Appendix K

Water Report

DEXTER WILSON ENGINEERING, INC.

WATER • WASTEWATER • RECYCLED WATER

CONSULTING ENGINEERS

WATER STUDY ANALYSIS FOR THE 9407 JERICHO ROAD PROJECT IN THE HELIX WATER DISTRICT

August 10, 2023

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WATER SYSTEM ANALYSIS
FOR THE 9407 JERICHO ROAD PROJECT
IN THE HELIX WATER DISTRICT

August 10, 2023

REGISTERED PROFESSIONAL ENGINEER
STEVEN J. HENDERSON
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EXP. 09/30/2023
CIVIL
STATE OF CALIFORNIA

8-10-2023

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Job No. 1043-003

TABLE OF CONTENTS

PAGE NO.

APPENDICES

LIST OF TABLES

LIST OF FIGURES

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August 10, 2023 1043-003

MLC Holdings, Inc.
5 Peters Canyon Road, Suite 310
Irvine, CA 92606

Attention: Johanna Crooker, Director of Forward Planning

Subject: Water System Analysis for the 9407 Jericho Road Project in the City of La Mesa and Helix Water District

Introduction and Purpose

The 9407 Jericho Road project is located in the City of La Mesa and Helix Water District southwest of the Jericho Road and Broadmoor Drive intersection. Access to the project is also from the Jericho Road and Broadmoor Drive intersection. Water service for the 9407 Jericho Road project will be provided by Helix Water District.

The proposed 9407 Jericho Road project is a residential development on an approximately 3.48-acre parcel. It is situated within a previous church site. The proposed project would develop 73 townhome residential units. Elevations within the project range from a low of 642 feet to a high of 652 feet.

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The purpose of this letter-report is to analyze the existing and proposed public water systems for the 9407 Jericho Road project and determine if there are any hydraulic deficiencies created by the proposed development of this property. Additionally, the recommended quantity and location of potable domestic meters will be provided. Irrigation is outside the scope of this analysis.

A Vicinity Map for the project is shown on Figure 1 and a preliminary site plan for the project is included in Appendix A.

Water System Design Criteria

Water system design criteria such as estimating potable water demands and evaluating the capacity of transmission and distribution pipes are based on the Water Agencies' Standards (WAS) of which Helix Water District (District) is a member. Based on the WAS, domestic average day water demands are determined using land use acreage and an associated water demand factor. A copy of the pertinent sections in the WAS standards which presents the design criteria is attached as Appendix B.

The water demand factors are presented in Table 1.

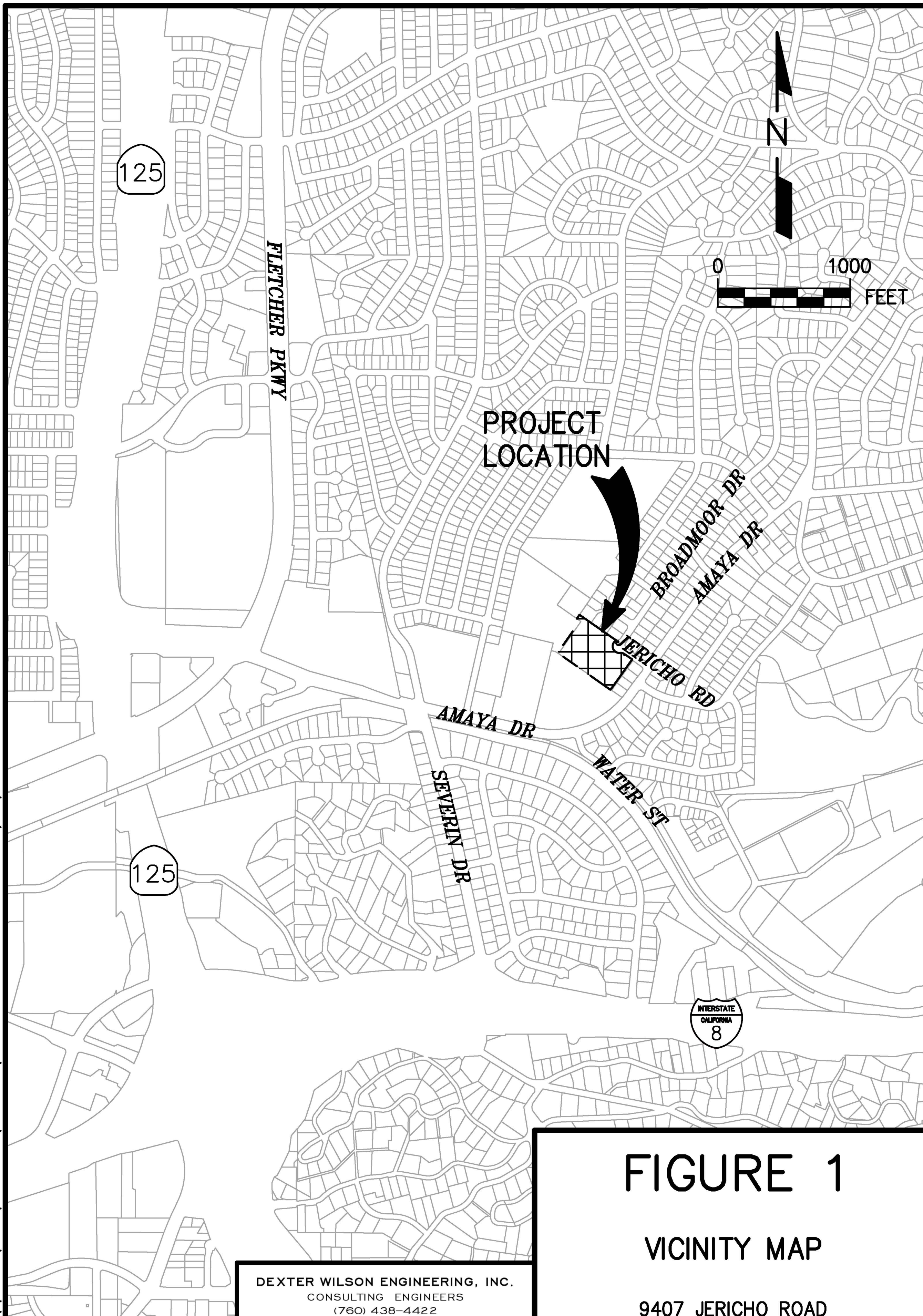

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FIGURE 1

VICINITY MAP

9407 JERICHO ROAD

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TABLE 1 9407 JERICHO ROAD PROJECT AVERAGE DAILY WATER DEMAND FACTORS	
Land Use	**Gallons Per Day Per Acre**
Residential (1 DU/ac)	900
Residential. (2 DU/ac)	1,050
Residential (4 DU/ac)	2,100
Residential (8 DU/ac)	4,200
Residential (14 DU/ac)	6,750
Residential (29 DU/ac)	13,050
Residential (43 DU/ac)	16,800
Agricultural	1,750
Industrial	4,000
Park	3,000
Commercial	5,000
Institutional	
Office	

WAS defines a minimum static pressure of at least 65 psi. During peak hour demands, the public water system must maintain a minimum residual pressure of 40 psi. Residual pressure under maximum day demands plus fire flow must be greater than 20 psi.

Pipeline velocity must not exceed 8 feet per second (fps) under maximum domestic demands (no fire flow). For fire flow conditions, velocities shall not exceed 15 fps for fire hydrant laterals, and velocities shall not exceed 10 fps for distribution pipelines.

Potable Water Demands

The estimated water demand for the project is calculated using the water use factors based on density presented in the WAS standards. The density is calculated based on gross area which equates to 3.48 acres for the 9407 Jericho Road site resulting in a density of 22 du/ac. The dwelling unit density for the 9407 Jericho Road project is shown below in Table 2.

TABLE 2
RESIDENTIAL DENSITY FOR THE
9407 JERICHO ROAD PROJECT

Dwelling Units	Gross Developable Area, acres	Density, DU/acre
73	3.48	21

The dwelling unit density corresponds to a water demand factor of 11,016 gpd per acre for the 9407 Jericho Road project. The demand factor of 11,016 gpd per acre is based on interpolating the values presented in Table 1. The total estimated average water demand for the 9407 Jericho Road project is calculated in Table 3.

TABLE 3
WATER DEMAND FOR THE
9407 JERICHO ROAD PROJECT

Land Use	Water Demand Factor, gpd/acre	Area, acres	Average Water Demand, gpd
Residential	9,690	3.48	33,721

The maximum day demands are 2.8 times the average, and peak hour demands are 5.8 times the average according to the curves presented in the WAS standards. This corresponds to 94,419 gpd (66 gpm) and 195,582 gpd (136 gpm), respectively.

Fire Flows

The fire flow requirement for the project site was estimated based on the 2019 California Fire Code; the official fire flow requirement has yet to be determined. The fire code takes into account building area and construction type. The largest building proposed for the project site is conservatively estimated to be approximately 16,200 square feet (9-plex comprised of the largest 1,800 square feet units). Construction Type V-B is proposed for the onsite buildings. This results in an estimated fire flow requirement of 3,500 gpm. Assuming a reduction of 50% for an NFPA approved fire sprinkler system, the estimated final fire flow requirement for the project site equates to 1,750 gpm. The excerpt from the 2019 California Fire Code pertaining to fire flow requirements and project information on building area and construction type are shown in Appendix D.

Available Water System Pressure

Water service to the project will be from the existing District's public water system adjacent to the project. Finished floor elevations on the 9407 Jericho Road property range between 642 feet and 652 feet. This results in a maximum static water pressure range of 71 psi to 75 psi on the project site based on the hydrant test results of 76 psi at an elevation of 640 feet.

Existing Water System

The 9407 Jericho Road project is located in an area of the District that is well developed. Existing water facilities in the vicinity of the project include 6-inch diameter water lines in Jericho Road and Broadmoor Drive.

Figure 2 shows the existing water lines in the vicinity of the 9407 Jericho Road project.

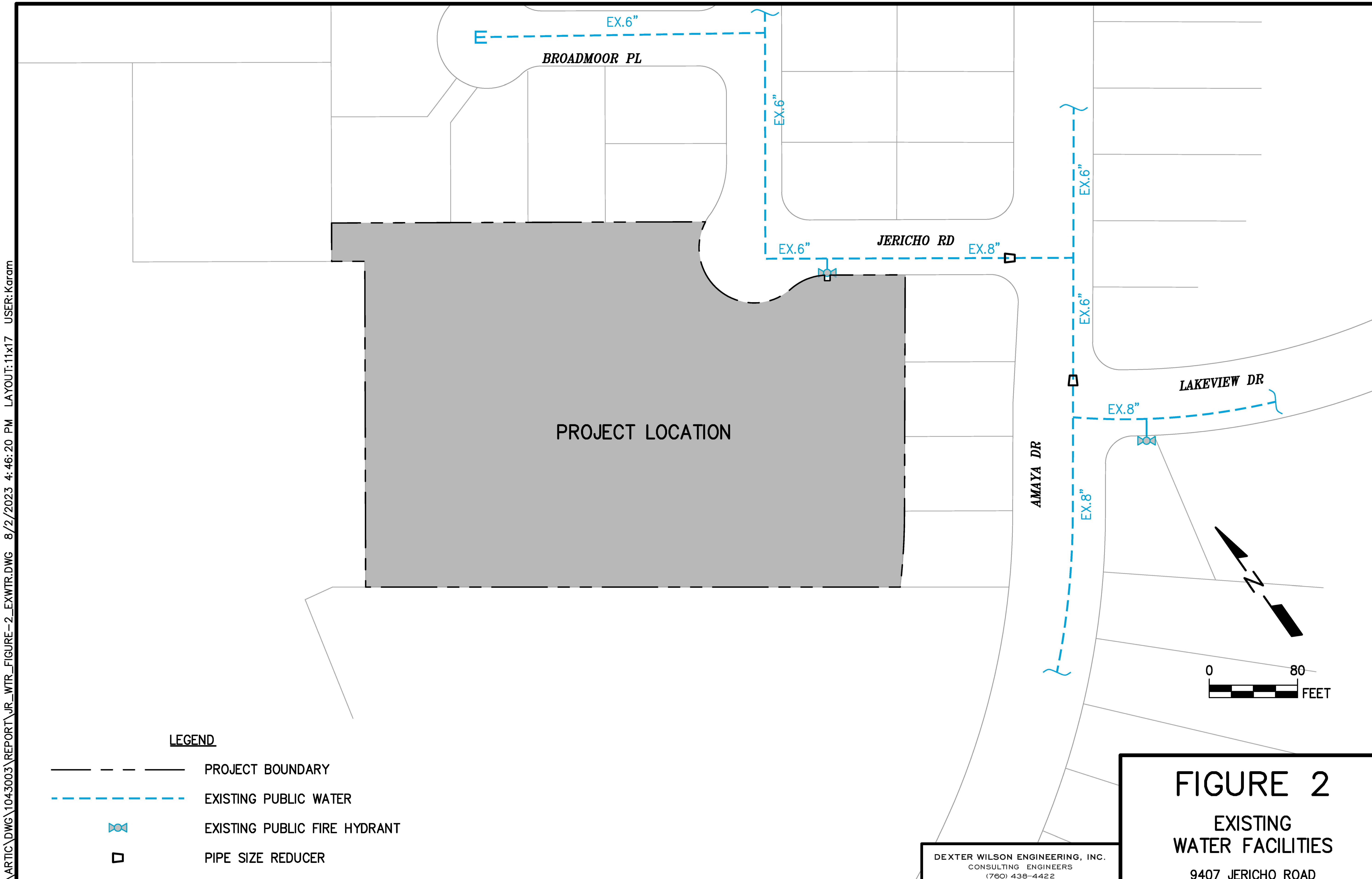

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FIGURE 2

EXISTING WATER FACILITIES

9407 JERICHO ROAD

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Proposed Water Facilities

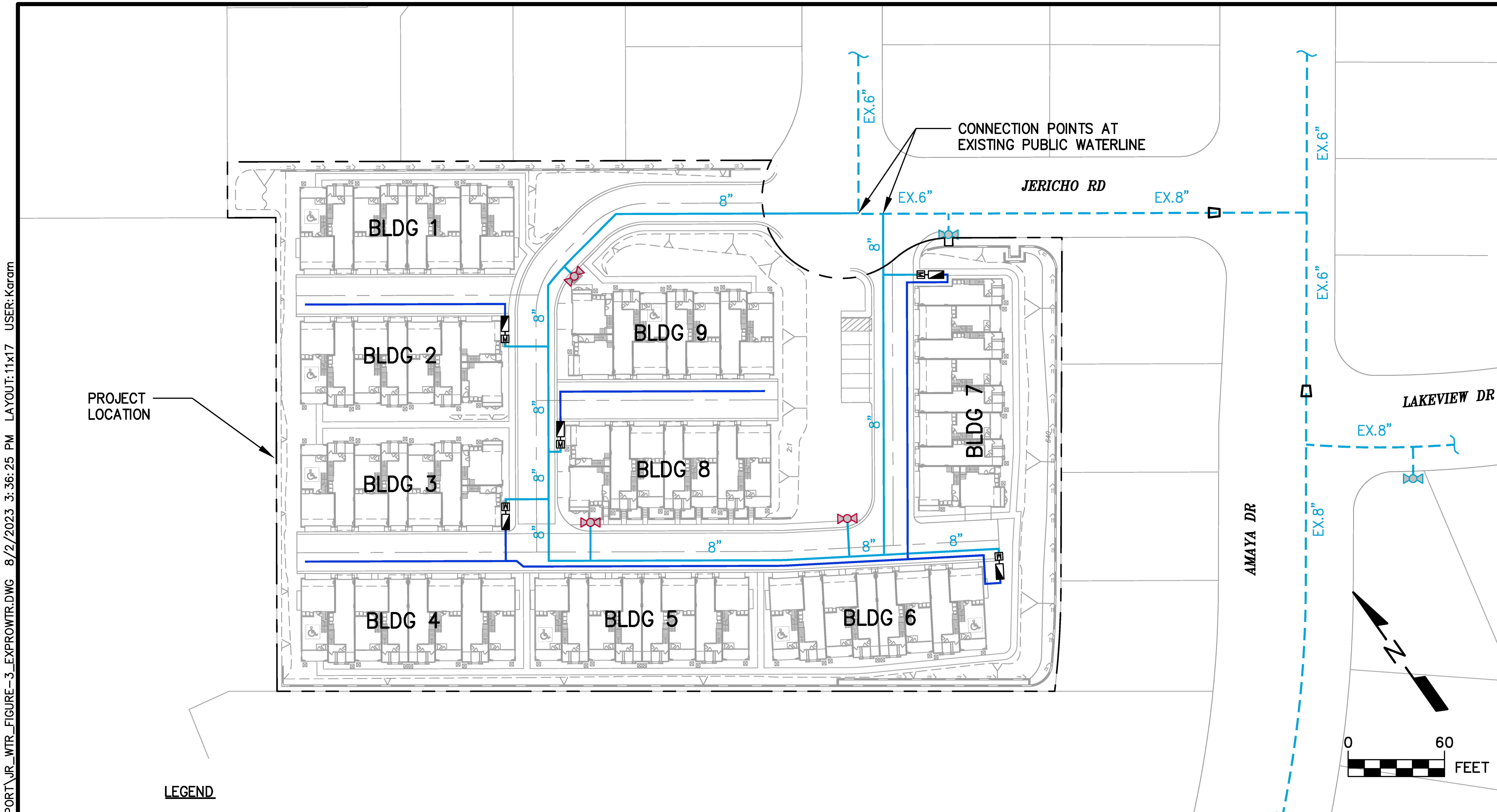
The water service in the area of the 9407 Jericho Road project is being supplied by the existing District water system. From a service pressure standpoint, connecting the 9407 Jericho Road project to this system will provide adequate service. As described in a previous section, the range of pad elevations on the project results in a minimum static water pressure of 71 psi.

The proposed public water system for the 9407 Jericho Road project consists of making two connections for an onsite public loop that will directly supply proposed fire hydrants as well as domestic meters. A domestic water meter connection will be made at five locations.

The 9407 Jericho Road project's proposed onsite domestic water system will consist of private water lines.

Private Water System. Per the District's requirement, the onsite domestic water system for 9407 Jericho Road will be private. Five connections will be made for domestic service to the project site. Domestic connections will be made along the proposed public water line loop. Both the project's private domestic water system and private fire protection system will be connected at each location. These facilities will be formally designed in accordance with the California Plumbing Code and/or WAS standards and will be analyzed in a separate study.

Figure 3 shows the proposed water system for the 9407 Jericho Road project. Reference information surrounding the proposed private water systems for 9407 Jericho Road are included in Appendix C.



LEGEND

PROJECT BOUNDARY
EXISTING PUBLIC WATER
PROPOSED PUBLIC WATER
PROPOSED PRIVATE WATER
PIPE SIZE REDUCER
EXISTING PUBLIC FIRE HYDRANT
PROPOSED PUBLIC FIRE HYDRANT
PROPOSED WATER METER
PROPOSED BACKFLOW PREVENTER

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FIGURE 3

EXISTING AND PROPOSED
WATER FACILITIES

9407 JERICHO ROAD

\\ARTIC\DWG\1043003\REPORT\JR_WTR_FIGURE-3_EXPROWTR.DWG 8/2/2023 3:36:25 PM LAYOUT:11x17 USER:Karam

Domestic Meter and Service. The preliminary water fixture count (WFU) for the proposed townhome units are estimated to be 30 to 35 WFUs per unit. Based on a WFU count of 30 to 35 fixture units per home, the design demand for water meter sizing is estimated to be between 350 and 400 gpm for the entire project.

Based on the meter capacities established in AWWA C700-20, the 9407 Jericho Road project will require five, 1.5-inch meters, with a 500 gpm total capacity, that shall be constructed per WAS standards. The final sizing of the service laterals and meters will need to be confirmed once the fixture units for each home are finalized.

Computer Model for System Analysis

To analyze the existing and proposed water systems for the 9407 Jericho Road project, a water system hydraulic computer model was generated for the pertinent proposed piping in the vicinity of the project. This hydraulic computer model included the public water system piping adjacent to the 9407 Jericho Road project as well as the proposed onsite piping. Several water demand scenarios were modeled which provided data upon which the recommended pipe sizing is based.

Available Hydraulic Grade Line. Appendix B presents the hydrant flow test data performed by the District. The available pressure under an expected fire flow requirement of 1,750 gpm was extrapolated from the hydrant flow tests through the utilization of an additional spreadsheet calculation. That spreadsheet calculation is included in Appendix B as well. Results from the hydrant flow test show a residual pressure of approximately 49 psi at the 1,750 gpm expected fire flow requirement for the project at the hydrant flow test location (adjacent in Jericho Road).

Water System Computer Model. Analysis using the KYPIPE computer software program developed by the University of Kentucky determined residual pressures throughout the water system. This computer software utilizes the Hazen-Williams equation for determining headloss in pipes. The Hazen-Williams “C” value used for all pipe sizes in our analysis is 120.

<u>Fitting and Valve Losses.</u> To simulate minor losses through pipe fittings and valves, minor loss coefficients or "k" values for all fittings associated with pipes were included in the hydraulic model.

<u>Computer Model Analysis – Results</u>

Computer modeling of the proposed onsite public water system and existing offsite water system for the 9407 Jericho Road project was performed to confirm the pipe sizes necessary to provide adequate domestic and fire protection service to the project. The water system was analyzed under three scenarios: average day demand, peak hour demand, and a maximum day demand plus 1,750 gpm scenario.

Appendix E provides the results of the computer modeling for the analyzed water system. Exhibit A at the back of Appendix E provides the Node and Pipe Diagram for the computer model.

The results in Appendix E show that the proposed water system shown in Figure 3 for the 9407 Jericho Road project is adequate for domestic service. The results of the computer model show that average day demand can be achieved onsite with a minimum residual pressure of 66 psi and that peak hour demand can be achieved onsite with a minimum residual pressure of 65 psi.

The results in Appendix E show that the proposed water system for the 9407 Jericho Road project is adequate for fire protection. The results of the computer model show that a 1,750 gpm fire flow can be provided onsite with a minimum residual pressure of 29 psi.

Conclusions and Recommendations

The following recommendations and conclusions are made based on the water system analyses performed for the 9407 Jericho Road project.

1. The 73-unit 9407 Jericho Road project will be supplied from the adjacent existing Helix Water District water system. Maximum static water pressure will be 75 psi.

2. Figure 2 in this report presents the existing water system surrounding the 9407 Jericho Road project.

3. Two public water system connections for the 9407 Jericho Road project will be made to the existing 6-inch diameter water line in the Jericho Road and Broadmoor Drive intersection.

4. The proposed 9407 Jericho Road development will be served by a proposed onsite public water loop for fire protection (hydrants) and separate private water systems stemming off the proposed public 8-inch diameter water loop for domestic service.

5. The 9407 Jericho Road project will require five, 1.5-inch meters that shall be constructed per WAS standards. The final sizing of the service laterals and meters will need to be confirmed once the fixture units for each home are finalized.

6. Offsite water improvements are not required for the 9407 Jericho Road project.

7. The fire flow requirement is estimated based on the 2019 California Fire Code. The fire code takes into account building area and construction type which results in a 1,750 gpm fire flow requirement for 9407 Jericho Road. The final fire flow requirement should be reviewed against the estimation.

8. Figure 3 in this report presents the proposed public water system for the 9407 Jericho Road project.

9. For PVC pipe to be used for public water lines within the project, we recommend the piping specification to be AWWA C900 DR-18 Class 235.

Thank you for the opportunity to prepare this report. If you have any questions on the enclosed information, please do not hesitate to call.

Dexter Wilson Engineering, Inc.

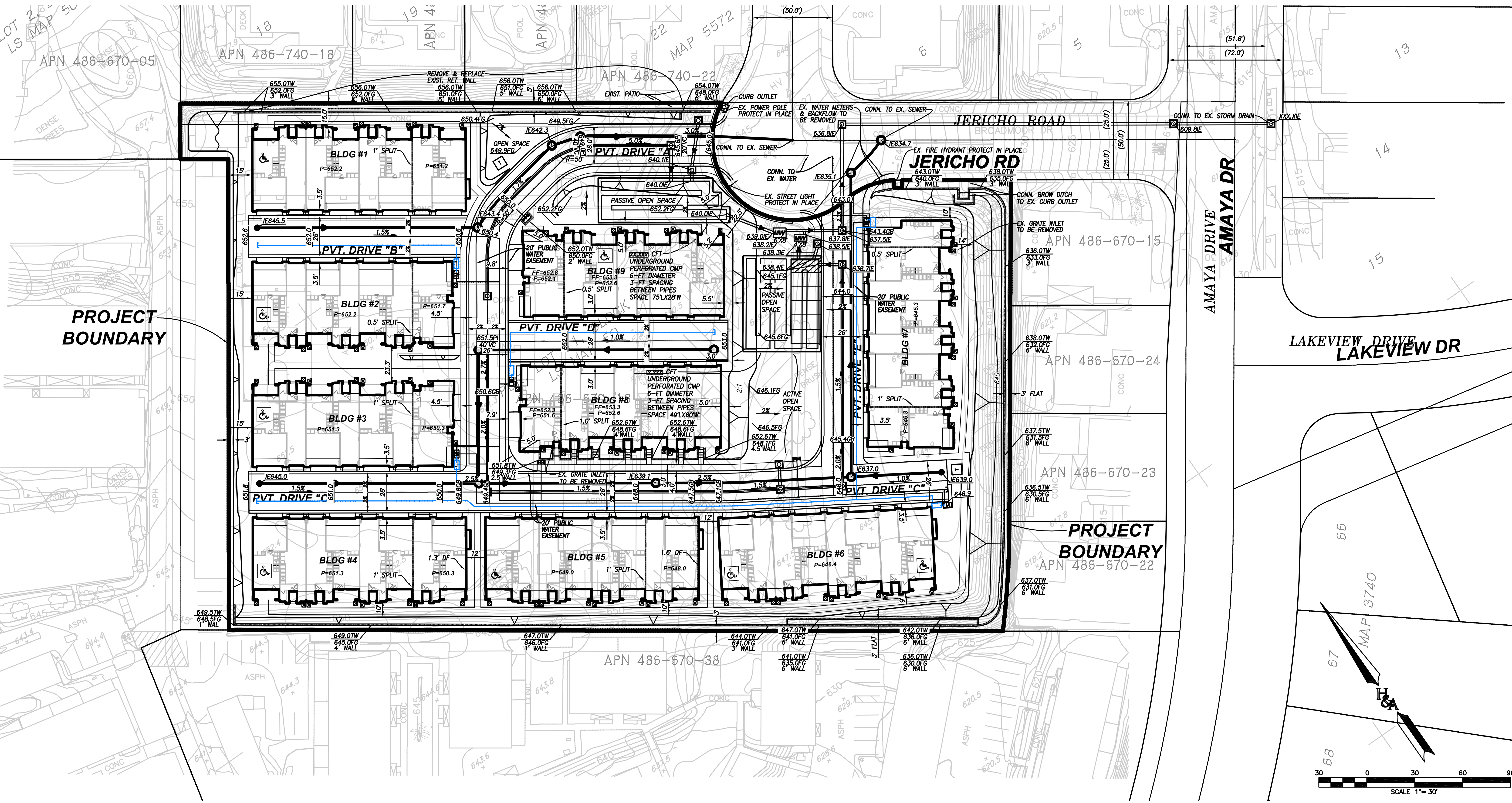
Steven Henderson, P.E.

SH:NF:ah

Attachments

APPENDIX A

PRELIMINARY SITE PLAN



JERICHO ROAD
JERICHO RD
BROADMOOR DR
AMAYA DRIVE
AMAYA DR
LAKEVIEW DRIVE
LAKEVIEW DR
PROJECT BOUNDARY
PROJECT BOUNDARY
APN 486-670-05
APN 486-740-18
APN 486-740-22
APN 486-670-15
APN 486-670-24
APN 486-670-23
APN 486-670-22
APN 486-670-38
MAP 5572
MAP 3740
BLDG #1
BLDG #2
BLDG #3
BLDG #4
BLDG #5
BLDG #6
BLDG #7
BLDG #8
BLDG #9
PVT. DRIVE "A"
PVT. DRIVE "B"
PVT. DRIVE "C"
PVT. DRIVE "C"
PVT. DRIVE "D"
PVT. DRIVE "E"
OPEN SPACE
PASSIVE OPEN SPACE
PASSIVE OPEN SPACE
ACTIVE OPEN SPACE
20' PUBLIC WATER EASEMENT
UNDERGROUND PERFORATED CMP 6-FT DIAMETER 3-FT SPACING BETWEEN PIPES SPACE 75'LX28'W
UNDERGROUND PERFORATED CMP 6-FT DIAMETER 3-FT SPACING BETWEEN PIPES SPACE 49'LX60'W
REMOVE & REPLACE EXIST. RET. WALL
EXIST. PATIO
CURB OUTLET
EX. POWER POLE PROTECT IN PLACE
EX. WATER METERS & BACKFLOW TO BE REMOVED
CONN. TO EX. SEWER
CONN. TO EX. STORM DRAIN
CONN. TO EX. WATER
EX. STREET LIGHT PROTECT IN PLACE
EX. FIRE HYDRANT PROTECT IN PLACE
CONN. BROW DITCH TO EX. CURB OUTLET
EX. GRATE INLET TO BE REMOVED
EX. GRATE INLET TO BE REMOVED
3' FLAT
SCALE 1"= 30'
H&A

APPENDIX B

HELIX WATER DISTRICT DESIGN CRITERIA

SECTION 4.1
WATER PLANNING

4.1.1 PURPOSE

This section outlines planning data to determine average, maximum day, and peak hour water demands, fire flows, pipeline velocities, system pressures, pump station capacities, and reservoir storage volumes.

A. The purpose of this section is to identify general water planning and pre-design information for use in developing AGENCY Capital Improvement Program (CIP) and developer projects. This section will help develop uniformity and consistency in projects and to assist in providing uniform and workable facilities including pipelines, pressure control facilities, pumping stations, and storage reservoirs.

B. The Engineer of Work shall incorporate the planning criteria presented in this section as a basis for design. Sometimes the criteria are given in ranges, in which case the final criterion is selected within the indicated range. In other cases, specific criteria have been given and are to be followed by the Engineer of Work.

C. If the Engineer of Work desires to deviate from the criteria presented in this section only the AGENCY can approve the change once the Engineer of Work has provided documented rationale consistent with industry standards.

4.1.2 UNITS OF MEASUREMENT

Units of measurement to be used in design calculations are listed in Appendix E.

4.1.3 PLANNING AREA AND WATER DEMAND GENERATION

A. Development Projects:

1. Planning areas and other detailed information required for development projects shall be defined in Sub Area Master Plans or may have been defined in an AGENCY's master plan. See Section 4.4 Sub-Area Master Plan Development for undefined planning areas.

2. In the absence of more refined demand data from the AGENCY, development projects shall use the Residential Water Demand and/or Non-Residential Water Demand Tables 4-1-1 and 4-1-2, respectively.

B. AGENCY Capital Improvement Program (CIP) Projects:

1. For the majority of AGENCY CIP projects, the AGENCY has previously defined planning areas through master-planning or other means. When this is not the case for a CIP project, the AGENCY may have the Engineer of Work define the planning area.

2. In the absence of more refined demand data from the AGENCY, CIP projects shall use the Residential Unit Water Demand and/or Non-Residential Unit Water Demand Tables 4-1-1 and 4-1-2, respectively.

4.1.4 LAND USE

The Engineer of Work collects and organizes existing and ultimate land use data for the geographic area to define land use categories such as: residential, commercial, institutional, parks, hospitals, hotels, industrial, office, and schools. The local cities or county can provide the information regarding zoning and dwelling unit density.

4.1.5 DWELLING UNIT DENSITY AND RESIDENTIAL UNIT WATER DEMAND

The Engineer of Work shall estimate the residential population in the service area based on existing and ultimate allowable land use. Unless otherwise provided by the AGENCY, unit water demands shall be estimated based on dwelling unit density in Table 4-1-1.

Table 4-1-1
Dwelling Unit Density and Unit Water Demands

Dwelling Unit Density (dwelling units/gross acre)	Unit Density (persons/dwelling unit)	Population Density (persons/gross acre)	Unit Water Demand (gallons/gross acre-day)
0.1	6.0	0.6	90
0.2	6.0	1.2	180
1	6.0	6.0	900
2	3.5	7.0	1050
3	3.5	10.5	1575
4	3.5	14	2100
8	3.5	28	4200
9	3.5	32	4800
14	3.2	45	6750
29	3.0	87	13050
43	2.6	112	16800
73	2.2	161	24150
109	1.8	196	29400
218	1.5	327	49050

4.1.6 NON-RESIDENTIAL UNIT WATER DEMAND

A. Unless more accurate unit water demand estimates are available from the AGENCY, the non-residential unit water demands in the service area shall be estimated based on the land use categories in Table 4-1-2.

Table 4-1-2
Non-Residential Unit Water Demands

Land Use Category	Unit Water Demand
Commercial and Institutional	5000 gallons/net acre-day
Landscaped Park*	3000 gallons/net acre-day
Hospital**	8000 gallons/net acre-day/floor
Hotel**	7000 gallons/net acre-day/floor
Industrial	4000 gallons/net acre-day
Office	5000 gallons/net acre-day
School	4500 gallons/net acre-day

*Assumes zero recycled water demand on landscaped park area. For parks using recycled water, potable water usage=0 to 5% of unit water demand.

**For multiple story hospitals or hotels, multiply net area per floor by unit water demand by number of floors.

B. If net acres are not known for non-residential land use categories, use Table 4-1-3 to convert gross acreage to net acreage.

Table 4-1-3
Gross Acreage to Net Acreage Conversion

Land Use Category	Gross Area	Net Area
Commercial and Institutional	1	0.30-0.40
Landscaped Park	1	0.40-1.00
Hospital	1	0.35-0.65
Hotel	1	0.30-0.50
Industrial	1	0.25-0.35
Office	1	0.30-0.40
School	1	0.30-0.40

4.1.7 AVERAGE ANNUAL WATER DEMAND

Average daily water demands are calculated as the sum of: (1) the residential water demand and (2) non-residential water demand for each land use category as follows:

A. Average Daily Residential Water Demand (gallons/day)=Gross acres x Unit Water Demand (gallons/gross acre-day) for each Dwelling Unit Density.

B. Average Daily Non-Residential Water Demand (gallons/day) = Net acres x Unit Water Demand (gallons/net acre-day) for each Land Use Category.

C. Total Average Annual Day Water Demand (gallons/day) = Residential Water Demand + Non-Residential Water Demands.

On some projects, particularly large residential developments or developments with disproportional open space requirements in relationship to the number of dwelling units, using the unit water demands in Table 4-1-1 may generate unrealistically high estimates. For these projects, the Engineer of Work may request that the AGENCY approve an alternative approach. Similarly, the Engineer may also consider alternative unit water demand estimates for specific land use types where such estimates are based on detailed demand evaluations.

4.1.8 PEAK WATER DEMANDS

Peak hour and maximum day water demands are estimated using the peak factors presented in Figures 4-1-1 and 4-1-2. These peaking factors correspond to the AGENCY identified in Figure 4-1-3.

Peak water demands are calculated as follows:

A. Peak Hour Demand = Average Day of Year Water Demand x Peak Hour Peaking Factor.

B. Maximum Day Demand = Average Day of Year Water Demand x Maximum Day Peaking Factor.

4.1.9 HAZEN-WILLIAMS COEFFICIENTS

For existing pipelines that have flow meters and pressure gauges, the Hazen William's "c" Coefficient shall be calculated from actual field measurements particularly for the development of system curves for pump curve selection.

The Hazen-William's coefficients for water pipelines **equal to or less than 12-inch diameter** shall be as follows:

Pipe Material	Hazen William's "c" Coefficients
Asbestos Cement	120
Cast Iron	120
DIP (Lined)	120
HDPE	120
PVC	120
Steel (CML&C)	120

The Hazen-William's coefficients for water pipelines **greater than 12-inch diameter** shall be as follows:

Pipe Material	Hazen William's "c" Coefficients
Asbestos Cement	130
Cast Iron	130
DIP (Lined)	130
HDPE	130
PVC	130-140 (See Agency)
Steel (CML&C)	130

4.1.10 FIRE DEMANDS

A. Before using Table 4-1-4 for fire flow rate, the governing fire department shall first be contacted to determine a rate. If the fire department cannot determine a rate, then minimum flows as set forth in Table 4-1-4 shall be used. The fire flow duration for planning purposes shall be two hours minimum.

Table 4-1-4
Fire Demands for Design Purposes

Development Type	**Fire Demand** (gpm)(1)	**Fire Duration** (hours)
Single family residential	1,500	2
Duplexes	2,000	2
Condominiums and apartments	2,500	2
Resorts	2,500	2
Commercial	3,000	3
Industrial	3,500	3

(1) Fire Demands shall not include building sprinkler demands.

B. As an alternate method, the Engineer of Work may estimate fire demand flows by using the California Fire Code (CFC), Title 24, Part 9 Appendix BB, (current version).

C. Should application of the CFC methodology result in figures lower than those shown in Table 4-1-4, the Engineer may approve the CFC figures on a case-by-case basis following submittal of supporting calculations.

D. To calculate the fire flow volume required in operational storage reservoirs, see paragraph 4.1.15.

E. The required fire flow demand shall be supplied from at least two fire hydrants (assumes ½ flow from each hydrant) within a maximum radius of 750 feet from the fire.

F. Maximum fire hydrant supply, in some cases, can be obtained from the AGENCY. The supply will be based on an actual flow test if fire hydrants are in the vicinity of the desired location and a calculated flow rate at 20 psi will be provided. If hydrants are not available, then hydraulic modeling is required.

4.1.11 PRESSURE CRITERIA

A. Static Pressures:

1. Static Pressure is defined as the pressure in the system with no demand occurring in the distribution system.

2. The basic pressure criteria for water system design are shown in Figure 4-1-4. It is desirable to have water distribution pipelines in each pressure zone capable of supplying a minimum static pressure of 65 psi.

3. Generally, it is undesirable to have a maximum static pressure that exceeds 80 psi without a house regulator or 150 psi in the distribution system with a house regulator. The maximum static pressure in reservoir 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 head, whichever is greater. In some instances the AGENCY may require the developer to build a pressure reducing station and create a closed zone to meet the criteria. The AGENCY will be responsible for operation and maintenance of these stations.

B. Dynamic (Operating) Pressures:

1. In analyzing the supply to a pressure zone, the minimum hydraulic grade line elevation available from the water source shall be used; a level that typically occurs during peak hour demand conditions.

2. Operating pressures under peak hour demand conditions shall not fall more than 25 psi below the static pressures greater than 65 psi, equating to a residual water distribution pipeline pressure of at least 40 psi. In areas where existing static water pressures are already below 65 psi and a 40 psi residual pressure cannot be maintained under peak hour demands, the Engineer of Work shall contact the Agency for further direction. Operating pressures are determined in the distribution system pipelines at the service connection or fire hydrant.

3. Water systems must be designed to meet the 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 in urban areas) 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._When analyzing a system with one source of supply (either a reservoir or a pipeline) out of service, pressures may fall more than 25 psi below the static

pressure of 65 psi, but in no event may the pressure fall more than 40 psi (keeping the minimum dynamic pressure at 25 psi in the distribution pipeline or as defined by the AGENCY).

C. Pressure Requirements During Fires:

1. For the simulation of fire conditions, a minimum operating pressure of 20 psi is required in the distribution pipelines in the vicinity of the fire. The residual pressure is determined given the fire demand concentrated at no more than two hydrants within a radius of 750 feet of the fire as stated in Section 4.1.10E.

2. For water systems, the residual pressures in the distribution system during a fire shall be maintained given the following conditions:

a. The water level in the storage facility at the time of the fire is at the minimum operational level.

b. The prescribed fire duration as determined by the governing fire department is coincident with the maximum day demand condition.

c. All Agency booster pumps into and out of the pressure zone where the fire is occurring are off.

d. Areas outside of the fire circumference in the same pressure zone maintain a minimum pressure of 20 psi.

4.1.12 VELOCITY CRITERIA

A. Transmission Pipelines:

1. Transmission pipelines are defined as larger diameter pipelines (typically 12" or 16") as defined by the Agency or pipelines **of any size** that do not have connections to them such as fire hydrants, water services, or distribution tees, which serve to transfer water from one region to another.

2. The maximum transmission pipeline velocity shall not exceed 8 feet per second under peak hour flow conditions.

3. There is no minimum transmission pipeline velocity criterion.

B. Distribution Pipelines:

1. The maximum distribution pipeline velocity shall not exceed 8 feet per second under peak hour flow conditions or 10 feet per second under maximum day plus fire flow conditions.

2. There is no minimum distribution pipeline velocity criterion.

C. Fire Hydrant Laterals

The maximum fire hydrant lateral velocity shall not exceed 15 feet per second under maximum day plus fire flow conditions.

4.1.13 PUMP STATION CRITERIA

A. Unless directed differently by the Agency, pumping stations that are connected to reservoirs shall be designed to pump the ultimate maximum day demand projected for the service area. Certain Agencies also require that for pumped zones that the ultimate maximum day demand plus fire flow recharge are met. See Agency for specific requirements.

B. Where pump stations are pumping in series, the first-lift pump station shall be designed to pump the ultimate maximum day demand for all service areas served. The ultimate maximum day demand shall be calculated by summing all of the average day demands of the service areas served, then peaking the average demand using the maximum day peaking factor curve listed in Figure 4-1-2. The ultimate maximum day demand shall **not** be calculated by summing the ultimate maximum day demand of each service area.

C. In some cases, it may be desirable to design a pump station with a higher capacity in order to receive better electrical energy rates. These energy periods have defined terms such as AL-TOU "Time of Use" by San Diego Gas and Electric Company. The AL-TOU and other rate structures allow AGENCIES to receive lower kilowatt-hour rates to pump water in a specified time. Many factors need to be considered when designing pump stations for the different rate structures including:

1. Storage volume
2. Pumping operation (On-off levels)
3. Peaking factors of a system
4. The on-peak hours demand
5. Pump characteristic curves
6. Seasonal demand

D. If a pump station is being designed to use limited hours of pumping, the Engineer of Work shall provide a hydraulic modeling analysis for approval by the Engineer.

E. If allowed by the AGENCY, hydropneumatic pump stations shall be designed to pump ultimate peak hour demand (2 pumps, 1 duty, 1 standby each capable of pumping the peak hour flow rate) projected for the service area plus a fire flow pump capable of supplying the fire flow demand determined by the governing fire department. A general rule for sizing hydropneumatic tanks is to multiply the duty pump capacity in gallons per minute by 10. This will provide adequate unused, working, and safe limit volumes. In addition, certain Agencies require that a lower capacity pump equivalent to 30% of the average day demand be included in the design. An annuity or other funding mechanism may be required by the AGENCY to cover all operational, maintenance, and replacement costs of a hydropneumatic pump station indefinitely.

4.1.14 STORAGE CRITERIA FOR OPERATIONAL STORAGE RESERVOIRS

Unless directed differently by the Agency, the minimum operational storage volume within a pressure zone is the sum of three elements: operational storage, fire storage, and emergency storage.

A. Operational Storage:

1. Operational storage is defined as the volume of storage required to allow a reservoir's sources of supply to operate at a uniform rate throughout the day to provide water to meet all diurnal demand conditions.

2. Based on analysis and Agencies' experience and observations, it has been determined that 30% of a maximum day's volume is generally needed to handle the ultimate peak hour fluctuations. For this reason, operational

storage in reservoirs shall be designed for 0.3 x ultimate maximum day demand. An example follows:

Ultimate average day demand of service area = 300,000 gallons

Maximum day peaking factor = 2.7

Ultimate maximum day demand=300,000 x 2.7 = 810,000 gallons

Operational storage required = 0.3 x 810,000 = 243,000 gallons

B. Fire Storage:

1. The governing fire department shall provide the AGENCY with the fire flow rate and duration to determine fire storage. If a number cannot be obtained from the governing fire department, use the values listed in Table 4-1-4. Fire storage shall be provided in all reservoirs. Fire storage is equal to the product of the fire demand and the duration of the fire.

   An example to calculate required fire storage volume follows:

   Fire demand = 1500 gpm
   Fire Duration = 2 hours

   Fire storage = 1500 gpm x 2 hours x 60 minutes/hour
   = 180,000 gallons, or 0.18 million gallons

2. When there are two or more reservoirs serving a storage zone, then the fire storage volume may be shared between the reservoirs or put in one reservoir at the AGENCY's discretion.

C. Emergency Storage Component of Operational Reservoir:

1. The AGENCIES differ widely in terms of being able to treat and store water. Some have large raw water lakes and their own treatment facilities. Other AGENCIES are solely dependent on imported water from the Metropolitan Water District and the San Diego County Water Authority. Because of the many differences, potable water emergency storage varies among the AGENCIES. Another factor that influences potable water emergency storage in operational reservoirs is that the San Diego County Water Authority recommends each member be able to withstand a 10-day planned or unplanned outage of the potable water aqueduct.

2. Table 4-1-5 lists the recommended emergency storage component of an operational storage reservoir by AGENCY.

Table 4-1-5
Emergency Storage Volume Required
In Operational Storage Reservoirs per AGENCY

AGENCY	**Volume Required (In terms of being multiplied by an ultimate maximum day demand in a pressure zone)**
Helix Water District	0.2
Lakeside Water District	0.2
Otay Water District	1.0
Padre Dam Municipal Water District	Gravity Zone 1.0, Pump Zone 1.5
Ramona Municipal Water District	1.0
Santa Fe Irrigation District	Case Specific
Sweetwater Authority	0.7

An example on how to calculate emergency storage volume in a Helix Water District reservoir follows:

Ultimate average day demand of service area = 300,000 gallons

Maximum day peaking factor = 2.7

Ultimate maximum day demand=300,000 x 2.7 = 810,000 gallons

Emergency storage volume required = 0.2 x 810,000 = 162,000 gallons

D. Minimum Total Storage Volume Requirement (Example for Helix):

Assuming the two-hour 1500 gpm fire flow volume is included in the reservoir, the total storage volume for the Helix reservoir would be 585,000 gallons (243,000 gallon operational, 180,000 gallon fire flow, and 162,000 gallon emergency storage volume).

4.1.15 STORAGE CRITERIA FOR EMERGENCY STORAGE RESERVOIRS

See each AGENCY for criteria regarding potable water emergency storage reservoirs and raw water reservoirs.

4.1.16 REFERENCE

A. Should the reader have any suggestions or questions concerning the material in this section, please contact one of the agencies listed.

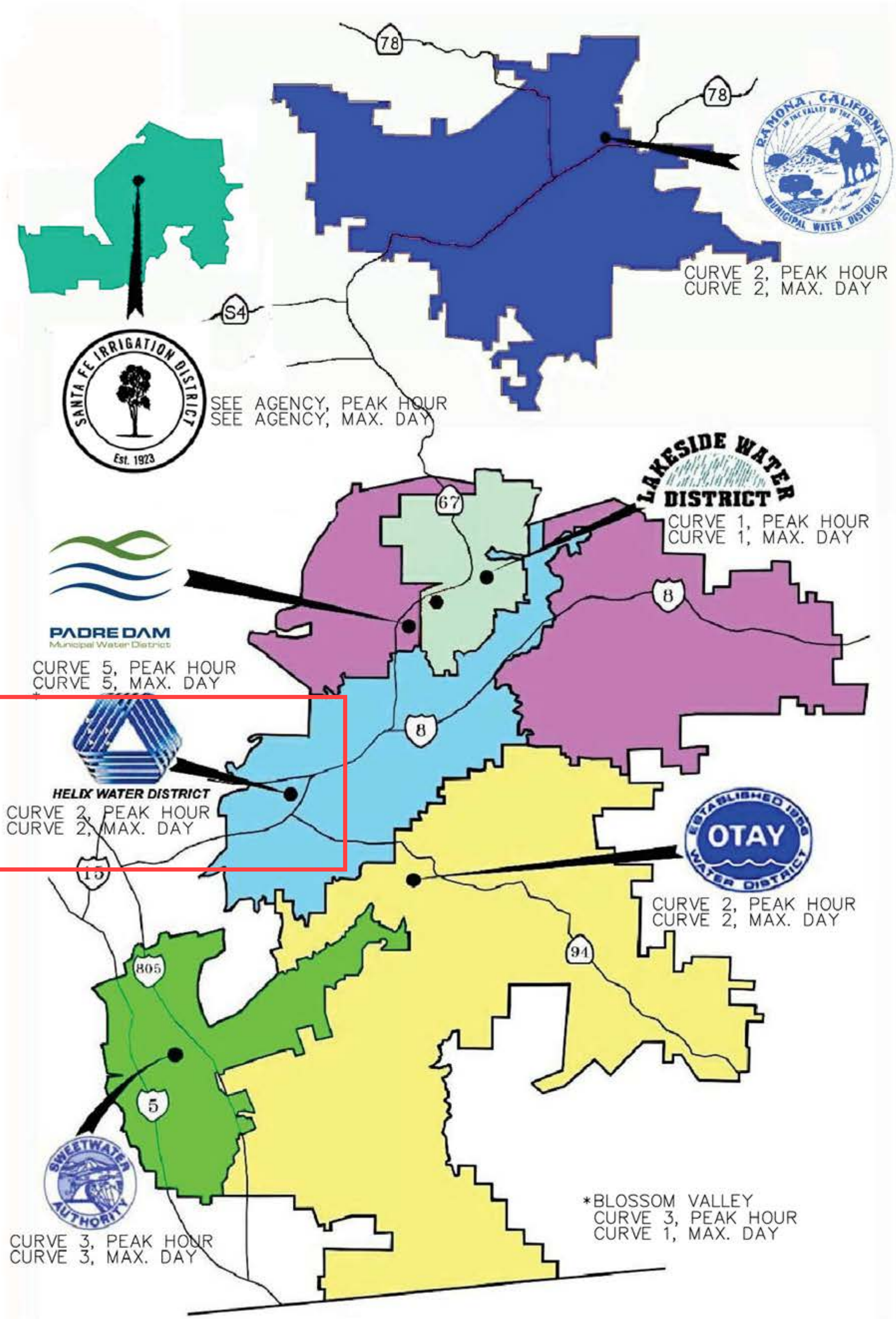
B. The publications listed below form a part of this section to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said publications unless otherwise called for. The following list of publications, as directly referenced within the body of this document, has been provided for the user's convenience. It is the responsibility of the user of these documents to make reference to and/or utilize industry standards not otherwise directly referenced within this document.

1. Fire Suppression Rating Schedule, Edition 6-80, Section 1 (Public Fire Suppression), published by the Insurance Services Office

2. Water Agencies' Standards:

    a. Design Guideline:

        1. Section 4.4, Sub Area Master Plans
        2. Appendix E, Units of Measurement



WAS
WATER AGENCIES' STANDARDS

WATER AGENCIES' DESIGN GUIDELINES

WATER PLANNING

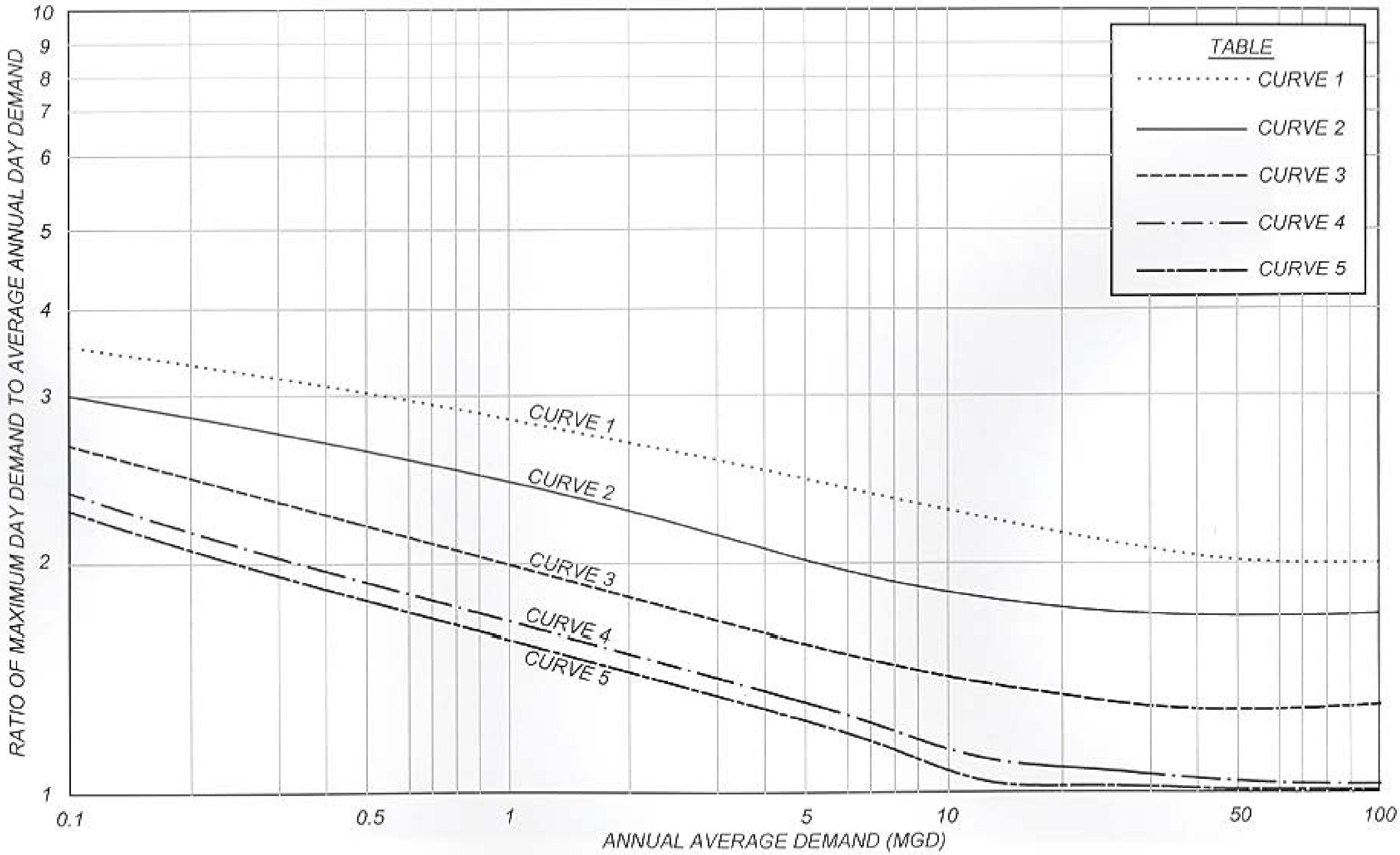
WATER AGENCIES MAP

FIGURE 4–1–3

P:\WORKING\WO8490-WASC\Water Agencies Design Guide (WADG)\Dwgs\ACAD 2000\4.1_Figure4-1-3-2000.dwg 8/18/2004 3:03:38 PM PST

2.8

MAXIMUM DAY DEMAND FACTOR



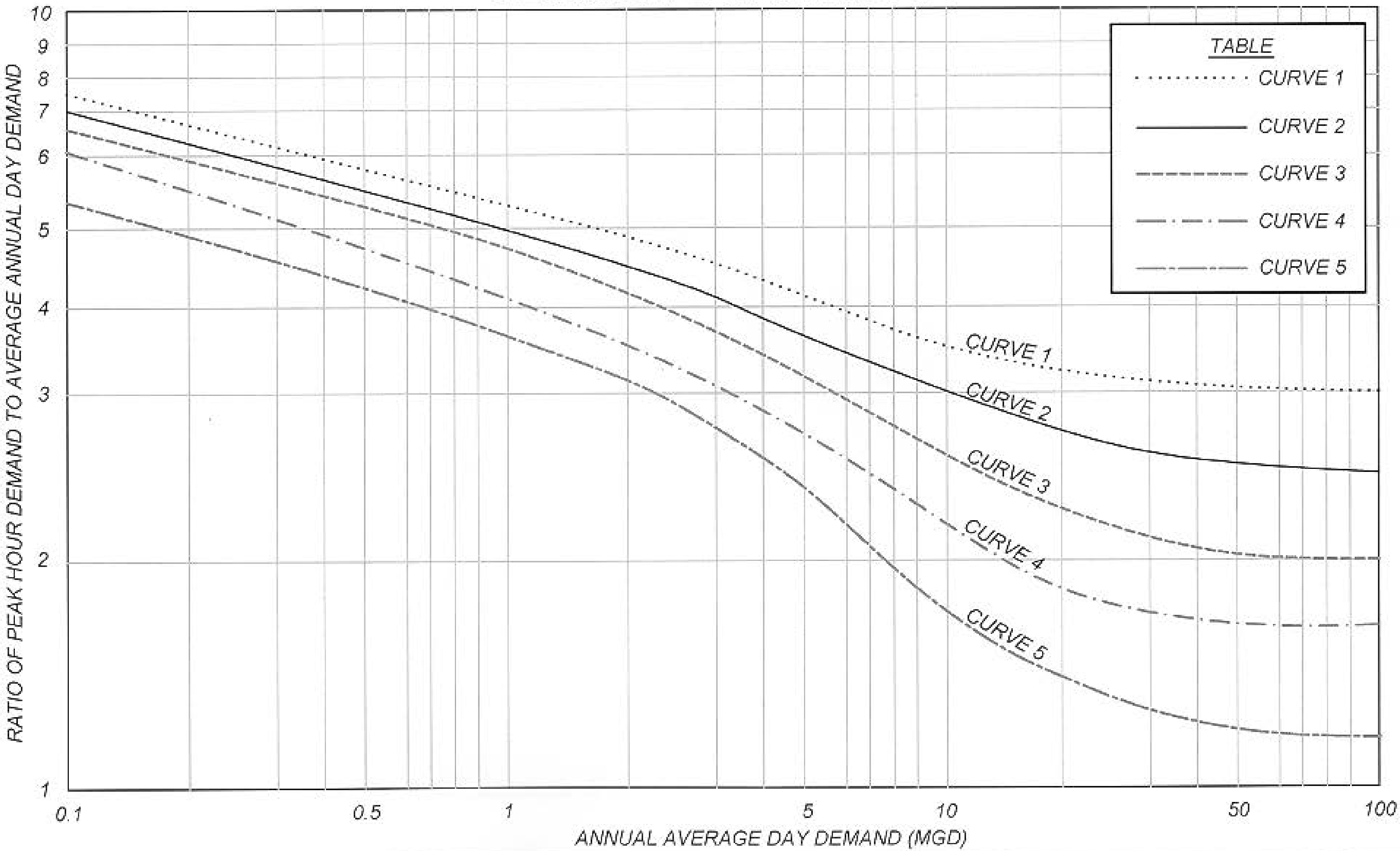
WAS

WATER AGENCIES' DESIGN GUIDELINES

WATER PLANNING

MAXIMUM DAY DEMAND
PEAKING FACTOR CURVE
FIGURE 4-1-2

PEAK HOUR DEMAND FACTOR



WATER AGENCIES' DESIGN GUIDELINES

WATER PLANNING

PEAK HOUR DEMAND
PEAKING FACTOR CURVE
FIGURE 4-1-1

Helix Water District
Setting standards of excellence in public service

7811 University Avenue
La Mesa, CA 91942-0427

(619) 466-0585
FAX (619) 466-1823
www.hwd.com

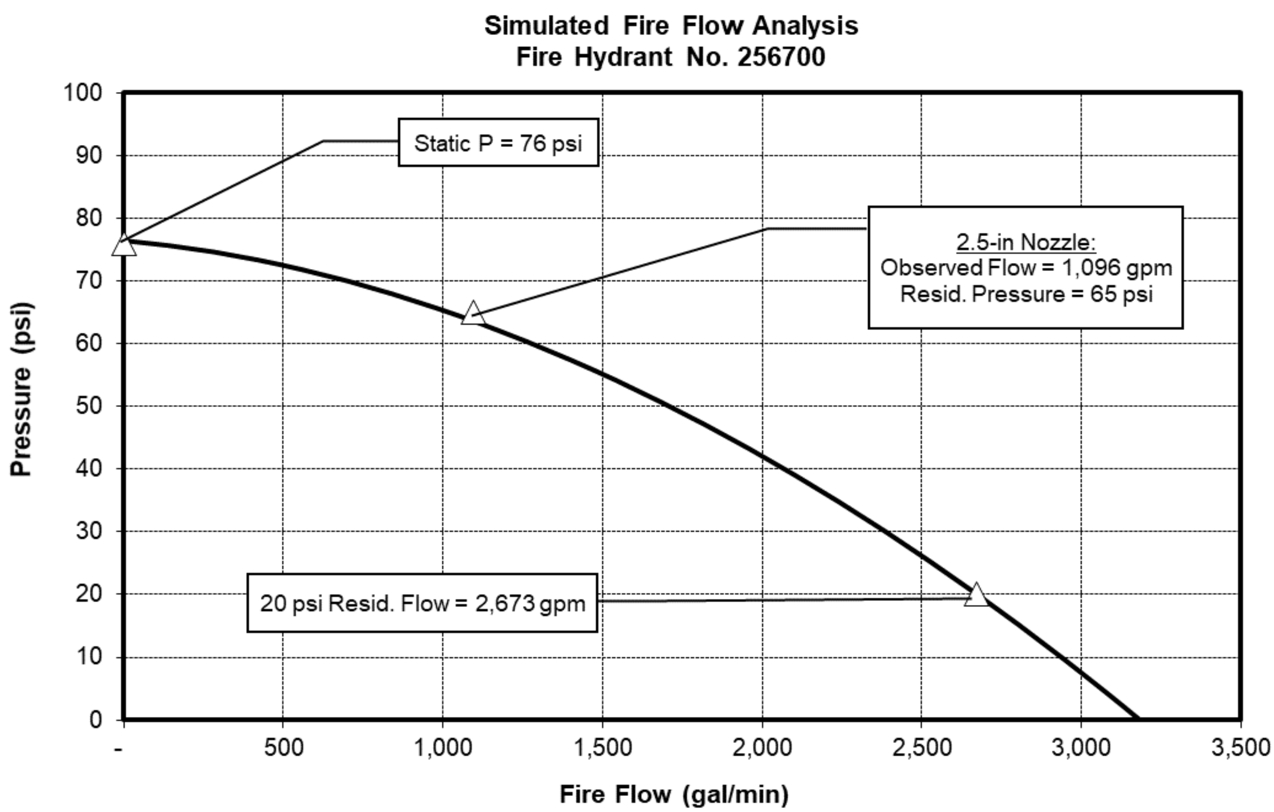
SIMULATED FIRE HYDRANT FLOW TEST

TESTED: April 13, 2023

FIRE HYDRANT LOCATION: 9407 Jericho Road, La Mesa

FIRE HYDRANT ID#: 256700

PROPERTY ADDRESS: 9407 Jericho Road, La Mesa



*This simulated fire flow was calculated on a fire hydrant located at 9407 Jericho Road, La Mesa, CA. Helix Water District cannot guarantee a minimum fire flow under all operating conditions at all times and assumes no responsibility for flows less than indicated above, due to but not limited to power outages, earthquakes, acts of nature, system malfunction or failures, and/or maintenance of the facilities. Simulated fire flow analysis performed by Aneld Anub, Associate Engineer.

HELIX WATER DISTRICT

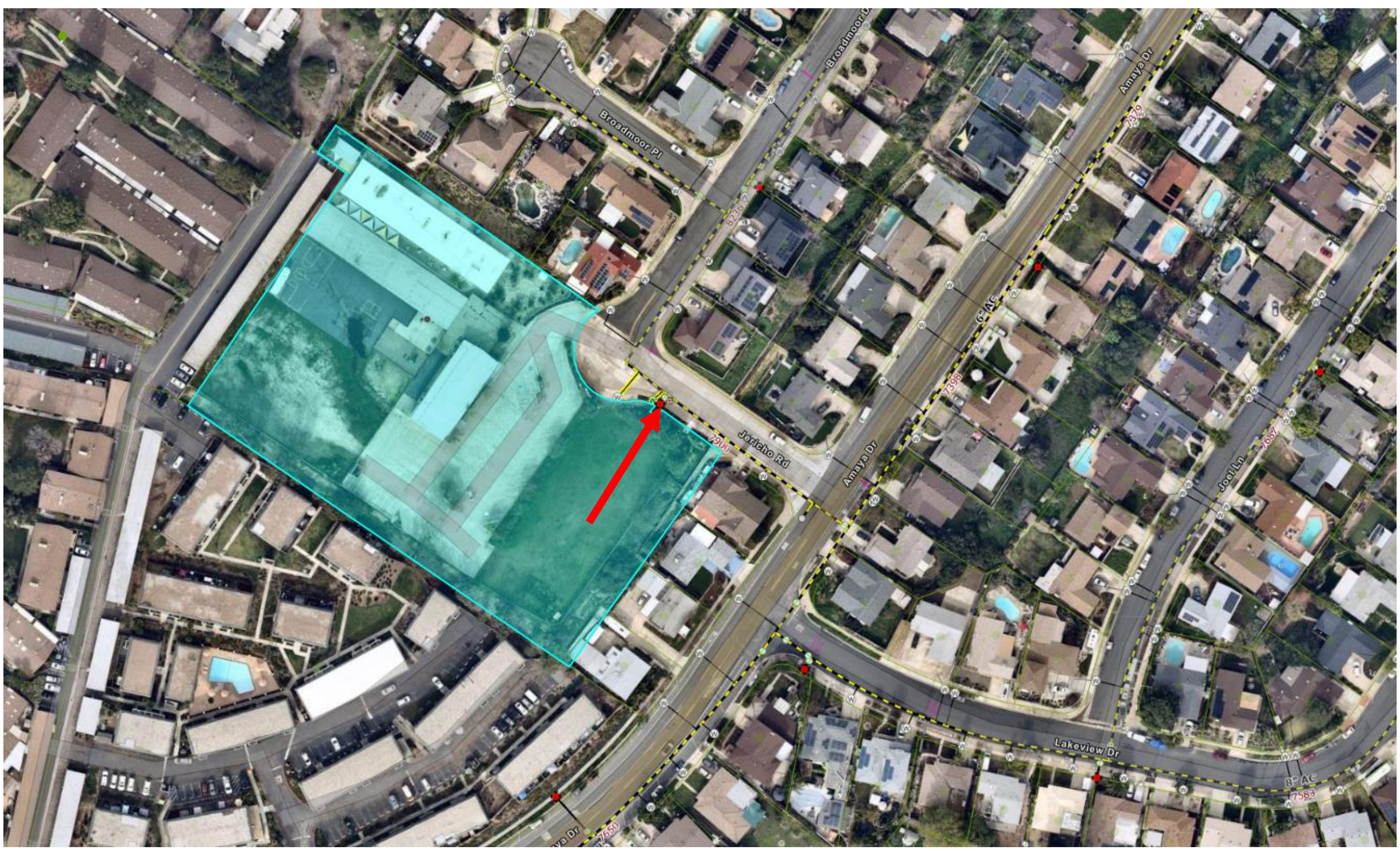
SIMULATED HYDRANT FLOW TEST

Date: April 13, 2023 **PERFORMED BY: Aneld Anub**

Location	F.H. #	PSI		F.H.	FH Size	Test Orifice Size	Discharge-G.P.M	
		Static	Residual	Model			Observed	20 Lbs.
9407 Jericho Rd., La Mesa	256700	76	65	Clow (1)2.5"x(1)4”	6"	2.5"	1,096	2,673

THE FIGURES SHOWN ABOVE WERE GENERATED USING A COMPUTER MODELING PROGRAM BASED ON MAXIMUM DAY DEMAND CONDITIONS.

*Helix Water District cannot guarantee a minimum fire flow under all operating conditions at all times and assumes no responsibility for flows less than indicated above, due to but not limited to power outages, earthquakes, acts of nature, system malfunction or failures, and/or maintenance of the facilities.



Fire Hydrant Flow Test Date 4/13/2023
Fire Hydrant Flow Test Location Jericho Road and Broadmoor

Input Flow Test Results

Static Pressure	76.0 PSI			
Residual Pressure	65.0 PSI			
Hydrant Flow	1096 GPM			
Actual Hydrant Elevation	630 Feet	HGL	805.4 Feet
Estimated Hydrant Elevation	630 Feet	HGL	805.4 Feet

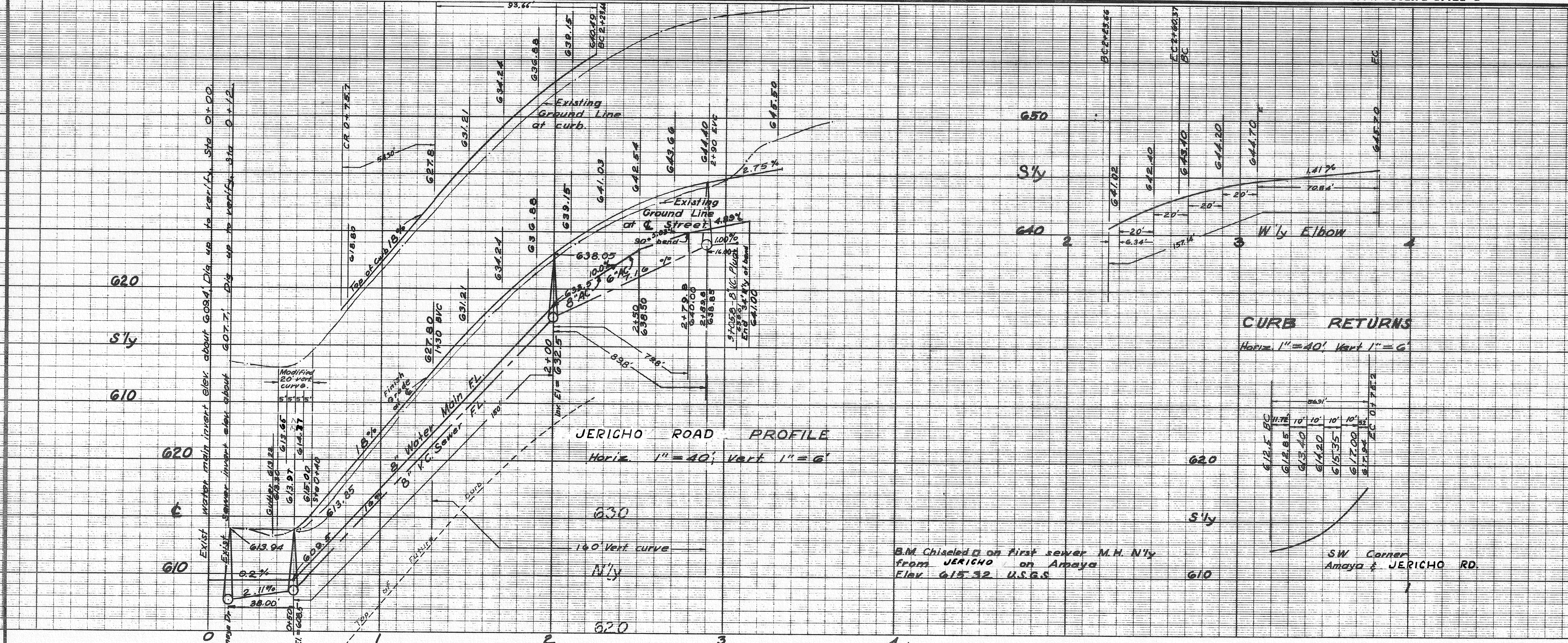
Equation $\Delta H = k\,Q^{1.85}$

k = 6.03919E-05

Extrapolated Calculations

Q, gpm	Residual Pressure	Available HGL
500	73.4 psi	799.5 ft
750	70.5 psi	792.8 ft
1000	66.7 psi	784.0 ft
1250	62.0 psi	773.0 ft
1500	56.3 psi	760.0 ft
1750	49.9 psi	745.1 ft
2000	42.5 psi	728.2 ft
2250	34.4 psi	709.4 ft
2500	25.4 psi	688.7 ft
2750	15.7 psi	666.2 ft
3000	5.1 psi	641.9 ft
3250	-6.2 psi	615.8 ft
3500	-18.2 psi	587.9 ft
3750	-31.1 psi	558.3 ft
4000	-44.7 psi	526.9 ft

Residual Pressure, psi	Available Flow, gpm
0 psi	3,116
10 psi	2,887
20 psi	2,642
30 psi	2,375
40 psi	2,080
50 psi	1,745
60 psi	1,342
70 psi	790
80 psi	Residual Pressure Exceeds Static Pressure
90 psi	Residual Pressure Exceeds Static Pressure
100 psi	Residual Pressure Exceeds Static Pressure



WORK TO BE DONE

The improvements consist of the following work to be done in accordance with these plans, the specifications of the City of La Mesa, and the Helix Irrigation District.

The grading of the portions of the streets shown thus:
The preparation of subgrade and paving of the portions of streets shown thus:
The construction of 6" type 'G' curb shown thus:
The construction of sidewalk shown thus:

The construction of 8" vitrified clay pipe sewer main shown thus: 8" V.C.
The construction of sewer manholes shown thus: MH #2
The construction of 4" vitrified clay sewer laterals shown thus:
The construction of copper water services shown thus: W
The construction of 6" standard fire hydrant assembly shown thus: 6" FH
The construction of gatevalves shown thus: 6" GV

NOTES:

All street improvements shall be done in accordance with the Standard Specifications Doc. No. 1285 and 1286 and to the satisfaction of the City Engineer of La Mesa, California.

Minimum of 95% Compaction required in fill areas within streets.

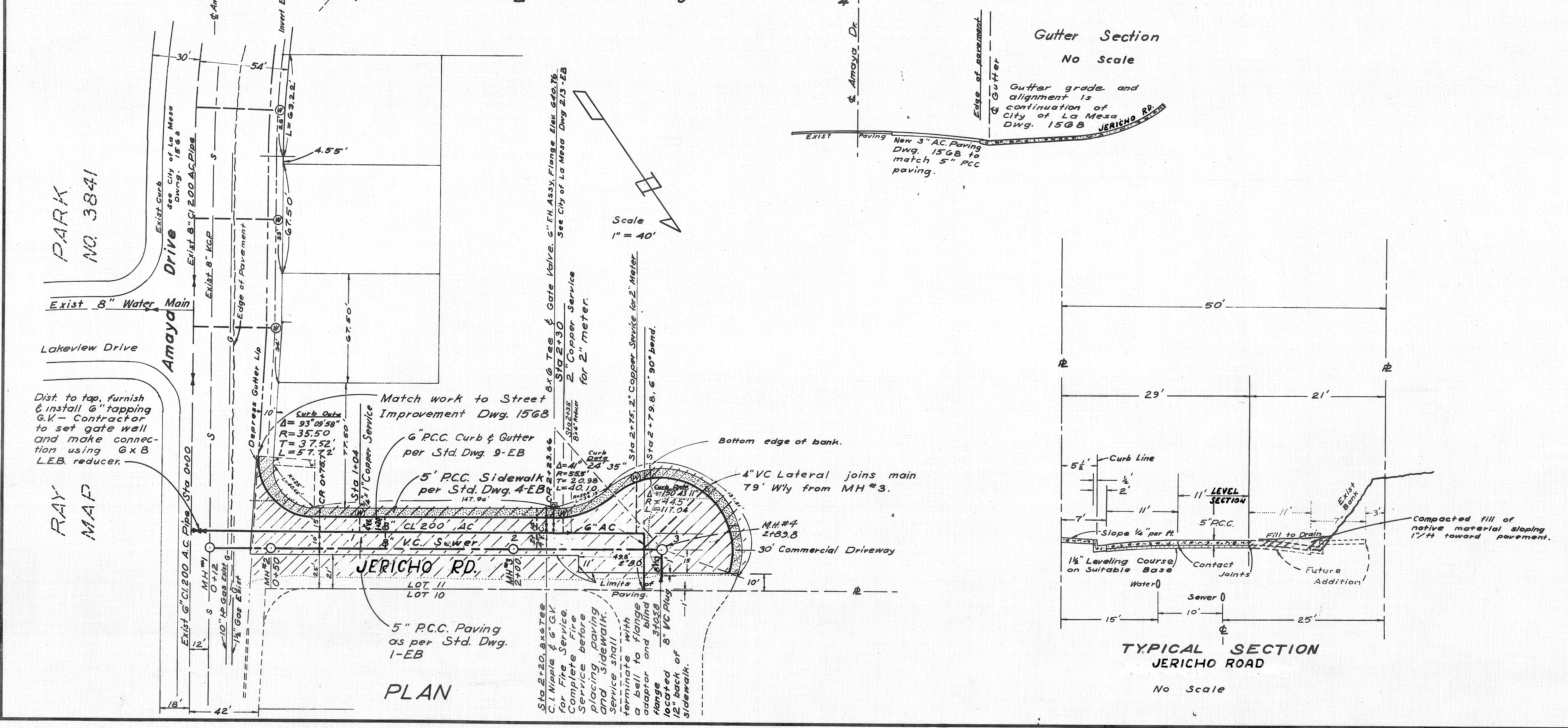
All water system work shall be performed in accordance with the Standard Specifications of Helix Irrigation District.

Contractor to install three ¾"x1" copper services as shown on Amaya Drive on existing main; District will make the 3 required wet taps after contractor has performed required excavation. Termination of services in meter box will conform to location and grades of approved street improvement Dwg. No. 1568.

The waterline shall have a minimum cover of 36".

Trench grade shall be .5' below bottom of pipe grade of water line.

Contractor to excavate at gas and sewer locations in advance of trenching to permit adjusting pipeline grades if necessary.



HELIX IRRIGATION DISTRICT
Approved [signature] RE 9695
Chief Engineer
Date 3/8/60
Subject to Revision in 90 days.

PRIVATE CONTRACT

ENGINEER OF WORK
[signature] Jan 26, '60
Bert C. Wilkas, RCE 8512
9837 Maine Ave, Lakeside HI 3 3700

IMPROVEMENT PLANS FOR JERICHO ROAD

PORTION OF LOT 11, BLOCK 30, EL CAJON HEIGHTS MAP NO. 593

CITY OF LA MESA
ENGINEERING DEPARTMENT

SHEET 1 OF 1 SHEETS — W.O. NO.

PLAN REVISION

CHANGE	BY	DATE	APPROVAL
AS BUILT	T.C.	1-27-61	

[signature] 5-4-60
CITY ENGINEER — DATE

APPROVALS FOR

WATER DEPT.	SEWERAGE
PLANNING DEPT.	DRAINAGE
ELECTRICAL	
STRUCTURAL	
TRAFFIC	

CONSTRUCTION RECORD
DATE STARTED — DATE COMPLETED
CONTR. — INSP.
FIELD BOOK

ASS'T CITY ENGINEER AND OFFICE ENGINEER
SUPERVISOR
CHECKED
DESIGNED

1750

APPENDIX C

PRIVATE WATER REFERENCE

APPENDIX A

RECOMMENDED RULES FOR SIZING THE WATER SUPPLY SYSTEM

The provisions contained in this appendix are not mandatory unless specifically adopted by a state agency, or referenced in the adopting ordinance.

A 101.0 General.

A 101.1 Applicability. This appendix provides a general procedure for sizing a water supply system. Because of the variable conditions encountered, it is impractical to lay down definite detailed rules of procedure for determining the sizes of water supply pipes in an appendix, which shall necessarily be limited in length. For an adequate understanding of the problems involved, refer to Water-Distributing Systems for Buildings, Report BMS 79 of the National Bureau of Standards; and Plumbing Manual, Report BMS 66, also published by the National Bureau of Standards.

A 102.0 Preliminary Information.

A 102.1 Daily Service Pressure. Obtain the necessary information regarding the minimum daily service pressure in the area where the building is to be located.

A 102.2 Water Meter. Where the building supply is to be metered, obtain information regarding friction loss relative to the rate of flow of meters in the range of sizes likely to be used. Friction-loss data is capable of being obtained from most manufacturers of water meters. Friction losses for disk-type meters shall be permitted to be obtained from Chart A 102.2.

A 102.3 Local Information. Obtain available local information regarding the use of different kinds of pipe with respect both to durability and to decrease in capacity with the length of service in the particular water supply.

A 103.0 Demand Load.

A 103.1 Supply Demand. Estimate the supply demand for the building main, the principal branches and risers of the system by totaling the fixture units on each, Table A 103.1, and then by reading the corresponding ordinate from Chart A 103.1(1) or Chart A 103.1(2), whichever is applicable.

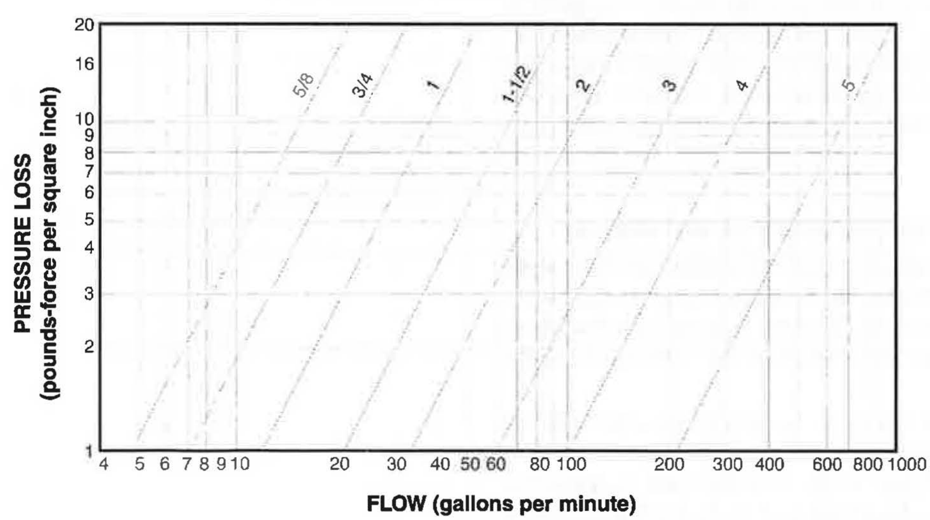
A 103.2 Continuous Supply Demand. Estimate continuous supply demands in gallons per minute (gpm) (L/s) for lawn sprinklers, air conditioners, etc., and add the sum to the total demand for fixtures. The result is the estimated supply demand of the building supply.

A 104.0 Permissible Friction Loss.

A 104.1 Residual Pressure. Decide what is the desirable minimum residual pressure that shall be maintained at the highest fixture in the supply system. Where the highest group of fixtures contains flushometer valves, the residual pressure for the group shall be not less than 15 pounds-force per square inch (psi) (103 kPa). For flush tank supplies, the available residual pressure shall be not less than 8 psi (55 kPa).

A 104.2 Elevation. Determine the elevation of the highest fixture or group of fixtures above the water (street) main. Multiply this difference in elevation by 0.43. The result is the loss of static pressure in psi (kPa).

CHART A 102.2
FRICTION LOSSES FOR DISK-TYPE WATER METERS



For SI units: 1 inch = 25 mm, 1 pound-force per square inch = 6.8947 kPa, 1 gallon per minute = 0.06 L/s

A 104.3 Available Pressure. Subtract the sum of loss in static pressure and the residual pressure to be maintained at the highest fixture from the average minimum daily service pressure. The result will be the pressure available for friction loss in the supply pipes, where no water meter is used. Where a meter is to be installed, the friction loss in the meter for the estimated maximum demand should also be subtracted from the service pressure to determine the pressure loss available for friction loss in the supply pipes.

A 104.4 Developed Length. Determine the developed length of pipe from the water (street) main to the highest fixture. Where close estimates are desired, compute with the aid of Table A 104.4(1), Table A 104.4(2), or Table A 104.4(3), whichever is applicable, the equivalent length of pipe for fittings in the line from the water (street) main to the highest fixture and add the sum to the developed length. The pressure available for friction loss in psi (kPa), divided by the developed lengths of pipe from the water (street) main to the highest fixture, times 100, will be the average permissible friction loss per 100 feet (30 480 mm) length of pipe.

A 105.0 Size of Building Supply.

A 105.1 Diameter. Knowing the permissible friction loss per 100 feet (30 480 mm) of pipe and the total demand, the diameter of the building supply pipe shall be permitted to be obtained from Chart A 105.1(1), Chart A 105.1(2), Chart A 105.1(3), Chart A 105.1(4) Chart A 105.1(5), Chart A 105.1(6), or Chart A 105.1(7), whichever is applicable. The diameter of pipe on or next above the coordinate point corresponding to the estimated total demand and the permissible friction loss will be the size needed up to the first branch from the building supply pipe.

A 105.2 Copper and Copper Alloy Piping. Where copper tubing or copper alloy pipe is to be used for the supply piping and where the character of the water is such that slight changes in the hydraulic characteristics are expected, Chart A 105.1(1) shall be permitted to be used.

A 105.3 Hard Water. Chart A 105.1(2) shall be used for ferrous pipe with the most favorable water supply in regards to corrosion and caking. Where the water is hard or corrosive, Chart A 105.1(3) or Chart A 105.1(4) will be applicable. For extremely hard water, it will be advisable to make additional allowances for the reduction of the capacity of hot-water lines in service.

A 106.0 Size of Principal Branches and Risers.

A 106.1 Size. The required size of branches and risers shall be permitted to be obtained in the same manner as the building supply, by obtaining the demand load on each branch or riser and using the permissible friction loss computed in Section A 104.0.

A 106.2 Branches. Where fixture branches to the building supply are sized for the same permissible friction loss per 100 feet (30 480 mm) of pipe as the branches and risers to the highest level in the building and lead to the inadequate water supply to the upper floor of a building, one of the following shall be provided:

(1) Selecting the sizes of pipe for the different branches so that the total friction loss in each lower branch is approximately equal to the total loss in the riser, including both friction loss and loss in static pressure.

(2) Throttling each such branch using a valve until the preceding balance is obtained.

(3) Increasing the size of the building supply and risers above the minimum required to meet the maximum permissible friction loss.

A 106.3 Water Closets. The size of branches and mains serving flushometer tanks shall be consistent with sizing procedures for flush tank water closets.

A 107.0 General.

A 107.1 Velocities. Velocities shall not exceed 10 feet per second (ft/s) (3 m/s), except as otherwise approved by the Authority Having Jurisdiction.

A 107.2 Pressure-Reducing Valves. Where a pressure-reducing valve is used in the building supply, the developed length of supply piping and the permissible friction loss shall be computed from the building side of the valve.

A 107.3 Fittings. The allowances in Table A 104.4(1) for fittings are based on non-recessed threaded fittings. For recessed threaded fittings and streamlined soldered fittings, one-half of the allowances given in the table will be ample.

TABLE A 103.1
WATER SUPPLY FIXTURE UNITS (WSFU) AND MINIMUM FIXTURE BRANCH PIPE SIZES[3]

APPLIANCES, APPURTENANCES, OR FIXTURES[2]	MINIMUM FIXTURE BRANCH PIPE SIZE[1,4] (inches)	PRIVATE	PUBLIC	ASSEMBLY[6]
Bathtub or Combination Bath/Shower (fill)	½	4.0	4.0	–
¾ inch Bathtub Fill Valve	¾	10.0	10.0	–
Bidet	½	1.0	–	–
Clothes Washer	½	4.0	4.0	–
Dental Unit, cuspidor	½	–	1.0	–
Dishwasher, domestic	½	1.5	1.5	–
Drinking Fountain or Water Cooler	½	0.5	0.5	0.75
Hose Bibb	½	2.5	2.5	–
Hose Bibb, each additional[7]	½	1.0	1.0	–
Lavatory	½	1.0	1.0	1.0
Lawn Sprinkler, each head[5]	–	1.0	1.0	–
Mobile Home, each (minimum)	–	12.0	–	–
Sinks	–	–	–	–
Bar	½	1.0	2.0	–
Clinical Faucet	½	–	3.0	–
Clinical Flushometer Valve with or without faucet	1	–	8.0	–
Kitchen, domestic	½	1.5	1.5	–
Laundry	½	1.5	1.5	–
Service or Mop Basin	½	1.5	3.0	–
Washup, each set of faucets	½	–	2.0	–
Shower per head	½	2.0	2.0	–
Urinal, 1.0 GPF Flushometer Valve	¾	3.0	4.0	5.0
Urinal, greater than 1.0 GPF Flushometer Valve	¾	4.0	5.0	6.0
Urinal, flush tank	½	2.0	2.0	3.0
Wash Fountain, circular spray	¾	–	4.0	–
Water Closet, 1.6 GPF Gravity Tank	½	2.5	2.5	3.5
Water Closet, 1.6 GPF Flushometer Tank	½	2.5	2.5	3.5
Water Closet, 1.6 GPF Flushometer Valve	1	5.0	5.0	8.0
Water Closet, greater than 1.6 GPF Gravity Tank	½	3.0	5.5	7.0
Water Closet, greater than 1.6 GPF Flushometer Valve	1	7.0	8.0	10.0

For SI units: 1 inch = 25 mm

Notes:

1 Size of the cold branch pipe, or both the hot and cold branch pipes.

2 Appliances, appurtenances, or fixtures not included in this table shall be permitted to be sized by reference to fixtures having a similar flow rate and frequency of use.

3 The listed fixture unit values represent their total load on the cold water building supply. The separate cold water and hot water fixture unit value for fixtures having both cold and hot water connections shall be permitted to be three-quarters of the listed total value of the fixture.

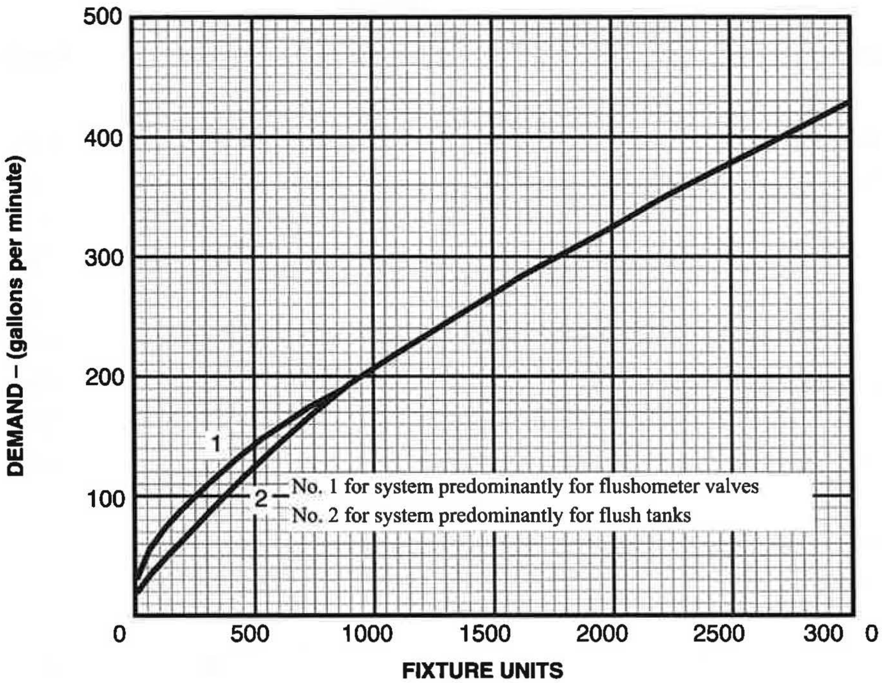
4 The listed minimum supply branch pipe sizes for individual fixtures are the nominal (I.D.) pipe size.

5 For fixtures or supply connections likely to impose continuous flow demands, determine the required flow in gallons per minute (gpm) (L/s) and add it separately to the demand in gpm (L/s) for the distribution system or portions thereof.

6 Assembly [Public Use (see Table 422.1)].

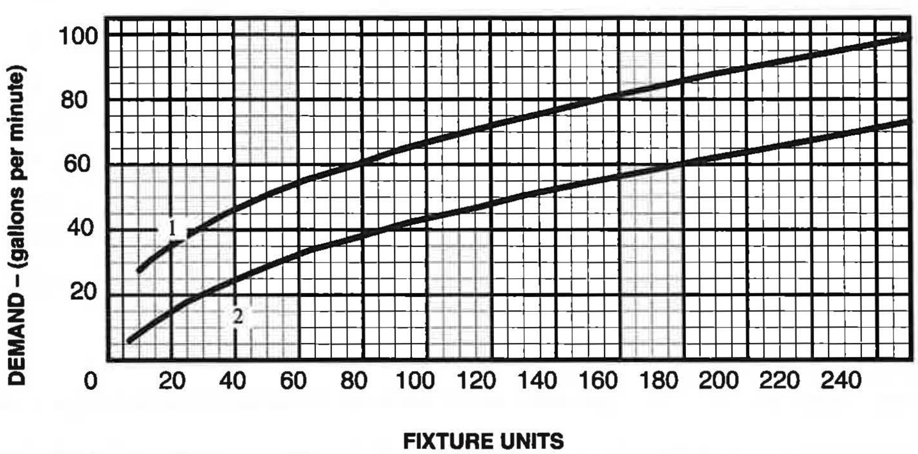
7 Reduced fixture unit loading for additional hose bibbs is to be used where sizing total building demand and for pipe sizing where more than one hose bibb is supplied by a segment of water distribution pipe. The fixture branch to each hose bibb shall be sized by 2.5 fixture units.

CHART A 103.1(1)
ESTIMATE CURVES FOR DEMAND LOAD



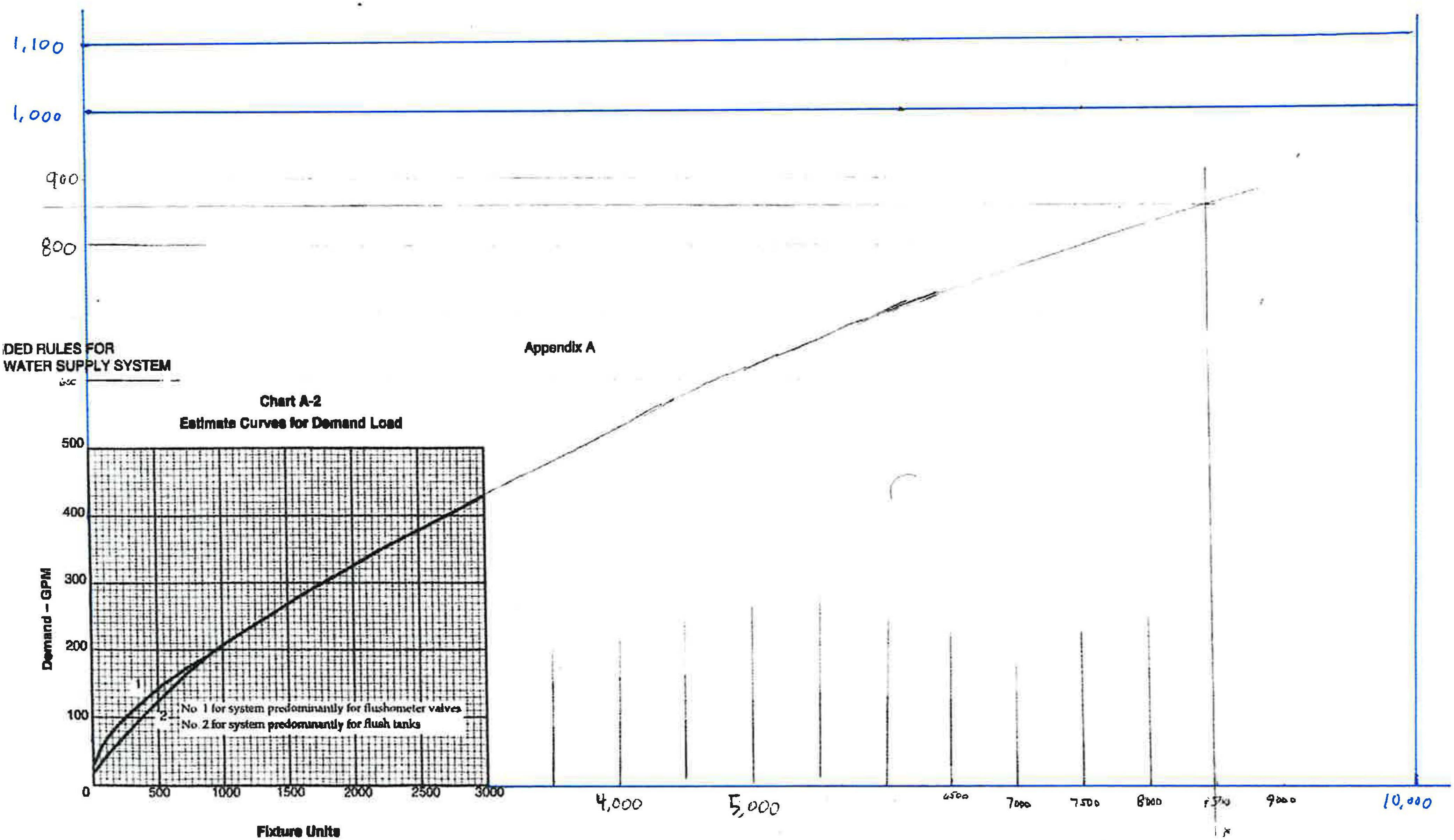
For SI units: 1 gallon per minute = 0.06 L/s

CHART A 103.1(2)
ENLARGED SCALE DEMAND LOAD



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

Chart A-2
Estimate Curves for Demand Load



Fees and Deposits

(Valid through December 31, 2023)

Project initiation fee	$325
Field estimate fee	$395
Water availability form fee	$151
Will serve letter fee`	$151
Fire hydrant flow test fee	$263
Street improvement processing fee	$845
Street improvement plan check deposit	$834/sheet*
Water main extension processing fee	$1,831
Water main extension plan check deposit	$1,240/sheet*
Grading/architectural/landscape plan check deposit	$118/sheet
Easement acquisition fee (by deed or map)	$1,190
Easement/quitclaim plat and legal review deposit	$2,000
Quitclaim deed processing fee	$1,241 + recording cost
Encroachment agreement fee	$1,601 + recording cost

*Includes title, notes, plan view, and detail sheets. Does not count sheets unrelated to water improvements, such as erosion control, traffic control, or striping sheets.

1. Water Meter Capacity Fees

A new metered connection to Helix's water system requires payment of capacity fees. The fees help Helix pay the cost of renewing existing infrastructure and developing additional capacity in our water system to accommodate growth. The fees are paid by developers and owners responsible for growth, rather than existing customers. The San Diego County Water Authority (SDCWA), Helix's wholesale water supplier, charges capacity fees for the same reason.

2023 Capacity Fee Schedule

(Through December 31, 2023)

Meter Size	3/4 Inch	1 Inch	1.5 Inch	2 Inch
Helix Capacity Fee	$7,624	$12,706	$30,497	$48,287
SDCWA Capacity Fee	$5,859	$9,374	$17,577	$30,467

Sec. 4.2 General Design

4.2.1 *Size.* The nominal sizes of meters (see Table 1) shall be the same as the nominal sizes of the casing connections.

4.2.2 *Capacity.* The nominal capacity ratings and the related pressu[illegible] loss limits shall be the same as those shown in Table 1 for the safe maximu[illegible] operating capacities.

Table 1 Operating characteristics

Nominal Meter Size		Safe Maximum Operating Capacity*		Maximum Rate for Continuous Duty		Maximum Loss of Head at Safe Maximum Operating Capacity†		Normal Test-Flow Limits	
[illegible]	(mm)	gpm	(m^3/h)	gpm	(m^3/h)	psi	(kPa)	gpm	(m^3/h)
Class I—Vertical-Shaft Type									
[illegible]	(20)	30	(7)	20	(5)	15	(103)	1.5–30	(0.3–7.0)
[illegible]	(25)	50	(11)	35	(8)	15	(103)	2–50	(0.5–11.0)
[illegible]	(40)	100	(23)	65	(15)	15	(103)	3–100	(0.7–23.0)
[illegible]	(50)	160	(36)	100	(23)	15	(103)	4–160	(0.9–36.0)
[illegible]	(80)	350	(80)	220	(50)	15	(103)	6–350	(1.4–79.0)
[illegible]	(100)	630	(140)	420	(96)	15	(103)	8–630	(1.8–140.0)
[illegible]	(150)	1,300	(290)	865	(200)	15	(103)	15–1,300	(3.4–290.0)
Class II—In-Line (High-Velocity) Type									
[illegible]	(40)	120	(27)	90	(20)	7	(48)	4–120	(0.9–27.0)
[illegible]	(50)	190	(43)	160	(36)	7	(48)	4–190	(0.9–43.0)
[illegible]	(80)	435	(99)	350	(80)	7	(48)	8–435	(1.8–99.0)
[illegible]	(100)	750	(170)	650	(150)	7	(48)	15–750	(3.4–170.0)
[illegible]	(150)	1,600	(360)	1,400	(320)	7	(48)	30–1,600	(6.8–360.0)
[illegible]	(200)	2,800	(640)	2,400	(550)	7	(48)	50–2,800	(11.0–640.0)
[illegible]	(250)	4,200	(950)	3,500	(790)	7	(48)	75–4,200	(17.0–950.0)
[illegible]	(300)	5,300	(1,200)	4,400	(1,000)	7	(48)	120–5,300	(27.0–1,200.0)
[illegible]	(400)	7,800	(1,770)	6,500	(1,470)	7	(48)	200–7,800	(45.0–1,770.0)
[illegible]	(500)	12,000	(2,730)	10,000	(2,270)	7	(48)	300–12,000	(68.0–2,730.0)

*[illegible]mum operating capacity is the maximum flow rate for intermittent service and should not exceed 33% usage (8 h/day).

†[illegible] not include strainer, which may be required in some applications. Maximum head loss listed for class II meters is at [illegible] rate for continuous duty.

APPENDIX D

FIRE CODE REFERENCE

APPENDIX B

FIRE-FLOW REQUIREMENTS FOR BUILDINGS

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance or legislation of the jurisdiction.

User note:

About this appendix: *Appendix B provides a tool for the use of jurisdictions in establishing a policy for determining fire-flow requirements in accordance with Section 507.3. The determination of required fire flow is not an exact science, but having some level of information provides a consistent way of choosing the appropriate fire flow for buildings throughout a jurisdiction. The primary tool used in this appendix is a table that presents fire flow based on construction type and building area based on the correlation of the Insurance Services Office (ISO) method and the construction types used in the* International Building Code®.

SECTION B101 GENERAL

B101.1 Scope. The procedure for determining fire-flow requirements for buildings or portions of buildings hereafter constructed shall be in accordance with this appendix. This appendix does not apply to structures other than buildings.

SECTION B102 DEFINITIONS

B102.1 Definitions. For the purpose of this appendix, certain terms are defined as follows:

FIRE FLOW. The flow rate of a water supply, measured at 20 pounds per square inch (psi) (138 kPa) residual pressure, that is available for fire fighting.

FIRE-FLOW CALCULATION AREA. The floor area, in square feet (m^2), used to determine the required fire flow.

SECTION B103 MODIFICATIONS

B103.1 Decreases. The fire code official is authorized to reduce the fire-flow requirements for isolated buildings or a group of buildings in rural areas or small communities where the development of full fire-flow requirements is impractical.

B103.2 Increases. The fire code official is authorized to increase the fire-flow requirements where conditions indicate an unusual susceptibility to group fires or conflagrations. An increase shall be not more than twice that required for the building under consideration.

B103.3 Areas without water supply systems. For information regarding water supplies for fire-fighting purposes in rural and suburban areas in which adequate and reliable water supply systems do not exist, the fire code official is authorized to utilize NFPA 1142.

SECTION B104 FIRE-FLOW CALCULATION AREA

B104.1 General. The fire-flow calculation area shall be the total floor area of all floor levels within the exterior walls, and under the horizontal projections of the roof of a building, except as modified in Section B104.3.

B104.2 Area separation. Portions of buildings that are separated by fire walls without openings, constructed in accordance with the *California Building Code,* are allowed to be considered as separate fire-flow calculation areas.

B104.3 Type IA and Type IB construction. The fire-flow calculation area of buildings constructed of Type IA and Type IB construction shall be the area of the three largest successive floors.

> **Exception:** Fire-flow calculation area for open parking garages shall be determined by the area of the largest floor.

SECTION B105 FIRE-FLOW REQUIREMENTS FOR BUILDINGS

B105.1 One- and two-family dwellings, Group R-3 and R-4 buildings and townhouses. The minimum fire-flow and flow duration requirements for one- and two-family dwellings, Group R-3 and R-4 buildings and townhouses shall be as specified in Tables B105.1(1) and B105.1(2).

TABLE B105.1(1)
REQUIRED FIRE FLOW FOR ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

FIRE-FLOW CALCULATION AREA (square feet)	AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE FLOW (gallons per minute)	FLOW DURATION (hours)
0–3,600	No automatic sprinkler system	1,000	1
3,601 and greater	No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B105.1(2) at the required fire-flow rate
0–3,600	Section 903.3.1.3 of the *California Fire Code* or Section *313.3* of the *California Residential Code*	500	$^1/_2$
3,601 and greater	Section 903.3.1.3 of the *California Fire Code* or Section *313.3* of the *California Residential Code*	$^1/_2$ value in Table B105.1(2)	1

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m.

TABLE B105.1(2)
REFERENCE TABLE FOR TABLES B105.1(1) AND B105.2

FIRE-FLOW CALCULATION AREA (square feet)					FIRE FLOW (gallons per minute)[b]	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a. Types of construction are based on the *California Building Code*.

b. Measured at 20 psi residual pressure.

TABLE B105.2
REQUIRED FIRE FLOW FOR BUILDINGS OTHER THAN ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE FLOW (gallons per minute)	FLOW DURATION (hours)
No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B105.1(2)
Section 903.3.1.1 of the *California Fire Code*	25% of the value in Table B105.1(2)[a]	Duration in Table B105.1(2) at the reduced flow rate
Section 903.3.1.2 of the *California Fire Code*	25% of the value in Table B105.1(2)[b]	Duration in Table B105.1(2) at the reduced flow rate

For SI: 1 gallon per minute = 3.785 L/m.

a. The reduced fire flow shall be not less than 1,000 gallons per minute.

b. The reduced fire flow shall be not less than 1,500 gallons per minute.

B105.2 Buildings other than one- and two-family dwellings, Group R-3 and R-4 buildings and townhouses. The minimum fire-flow and flow duration for buildings other than one- and two-family dwellings, Group R-3 and R-4 buildings and townhouses shall be as specified in Tables B105.2 and B105.1(2).

Exception: *[SFM] Group B, S-2 and U occupancies having a floor area not exceeding 1,000 square feet, primarily constructed of noncombustible exterior walls with wood or steel roof framing, having a Class A roof assembly, with uses limited to the following or similar uses:*

1. *California State Parks buildings of an accessory nature (restrooms).*
2. *Safety roadside rest areas, (SRRA), public restrooms.*
3. *Truck inspection facilities, (TIF), CHP office space and vehicle inspection bays.*
4. *Sand/salt storage buildings, storage of sand and salt.*

B105.3 Water supply for buildings equipped with an automatic sprinkler system. For buildings equipped with an approved automatic sprinkler system, the water supply shall be capable of providing the greater of:

1. The automatic sprinkler system demand, including hose stream allowance.
2. The required fire flow.

SECTION B106
REFERENCED STANDARDS

ICC	IBC—18	International Building Code	B104.2
ICC	IWUIC—18	International Wildland-Urban Interface Code	B103.3
ICC	IRC—18	International Residential Code	Table B105.1(1)
NFPA	1142—17	Standard on Water Supplies for Suburban and Rural Fire Fighting	B103.3

APPENDIX E

HYDRAULIC COMPUTER MODEL OUTPUT
PRIVATE DOMESTIC SYSTEM

Reference Exhibit A for Node and Pipe Diagram

The following conditions were modeled for the 9407 Jericho Road Project:

0. Average Day Demand

1. Peak Hour Demand

2. Maximum Day Demand plus 1,750 gpm Fire Flow split between Node 5 and Node 6

3. Maximum Day Demand plus 1,750 gpm Fire Flow split between Node 8 and Node 6

```
* * * * * * * * * * * *  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: Thu Aug 10 11:43:57 2023

Master File : \\artic\eng\1043003\jericho rd ky pipe august 2023.KYP\jericho rd ky pipe august 2023.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-2	J-2	J-4	50.00	6.00	120.0000	0.00
P-3	J-2	J-7	40.00	8.00	120.0000	1.00
P-4	J-4	J-3	40.00	6.00	120.0000	0.00
P-5	J-5	J-4	200.00	8.00	120.0000	2.50
P-6	J-6	J-11	100.00	8.00	120.0000	0.75
P-7	J-7	J-8	210.00	8.00	120.0000	1.50
P-8	J-8	J-6	160.00	8.00	120.0000	3.00
P-11	Hyd Test	J-2	50.00	6.00	120.0000	0.00
P-12	J-11	J-5	90.00	8.00	120.0000	0.75

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 Hyd Test DESCRIBED BY THE FOLLOWING DATA: (ID= 1)

HEAD (ft)	FLOWRATE (gpm)	EFFICIENCY (%)
805.00	0.00	75.00 (Default)
799.00	500.00	75.00 (Default)
784.00	1000.00	75.00 (Default)
760.00	1500.00	75.00 (Default)
728.00	2000.00	75.00 (Default)
688.00	2500.00	75.00 (Default)
641.00	3000.00	75.00 (Default)

N O D E   D A T A

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	EXTERNAL GRADE (ft)
Hyd Test		0.00	0.00	
J-2		0.00	640.00	
J-3		0.00	648.00	
J-4		0.00	642.00	
J-5		4.70	652.00	
J-6		4.70	651.00	
J-7		4.70	644.00	
J-8		4.70	645.00	
J-11		4.70	0.00	

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) = 9
NUMBER OF END NODES ....(J) = 8
NUMBER OF PRIMARY LOOPS ....(L) = 1
NUMBER OF SUPPLY NODES ....(F) = 1
NUMBER OF SUPPLY ZONES ....(Z) = 1

Case: 0

RESULTS OBTAINED AFTER 9 TRIALS: ACCURACY = 0.10711E-06

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

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-2	J-2	J-4	9.06	0.00	0.00	0.10	0.01	0.01
P-3	J-2	J-7	14.44	0.00	0.00	0.09	0.01	0.01
P-4	J-4	J-3	0.00	0.00	0.00	0.00	0.00	0.00
P-5	J-5	J-4	-9.06	0.00	0.00	0.06	0.00	0.00
P-6	J-6	J-11	0.34	0.00	0.00	0.00	0.00	0.00
P-7	J-7	J-8	9.74	0.00	0.00	0.06	0.00	0.00
P-8	J-8	J-6	5.04	0.00	0.00	0.03	0.00	0.00
P-11	Hyd Test	J-2	23.50	0.00	0.00	0.27	0.08	0.08
P-12	J-11	J-5	-4.36	0.00	0.00	0.03	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
Hyd Test	23.50	0.00	804.98	805.0	75.00	5.	0.2	0.2	**	**	33.2	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
Hyd Test		0.00	804.98			
J-2		0.00	804.97	640.00	164.97	71.49
J-3		0.00	804.97	648.00	156.97	68.02
J-4		0.00	804.97	642.00	162.97	70.62
J-5		4.70	804.97	652.00	152.97	66.29
J-6		4.70	804.97	651.00	153.97	66.72
J-7		4.70	804.97	644.00	160.97	69.75
J-8		4.70	804.97	645.00	159.97	69.32
J-11		4.70	804.97			

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-2	71.49	J-5	66.29
J-4	70.62	J-6	66.72
J-7	69.75	J-3	68.02

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-11	0.27	P-6	0.00
P-2	0.10	P-12	0.03
P-3	0.09	P-8	0.03

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
Hyd Test	23.50	

NET SYSTEM INFLOW = 23.50
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 23.50

==

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 = 0.56760E-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-2	J-2	J-4	52.88	0.02	0.00	0.60	0.37	0.37
P-3	J-2	J-7	83.42	0.01	0.00	0.53	0.32	0.21
P-4	J-4	J-3	0.00	0.00	0.00	0.00	0.00	0.00
P-5	J-5	J-4	-52.88	0.02	0.00	0.34	0.11	0.09
P-6	J-6	J-11	1.64	0.00	0.00	0.01	0.00	0.00
P-7	J-7	J-8	56.16	0.02	0.00	0.36	0.12	0.10
P-8	J-8	J-6	28.90	0.00	0.00	0.18	0.04	0.03
P-11	Hyd Test	J-2	136.30	0.11	0.00	1.55	2.15	2.15
P-12	J-11	J-5	-25.62	0.00	0.00	0.16	0.03	0.02

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
Hyd Test	136.30	0.00	804.43	804.4	75.00	28.	0.2	0.5	**	**	33.2	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
Hyd Test		0.00	804.43			
J-2		0.00	804.32	640.00	164.32	71.21
J-3		0.00	804.30	648.00	156.30	67.73
J-4		0.00	804.30	642.00	162.30	70.33
J-5		27.26(5.80)	804.28	652.00	152.28	65.99
J-6		27.26(5.80)	804.28	651.00	153.28	66.42
J-7		27.26(5.80)	804.31	644.00	160.31	69.47
J-8		27.26(5.80)	804.28	645.00	159.28	69.02
J-11		27.26(5.80)	804.28			

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-2	71.21	J-5	65.99
J-4	70.33	J-6	66.42
J-7	69.47	J-3	67.73

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-11	1.55	P-6	0.01
P-2	0.60	P-12	0.16
P-3	0.53	P-8	0.18

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
Hyd Test	136.30	

NET SYSTEM INFLOW = 136.30
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 136.30

==

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 1,750 Fire Flow split between Node 5 and 6

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 3 TRIALS: ACCURACY = 0.38947E-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-2	J-2	J-4	890.60	3.47	0.00	10.11	69.40	69.40
P-3	J-2	J-7	926.88	0.74	0.54	5.92	31.99	18.41
P-4	J-4	J-3	0.00	0.00	0.00	0.00	0.00	0.00
P-5	J-5	J-4	-890.60	3.42	1.25	5.68	23.37	17.10
P-6	J-6	J-11	-613.44	0.86	0.18	3.92	10.36	8.57
P-7	J-7	J-8	913.72	3.76	0.79	5.83	21.70	17.93
P-8	J-8	J-6	900.56	2.79	1.54	5.75	27.07	17.45
P-11	Hyd Test	J-2	1817.48	13.00	0.00	20.62	260.05	260.05
P-12	J-11	J-5	-626.60	0.80	0.19	4.00	10.98	8.91

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
Hyd Test	1817.48	0.00	741.19	741.2	75.00	340.	1.4	1.9	**	**	33.2	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
Hyd Test		0.00	741.19			
J-2		0.00	728.19	640.00	88.19	38.21
J-3		0.00	724.72	648.00	76.72	33.24
J-4		0.00	724.72	642.00	82.72	35.84
J-5		264.00(**)	720.04	652.00	68.04	29.49
J-6		1514.00(**)	718.02	651.00	67.02	29.04
J-7		13.16(2.80)	726.91	644.00	82.91	35.93
J-8		13.16(2.80)	722.35	645.00	77.35	33.52
J-11		13.16(2.80)	719.06			

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-2	38.21	J-6	29.04
J-7	35.93	J-5	29.49
J-4	35.84	J-3	33.24

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-11	20.62	P-6	3.92
P-2	10.11	P-12	4.00
P-3	5.92	P-5	5.68

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
Hyd Test	1817.48	

NET SYSTEM INFLOW = 1817.48
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 1817.48

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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 1,750 Fire Flow split between Node 8 and 6

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 3 TRIALS: ACCURACY = 0.39173E-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-2	J-2	J-4	804.02	2.87	0.00	9.12	57.42	57.42
P-3	J-2	J-7	1013.46	0.87	0.65	6.47	37.96	21.72
P-4	J-4	J-3	0.00	0.00	0.00	0.00	0.00	0.00
P-5	J-5	J-4	-804.02	2.83	1.02	5.13	19.26	14.15
P-6	J-6	J-11	-777.70	1.33	0.29	4.96	16.17	13.30
P-7	J-7	J-8	1000.30	4.45	0.95	6.38	25.72	21.20
P-8	J-8	J-6	736.30	1.92	1.03	4.70	18.45	12.02
P-11	Hyd Test	J-2	1817.48	13.00	0.00	20.62	260.05	260.05
P-12	J-11	J-5	-790.86	1.23	0.30	5.05	17.02	13.72

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
Hyd Test	1817.48	0.00	741.19	741.2	75.00	340.	16.9	18.8	**	**	33.2	3.0000

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
Hyd Test		0.00	741.19			
J-2		0.00	728.19	640.00	88.19	38.21
J-3		0.00	725.32	648.00	77.32	33.50
J-4		0.00	725.32	642.00	83.32	36.10
J-5		13.16(2.80)	721.47	652.00	69.47	30.10
J-6		1514.00(**)	718.32	651.00	67.32	29.17
J-7		13.16(2.80)	726.67	644.00	82.67	35.82
J-8		264.00(**)	721.27	645.00	76.27	33.05
J-11		13.16(2.80)	719.93			

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-2	38.21	J-6	29.17
J-4	36.10	J-5	30.10
J-7	35.82	J-8	33.05

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-11	20.62	P-8	4.70
P-2	9.12	P-6	4.96
P-3	6.47	P-12	5.05

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
Hyd Test	1817.48	

NET SYSTEM INFLOW = 1817.48
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 1817.48

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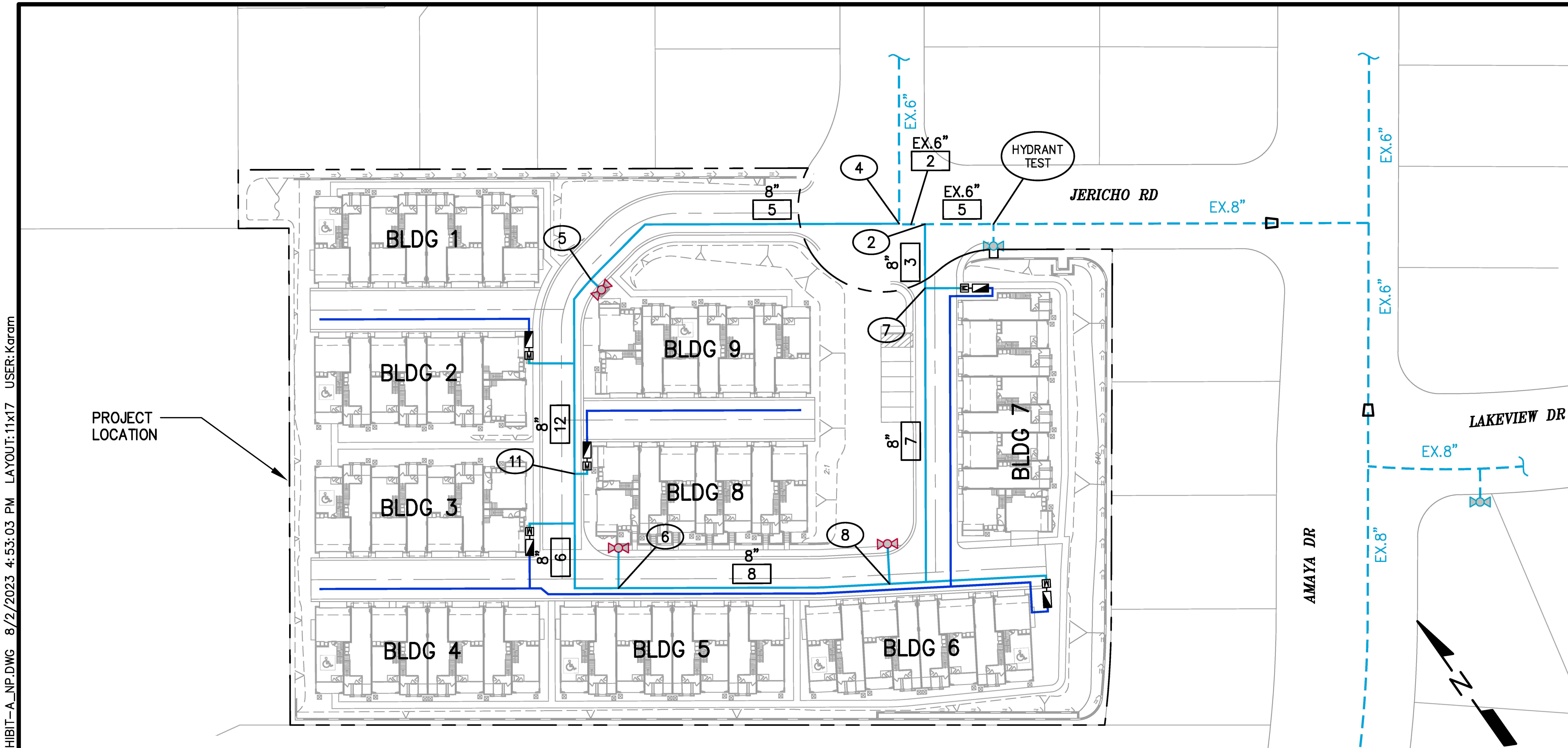
***** HYDRAULIC ANALYSIS COMPLETED *****



LEGEND

- PROJECT BOUNDARY
- EXISTING PUBLIC WATER
- PROPOSED PUBLIC WATER
- PROPOSED PRIVATE WATER
- EXISTING PUBLIC FIRE HYDRANT
- PROPOSED PUBLIC FIRE HYDRANT
- PROPOSED WATER METER
- PROPOSED BACKFLOW PREVENTER
- PIPE SIZE REDUCER
- 0 COMPUTER MODEL NODE NUMBER
- 1 COMPUTER MODEL PIPE NUMBER

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

EXHIBIT A

NODE AND PIPE DIAGRAM

9407 JERICHO ROAD

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