0.00	4.79	5.54	5.54
P-85	J-40	J-36	70.40	0.00	0.00	0.11	0.01	0.01
P-101	J-20	J-22	248.59	0.02	0.00	0.18	0.01	0.01
P-201	Princess P	J-202	3727.79	0.12	0.00	1.69	0.39	0.39

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
Ocean View		----	680.00			

Otay Mesa	0.00	679.77			
OWD Interc	0.00	679.78			
Princess P	----	680.00			
J-1	0.00	661.52	170.00	491.52	212.99
J-4	128.80(1.60)	679.95	521.00	158.95	68.88
J-5	0.00	624.12	470.00	154.12	66.79
J-8	128.80(1.60)	679.84	534.00	145.84	63.20
J-10	128.80(1.60)	679.79	517.00	162.79	70.54
J-12	128.80(1.60)	679.78	516.00	163.78	70.97
J-16	128.80(1.60)	679.77	333.00	346.77	150.27
J-20	128.80(1.60)	679.87	322.00	357.87	155.08
J-22	128.80(1.60)	679.85	466.00	213.85	92.67
J-24	128.80(1.60)	679.84	550.00	129.84	56.26
J-28	68.80(1.60)	624.07	488.00	136.07	58.96
J-29	70.40(1.60)	624.07	483.00	141.07	61.13
J-32	0.00	679.84	516.00	163.84	71.00
J-36	70.40(1.60)	624.09	482.00	142.09	61.57
J-40	0.00	624.09	475.00	149.09	64.60
J-41	70.40(1.60)	620.32	483.00	137.32	59.50
J-42	70.40(1.60)	614.82	490.00	124.82	54.09
J-43	3000.00(**)	612.05	495.00	117.05	50.72
J-202	0.00	679.88	322.00	357.88	155.08

M A X I M U M A N D M I N I M U M V A L U E S

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
J-1	212.99	J-43	50.72
J-202	155.08	J-42	54.09
J-20	155.08	J-24	56.26

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-2	5.35	P-51	0.00
P-4	5.35	P-55	0.00
P-6	5.01	P-43	0.01

S U M M A R Y O F I N F L O W S A N D O U T F L O W S

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

NODE NAME	FLOWRATE gpm	NODE TITLE
Ocean View	653.01	
Princess Pa	3727.79	

NET SYSTEM INFLOW = 4380.80
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 4380.80

***** HYDRAULIC ANALYSIS COMPLETED *****

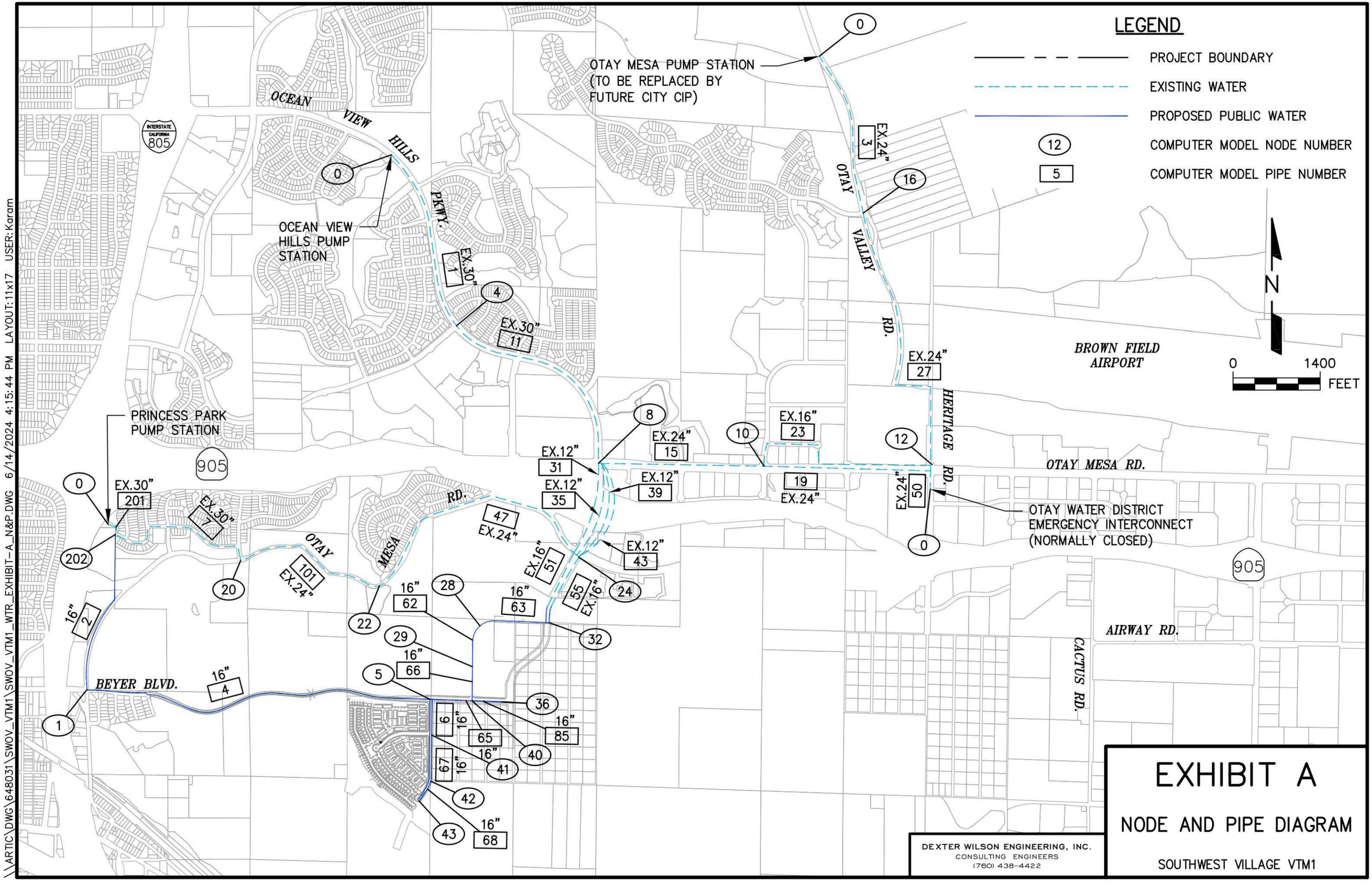


EXHIBIT A

NODE AND PIPE DIAGRAM

SOUTHWEST VILLAGE VTM1

DEXTER WILSON ENGINEERING, INC.
CONSULTING ENGINEERS
(760) 438-4422

APPENDIX C

RESPONSE TO CITY COMMENTS

(No outstanding comments at time of study)

APPENDIX D

PRIVATE WATER INFORMATION

SW Village VTM 1
Domestic Water System Analysis

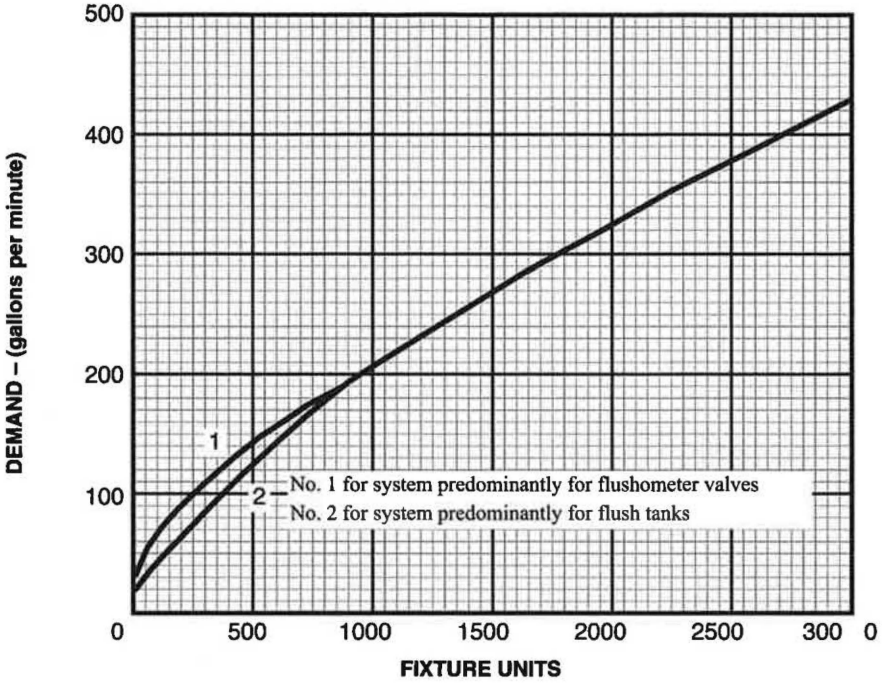
Job Number 648-031
Date December 20, 2022

Water Fixture Units:

DESCRIPTION	PA 8			PA 9			PA 10			PA 11			PA 12			PA 13			PA 14		
	QUANTITY	FIXTURE UNITS EACH	TOTAL FIXTURE UNITS	QUANTITY	FIXTURE UNITS EACH	TOTAL FIXTURE UNITS	QUANTITY	FIXTURE UNITS EACH	TOTAL FIXTURE UNITS	QUANTITY	FIXTURE UNITS EACH	TOTAL FIXTURE UNITS	QUANTITY	FIXTURE UNITS EACH	TOTAL FIXTURE UNITS	QUANTITY	FIXTURE UNITS EACH	TOTAL FIXTURE UNITS	QUANTITY	FIXTURE UNITS EACH	TOTAL FIXTURE UNITS
CLOTHES WASHER	1	4	4	1	4	4	1	4	4	1	4	4	1	4	4	1	4	4	1	4	4
TUB/SHOWER	2	4	8	2	4	8	3	4	12	3	4	12	3	4	12	3	4	12	3	4	12
SHOWER	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2	1	2	2
KITCHEN SINK	1	1.5	1.5	1	1.5	1.5	1	1.5	1.5	1	1.5	1.5	1	1.5	1.5	1	1.5	1.5	1	1.5	1.5
BAR SINK	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0
DISHWASHER	1	1.5	1.5	1	1.5	1.5	1	1.5	1.5	1	1.5	1.5	1	1.5	1.5	1	1.5	1.5	1	1.5	1.5
LAUNDRY SINK	0	1.5	0	0	1.5	0	1	1.5	1.5	1	1.5	1.5	1	1.5	1.5	1	1.5	1.5	1	1.5	1.5
LAVATORY	4	1	4	4	1	4	5	1	5	5	1	5	5	1	5	5	1	5	5	1	5
WATER CLOSET (1.6 GPF, private)	3	2.5	7.5	3	2.5	7.5	3	2.5	7.5	3	2.5	7.5	3	2.5	7.5	3	2.5	7.5	3	2.5	7.5
HOSE BIBB	1	2.5	2.5	1	2.5	2.5	1	2.5	2.5	1	2.5	2.5	1	2.5	2.5	1	2.5	2.5	1	2.5	2.5
EACH ADDTL HB	2	1	2	2	1	2	3	1	3	3	1	3	3	1	3	3	1	3	3	1	3
TOTAL			33			33			40.5			40.5			40.5			40.5			40.5

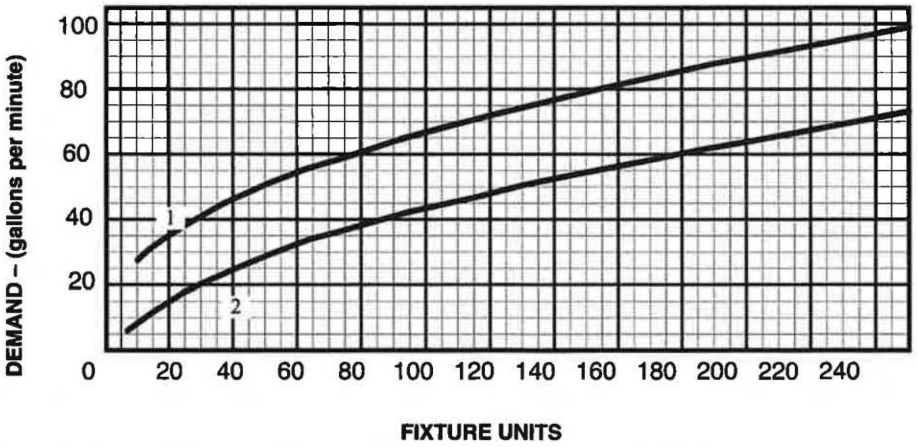
Plan	# of Units	Total WFU
PA 8	185	6105
PA 9	95	3135
PA 10	130	5265
PA 11	168	6804
PA 12	76	3078
PA 13	170	6885
PA 14	96	3888

CHART A 103.1(1)
ESTIMATE CURVES FOR DEMAND LOAD



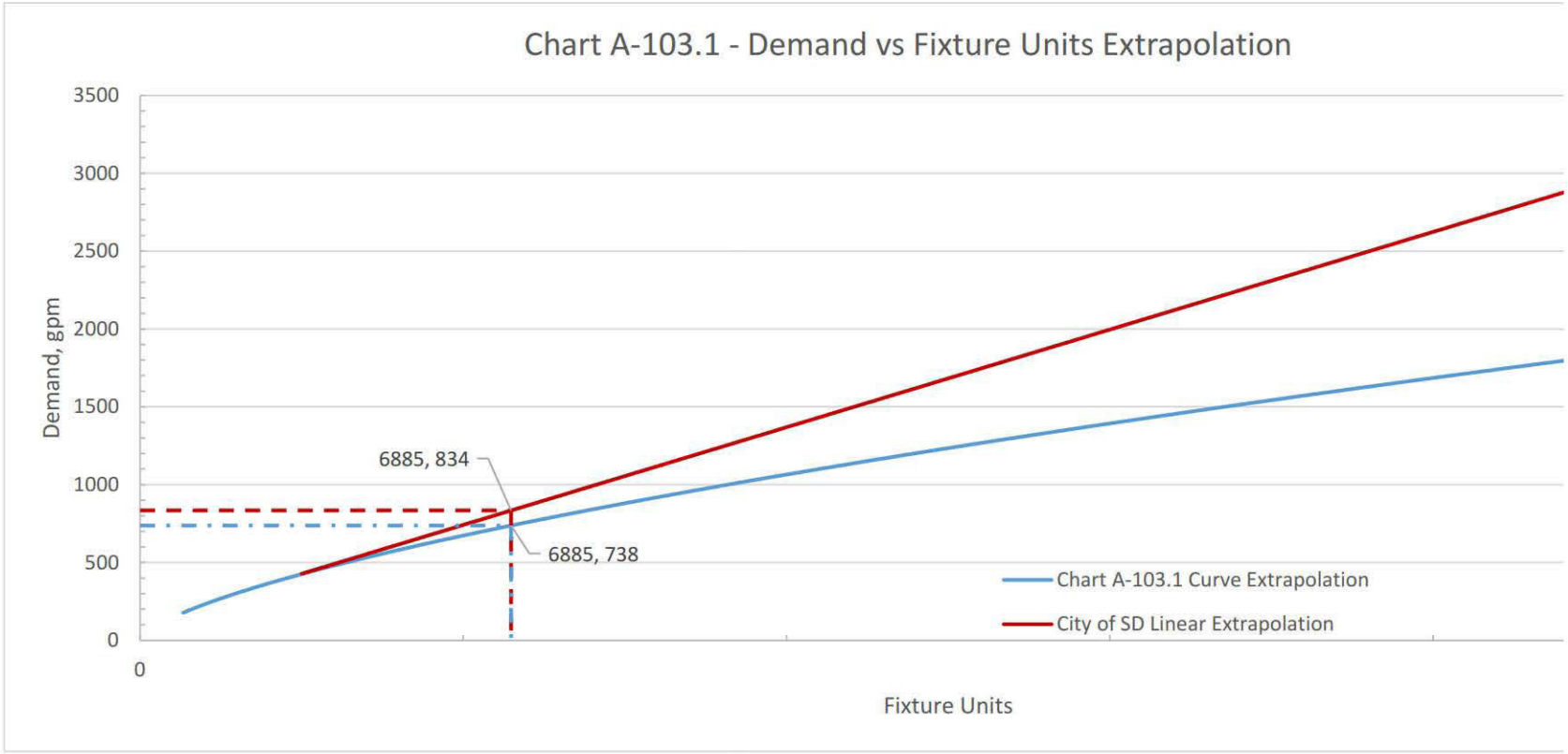
For SI units: 1 gallon per minute = 0.06 L/s

CHART A 103.1(2)
ENLARGED SCALE DEMAND LOAD



For SI units: 1 gallon per minute = 0.06 L/s

WFU	Demand, gpm	Demand, gpm
6,885	834	738



Graph data and line fit are based on Chart A-103.1 from the 2016 CPC.

2015 AWWA Standards for Water Meter Capacities

Meter Size	City of San Diego 1973 AWWA Table		2015 AWWA Standards	
	Max Capacity per AWWA (gpm)	City Uses 80% of Max Capacity (gpm)	Max Capacity per AWWA (gpm)	City Uses 80% of Max Capacity (gpm)
Displacement Type Meters - AWWA C700-15				
5/8 x 3/4	20	16	20	16
3/4	30	24	30	24
1	50	40	50	40
1-1/2	100	80	100	80
2	160	128	160	128
Compound Type Meters - AWWA C702-15				
3	320	250	350	280
4	500	400	600	480
6	1,000	800	1,350	1,080
8	1,600	1,280	1,600	1,280
Turbine Type Meters - AWWA C701-15 Class II				
3	350	280	435	348
4	600	480	750	600
6	1,250	1,000	1,600	1,280
8			2,800	2,240
10			4,200	3,360
12			5,300	4,240
16			7,800	6,240
20			12,000	9,600

August 23, 2016

Notes:

1. Most large water meters are Compound Type Meters.
2. Installation of a Turbine meter requires approval from the Water Systems Technician Supervisor.