Appendix L
Public Water Study

DEXTER WILSON ENGINEERING, INC.

WATER • WASTEWATER • RECYCLED WATER

CONSULTING ENGINEERS

PUBLIC WATER STUDY
FOR THE PASEO MONTRIL PROJECT
IN THE CITY OF SAN DIEGO

January 6, 2021

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

PUBLIC WATER STUDY
FOR THE PASEO MONTRIL PROJECT
IN THE CITY OF SAN DIEGO

January 6, 2021

1-6-2020

Prepared by:
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2234 Faraday Avenue
Carlsbad, CA 92008
(760) 438-4422

Job No. 648-030

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January 6, 2021 648-030

Pardee Homes
13400 Sabre Springs Parkway, Suite 200
San Diego, CA 92128

Attention: Tiffany Finstad, Director of Project Management

Subject: Public Water Study for the Paseo Montril Project in the City of San Diego

Introduction

This report provides a public water study for the Paseo Montril project in the City of San Diego. The project is located in the Rancho Penasquitos community at the eastern terminus of Paseo Montril approximately 600 feet east of Rancho Penasquitos Boulevard. Figure 1 provides a location map for the project.

The project encompasses 15.2 gross acres (3.1 net acres) and the existing land is currently composed of open space. The project proposes to develop the site to incorporate 55 multi-family residential units. Proposed finished floor elevations for the project range from approximately 502 feet to 512 feet.

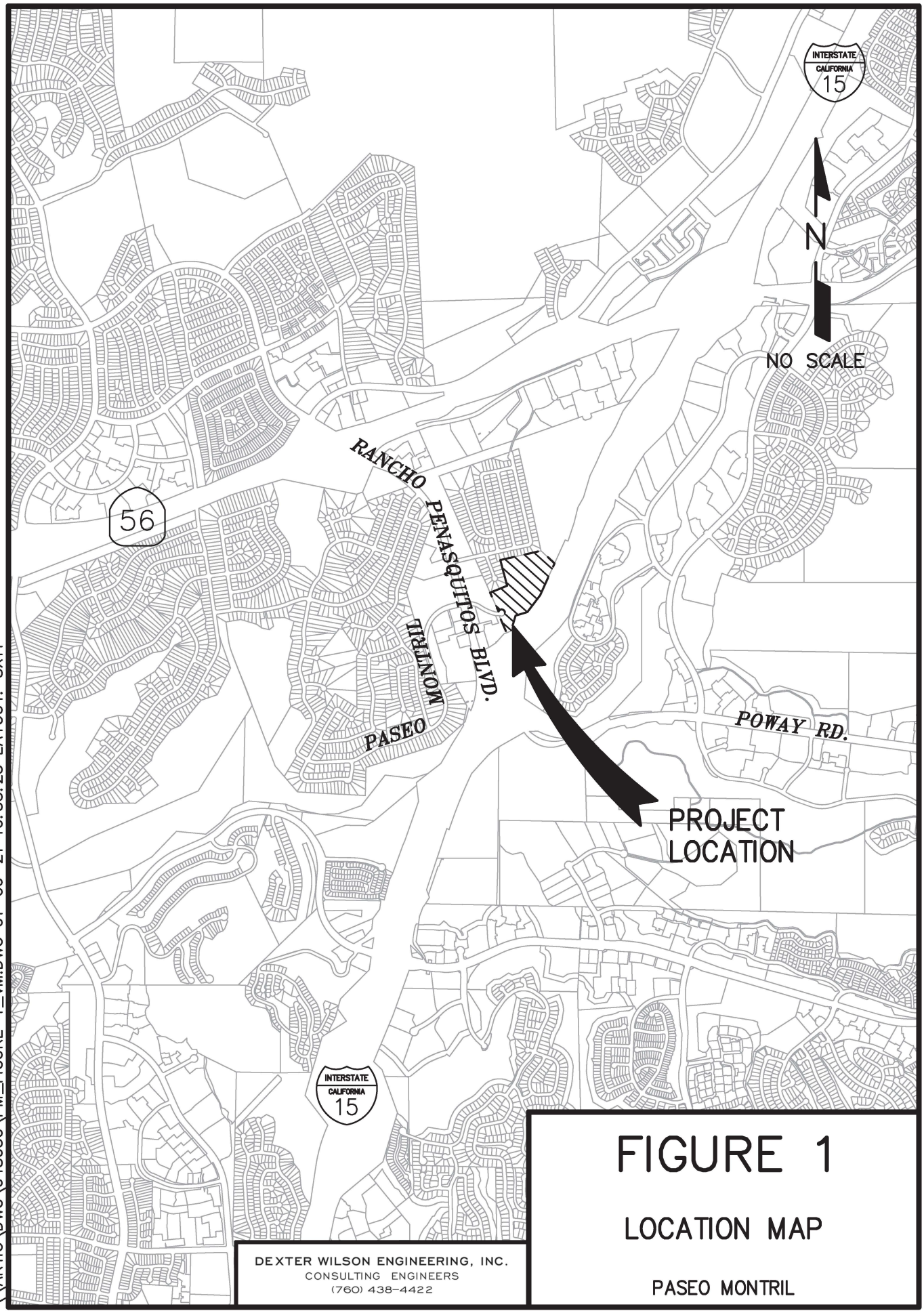

FIGURE 1

LOCATION MAP

PASEO MONTRIL

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Purpose of Study

The purpose of this study is to analyze and determine if the existing public water system is able to provide adequate domestic and fire protection service for the Paseo Montril project. This report will address if any offsite (public) water system improvements are needed for the development of the project so that the offsite water system will be in conformance with the City of San Diego Public Utilities water system design standards.

An overview of the proposed private water system(s) will be presented as well. In conformance with City design and operations standards, there will be two separate private onsite water systems. A looped fire protection system along with a private domestic system will be constructed as part of the onsite water system and connected to the City system.

Study Area

The study area for this report is the boundary of the Paseo Montril project and the water system surrounding the project. The extent of the existing water system which was incorporated into the analysis of the project site was based on the existing Rancho Bernardo 793 Zone distribution system that serves the area. Adjacent water mains were included in the computer model to ensure that the dynamics of the existing water system were analyzed as closely as possible without modeling the entire pressure zone.

Hydrant flow test data was provided by the City at an existing public hydrant adjacent to the project at the end of the Paseo Montril cul-de-sac. A copy of the hydrant flow test is included in Appendix B.

All onsite water lines will be private and will connect to the City's public water system via backflow preventers and meters at the end of the Paseo Montril cul-de-sac. A preliminary analysis of the onsite domestic and private fire protection system is included in this report. A complete analysis of the private domestic and fire protection water facilities will be under a separate report/study.

Paseo Montril Project Water Demand

The water demands were developed in accordance with the City of San Diego Design Guidelines and Standards. Multi-family residential water demand is estimated based on density and a unit water demand of 150 gpd/person. The Paseo Montril project proposes 55 residential units over 3.1 net acres equaling 18 units per acre. Table 2-1 in the City of San Diego Design Guidelines and Standards, attached as Appendix A, indicates that 28 units per acre falls in the range of approximately 3.0 persons per dwelling unit. A dwelling unit density of 3.0 persons per dwelling unit and a unit water demand of 150 gpd/person results in a water demand rate of 450 gpd per multi-family dwelling unit at the project.

Table 1 presents the projected potable water demand for the Paseo Montril project.

TABLE 1
PASEO MONTRIL PROJECT
POTABLE WATER DEMAND

Land Use	Quantity	Demand Factor	Average Water Use, gpd
Multi-Family Residential (28 DUs/net acre)	55 Units	450 gpd/DU	24,750
TOTAL			**24,750 = 17.2 gpm**

From the City of San Diego Guidelines and Standards, Figure 2-2, the maximum day demand to average annual demand ratio is approximately 3.6 based on the Inland North peaking curve, resulting in an estimated maximum day demand of 89,100 gpd (62 gpm).

From the City of San Diego Guidelines and Standards, Figure 2-1, the peak hour demand to average annual demand ratio is approximately 7.4 based on the Inland North peaking curve, resulting in an estimated peak hour demand of 183,150 gpd (127 gpm).

Appendix A of this report presents the backup data for determining these peaking factors. For estimating the peaking factors, average demand was based on the project's average demand.

An irrigation water demand for the project is estimated to be 948 gpd based on the current landscape plan.

City of San Diego Design Criteria

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

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

TABLE 2
CITY OF SAN DIEGO
WATER SYSTEM DESIGN CRITERIA

Criteria	Design Requirement
Multi-Family Residential Fire Flow	3,000 gpm
Minimum Static Pressure	65 psi
Maximum Static Pressure	120 psi
Maximum Pressure Drop – Reservoir Out of Service	40 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

[1] Section 3.3.1 E
[2] Section 3.10.1

Static and Working Pressures

Maximum static pressures within the Paseo Montril project are calculated based on the Rancho Bernardo 793 Water Service Pressure Zone. Using the static pressure data from the City's hydrant flow test (126 psi at 497 feet equates to 788 HGL static), maximum static pressures within the project will range between 119 psi and 123 psi. This is slightly above the City of San Diego Water System Design Guidelines maximum allowable pressure of 120 psi.

Due to the elevation and the relatively high static pressures at the Paseo Montril project site, individual pressure regulators will be installed for building services in order to comply with the California Plumbing Code which limits pressure inside a dwelling unit to a maximum of 80 psi.

Existing and Proposed Public Water System

There are existing public water facilities directly adjacent to the Paseo Montril project site. The existing facilities are part of the Rancho Bernardo 793 Zone. There is an existing 12-inch diameter public water line in the Paseo Montril cul-de-sac adjacent to the project. An additional 12-inch diameter water line in Paseo Montril will need to be constructed by the project in order to comply with the City's design criteria of having no more than 30 homes on a dead-end water line as well as serving greater than one fire hydrant onsite.

The existing and proposed public water facilities in the vicinity of the project are shown on Figure 2 and a hydraulic control map is presented on Figure 3. The pressure zones (hydraulic control) map shows existing water service areas and pressure zones in the vicinity of the proposed project.

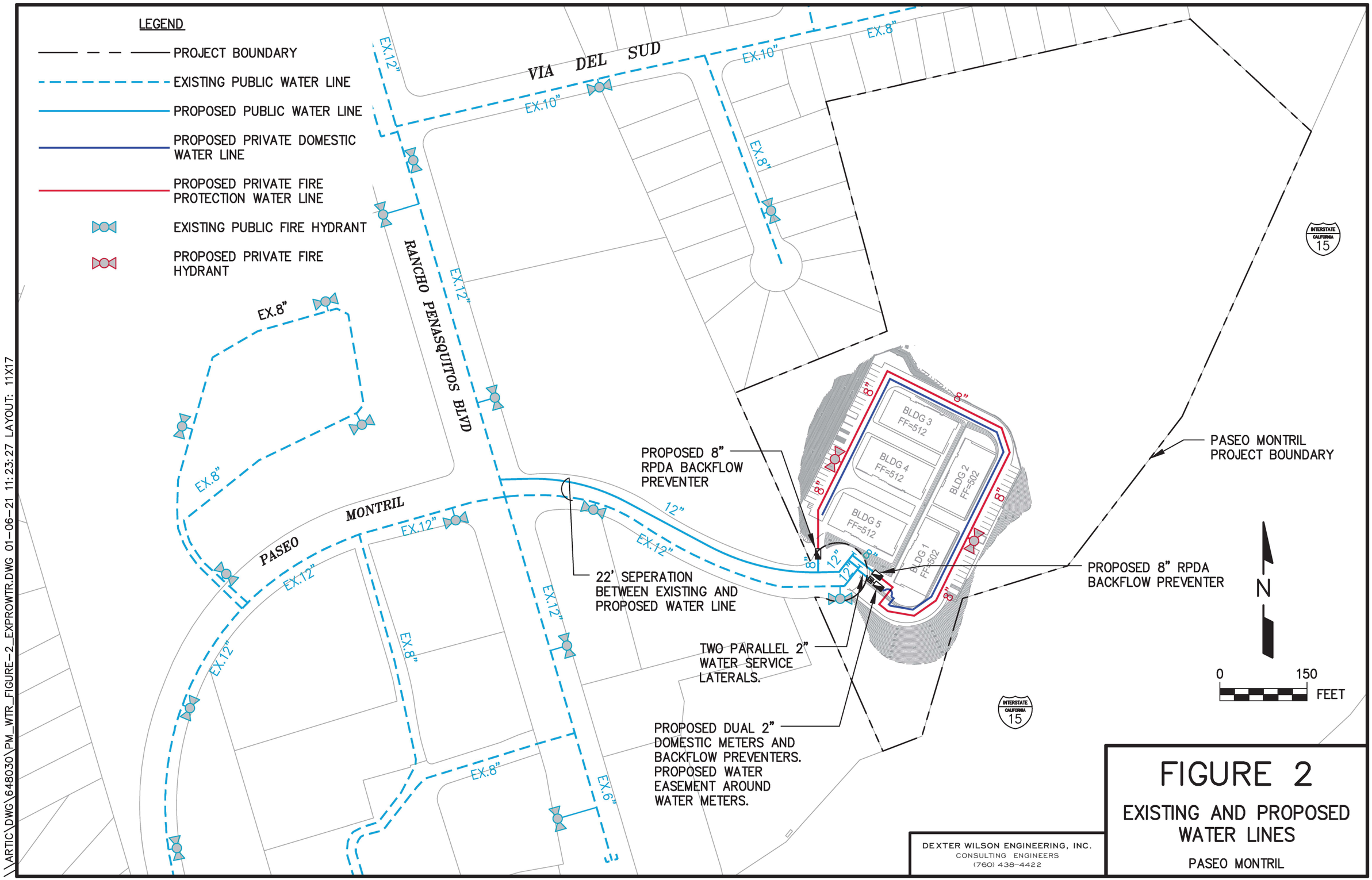

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FIGURE 2

EXISTING AND PROPOSED WATER LINES

PASEO MONTRIL

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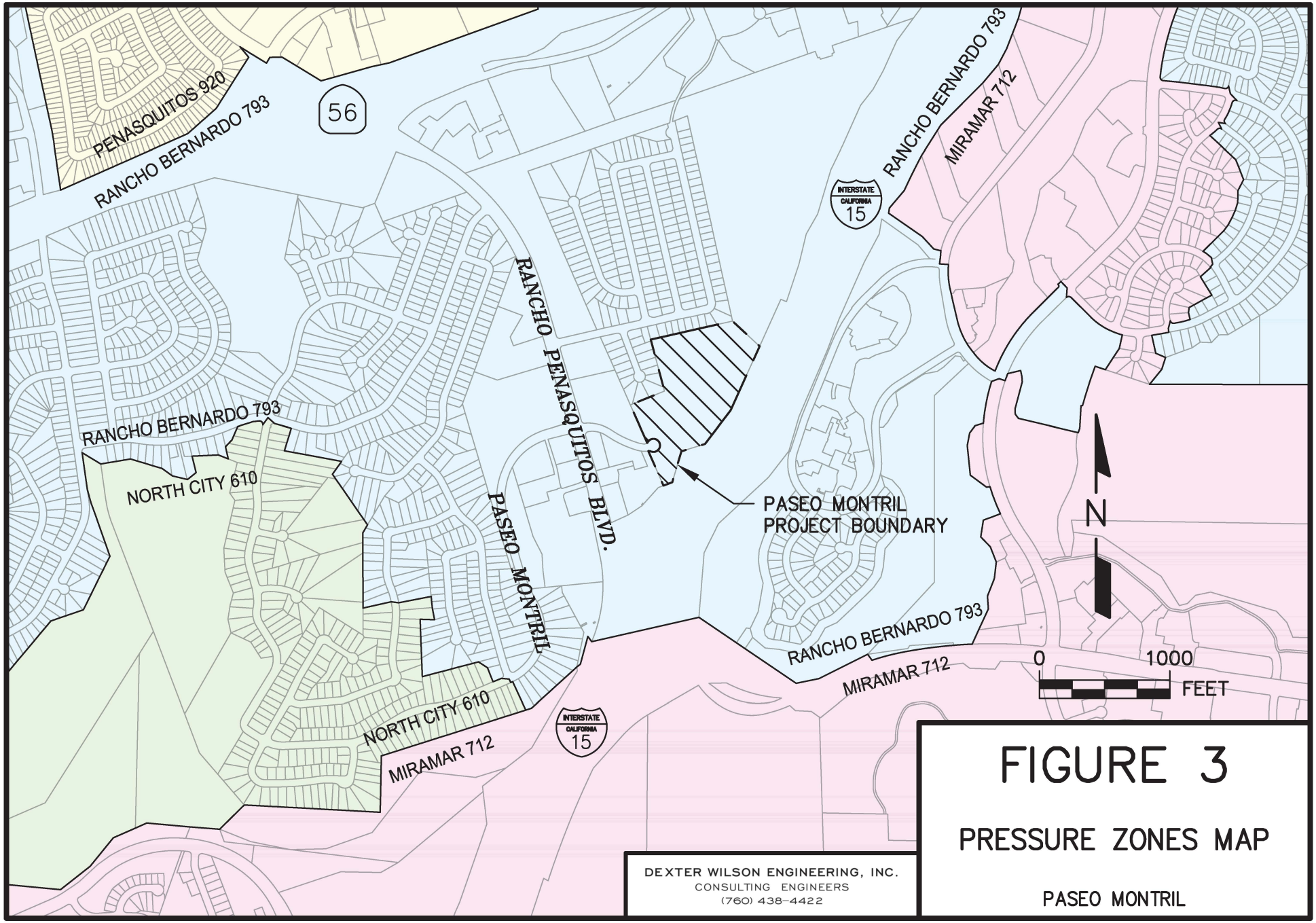

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FIGURE 3

PRESSURE ZONES MAP

PASEO MONTRIL

Proposed Water Meter

Private domestic water service to the Paseo Montril project will be provided through a master meter. This domestic water meter is preliminarily sized based on the California Plumbing Code. The California Plumbing Code uses Water Fixture Units as a basis for determining maximum domestic flow. The preliminary sizing of the project's master water meter is summarized below as well as in Appendix D.

For the Paseo Montril project, the California Plumbing Code estimates the maximum domestic flow to be approximately 250 gpm based on a count of Water Fixture Units based on the proposed residential product type. The city of San Diego Public Utilities Department uses 80 percent of the AWWA meter rating as their maximum allowable flow rate. A 3-inch meter has an AWWA rated capacity of 350 gpm, which means the maximum flow rate allowed by the city of San Diego for a 3-inch meter is 280 gpm. As this is still higher than the estimated demand for Paseo Montril of 250 gpm, a single 3-inch meter is sufficient for Paseo Montril.

The City of San Diego Public Utilities Department, however, also has a policy of installing two parallel meters whenever the peak flow rate exceeds the capacity of a 2-inch meter. Thus, for this project which needs a single 3-inch meter, the Public Utilities Department will instead install two 2-inch meters in parallel. There will be two 2-inch public water service laterals that will flow into the two 2-inch meters with each meter being followed by a 2-inch reduced pressure principle backflow preventer.

The two proposed 2-inch domestic water service laterals will be connected to the proposed 12-inch 793 Zone water line in Paseo Montril.

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 existing public and proposed public water lines in the near vicinity of the project site. The hydraulic grade line (HGL) was determined by a hydrant flow test performed by the Development Services Department of the City. Using the data provided by the hydrant flow test, an extrapolation calculation was done to determine the HGL at various flow values. The location of the test hydrant is on Paseo Montril at the end of its east cul-de-sac adjacent to the project.

This location also was chosen as the source of the water model. Making the test hydrant the location of the water model source allows for a more accurate calculation of the HGL in the vicinity of the project. Utilizing the hydrant flow test and extrapolation calculation described above, an HGL of approximately 788 feet was determined for a static condition and an HGL of approximately 688 feet was determined for a 3,000 gpm fire flow condition. This was inputted as a variable pressure source in the hydraulic model.

A copy of the hydrant flow test and corresponding extrapolation calculation table is included in Appendix B.

Water System Analysis and Results

Appendix C presents the computer modeling results and Exhibit A at the back of this report presents the corresponding Node and Pipe Diagram. The planning-level fire flow guideline of 3,000 gpm was modeled between two onsite proposed private fire hydrants at the project site. A pipe break scenario was also modeled within the public water system.

Under normal operating conditions (all pipes open) the planning-level fire flow of 3,000 gpm is being met with a minimum residual pressure of greater than 61 psi onsite and a maximum pipeline velocity of 9.6 feet per second (fps).

Under the pipe break condition, the fire flow of 3,000 gpm is being met with minimum residual pressures of greater than 48 psi onsite and a maximum pipeline velocity of 9.7 fps.

As presented in the computer model calculations and summary tables in Appendix C, the City's design criteria for a maximum allowable pressure drop of 25 psi under maximum day demand plus fire flow with all pipes open is not being met at the project connection point at the end of Paseo Montril. Pressure drops from static are as high as 48 psi.

The majority of this pressure drop (45 psi) results from the extrapolation of the fire hydrant flow test data (788 HGL static to 684 HGL at 3,062 gpm). This suggests that the flow characteristics resulting in higher than allowable pressure drops in the Rancho Bernardo 793 Zone are inherent to the distribution system for the overall pressure zone and not related specifically to the Paseo Montril project.

For example, a 25 psi drop from measured static at the fire hydrant test location will occur at a flow of 2,250 gpm. Land uses in the vicinity of this test hydrant include a hotel, gas stations, restaurants, and other commercial establishments which correspond to a planning-level fire flow of greater than 2,250 gpm.

The results of the computer hydraulic analyses for the Paseo Montril project indicate that with the addition of a parallel 12-inch diameter public water main in Paseo Montril from Rancho Penasquitos Boulevard to the end of the cul-de-sac, the existing and proposed water system can provide sufficient flow and pressure for the Paseo Montril domestic and fire protection service needs. The public water system with the proposed 12-inch diameter parallel public water line in Paseo Montril can deliver a 3,000 gpm fire flow under a maximum day demand to the project at a residual pressure greater than 48 psi onsite under normal operating conditions and under a pipe break scenario.

Conclusions and Recommendations

The following conclusions and recommendations are summarized based on the water system analysis prepared for the Paseo Montril project.

1. The Paseo Montril project will be supplied from the Rancho Bernardo 793 Zone system.

2. Maximum static pressure within the Paseo Montril project will range between 119 psi and 123 psi. Note that this marginally exceeds the City's design criteria of 120 psi.

3. Private domestic service for the Paseo Montril project will be supplied by two 2-inch domestic water meters. Each 2-inch domestic meter will be followed by a 2-inch reduced pressure principle backflow preventer. The Water Fixture Units for the project must be further evaluated and confirmed during the improvement plan review stage of this project.

4. A maximum day demand plus 3,000 gpm fire flow scenario can be met at the Paseo Montril project site with all residual pressures greater than 48 psi onsite and pipeline velocities less than 15 fps under an all-pipes-open scenario as well as under a pipe break scenario.

5. The Paseo Montril onsite private water systems will be analyzed in whole under a separate report. These facilities are proposed to be private and separate from the City's public water system.

6. Figure 2 presents the existing and proposed public water system surrounding the Paseo Montril project.

7. Due to the elevation of the Paseo Montril project site, individual pressure regulators must be installed for building services in order to comply with the California Plumbing Code which limits pressure inside a dwelling unit to a maximum of 80 psi.

8. The recommended material specification for all new potable water lines is AWWA C900 PVC DR18 Class 235.

9. 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.

SH:ah

Attachments

APPENDIX A

TABLE 2-1 IN THE CITY OF SAN DIEGO DESIGN GUIDELINES AND STANDARDS AND PEAKING FACTOR TABLES

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 and Project Development, or Planning and Development Review Water Review Section, 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)
A-1-10	0.1	3.5	0.4
A-1-5	0.2	3.5	0.7
A-1-1	1	3.5	3.5
R-1-40	1	3.5	3.5
R-1-20	2	3.5	7.0
R-1-10	4	3.5	14
R-1-5	9	3.5	32
R-2	14	3.2	45
R-2A	29	3.0	87
R-3	43	2.6	112
R-3A	73	2.2	161
R-4	109	1.8	196
R-4C	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

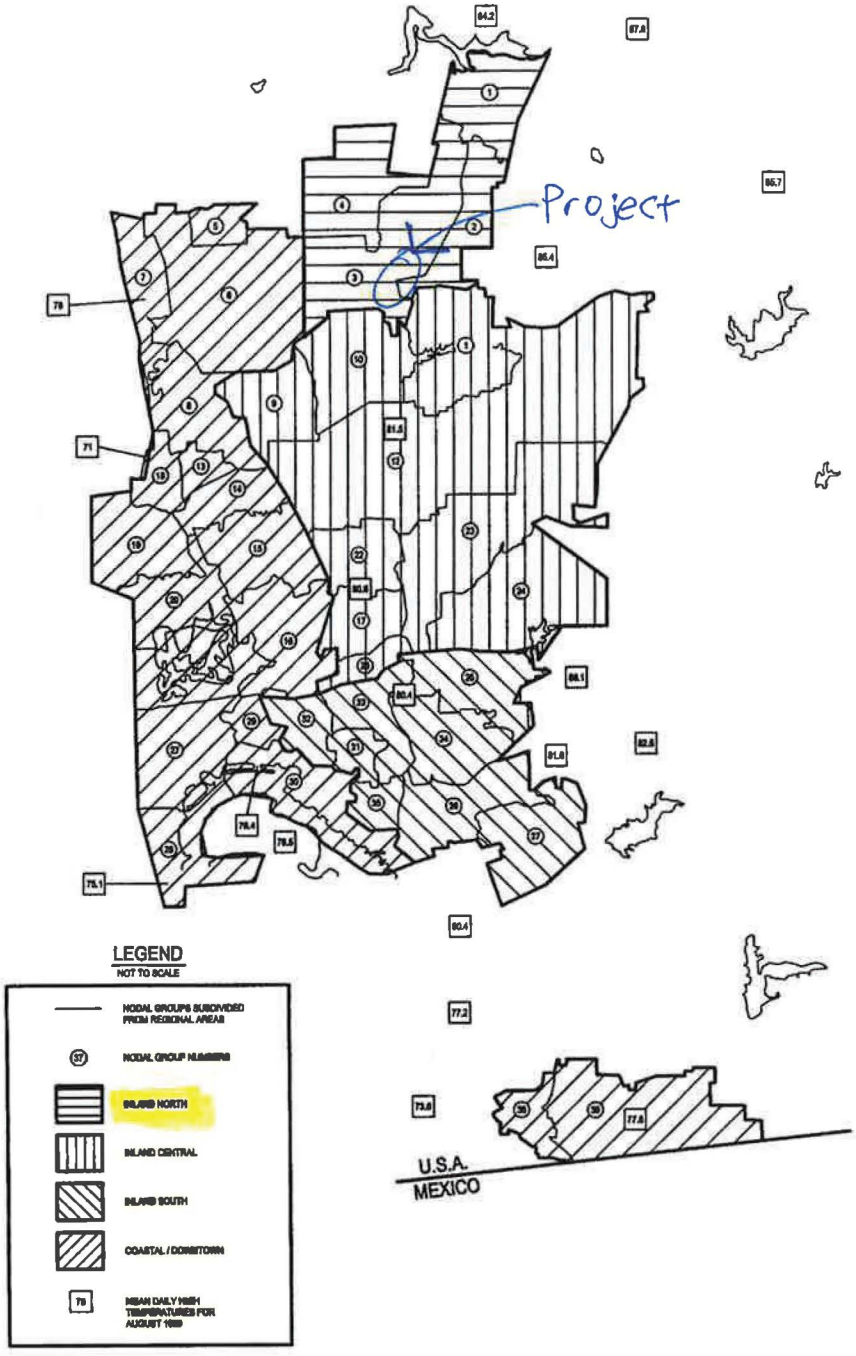
On some projects, particularly large residential developments, using the unit water demands in Table 2-2 may generate unrealistically high estimates of water requirements. For these large projects, the DESIGN CONSULTANT or developer may request that the CIP Project Manager consider an alternative approach, making use of the City's water demand distribution data developed for macroscale planning purposes. Similarly, the CIP Project Manager may also consider alternative unit water demand estimates for specific land use types where such estimates are based on detailed demand evaluations.

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. These peaking factors correspond to the zones identified in Figure 2-3.

PEAKING FACTOR ZONES
(BOUNDARIES BASED ON LAND USE GROUPINGS)

FIGURE 2-3



July 1999

FIGURE 2-2
MAXIMUM DAY DEMAND FACTOR

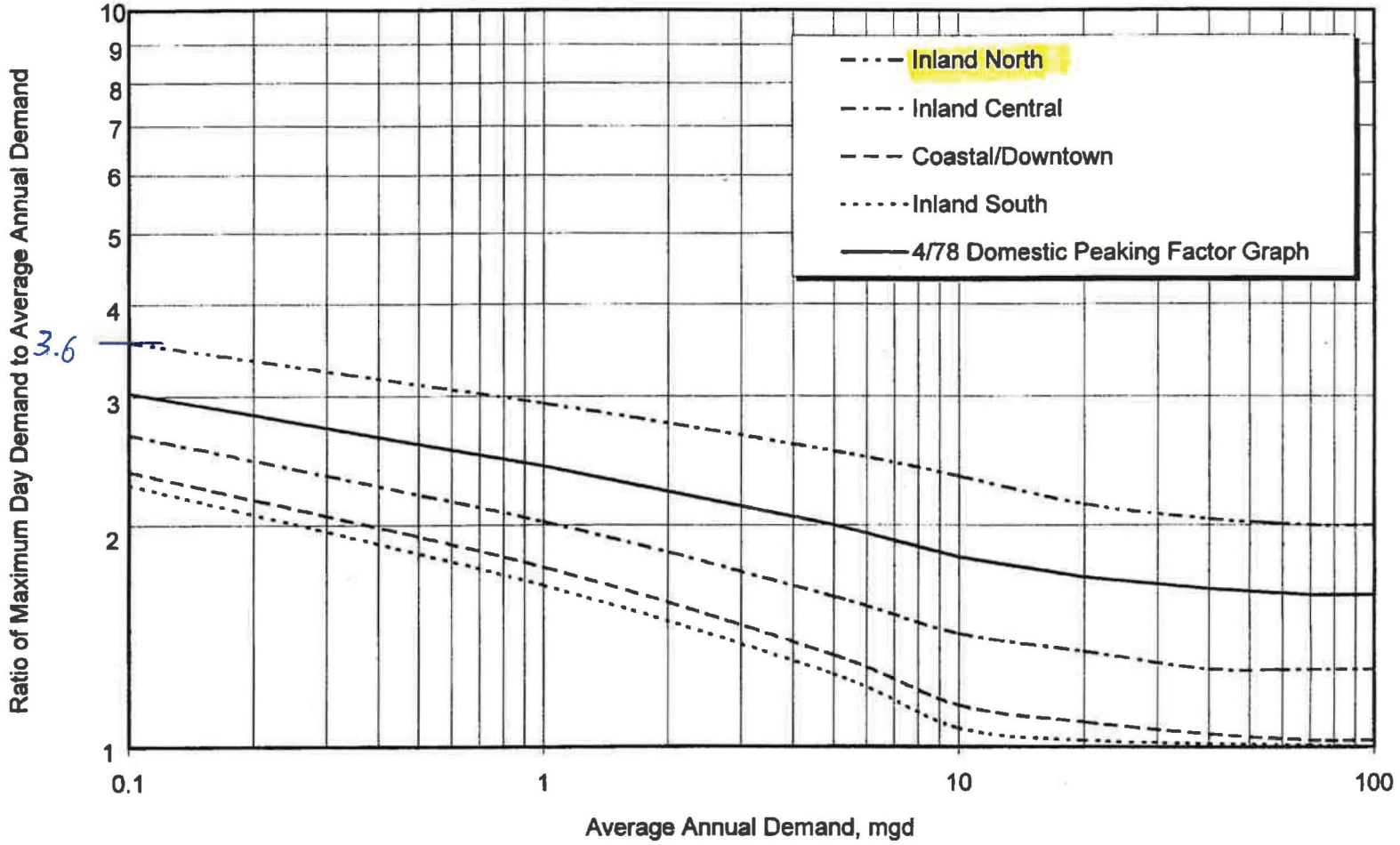
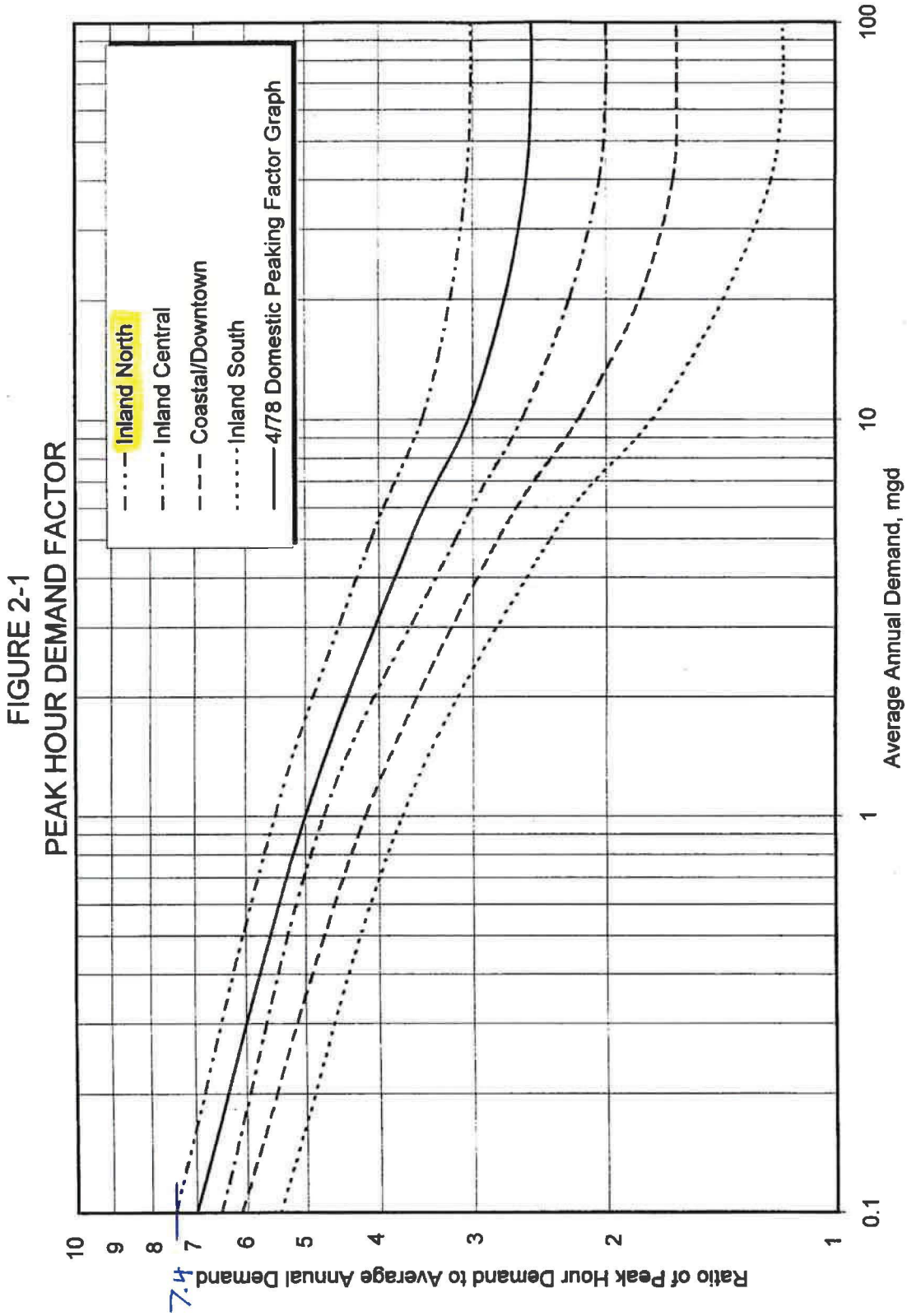


FIGURE 2-1
PEAK HOUR DEMAND FACTOR



APPENDIX B

FIRE HYDRANT FLOW TEST
AND EXTRAPOLATION CALCULATION

City of San Diego
Development Services
Attention: **Hydrant Flow Request**
1222 First Ave., MS-401
San Diego, CA 92101
(619) 446-5000

Hydrant Flow Request

FORM DS-160
October 2016

Fill out the information below completely for all sprinkler system flow requests, including NFPA 13, 13D and 13R systems. E-mail form to: DSDHydrantFlow@sandiego.gov, or mail request to the above address.

Please print or type legibly.

Company Requesting Hydrant Flow:
Dexter Wilson Engineering

Telephone No:	Fax No:	E-mail Address:
760-438-4422	760-438-0173	steven@dwilsoneng.com

Project Number for the Building Permits:
658273

Location of Hydrants:
Paseo Montril

Cross Street:	City:	State:	ZIP Code:
Rancho Penasquitos Blvd.	San Diego	CA	92129

FOR CITY USE ONLY

Facility Sequence Number: (FSN): 5353518

Static: 126 PSI

Elevation: 497 FEET

Pitot: --- PSI

Residual: 112 PSI

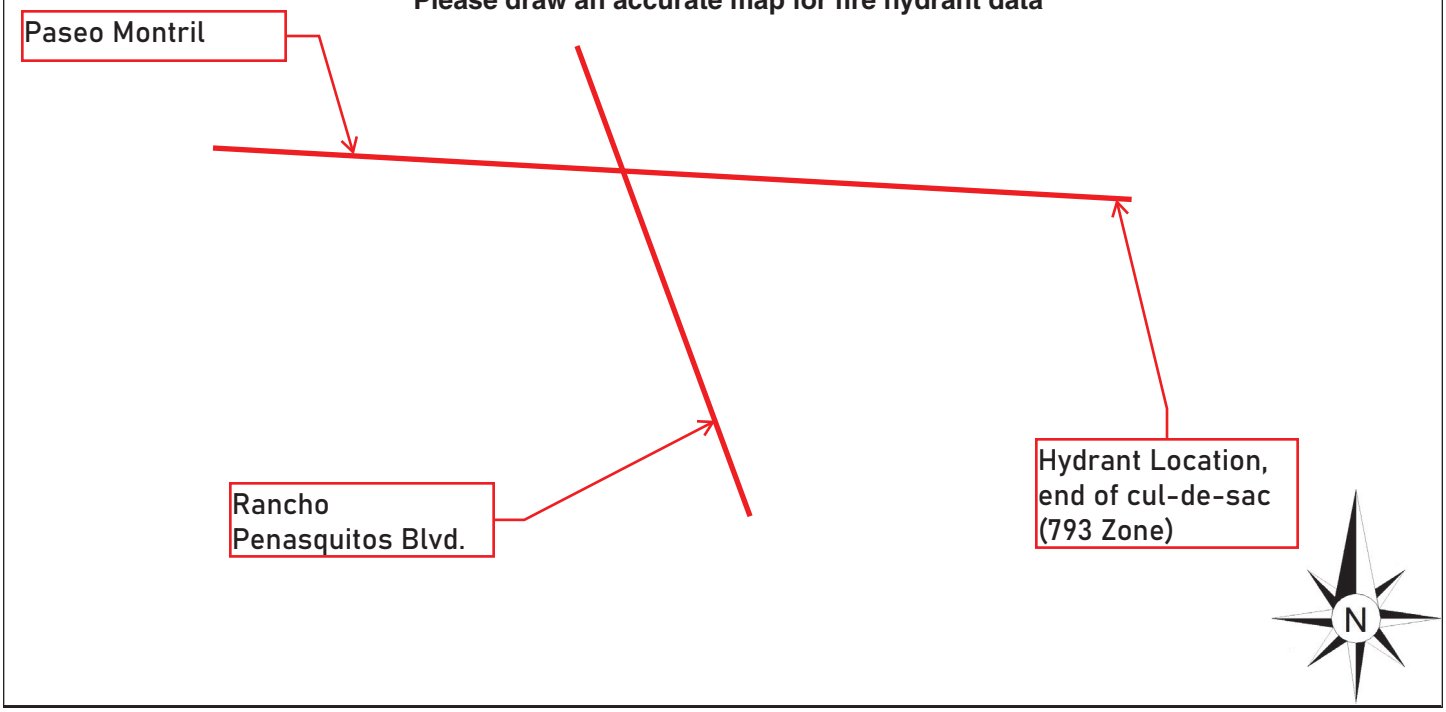
Date: 9/21/20

Flow: 1632 GPM

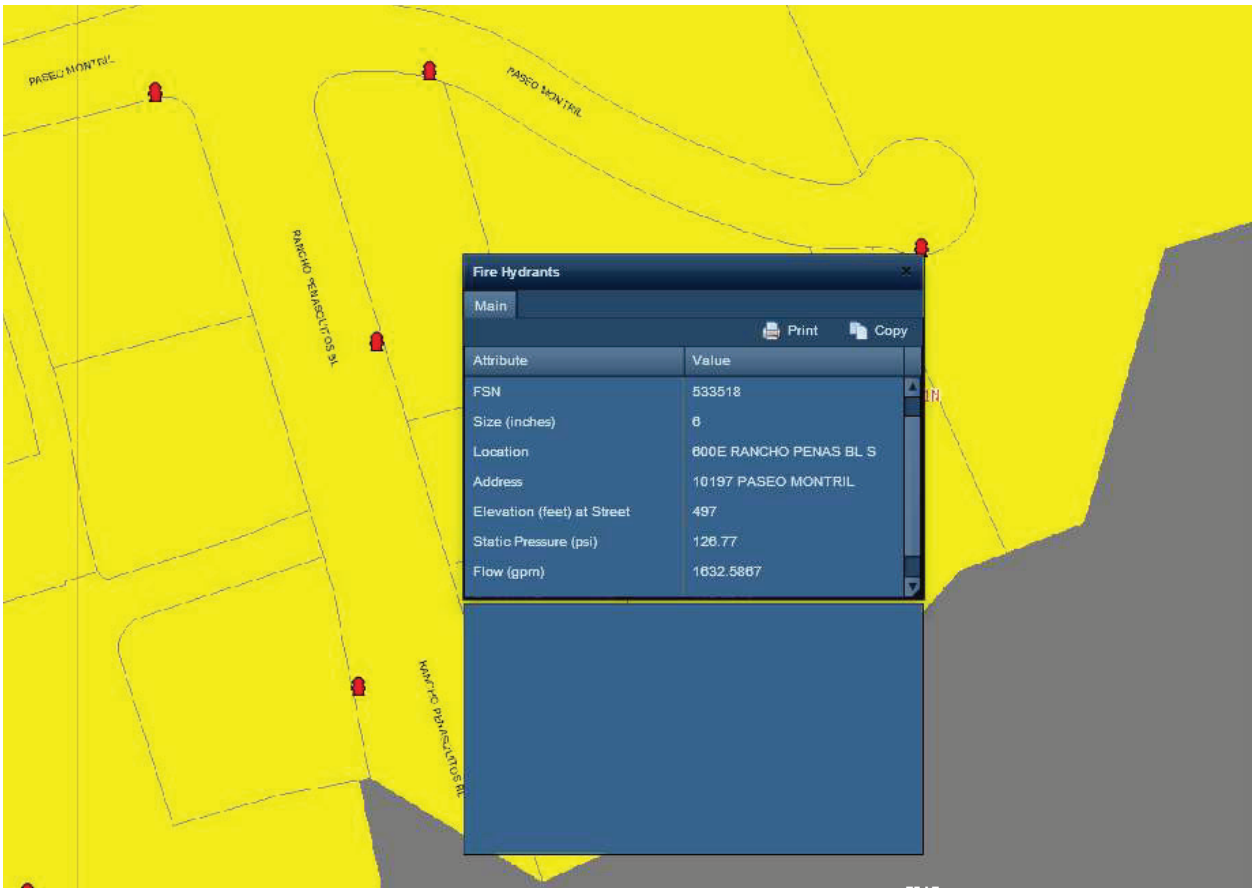
Researched in database by: Miguel Tamayo

The information provided above is based upon a water model. It is the contractor's responsibility to confirm the available static pressure at the system point of connection. If a discrepancy is noticed at that time, notify DSDHydrantFlow@sandiego.gov as soon as possible.

Please draw an accurate map for fire hydrant data



Attribute	Value
Fire Hydrant Name	H533518
FSN	533518
Size (inches)	6
Location	600E RANCHO PENAS BL S
Address	10197 PASEO MONTRIL
Elevation (feet) at Street	497
Static Pressure (psi)	126.77
Flow (gpm)	1632.5867
Residual Pressure (psi)	112.7019


PASEO MONTRIL
PASEO MONTRIL
RANCHO PENASCUITOS SL
RANCHO PENASCUITOS SL
Fire Hydrants
Main
Print
Copy
Attribute
Value
FSN
533518
Size (inches)
6
Location
600E RANCHO PENAS BL S
Address
10197 PASEO MONTRIL
Elevation (feet) at Street
497
Static Pressure (psi)
126.77
Flow (gpm)
1632.5867

Fire Hydrant Flow Test Date September 21, 2020

Input Flow Test Results

Static Pressure	126 PSI			
Residual Pressure	112 PSI			
Hydrant Flow	1632 GPM			
Actual Hydrant Elevation	497 Feet	HGL	787.8 Feet	
Estimated Hydrant Elevation	497 Feet	HGL	787.8 Feet	

Equation $\Delta H = k\, Q^{1.85}$

k = 3.67986E-05

Extrapolated Calculations

Q, gpm	Residual Pressure	Available HGL
500	124.4 psi	784.2 ft
750	122.7 psi	780.1 ft
1000	120.3 psi	774.8 ft
1250	117.5 psi	768.1 ft
1500	114.0 psi	760.2 ft
1750	110.1 psi	751.0 ft
2000	105.6 psi	740.7 ft
2250	100.6 psi	729.3 ft
2500	95.2 psi	716.7 ft
2750	89.2 psi	703.0 ft
3000	82.8 psi	688.2 ft
3250	75.9 psi	672.2 ft
3500	68.6 psi	655.3 ft
3750	60.8 psi	637.2 ft
4000	52.5 psi	618.1 ft

Residual Pressure, psi	Available Flow, gpm
0 psi	5,352
10 psi	5,118
20 psi	4,875
30 psi	4,621
40 psi	4,354
50 psi	4,072
60 psi	3,773
70 psi	3,453
80 psi	3,104
90 psi	2,719
100 psi	2,281
110 psi	1,754
120 psi	1,032
130 psi	Residual Pressure Exceeds Static Pressure
140 psi	Residual Pressure Exceeds Static Pressure

APPENDIX C

COMPUTER MODELING OUTPUT

The following conditions were modeled:

1. Average Day Demand.

2. Maximum Day Demand plus 3,000 gpm Fire Flow Onsite split between Node 2 and Node 3.

3. Maximum Day Demand plus 3,000 gpm Fire Flow Onsite split between Node 2 and Node 3. Pipe 1 closed.

Project: Paseo Montril City of San Diego
Date: 9/25/2020
Job Number: 648-030

Scenario: Average Day Demand

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi	Delta P from Static
O-BF-1	510	793	122.6	116.6	6.1
O-BF-2	500	793	126.9	120.9	6.0
J-2	515	793	120.5	114.4	6.1
J-3	500	793	126.9	120.9	6.0
J-4	465	793	142.1	140.0	2.2
J-8	465	793	142.1	140.0	2.2
J-12	498	793	127.8	125.7	2.2
J-16	498	793	127.8	125.7	2.2
I-BF-1	510	793	122.6	120.5	2.2
I-BF-2	500	793	126.9	124.8	2.1

Project: Paseo Montril City of San Diego
Date: 9/25/2020
Job Number: 648-030

Scenario: Maximum Day Demand plus 3,000 gpm Fire Flow splitt between Node 2 and Node 3

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi	Delta P from Static
O-BF-1	510	793	122.6	65.9	56.7
O-BF-2	500	793	126.9	71.6	55.4
J-2	515	793	120.5	61.1	59.3
J-3	500	793	126.9	67.6	59.3
J-4	465	793	142.1	94.7	47.4
J-8	465	793	142.1	94.7	47.4
J-12	498	793	127.8	80.3	47.6
J-16	498	793	127.8	80.2	47.6
I-BF-1	510	793	122.6	71.0	51.6
I-BF-2	500	793	126.9	76.7	50.3

Project: Paseo Montril City of San Diego
Date: 9/25/2020
Job Number: 648-030

Scenario: Maximum Day Demand plus 3,000 gpm Fire Flow splitt between Node 2 and Node 3 (Pipe 1 Closed)

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi	Delta P from Static
O-BF-1	510	793	122.6	52.8	69.8
O-BF-2	500	793	126.9	58.4	68.5
J-2	515	793	120.5	48.0	72.4
J-3	500	793	126.9	54.5	72.4
J-4	465	793	142.1	88.4	53.8
J-8	465	793	142.1	88.1	54.1
J-12	498	793	127.8	67.1	60.7
J-16	498	793	127.8	67.2	60.6
I-BF-1	510	793	122.6	57.9	64.7
I-BF-2	500	793	126.9	53.5	73.5

Project: Paseo Montril City of San Diego
Date: 9/25/2020
Job Number: 648-030

Scenario: Average Day Demand

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
P-1	12	16.02	0.05
P-3	8	-5.31	0.03
P-4	8	-7.31	0.05
P-5	12	3.18	0.01
P-6	8	-6.31	0.04
P-7	8	-7.31	0.05
P-8	8	-5.31	0.03
P-9	12	3.18	0.01
P-13	12	-3.18	0.01
P-17	12	4.12	0.01

Project: Paseo Montril City of San Diego
Date: 9/25/2020
Job Number: 648-030

Scenario: Maximum Day Demand plus 3,000 gpm Fire Flow split between Node 2 and Node 3

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
P-1	12	2594.82	7.36
P-3	8	1489.7	9.51
P-4	8	-1510.3	9.64
P-5	12	467.1	1.32
P-6	8	-10.3	0.07
P-7	8	-1510.3	9.64
P-8	8	1489.7	9.51
P-9	12	467.1	1.32
P-13	12	-467.1	1.32
P-17	12	1043.2	2.96

Project: Paseo Montril City of San Diego
Date: 9/25/2020
Job Number: 648-030

Scenario: Maximum Day Demand plus 3,000 gpm Fire Flow split between Node 2 and Node 3 (Pipe 1 Closed)

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
P-1	12		
P-3	8	1483.07	9.47
P-4	8	-1516.93	9.68
P-5	12	3061.92	8.69
P-6	8	-16.93	0.11
P-7	8	-1516.93	9.68
P-8	8	1483.07	9.47
P-9	12	3061.92	8.69
P-13	12	-3061.92	8.69
P-17	12	-1544.99	4.38

```
* * * * * * * * * * * * 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                                    *
*                                                           *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Date & Time: Fri Sep 25 17:16:29 2020

Master File : \\artic\eng\648030\ky pipe\paseo montril sept 2020 update 55 units.KYP\paseo montril sept 2020 update 55 units.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

PIPE NAME	NODE NAMES #1	#2	LENGTH (ft)	DIAMETER (in)	ROUGHNESS COEFF.	MINOR LOSS COEFF.
P-1	0	J-12	50.00	12.00	120.0000	0.00
P-3	J-12	I-BF-2	40.00	8.00	120.0000	3.25
P-4	J-2	O-BF-1	120.00	8.00	120.0000	0.40
P-5	J-4	J-8	30.00	12.00	120.0000	0.00
P-6	J-3	J-2	470.00	8.00	120.0000	1.45
P-7	I-BF-1	J-16	100.00	8.00	120.0000	3.25
P-8	O-BF-2	J-3	170.00	8.00	120.0000	1.10
P-9	0	J-4	650.00	12.00	120.0000	0.00
P-13	J-16	J-8	650.00	12.00	120.0000	0.00
P-17	J-12	J-16	30.00	12.00	120.0000	0.00

P U M P/L O S S E L E M E N T D A T A

THERE IS A DEVICE AT NODE 0 DESCRIBED BY THE FOLLOWING DATA: (ID= 1)

HEAD (ft)	FLOWRATE (gpm)	EFFICIENCY (%)
788.00	0.00	75.00 (Default)
784.00	500.00	75.00 (Default)
774.00	1000.00	75.00 (Default)
760.00	1500.00	75.00 (Default)
740.00	2000.00	75.00 (Default)

716.00	2500.00	75.00 (Default)
688.00	3000.00	75.00 (Default)
655.00	3500.00	75.00 (Default)
618.00	4000.00	75.00 (Default)

THERE IS A DEVICE AT NODE BF-1 DESCRIBED BY THE FOLLOWING DATA: (ID= 2)

HEAD (ft)	FLOWRATE (gpm)	EFFICIENCY (%)
-9.00	0.00	75.00 (Default)
-12.00	1600.00	75.00 (Default)
-14.00	2400.00	75.00 (Default)

THERE IS A DEVICE AT NODE BF-2 .....> (ID= 2)

N O D E D A T A

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	EXTERNAL GRADE (ft)
0		0.00	0.00	
O-BF-1		0.00	510.00	
O-BF-2		0.00	500.00	
J-2		1.00	515.00	
J-3		1.00	500.00	
J-4		0.00	465.00	
J-8		0.00	465.00	
J-12		17.20	498.00	
J-16		0.00	498.00	
I-BF-1		0.00	510.00	
I-BF-2		0.00	500.00	

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) = 10
NUMBER OF END NODES .....(J) = 8
NUMBER OF PRIMARY LOOPS .....(L) = 2
NUMBER OF SUPPLY NODES .....(F) = 1
NUMBER OF SUPPLY ZONES .....(Z) = 1

==========

Case: 1

Average Day Demand

RESULTS OBTAINED AFTER 200 TRIALS: ACCURACY = 0.11052E+01

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)

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	0	J-12	16.02	0.00	0.00	0.05	0.00	0.00
P-3	J-12	I-BF-2	-5.31	0.00	0.00	0.03	0.00	0.00
P-4	J-2	O-BF-1	-7.31	0.00	0.00	0.05	0.00	0.00
P-5	J-4	J-8	3.18	0.00	0.00	0.01	0.00	0.00
P-6	J-3	J-2	-6.31	0.00	0.00	0.04	0.00	0.00
P-7	I-BF-1	J-16	-7.31	0.00	0.00	0.05	0.00	0.00
P-8	O-BF-2	J-3	-5.31	0.00	0.00	0.03	0.00	0.00
P-9	0	J-4	3.18	0.00	0.00	0.01	0.00	0.00
P-13	J-16	J-8	-3.18	0.00	0.00	0.01	0.00	0.00
P-17	J-12	J-16	4.12	0.00	0.00	0.01	0.00	0.00

P U M P/L O S S E L E M E N T R E S U L T S

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft	EFFIC- ENCY %	USEFUL POWER Hp	INCREMTL COST $	TOTAL COST $	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. ft	Case
0	19.20	0.00	787.99	788.0	75.00	4.	0.2	0.2	**	**	33.2	0.0000
BF-1	7.31	277.99	268.99	-9.0	75.00	0.	0.0	0.0	**	**	311.2	0.0000
Warning P2K107:Device BF-2 is operating out of range.												
BF-2	-5.31	287.99	278.99	-9.0	75.00	0.	0.0	0.0	**	**	321.2	0.0000

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
0		0.00	787.99			
O-BF-1		0.00	778.99	510.00	268.99	116.56
O-BF-2		0.00	778.99	500.00	278.99	120.90
J-2		1.00	778.99	515.00	263.99	114.40
J-3		1.00	778.99	500.00	278.99	120.90
J-4		0.00	787.99	465.00	322.99	139.96
J-8		0.00	787.99	465.00	322.99	139.96
J-12		17.20	787.99	498.00	289.99	125.66
J-16		0.00	787.99	498.00	289.99	125.66
I-BF-1		0.00	787.99	510.00	277.99	120.46
I-BF-2		0.00	787.99	500.00	287.99	124.80

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-4	139.96	J-2	114.40
J-8	139.96	O-BF-1	116.56
J-12	125.66	I-BF-1	120.46

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-4	0.05	P-5	0.01
P-7	0.05	P-9	0.01
P-1	0.05	P-13	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
0	19.20	

NET SYSTEM INFLOW = 19.20
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 19.20

==========

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 = 1)

Paseo Montril Project City of San Diego
3000 gpm Fire Flow split between Node 2 and Node 3

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 6 TRIALS: ACCURACY = 0.75644E-05

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

P I P E N A M E	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	0	J-12	2594.82	0.86	0.00	7.36	17.20	17.20
P-3	J-12	I-BF-2	1489.70	1.77	4.56	9.51	158.36	44.33
P-4	J-2	O-BF-1	-1510.30	5.46	0.58	9.64	50.28	45.47
P-5	J-4	J-8	467.10	0.02	0.00	1.32	0.72	0.72
P-6	J-3	J-2	-10.30	0.00	0.00	0.07	0.00	0.00
P-7	I-BF-1	J-16	-1510.30	4.55	4.69	9.64	92.35	45.47
P-8	O-BF-2	J-3	1489.70	7.54	1.54	9.51	53.41	44.33
P-9	0	J-4	467.10	0.47	0.00	1.32	0.72	0.72
P-13	J-16	J-8	-467.10	0.47	0.00	1.32	0.72	0.72
P-17	J-12	J-16	1043.20	0.10	0.00	2.96	3.18	3.18

P U M P/L O S S E L E M E N T R E S U L T S

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft	EFFIC- ENCY %	USEFUL POWER Hp	INCREMTL COST $	TOTAL COST $	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. ft	Case
0	3061.92	0.00	684.08	684.1	75.00	529.	0.2	0.4	**	**	33.2	1.0000
BF-1	1510.30	163.89	152.10	-11.8	75.00	-5.	0.0	0.0	**	**	195.6	1.0000
BF-2	1489.70	176.88	165.14	-11.7	75.00	-4.	0.0	0.0	**	**	208.7	1.0000

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
0		0.00	684.08			
O-BF-1		0.00	662.10	510.00	152.10	65.91
O-BF-2		0.00	665.14	500.00	165.14	71.56
J-2		1500.00(**)	656.06	515.00	141.06	61.13
J-3		1500.00(**)	656.06	500.00	156.06	67.63
J-4		0.00	683.61	465.00	218.61	94.73
J-8		0.00	683.59	465.00	218.59	94.72
J-12		61.92(3.60)	683.22	498.00	185.22	80.26
J-16		0.00	683.12	498.00	185.12	80.22
I-BF-1		0.00	673.89	510.00	163.89	71.02
I-BF-2		0.00	676.88	500.00	176.88	76.65

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-4	94.73	J-2	61.13
J-8	94.72	O-BF-1	65.91
J-12	80.26	J-3	67.63

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-4	9.64	P-6	0.07
P-7	9.64	P-5	1.32
P-3	9.51	P-9	1.32

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

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

NODE NAME	FLOWRATE gpm	NODE TITLE
0	3061.92	

NET SYSTEM INFLOW = 3061.92
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 3061.92

==========

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 = 2)

Paseo Montril Project City of San Diego
3000 gpm Fire Flow split between Node 2 and Node 3
Pipe 1 Closed (Pipe Break)

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

Pipe P-1 is CLOSED

RESULTS OBTAINED AFTER 3 TRIALS: ACCURACY = 0.14732E-05

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-XX	0	J-12						
P-3	J-12	I-BF-2	1483.07	1.76	4.52	9.47	156.98	43.96
P-4	J-2	O-BF-1	-1516.93	5.50	0.58	9.68	50.69	45.84
P-5	J-4	J-8	3061.92	0.70	0.00	8.69	23.37	23.37
P-6	J-3	J-2	-16.93	0.01	0.00	0.11	0.01	0.01
P-7	I-BF-1	J-16	-1516.93	4.58	4.73	9.68	93.14	45.84
P-8	O-BF-2	J-3	1483.07	7.47	1.53	9.47	52.96	43.96
P-9	0	J-4	3061.92	15.19	0.00	8.69	23.37	23.37
P-13	J-16	J-8	-3061.92	15.19	0.00	8.69	23.37	23.37
P-17	J-12	J-16	-1544.99	0.20	0.00	4.38	6.58	6.58

P U M P/L O S S E L E M E N T R E S U L T S

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft	EFFIC-ENCY %	USEFUL POWER Hp	INCREMTL COST $	TOTAL COST $	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. ft	Case
0	3061.92	0.00	684.08	684.1	75.00	529.	26.3	26.7	**	**	33.2	2.0000
BF-1	1516.93	133.69	121.88	-11.8	75.00	-5.	-0.2	-0.2	**	**	165.4	2.0000
BF-2	1483.07	146.52	134.80	-11.7	75.00	-4.	-0.2	-0.2	**	**	178.3	2.0000

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
0		0.00	684.08			
O-BF-1		0.00	631.88	510.00	121.88	52.82
O-BF-2		0.00	634.80	500.00	134.80	58.41
J-2		1500.00(**)	625.80	515.00	110.80	48.01
J-3		1500.00(**)	625.79	500.00	125.79	54.51
J-4		0.00	668.89	465.00	203.89	88.35
J-8		0.00	668.19	465.00	203.19	88.05
J-12		61.92(3.60)	652.80	498.00	154.80	67.08
J-16		0.00	653.00	498.00	155.00	67.17
I-BF-1		0.00	643.69	510.00	133.69	57.93
I-BF-2		0.00	646.52	500.00	146.52	63.49

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-4	88.35	J-2	48.01
J-8	88.05	O-BF-1	52.82
J-16	67.17	J-3	54.51

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-4	9.68	P-6	0.11
P-7	9.68	P-17	4.38
P-8	9.47	P-5	8.69

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        FLOWRATE        NODE
        NAME         gpm            TITLE
     ------------------------------------------
      0               3061.92

 NET SYSTEM INFLOW  =   3061.92
 NET SYSTEM OUTFLOW =      0.00
 NET SYSTEM DEMAND  =   3061.92
================================================================================
Total Power Cost


              **************************************************

              TOTAL POWER COST($) FOR THIS SIMULATION =     26.23

              **************************************************


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

APPENDIX D

PRIVATE WATER AND WATER METER INFORMATION

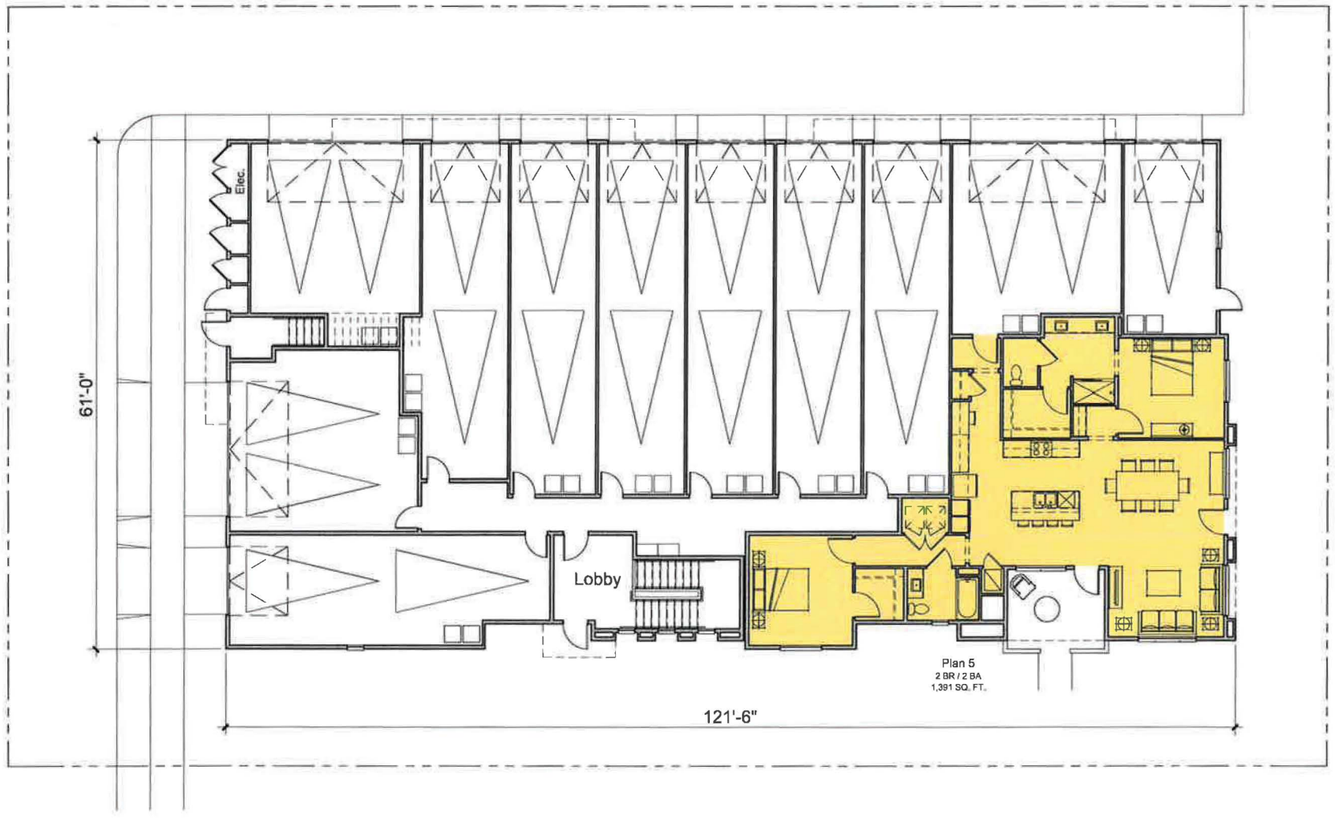
Site Summary

Net Site Area:	0.33 Acres
Dwelling Units:	11 Units
Net Density:	33 DU/AC

Plan	Type	Net Area	#
Plan 1	1 bd+den/1 ba	864 sf	2
Plan 2	2 bd/2 ba	1,135 sf	2
Plan 3	3 bd/2 ba	1,210 sf	4
Plan 4	3 bd/2 ba	1,359 sf	2
Plan 5	2 bd/2 ba	1,391 sf	1
Total Units			11

Parking Provided

Garage Spaces (1.9/unit)	21 Spaces



Site Summary

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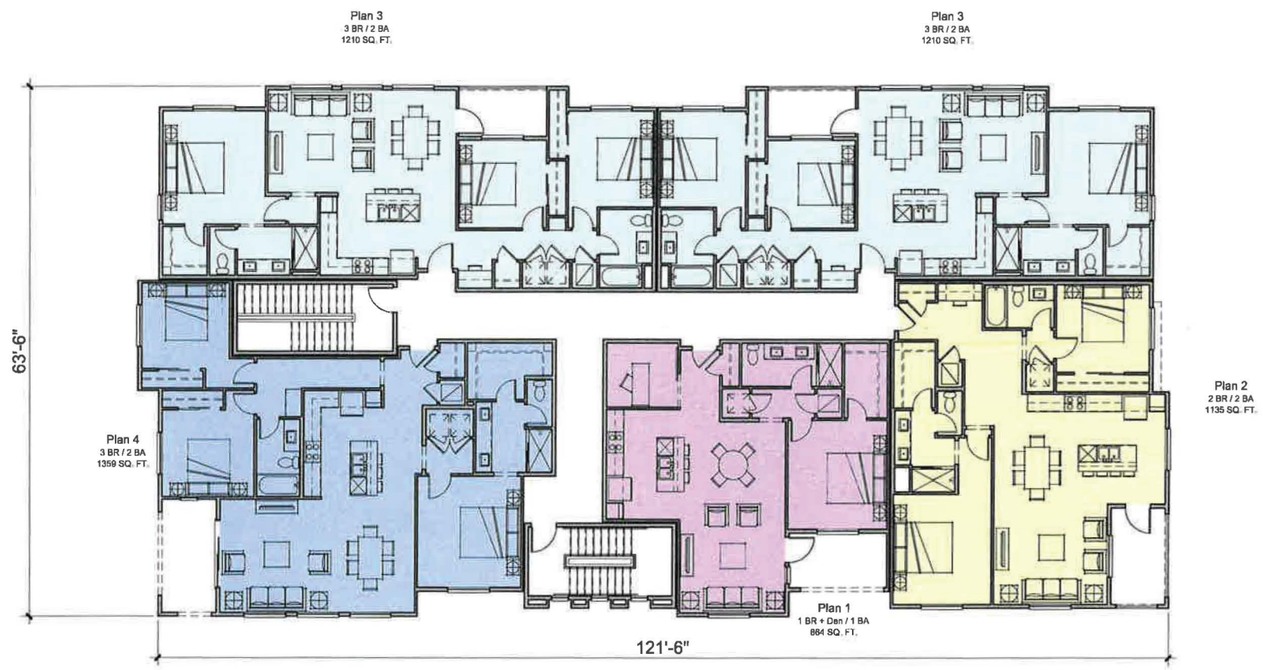
Dwelling Units:	11 Units
Net Density:	33 DU/AC

Plan	Type	Net Area	#
Plan 1	1 bd+den/1 ba	864 sf	2
Plan 2	2 bd/2 ba	1,135 sf	2
Plan 3	3 bd/2 ba	1,210 sf	4
Plan 4	3 bd/2 ba	1,359 sf	2
Plan 5	2 bd/2 ba	1,391 sf	1
Total Units			11

Parking Provided

Garage Spaces (1.9/unit)	21 Spaces



Paseo Montril City of San Diego
Five 11-Plex Architectural

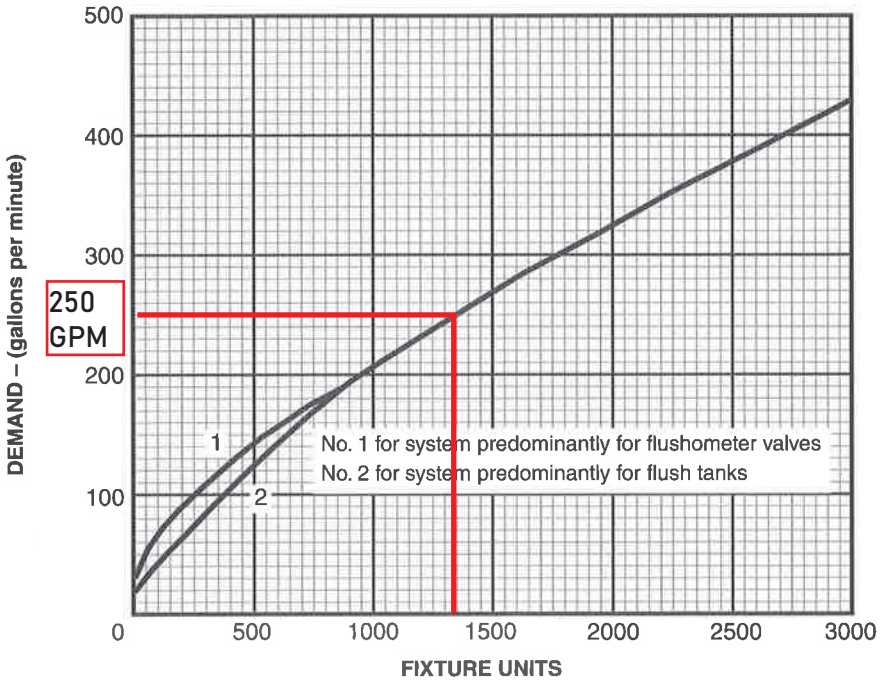
Job Number 648-030
Date 11/23/2020

Water Fixture Units:

DESCRIPTION	Plan 1			Plan 2			Plan 3			Plan 4			Plan 5		
	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
TUB/SHOWER	1	4	4	2	4	8	2	4	8	2	4	8	2	4	8
SHOWER	0	2	0	0	2	0	0	2	0	0	2	0	0	2	0
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
BAR SINK	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
LAUNDRY SINK	0	1.5	0	0	1.5	0	0	1.5	0	0	1.5	0	0	1.5	0
MOP BASIN	0	3	0	0	3	0	0	3	0	0	3	0	0	3	0
LAVATORY	2	1	2	3	1	3	3	1	3	3	1	3	3	1	3
WATER CLOSET (1.6 GPF, private)	1	2.5	2.5	2	2.5	5	2	2.5	5	2	2.5	5	2	2.5	5
DRINKING FOUNTAIN	0	0.5	0	0	0.5	0	0	0.5	0	0	0.5	0	0	0.5	0
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
EACH ADDTL HB	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0
TOTAL			18			25.5			25.5			25.5			25.5

Plan Type	Quantity	WFU
Plan 1	10	180
Plan 2	10	255
Plan 3	20	510
Plan 4	10	255
Plan 5	5	127.5
TOTAL	55	1327.5

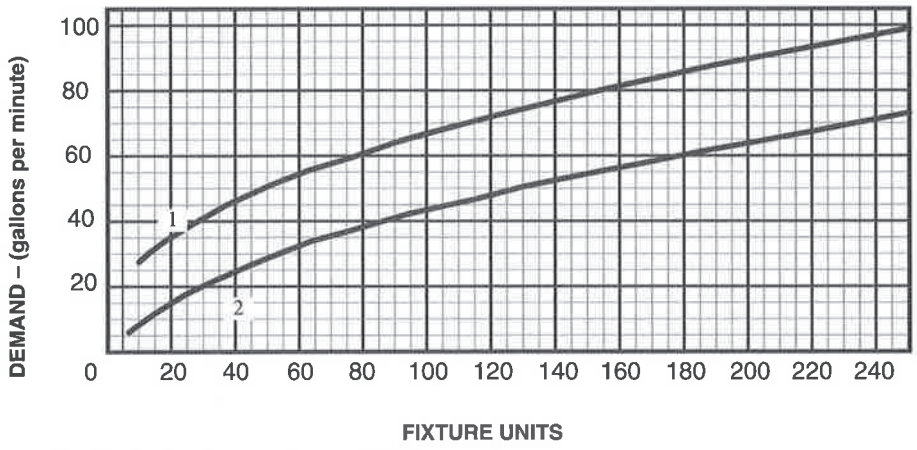
CHART A 103.1(1)
ESTIMATE CURVES FOR DEMAND LOAD



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

1,327.5 WFUs

CHART A 103.1(2)
ENLARGED SCALE DEMAND LOAD



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

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.

EXHIBIT A

NODE AND PIPE DIAGRAM

LEGEND

PROJECT BOUNDARY

EXISTING PUBLIC WATER LINE

PROPOSED PUBLIC WATER LINE

PROPOSED PRIVATE FIRE PROTECTION WATER LINE

EXISTING PUBLIC FIRE HYDRANT

PROPOSED PRIVATE FIRE HYDRANT

0 COMPUTER MODEL NODE NUMBER

1 COMPUTER MODEL PIPE NUMBER

PASEO MONTRIL

RANCHO PENASQUITOS BLVD

EX.12"

EX.8"

EX.6"

8"

12"

PROPOSED 8" RPDA BACKFLOW PREVENTER

PROPOSED 8" RPDA BACKFLOW PREVENTER

BF1

BF2

BLDG 1 FF=512

BLDG 2 FF=502

BLDG 3 FF=512

BLDG 4 FF=512

BLDG 5 FF=512

PASEO MONTRIL PROJECT BOUNDARY

N

0 100 FEET

EXHIBIT A

NODE AND PIPE DIAGRAM

PASEO MONTRIL

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