DEXTER WILSON ENGINEERING, INC.

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CONSULTING ENGINEERS

WATER STUDY
FOR THE CALIFORNIA TERRACES
PLANNING AREA 61 PROJECT
(LOT 1 RESIDENTIAL)
IN THE CITY OF SAN DIEGO

December 9, 2021

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

WATER STUDY
FOR THE CALIFORNIA TERRACES
PLANNING AREA 61 PROJECT
(LOT 1 RESIDENTIAL)
IN THE CITY OF SAN DIEGO

December 9, 2021

12-9-2021

Prepared by:
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Job No. 648-032

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December 9, 2021 648-032

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

Attention: Jimmy Ayala, Division President

Subject: Water Study for the California Terraces Planning Area 61 Lot 1 Residential Project in the City of San Diego

Introduction

This report provides a water study for Lot 1 of the California Terraces Planning Area 61 (PA61) project in the City of San Diego. The project proposes a partial land use revision which replaces the originally planned 45,000 square feet of commercial uses within Lot 1 with 79 additional multi-family residential units. The 203 multi-family residential units within Lot 2 will remain as is resulting in 282 total multi-family units for the entire PA61 site. The 4.49-acre Lot 1 project site is located at the southeast corner of Otay Mesa Road and Caliente Ave and within the Otay Mesa Community Plan Area. This report reflects the land use change for Lot 1 of the overall PA61 project.

Figure 1 provides a Vicinity Map for the project and a utility plan is attached as Appendix A.

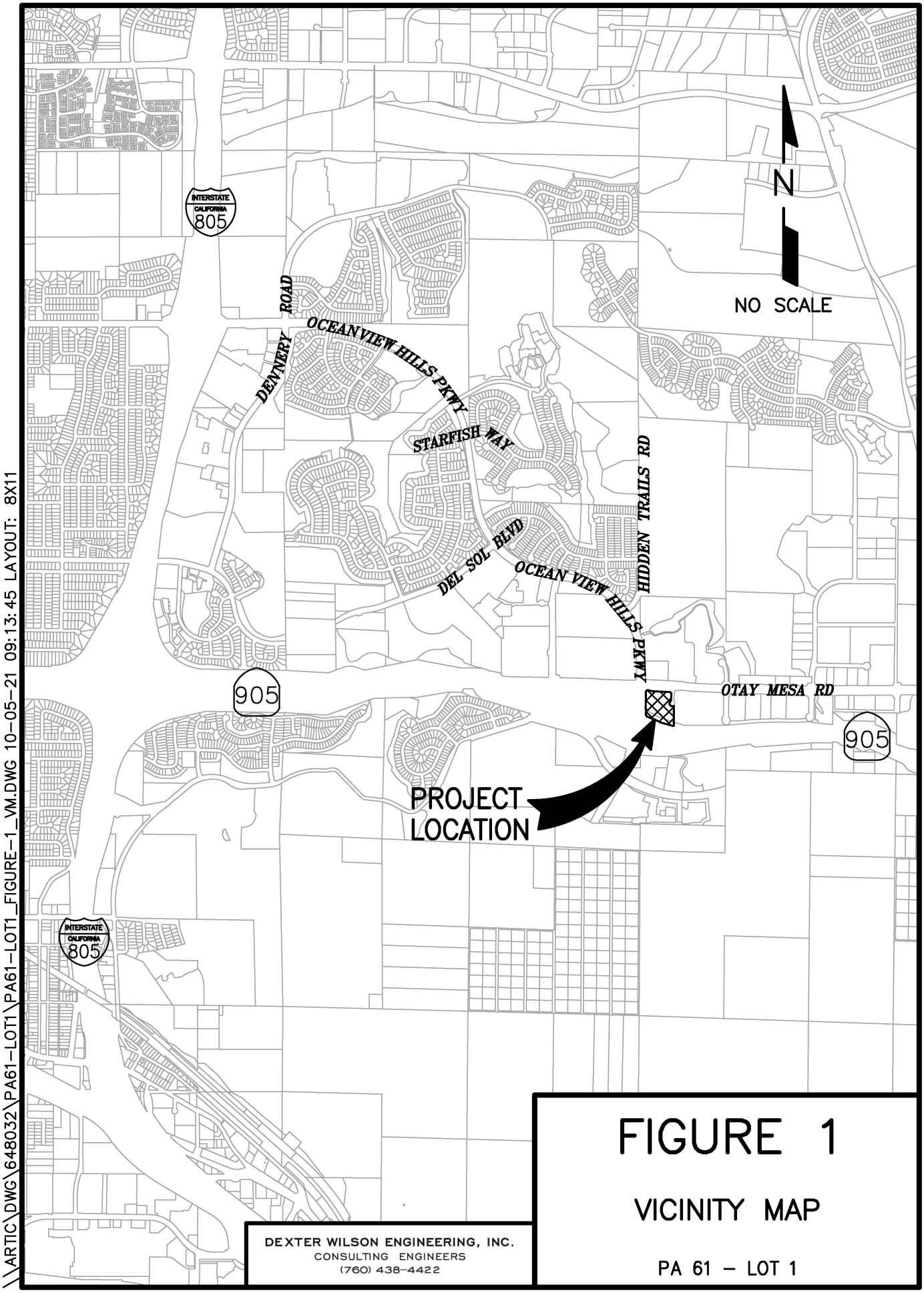

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FIGURE 1

VICINITY MAP

PA 61 – LOT 1

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Purpose of Study

The purpose of this study is to analyze and determine if the existing water system is able to provide adequate domestic and fire protection service for the PA61 Lot 1 Residential 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 Water Department water system design standards.

An overview of the proposed 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 existing City system. An overview of the private water systems are shown on the Plumbing Plans within Appendix A.

Study Area

The study area for this report is the boundary of the PA61 Lot 1 Residential 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 Otay Mesa 680 Zone distribution system that serves the area. The onsite water improvements presented in the May 29, 2020 PA61 water study are incorporated as well.

All onsite water lines will be private and will connect to the City's public water system via approved backflow preventers and meters at each end of the PA61 project boundary. A preliminary analysis of the onsite private fire protection system is included in this report. The private domestic water facilities will be fully analyzed under a separate report/study.

PA61 Lot 1 Residential 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 PA61 Lot 1 Residential project proposes 79 residential units over 3.59 net acres equaling 22 units per acre. Table 2-1 in the City of San Diego Design Guidelines and Standards, attached as Appendix B, indicates that 22 units per acre falls in the range of 3.1 persons per dwelling unit. A dwelling unit density of 3.1 persons per dwelling unit and a unit water demand of 150 gpd/person results in a water demand rate of 465 gpd per multi-family dwelling unit at the project.

Table 1 presents the projected potable water demand for the PA61 Lot 1 Residential project.

TABLE 1
PA61 LOT 1 RESIDENTIAL PROJECT
POTABLE WATER DEMAND

Land Use	Quantity	Demand Factor	Average Water Use, gpd
Multi-Family Residential (22 DUs/net acre)	79 Units	465 gpd/DU	36,735
TOTAL			**36,735 = 25.5 gpm**

From the City of San Diego Guidelines and Standards, Figure 2-2, the maximum day demand to average annual demand ratio is approximately 1.3 based on the RM residential zoning peaking curve, resulting in an estimated maximum day demand in the pressure zone of 47,756 gpd (33 gpm).

From the City of San Diego Guidelines and Standards, Figure 2-1, the peak hour demand to average annual demand ratio is approximately 1.9 based on the RM residential zoning peaking curve, resulting in an estimated peak hour demand of 69,797 gpd (48 gpm).

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

City of San Diego Design Criteria

Book 2 of the City of San Diego Guidelines and Standards was used to analyze 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
Minimum Static Pressure	65 psi
Maximum Static Pressure	120 psi
Maximum Domestic Pressure Drop	25 psi
Minimum Domestic Pressure	40 psi
Minimum Max Day plus Fire Flow Pressure	20 psi
Maximum Pipeline Velocity (Fire Flow)	15 fps
Maximum Pipeline Velocity (Normal Operating Conditions)	5 fps

Static Pressures

Maximum static pressures within the PA61 Lot 1 Residential project are calculated based on the Otay Mesa 680 Water Service Pressure Zone. Finished floor elevations onsite range from 528 feet to 530 feet. Using the maximum potential hydraulic gradeline of 680 feet, maximum static pressures within the project will range between 65 psi and 66 psi.

Existing and Proposed Water System

There are existing public water facilities directly adjacent to the PA61 Lot 1 Residential project site. The existing facilities are part of the Otay Mesa 680 Zone. There is an existing 24-inch public water line in Otay Mesa Road adjacent to the project. The overall PA61 project will be connecting to this 24-inch line at one location. At this location, the "east" cul-de-sac, there is an existing stub in which the project will connect to.

The other private fire protection system connection will be made in Caliente Avenue along the western boundary of the project. The private domestic system connection will be made at this location as well. Connecting to the existing 16-inch public line in Caliente Avenue ensures looping within the City water system. The private domestic water system for Lot 1 will be combined with Lot 2. These improvements and connections to the existing City water system have already been incorporated as part of the May 29, 2020 PA61 water study.

The existing and proposed public water facilities in the vicinity of the project are shown on Figure 2 and a Pressure Zones Map is presented on Figure 3. The Pressure Zones Map shows existing water service areas and pressure zones in the vicinity of the proposed project.

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 and proposed public and private water lines in the near vicinity of the project site. The hydraulic grade line (HGL) was determined by the results of the computer hydraulic modeling in the approved California Terraces Water Study (October 2003). The location of this hydraulic modeling node in the vicinity of the PA61 project is at the Ocean View Hills Boulevard and Hidden Trials Road intersection approximately 1,300 feet north of the project boundary.

OCEAN VIEW HILLS PKWY

EX.30"

OTAY MESA ROAD

EMERALD CREST CT

EX.24"

EX.24"

EX.24"

EX.16"

EX.16"

EXSITING DUAL 4" METERS
AND BACKFLOW PREVENTERS
PER DWG. 41595-5-D

EX.10"

EXISTING 10" RPDA
BACKFLOW PREVENTER
PER DWG. 41595-5-D

EX.12"

LOT 1

EX.12"

EX.12"

EX.12"

EX.12"

EX.12"

EX.12"

EX.10"

EXISITNG 10"
RPDA BACKFLOW
PREVENTER PER
DWG. 41595-5-D

LOT 2

EX.12"

EX.12"

EX.12"

EX.12"

12"

12"

12"

CALIENTE AVENTE AVE

DUAL EX.12"

DUAL EX.12"

N

0 120

FEET

LEGEND

- PROJECT BOUNDARY
- EXISTING PUBLIC WATER LINE
- EXISTING PRIVATE DOMESTIC RESIDENTIAL WATER LINE
- EXISTING PRIVATE FIRE PROTECTION WATER LINE
- PROPOSED PRIVATE DOMESTIC RESIDENTIAL WATER LINE
- PROPOSED PRIVATE FIRE PROTECTION WATER LINE
- EXISTING PUBLIC FIRE HYDRANT
- EXISTING PRIVATE FIRE HYDRANT
- PROPOSED PRIVATE FIRE HYDRANT

FIGURE 2

EXISTING AND PROPOSED WATER SYSTEM

PA 61 – LOT 1

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\\ARTIC\DWG\648032\PA61-LOT1\PA61-LOT1_WAT_FIGURE-2_EXPROWATER.DWG 12/9/2021 10:26:41 AM LAYOUT:11x17 USER:SirJay

\\ARTIC\DWG\648032\PA61-LOT1\PA61-LOT1_WAT_FIGURE-3_HYDRO.DWG 10-05-21 09:27:08 LAYOUT: 8X11

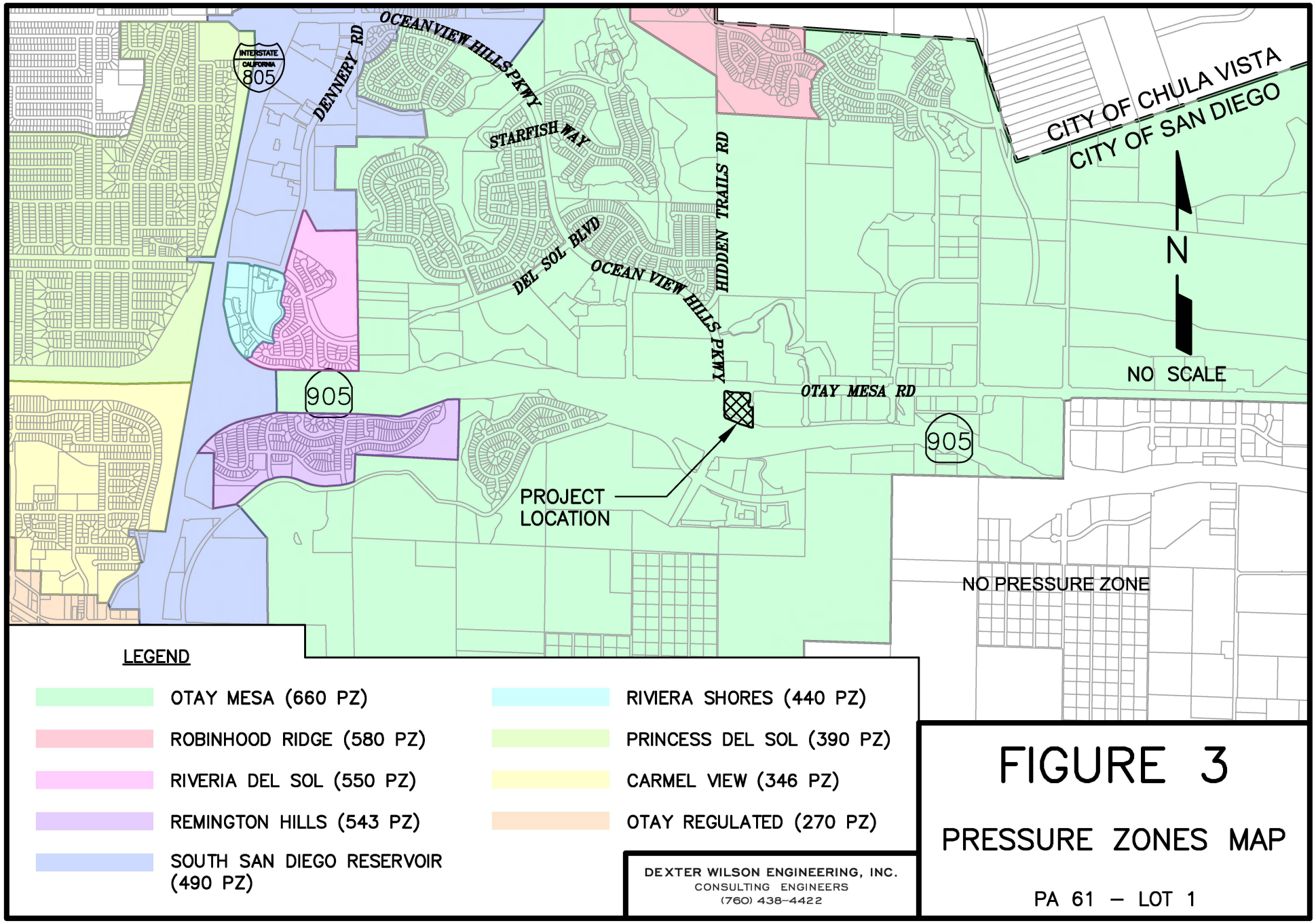

FIGURE 3

PRESSURE ZONES MAP

PA 61 – LOT 1

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CONSULTING ENGINEERS
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Output from the approved California Terraces Water Study is included as Appendix C. Junction "6503" is the location of the node mentioned in the above paragraph.

This location also was chosen as the source ("0" Node) of the water model for this study. Making this modeling node the location of the water model source allows for a more accurate calculation of the HGL in the vicinity of the project. Utilizing the modeling data described above, an HGL of 680 feet was determined for a static condition and an HGL of 673 feet was determined for a maximum day demand plus 3,000 gpm fire flow condition.

Water System Analysis and Results

Appendix D presents the computer modeling results and Exhibit A at the back of this report presents the corresponding Node and Pipe Diagram. The planning-level multi-family fire flow guideline of 3,000 gpm was modeled at the Lot 1 multi-family residential area between the two proposed private fire hydrants within the Lot 1 project site. Pipe break scenarios were 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 51 psi and a maximum pipeline velocity of 6.7 feet per second (fps) in the proposed 10-inch public fire service lateral off Caliente Avenue.

Under pipe break conditions, a fire flow of 3,000 gpm is being met with minimum residual pressures of greater than 36 psi and a maximum pipeline velocity of 12.3 fps.

The results of the computer hydraulic analyses for the PA61 Lot 1 Residential project indicate that with the proposed connection off Caliente Avenue and utilizing the 12-inch diameter public water main from the existing stub in Otay Mesa Road in the "east" cul-de-sac of Lot 2, the existing and proposed water system can provide sufficient flow and pressure for the PA61 Lot 1 Residential projects' fire protection service needs.

Private Onsite Water System

As mentioned earlier in this document, the onsite water systems for the PA 61 Lot 1 Residential and overall PA61 project are proposed to be private. This will entail the planning, expansion, and construction of a dual water system within the Lot 1 site. One private system will provide fire protection, and the second parallel private system will provide domestic service.

Figure 2 shows the basic layout of the private fire protection system including the location of the fire service connection to the public water system. The private domestic water system will utilize the two 4-inch diameter meters and RP backflow preventers.

An initial water fixture unit count for the PA61 site as a whole is included in Appendix E. The initial water fixture unit count for the entire PA61 project amounts to approximately 8,594 which equates to approximately 1,015 gpm per the City of San Diego linear extrapolation of the California Plumbing Code Chart A-103.1. A peak domestic flow rate of 1,015 gpm would allow the entire PA61 project to utilize the existing dual 4-inch diameter meters which have a capacity of 1,080 gpm per the City's requirements.

Both of these private water systems will be confirmed and addressed completely in a separate study specific to these private onsite water systems.

The private fire protection system for Lot 1 will consist of an expansion of an existing overall private fire protection system. The existing private fire protection system consists of two fire service connections to existing public water lines. The internal private fire protection system will consist of 12-inch diameter water lines which size is sufficient to provide the 3,000 gpm fire hydrant flow required for this site.

Conclusions and Recommendations

The following conclusions and recommendations are summarized based on the water system analysis prepared for the PA61 Lot 1 Residential project.

1. The PA61 Lot 1 Residential project will be supplied from the Otay Mesa 680 Zone system.

2. Maximum static pressure within the residential project will range between 65 psi and 66 psi.

3. A maximum day demand plus 3,000 gpm fire flow scenario can be met at the project site with all residual pressures greater than 36 psi and pipeline velocities less than 15 fps under all-pipes-open scenarios as well as under pipe break scenarios.

4. A preliminary analysis of the private onsite fire protection system and hydrants is included in this report. The private domestic water facilities will be under a separate report/study. These facilities are proposed to be private and separate from the City's public water system.

5. Figure 2 presents the existing and proposed water systems surrounding and within the project.

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

7. 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

PA61 LOT 1 RESIDENTIAL UTILITY AND PLUMBING PLAN

CALLE ALBATROSS

OTAY MESA ROAD

TOT LOT AREA

BLDG 1
FF=529.0
PAD=528.3

BLDG 2
FF=529.2
PAD=528.5

BLDG 3
FF=529.5
PAD=528.8

BLDG 4
FF=529.6
PAD=528.9

BLDG 5
PAD=528.7
FF=529.4

BLDG 6
PAD=528.3
FF=529.0

BLDG 7
FF=529.2
PAD=528.5

BLDG 8
FF=529.2
PAD=528.5

BLDG 9
FF=529.6
PAD=528.9

BLDG 10
FF=528.9
PAD=528.2

BLDG 11
FF=529.6
PAD=528.9

BLDG 12
FF=529.6
PAD=528.9

ALLEY FF

ALLEY EE

ALLEY CC

ALLEY DD

ALLEY GG

DRIVEWAY AA

DRIVEWAY BB

DRIVEWAY BB

CALIENTE AVENUE

PROJECT INFORMATION

EXISTING ZONE: CC-1-3
(COMMUNITY COMMERCIAL)

PROPOSED ZONE: RM-2-5
(RESIDENTIAL-MULTIPLE UNIT)

PARKING REQUIREMENTS

VEHICLE PARKING

REQUIRED AUTOMOBILE SPACES (PER SDMC 142-05C)

PLAN 1	2BR	10
PLAN 2	2BR	10
PLAN 3.1	3BR	14
PLAN 3.2	3BR	10
PLAN 4.1	4BR	19
PLAN 4.2	4BR	6
PLAN 5	5BR	10
	TOTAL:	79

79 DU x 2.00 = 158 REQUIRED PARKING SPACES

ACCESSIBLE PARKING SUMMARY (PER SDM-117)

158	x 0.02	=	3	ACCESSIBLE PARKING REQUIRED
3	/ 6	=	1	VAN ACCESSIBLE SPACES REQUIRED

TOTAL ACCESSIBLE PARKING SPACES REQUIRED

3	ACCESSIBLE SPACES
1	VAN ACCESSIBLE SPACES
4	TOTAL ACCESSIBLE SPACES

PROVIDED PARKING SUMMARY

158	GARAGE SPACES
4	ACCESSIBLE SPACES
2	EV AND EV CAPABLE SPACES
20	DRIVEWAY PARKING (10 UNITS)
28	OPEN SPACES
212	TOTAL SPACES PROVIDED

MOTORCYLE PARKING SUMMARY (PER SDMC 142-05C)

79 DU x .1 = 0.79 REQUIRED PARKING SPACES

TOTAL MOTORCYLE PARKING SPACES REQUIRED

1 ACCESSIBLE SPACES

BICYCLE PARKING SUMMARY

NOT REQUIRED FOR DWELLING UNITS WITH ENCLOSED GARAGES

EARTHWORK QUANTITIES (FROM MASS GRADE)

RAW QUANTITIES

3,000 CUBIC YARDS CUT
5,600 CUBIC YARDS FILL
2,600 CUBIC YARDS IMPORT

2' UNDERCUT SECTION IN STREET GENERATES
3,600 CUBIC YARDS

IMPORT 1,000 CUBIC YARDS NOT TAKING INTO ACCOUNT SHRINKING, BULKING, OR UTILITY SPOILS

0 10 20 40 60
(IN FEET)
1 inch = 20 ft.

CIVIL SENSE INC
13475 Danielson Street, Suite 150
Poway, CA 92064

PLANNING AREA 61 - LOT 1 RESIDENTIAL
MAREA PRODUCT PLOTTING
REVISED AUGUST 13, 2021

PRIVATE PLUMBING PLAN FOR:
CALIFORNIA TERRACES PLANNING AREA 61

WORK TO BE DONE

THE FOLLOWING NOTES ARE PROVIDED TO GIVE DIRECTION TO THE CONTRACTOR BY THE ENGINEER OF WORK. THE CITY'S SIGNATURE ON THESE PLANS DOES NOT CONSTITUTE APPROVAL OF ANY OF THESE NOTES AND THE CITY WILL NOTE BE RESPONSIBLE FOR THEIR ENFORCEMENT.

1. NEITHER THE OWNER, NOT THE ENGINEER OF WORK WILL ENFORCE SAFETY MEASURES OR REGULATIONS. THE CONTRACTOR SHALL DESIGN, CONSTRUCT AND MAINTAIN ALL SAFETY DEVICES, INCLUDING SHORING, AND SHALL BE SOLELY RESPONSIBLE FOR CONFORMING TO ALL LOCAL, STATE, AND FEDERAL SAFETY AND HEALTH STANDARDS, LAWS AND REGULATIONS.
2. CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE JOBSITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT. INCLUDING SAFETY OF ALL PERSONS AND PROPERTY AND THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND INDEMNIFY, AND HOLD THE OWNER, ENGINEER, AND ITS OFFICERS AND EMPLOYEES HARMLESS FROM ANY AND ALL LIABILITY, EXCEPTING ANY LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR ENGINEER.
3. WHERE TRENCHES ARE WITHIN EASEMENTS OR WITHIN 10' OF ANY BUILDING, A SOILS REPORT SHALL BE SUBMITTED TO THE ENGINEER OF WORK BY A QUALIFIED SOILS ENGINEER WHICH INDICATES THAT TRENCH BACKFILL WAS COMPACTED UNDER THE OBSERVATION OF THE SOILS ENGINEER AND IN ACCORDANCE WITHE ABOVE NAMED SPECIFICATIONS.
4. BEFORE EXCAVATION FOR THIS CONTRACT, THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF ALL UNDERGROUND UTILITIES WITH THE APPROPRIATE UTILITY COMPANY. THE EXISTENCE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS TO THE BEST OF OUR KNOWLEDGE. THE CONTRACTOR IS REQUIRED TO TAKE ALL PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINE SHOWN AND ANY OTHER NOT OF RECORD OR NOT SHOWN ON THESE PLANS.
5. ALL DAMAGE THERETO CAUSED BY THE CONTRACTOR SHALL BE REPAIRED TO THE APPROPRIATE SPECIFICATIONS AND AT THE EXPENSE OF THE CONTRACTOR. LOCATION AND ELEVATIONS OF EXISTING IMPROVEMENTS TO BE MET BY NEW CONSTRUCTION SHALL BE VERIFIED BY FIELD MEASUREMENT PRIOR TO CONSTRUCTION.
6. ALL VALVES WILL BE FLANGED TO CROSSES AND TEES. ONLY GATE VALVES SHALL BE USED IN FIRE HYDRANT INSTALLATIONS.
7. ALL BURIED DUCTILE AND GRAY CAST IRON PIPE, FITTINGS, VALVES SHALL BE USED IN FIRE HYDRANT INSTALLATIONS.
8. ALL PROPOSED WATER AND SEWER FACILITY INSTALLATIONS SHALL BE CONSTRUCTED WITH MATERIALS CURRENTLY LISTED IN THE MOST CURRENT EDITION OF THE CITY OF SAN DIEGO WATER UTILITIES DEPARTMENT APPROVED MATERIALS LIST AS REFERENCED IN THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION. RECENT REVISIONS INCLUDE BUT IS NOT LIMITED TO THE REQUIREMENT FOR POLYMER CONCRETE WATER METER BOXES INSTEAD OF THE STANDARD PRECAST WATER METER BOXES.
9. ALL HORIZONTAL AND VERTICAL SEPARATION DIMENSIONS SHOWN BETWEEN WATER AND SEWER MAINS SHALL BE MEASURED FROM THE NEAREST EDGE OF EACH PIPELINE PER STATE OF CALIFORNIA, DEPARTMENT OF HEALTH SERVICES, BASIC SEPARATION STANDARDS. MINIMUM SEPARATION BETWEEN WATER AND SEWER MAINS SHALL BE 10 FOOT HORIZONTAL AND 1 FOOT VERTICAL.

PRIVATE WATER NOTES

1. ALL VALVES WILL BE FLANGED TO CROSSES AND TEES. ONLY GATE VALVES SHALL BE USED IN FIRE HYDRANT INSTALLATIONS.
2. ALL BURIED DUCTILE AND GRAY CAST IRON PIPE, FITTINGS, VALVES AND APPURTENANCES SHALL BE COASTED WITH A DIELECTRIC COASTING; A LIQUID EPOXY COATING SYSTEM PER AWWA C-210 AT 24 MILS MINIMUM DRY FILM THICKNESS (MDFT), OR A COLD APPLIED THREE PART SYSTEM PETROLEUM WAX TAPE PER AWWA C-217, OR A 100% POLYURETHANE COATING OF 24 MILS MDFT SUITABLE FOR BURIED USE.
3. ALL PROPOSED WATER AND SEWER FACILITY INSTALLATIONS SHALL BE CONSTRUCTED WITH MATERIALS CURRENTLY LISTED IN THE MOST CURRENT EDITION OF THE CITY OF SAN DIEGO WATER UTILITIES DEPARTMENT APPROVED MATERIALS LIST AS REFERENCED IN THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION. RECENT REVISIONS INCLUDE BUT IS NOT LIMITED TO THE REQUIREMENT FOR POLYMER CONCRETE WATER METER BOXES INSTEAD OF THE STANDARD PRECAST WATER METER BOXES.
4. ALL HORIZONTAL AND VERTICAL SEPARATION DIMENSIONS SHOWN BETWEEN WATER AND SEWER MAINS SHALL BE MEASURED FROM THE NEAREST EDGE OF EACH PIPELINE PER STATE OF CALIFORNIA, DEPARTMENT OF HEALTH SERVICES, BASIC SEPARATION STANDARDS. MINIMUM SEPARATION BETWEEN WATER AND SEWER MAINS SHALL BE 10 FOOT HORIZONTAL AND 1 FOOT VERTICAL.
5. UNLESS OTHERWISE NOTED, ONLY MECHANICAL JOIN FITTINGS (MEGA-LUG OR EQUAL) SHALL BE USED ON PVC PIPE.

PRIVATE SEWER NOTES

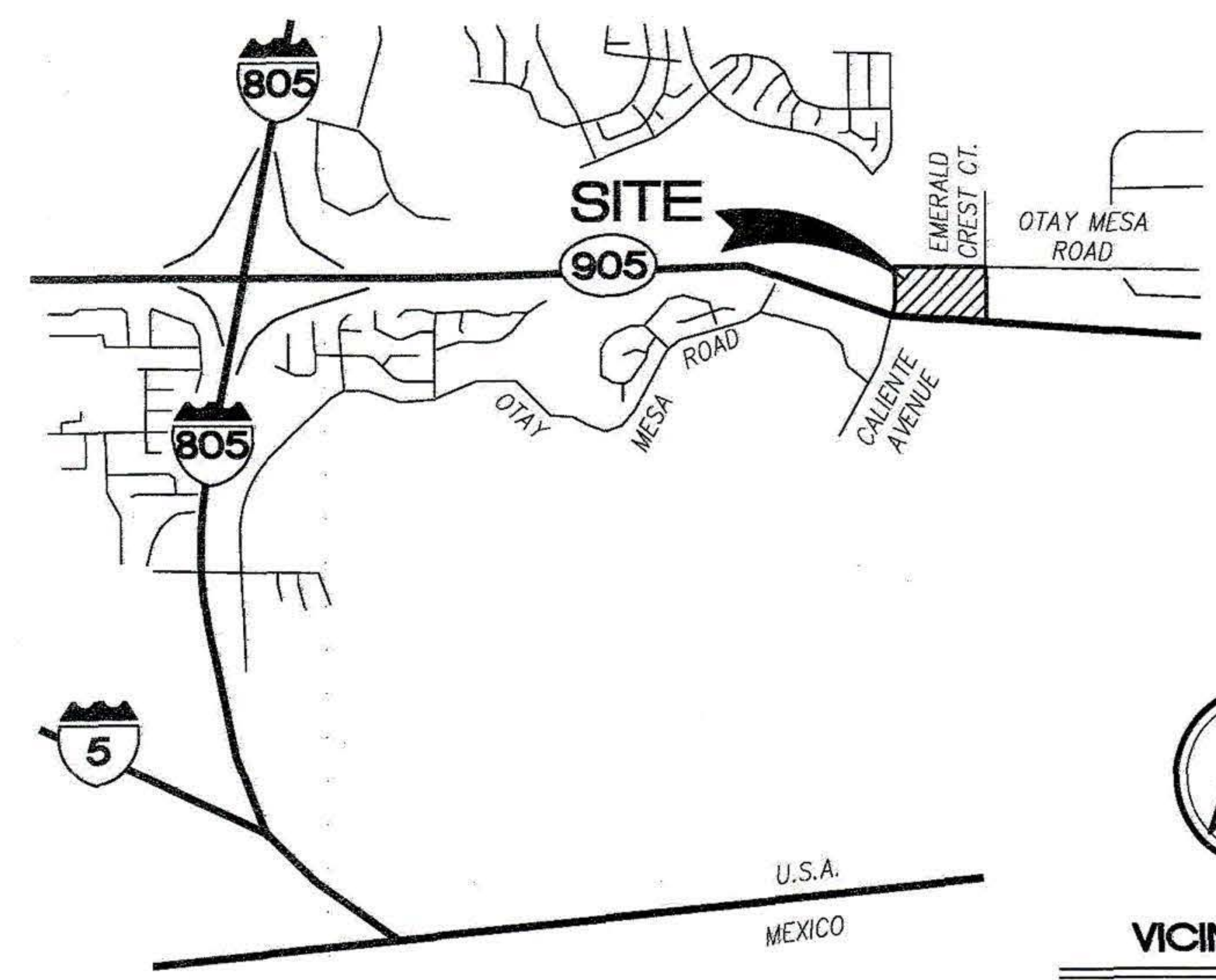
1. ALL HORIZONTAL SEPARATION DIMENSIONS SHOWN BETWEEN WATER AND SEWER MAINS SHALL MEASURED FROM THE NEAREST EDGE OF EACH PIPELINE PER STATE OF CALIFORNIA, DEPARTMENT OF HEALTH SERVICES, BASIC SEPARATION STANDARDS. MINIMUM SEPARATION BETWEEN WATER AND SEWER MAINS SHALL BE 10 FOOT HORIZONTAL AND 1 FOOT VERTICAL.
2. ALL PROPOSED PUBLIC SEWER FACILITY INSTALLATIONS SHALL BE CONSTRUCTED WITH MATERIALS CURRENTLY LISTED IN THE MOST CURRENT EDITION OF THE CITY OF SAN DIEGO WATER AND MUNICIPAL SEWER APPROVED MATERIALS LIST AS REFERENCED IN THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
3. HYDRAULIC CALCULATIONS FOR THE PROPOSED SEWER COMPLY WITH THE CITY OF SAN DIEGO, SEWER DESIGN GUIDE DATED FEBRUARY 2013.
4. ALL EXISTING UNUSED SEWER LATERALS SHALL BE PLUGGED AT PROPERTY LINE BY CONTRACTOR.
5. PRIOR TO CONNECTING TO ANY EXISTING SEWER LATERAL, IT SHALL BE CLOSED CIRCUIT TELEVISION INSPECTED BY CALIFORNIA LICENSED PLUMBING CONTRACTOR TO VERIFY LATERAL IS IN GOOD WORKING CONDITION AND FREE OF ALL DEBRIS.
6. NO SHRUBS MORE THAN 3 FEET IN HEIGHT AT MATURITY OR TREES ALLOWED WITHIN 10 FEET OF ANY PUBLIC SEWER MAINS OR SEWER LATERALS. NO PRESSURIZED LANDSCAPE IRRIGATION MAINS ALLOWED WITHIN ANY SEWER EASEMENTS.
7. ALL DUCTILE IRON PIPE PROPOSED FOR SEWER FORCE MAINS OR GRAVITY SEWER MAINS SHALL BE POLYURETHANE COATED AND LINED PER SECTION 02630 OF THE CLEAN WATER PROGRAM GUIDELINES. THE PIPE EXTERIOR SHALL BE 40 MILS MINIMUM DRY FILM THICKNESS (MDFT), AND THE PIPE INTERIOR SHALL BE 30 MILS MINIMUM DRY FILM THICKNESS (MDFT).
8. FOR ALL SEWER PLANS: THE CONTRACTOR SHALL OBSERVE AND COMPLY WITH ALL FEDERAL, STATE, AND LOCAL LAWS, ORDINANCES, CODES, ORDERS, AND REGULATIONS WHICH IN ANY MANNER AFFECT THE CONDUCT OF THE WORK, SPECIFICALLY AS IT RELATES TO SEWAGE SPILLS. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR PREVENTING SEWAGE SPILLS, FOR CONTAINING SEWAGE SPILLS, AND FOR RECOVERY AND LEGAL DISPOSAL OF ANY SPILLED SEWAGE, AND FOR ANY FINES, PENALTIES, CLAIMS AND LIABILITY ARISING FROM CAUSING A SEWAGE S PILL, AND FOR ANY VIOLATION OF ANY LAW, ORDINANCE, CODE, ORDER, OR REGULATION AS A RESULT OF THE SPILL(S).

GENERAL NOTES

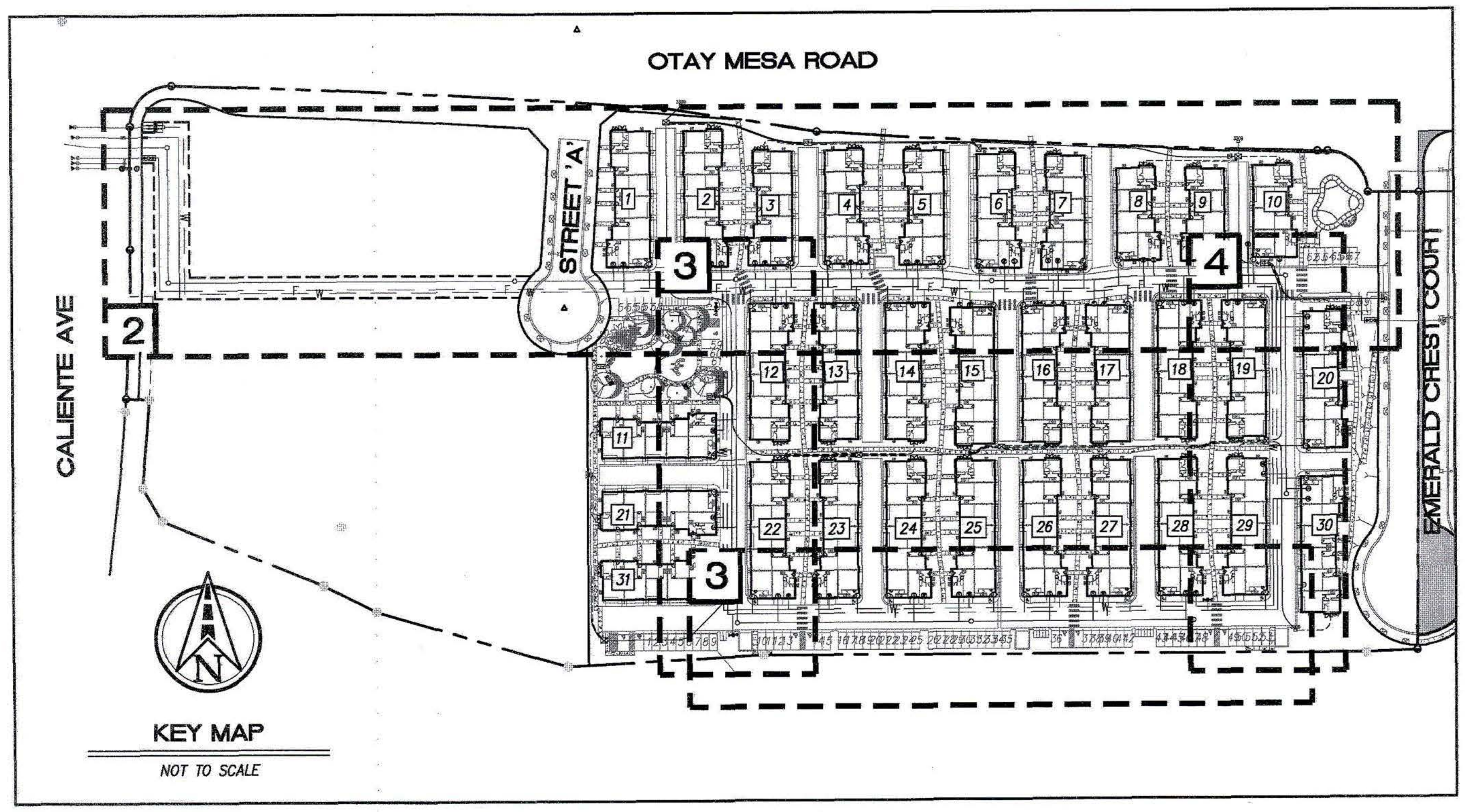
1. THE APPROVAL OF THIS PLAN OR ISSUANCE OF A PERMIT BY THE CITY OF SAN DIEGO DOES NOT AUTHORIZE THE SUBDIVIDER AND OWNER TO VIOLATE ANY FEDERAL, STATE OR CITY LAWS, ORDINANCES, REGULATIONS, OR POLICIES, INCLUDING, BUT NOT LIMITED TO, THE FEDERAL ENDANGERED SPECIES ACT OF 1973 AND AMENDMENTS THERETO (16 USC SECTION 1531 ET.SEQ.)
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SURVEY MONUMENTS AND/OR VERTICAL CONTROL BENCHMARKS WHICH ARE DISTURBED OR DESTROYED BY CONSTRUCTION. A LAND SURVEYOR MUST FIELD LOCATE, REFERENCE, AND/OR PRESERVE ALL HISTORICAL OR CONTROLLING MONUMENTS PRIOR TO ANY CONSTRUCTION. IF DESTROYED, A LAND SURVEYOR SHALL REPLACE SUCH MONUMENTS WITH APPROPRIATE MONUMENTS. A CORNER RECORD OR RECORD OF SURVEY, AS APPROPRIATE, SHALL BE FILED AS REQUIRED BY THE PROFESSIONAL LAND SURVEYORS ACT, SECTION 8771 OF THE BUSINESS AND PROFESSIONS CODE OF THE STATE OF CALIFORNIA. IF ANY VERTICAL CONTROL IS TO BE DISTURBED OR DESTROYED, THE CITY OF SAN DIEGO FIELD SURVEY SECTION MUST BE NOTIFIED, IN WRITING, AT LEAST 3 DAYS PRIOR TO THE CONSTRUCTION. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE COST OF REPLACING ANY VERTICAL CONTROL BENCHMARKS DESTROYED BY THE CONSTRUCTION.
3. IMPORTANT NOTICE: SECTION 4216 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A "PERMIT TO EXCAVATE" WILL BE VALID. FOR YOUR DIG ALERT I.D. NUMBER, CALL UNDERGROUND SERVICE ALERT. TOLL FREE 1-800-422-4133, TWO DAYS BEFORE YOU DIG.
4. CONTRACTOR SHALL IMPLEMENT AN EROSION ANO SEDIMENT CONTROL PROGRAM DURING THE PROJECT GRADING ANO/OR CONSTRUCTION ACTIVITIES. THE PROGRAM SHALL MEET ALL APPLICABLE REQUIREMENTS OF THE STATE WATER RESOURCE CONTROL BOARD AND THE CITY OF SAN DIEGO MUNICIPAL CODE AND STORM WATER STANDARDS MANUAL.
5. "PUBLIC IMPROVEMENT SUBJECT TO DESUETUDE OR DAMAGE." IF REPAIR OR REPLACEMENT OF SUCH PUBLIC IMPROVEMENTS IS REQUIRED, THE OWNER SHALL OBTAIN THE REQUIRED PERMITS FOR WORK IN THE PUBLIC RIGHT-OF-WAY, SATISFACTORY TO THE PERMIT- ISSUING AUTHORITY.
6. DEVIATIONS FROM THESE SIGNED PLANS WILL NOT BE ALLOWED UNLESS A CONSTRUCTION CHANGE IS APPROVED BY THE ENGINEER OF RECORD.

PRIVATE WATER AND SEWER NOTE

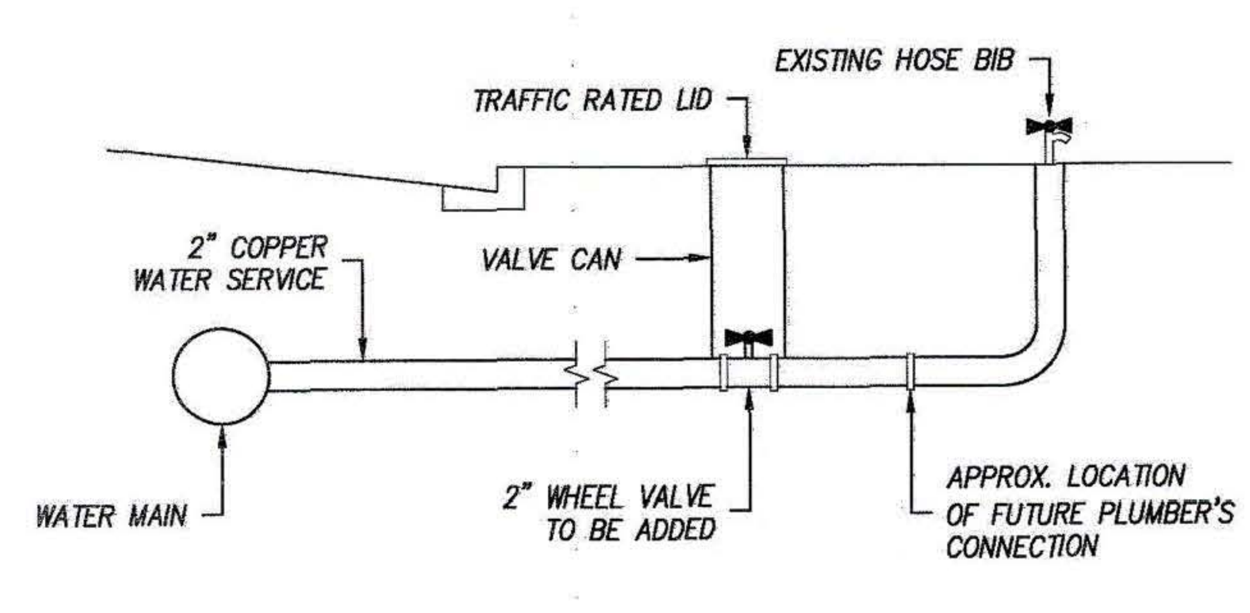
ALL ONSITE WATER AND SEWER FACILITIES SHOWN ON THIS DRAWING ARE PRIVATE AND SHALL BE DESIGNED TO MEET THE REQUIREMENTS OF THE CALIFORNIA UNIFORM PLUMBING CODE AND SHALL BE REVIEWED AS PART OF THE BUILDING PERMIT PLAN CHECK.



VICINITY MAP
NOT TO SCALE



KEY MAP
NOT TO SCALE



DETAIL: DOMESTIC WATER SERVICE
SCALE: NOT TO SCALE

OWNER / APPLICANT

PARDEE HOMES
13400 SABRE SPRINGS PARKWAY, SUITE 200
SAN DIEGO, CA 92128
858-794-2500

REFERENCE DRAWINGS

GRADING PLANS FOR CALIFORNIA TERRACES PLANNING AREA 61	41594-D
PUBLIC IMPROVEMENTS FOR CALIFORNIA TERRACES PLANNING AREA 61	41595-D

SITE ADDRESS

SOUTH OF OTAY MESA ROAD, EAST OF CALIENTE AVENUE, AND NORTH OF INTERSTATE 905.

BENCHMARK

DESCRIPTION: CENTERLINE CONTROL MONUMENT
LOCATION: INTERSECTION OF OTAY MESA ROAD AND HERITAGE ROAD
REFERENCE: CITY OF SAN DIEGO VERTICAL CONTROL RECORD DATED OCTOBER 4, 2011, INDEX NO. 1469 17701
ELEVATION: 504.568 FT. MSL
DATUM: NGVD-29

LEGAL DESCRIPTION

LOT 2 OF CALIFORNIA TERRACES – PA61, MAP NO ________
IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA

ACCESSOR'S PARCEL NUMBER

645-080-16-00

TOPOGRAPHY SOURCE

SOURCE: PROJECT DESIGN CONSULTANTS
701 B STREET, SUITE 800
SAN DIEGO, CA 92101
METHOD: COMPILED BY PHOTOGRAMMATIC METHODS
DATE OF PHOTOGRAPHY: JANUARY 17, 2018

WORK TO BE DONE

THE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS AND THE SPECIFICATIONS AND STANDARD DRAWINGS OF THE CITY OF SAN DIEGO.

STANDARD SPECIFICATIONS:

DOCUMENT NO.	DESCRIPTION
PWPI010119-01	STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREENBOOK), 2018 EDITION
PWPI010119-02	CITY OF SAN DIEGO STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (WHITEBOOK), 2018 EDITION
PWPI010119-04	CITY WIDE COMPUTER AIDED DESIGN AND DRAFTING (CADD) STANDARDS, 2018 EDITION
PWPI030119-07	CALIFORNIA DEPARTMENT OF TRANSPORTATION MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, 2014 EDITION
PWPI030119-05	CALIFORNIA DEPARTMENT OF TRANSPORTATION U.S. CUSTOMARY STANDARD SPECIFICATIONS, 2018 EDITION

CITY OF SAN DIEGO APPROVED
653925 Construction Project Number
2373623 Construction Approval Number
☐ Construction Change Project Number
☐ Deferred Document Project Number
This set of plans and specifications shall be kept on the site of the structure or work at all times during which work authorized by these plans is in progress, and shall be made available to City officials upon request. It is unlawful to change, modify or alter the approved plans and specifications without authorization of the Building Official. The stamping of these plans and specifications SHALL NOT be held to permit or approve the violation of any City, County, State or Federal laws and restrictions.
Issued By
Date 11/12/20

STANDARD DRAWINGS:

DOCUMENT NO.	DESCRIPTION
PWPI010119-03	CITY OF SAN DIEGO STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, 2018 EDITION
PWPI030119-06	CALIFORNIA DEPARTMENT OF TRANSPORTATION U.S CUSTOMARY STANDARD PLANS, 2018 EDITION

LEGEND

PVT. SEWER MAIN (SIZE PER PLAN)	SDS-101, SDS-110(C)	—S—
PVT. SEWER MANHOLE	M-3, SDS-106, SDS-107, SDS-108, SDS-120	
PVT. SEWER END CAP		]
4" SEWER LATERAL W/ CLEANOUT	SDS-102/103, SDS-105, SDS110(C)	(S)
PVT. WATER MAIN (SIZE PER PLAN)	SDM-105 SDW-110, SDW-151	—W—
2" PVC (SCHEDULE 40)	SDM-105, SDW-107, SDW-135, SDW-136, SDW-149	(W)
PVT. FIRE MAIN (SIZE PER PLAN)	SDM-105 SDW-110, SDW-151	—F—
4" FIRE SERVICE LATERAL	SDM-105, SDW-105, SDW-118, SDW-152, SDW-153	(F)
END CAP	SDW-151	]
THRUST BLOCK	SDW-151	
GATE VALVE	SDW-109, SDW-152, SDW-151 SDW-153, WV-05	
FIRE HYDRANT ASSEMBLY	SDM-105, SWD-104, SDW-109 SDW-151, SDW-152, SDW-153	
2" BLOW-OFF ASSEMBLY (END OF MAIN)	SDW-106	
2" BLOW-OFF ASSEMBLY (LOW POINT)	SDW-143	
AIR/VACUUM VALVE	SDW-117, SDW-160	
U.O.N.	UNLESS OTHERWISE NOTED	

SEWER LATERAL TABLE

BUILDING NUMBER	DRIVEWAY	SEWER STATION	INVERT AT MAIN	DROP AT MAIN	SLOPE	LENGTH	INVERT AT 3' FROM CURB	WATER STATION	FIRE STATION
1	PVT. DRIVEWAY 'C'	0+10.00	515.37	1.20	2.00%	6.00	516.69	0+20.00	0+45.00
2	PVT. DRIVEWAY 'C'	1+16.00	515.85	7.00	2.00%	6.00	522.97	1+06.00	0+81.00
3	PVT. DRIVEWAY 'C'	1+49.00	516.04	7.00	2.00%	6.00	523.16	1+59.00	1+84.00
4	PVT. DRIVEWAY 'C'	2+53.00	516.74	6.00	2.00%	6.00	522.86	2+43.00	2+20.00
5	PVT. DRIVEWAY 'C'	2+98.00	517.04	6.00	2.00%	6.00	523.16	3+08.00	3+33.43
6	PVT. DRIVEWAY 'C'	4+03.32	517.78	5.00	2.00%	6.00	522.90	3+93.32	3+68.43
7	PVT. DRIVEWAY 'C'	4+36.32	518.09	4.00	2.00%	6.00	522.21	4+46.32	4+71.22
8	PVT. DRIVEWAY 'C'	5+40.65	519.08	1.20	2.00%	6.00	520.40	5+30.65	5+05.24
9	PVT. DRIVEWAY 'C'	4+74.65	518.46	0.50	2.00%	6.00	519.08	5+84.65	6+07.65
10	PVT. DRIVEWAY 'C'	6+64.23	520.26	0.50	2.00%	6.00	520.88	6+33.65	6+38.65
11	PVT. DRIVEWAY 'D'	6+33.00	517.16	1.20	2.00%	13.00	518.62	6+43.00	6+68.00
12	PVT. DRIVEWAY 'C'	1+69.00	516.17	1.20	2.00%	14.00	517.65	1+79.00	1+44.00
13	PVT. DRIVEWAY 'C'	2+15.00	516.48	1.20	2.00%	14.00	517.96	2+25.00	2+48.00
14	PVT. DRIVEWAY 'C'	3+03.00	517.07	1.20	2.00%	14.00	518.55	3+14.05	2+79.00
15	PVT. DRIVEWAY 'C'	3+48.46	517.38	1.20	2.00%	14.00	518.86	3+59.90	3+82.34
16	PVT. DRIVEWAY 'C'	4+41.32	518.14	1.20	2.00%	17.00	519.68	4+51.32	4+11.32
17	PVT. DRIVEWAY 'C'	4+82.06	518.53	1.20	2.00%	17.00	520.07	4+90.50	5+14.41
18	PVT. DRIVEWAY 'C'	5+69.65	519.36	1.20	2.00%	14.00	520.84	5+79.65	5+45.65
19	PVT. DRIVEWAY 'C'	6+12.65	519.77	1.20	2.00%	14.00	521.25	6+22.65	6+48.65
20	PVT. DRIVEWAY 'F'	0+36.37	520.67	1.20	2.00%	7.00	522.01	0+46.37	1+62.00
21	PVT. DRIVEWAY 'D'	7+38.00	518.11	1.20	2.00%	13.00	519.57	7+28.00	7+03.00
22	PVT. DRIVEWAY 'E'	1+73.00	519.33	1.20	2.00%	15.00	520.83	1+83.00	1+48.00
23	PVT. DRIVEWAY 'E'	2+13.00	519.73	1.20	2.00%	15.00	521.23	2+23.00	2+51.00
24	PVT. DRIVEWAY 'E'	3+06.00	520.66	1.20	2.00%	15.00	522.16	3+16.00	2+81.00
25	PVT. DRIVEWAY 'E'	3+50.00	521.10	1.20	2.00%	15.00	522.60	3+60.00	3+84.00
26	PVT. DRIVEWAY 'E'	4+39.00	521.95	1.20	2.00%	15.00	523.45	4+49.00	4+14.00
27	PVT. DRIVEWAY 'E'	4+82.00	522.38	1.20	2.00%	15.00	523.88	4+92.00	5+18.00
28	PVT. DRIVEWAY 'E'	5+73.00	523.29	1.20	2.00%	15.00	524.79	5+83.00	5+48.00
29	PVT. DRIVEWAY 'F'	1+79.79	522.11	1.20	2.00%	13.00	523.57	1+89.79	6+51.00*
30	PVT. DRIVEWAY 'F'	2+03.92	522.35	1.20	2.00%	7.00	523.69	2+14.00	1+94.00
31	PVT. DRIVEWAY 'D'	7+72.00	518.42	1.20	2.00%	13.00	519.88	7+82.00	8+07.00
	* = STATION OFF PVT. DRIVEWAY 'F'								

SHEET INDEX

MECHANICAL REVIEW
... Suhendra
653925
11/3/20
ST For A.Z.

REGISTERED PROFESSIONAL ENGINEER
HENRY H. PENG
No. 63686
Exp. 09-30-20
CIVIL
STATE OF CALIFORNIA

HENRY H. PENG R.C.E 63686	DATE	REGISTRATION EXPIRES: 09/30/20	DESIGNED BY: IL	PM REVIEW: MV

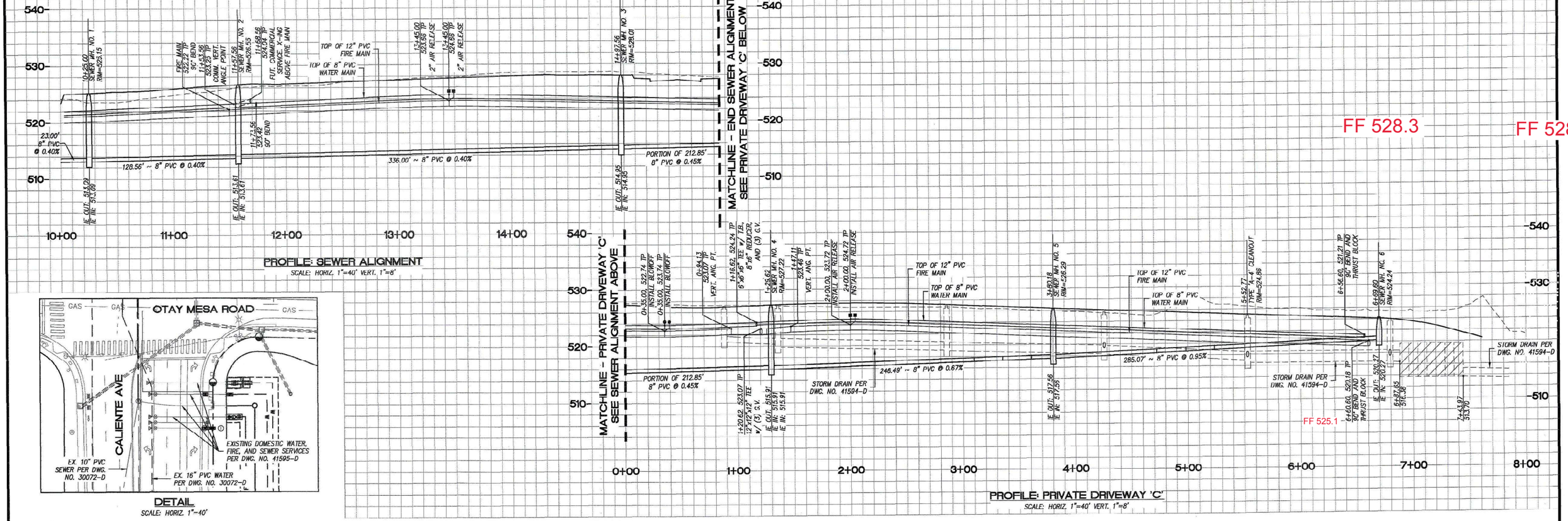
CIVIL SENSE INC
13475 Danielson Street, Suite 150
Poway, CA 92064

DATE	REVISIONS	BY
9/22/20	SUBMITTAL	CSI
8/17/20	ADDED LATERAL TABLE	CSI
11/22/19	CITY SUBMITTAL	CSI

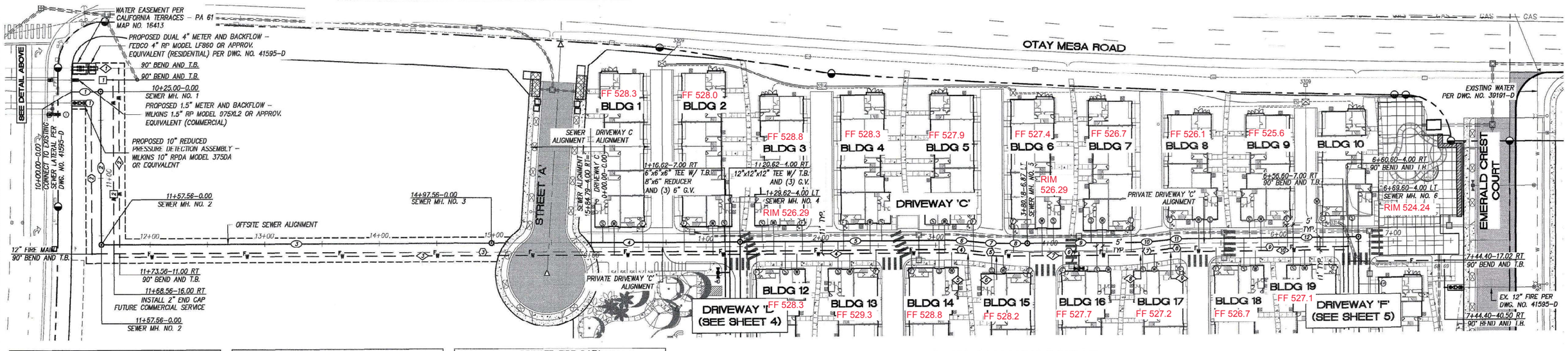
PRIVATE PLUMBING PLANS FOR:
CALIFORNIA TERRACES
PA61

PTS 653925

8/22/2020 JOB NO. 10033.00



DETAIL
SCALE: HORIZ. 1"=40'



PLAN: SEWER ALIGNMENT AND PRIVATE DRIVEWAY 'C'
SCALE: 1"=40'

0 20 40 80 120
(IN FEET)
1 inch = 40 ft.

PRIVATE WATER DATA (COMMERCIAL)

NO.	DELTA OR BRG.	RADIUS(ft)	LENGTH(ft)	REMARKS
1	N90°00'00"E	------	17.71	2" PVC CL235
2	N00°00'00"E	------	158.47	"

PRIVATE WATER DATA (RESIDENTIAL)

NO.	DELTA OR BRG.	RADIUS(ft)	LENGTH(ft)	REMARKS
1	N90°00'00"E	------	22.66	8" PVC CL235
2	N00°00'00"E	------	163.47	"
3	N90°00'00"E	------	527.85	"
4	N90°00'00"E	------	193.24	6" PVC CL235
5	6°41'40"	209.00	24.42	"
6	6°41'40"	231.00	26.99	"
7	N90°00'00"E	------	110.42	"
8	6°41'40"	231.00	26.99	"
9	6°41'40"	209.00	24.42	"
10	N90°00'00"E	------	159.71	"

PRIVATE SEWER DATA

NO.	DELTA OR BRG.	RADIUS(ft)	LENGTH(ft)	REMARKS
1	N90°00'00"E	------	23.00	8" PVC SDR-35
2	N00°00'00"E	------	128.56	"
3	N90°00'00"E	------	336.00	"
4	N90°00'00"E	------	212.85	"
5	N90°00'00"W	------	178.24	"
6	6°41'40"	220.00	25.70	"
7	6°41'40"	220.00	25.70	"
8	N90°00'00"W	------	16.85	"
9	N90°00'00"W	------	89.57	"
10	6°41'40"	220.00	25.70	"
11	6°41'40"	220.00	25.70	"
12	N90°00'00"W	------	144.09	"

PRIVATE FIRE DATA

NO.	DELTA OR BRG.	RADIUS(ft)	LENGTH(ft)	REMARKS
1	N90°00'00"W	------	3.00	12" PVC C900
2	N00°00'00"E	------	130.56	"
3	N90°00'00"E	------	745.28	"
4	6°41'40"	212.00	24.77	"
5	6°41'40"	228.00	26.64	"
6	N90°00'00"E	------	110.42	"
7	6°41'40"	228.00	26.64	"
8	6°41'40"	212.00	24.77	"
9	N90°00'00"E	------	137.09	"

REGISTERED PROFESSIONAL ENGINEER HENRY H. PENG No. 63686 Exp. 09-30-18 CIVIL STATE OF CALIFORNIA

HENRY H. PENG
R.C.E. 63686
DATE
REGISTRATION EXPIRES: 09/30/20
DESIGNED BY: I.L./C.L.
PM REVIEW: M.V

CIVIL SENSE INC
13475 Danielson Street, Suite 150
Poway, CA 92064

DATE	REVISIONS	BY
9/22/20	SUBMITTAL	CSI
6/17/20	ADDED LATERAL TABLE	CSI
11/22/19	CITY SUBMITTAL	CSI

PRIVATE PLUMBING PLANS FOR:
CALIFORNIA TERRACES
PA61

PTS 653925

SHEET 2 OF 4

8/22/2020 JOB NO. 10009.20

APPENDIX B

CITY OF SAN DIEGO WATER FACILITY DESIGN GUIDELINES

Chapter 2

WATER DEMANDS AND SERVICE CRITERIA

2.1 General

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

2.2 Service Area

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

2.3 Land Use and Residential Population

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

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

Table 2-1
Residential Population Density

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

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

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

2.4 Average Annual Water Demands

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

Table 2-2
Unit Water Demands

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

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

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

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

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

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

2.5 Peak Water Demands

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

Peak water demands are estimated as follows:

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

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

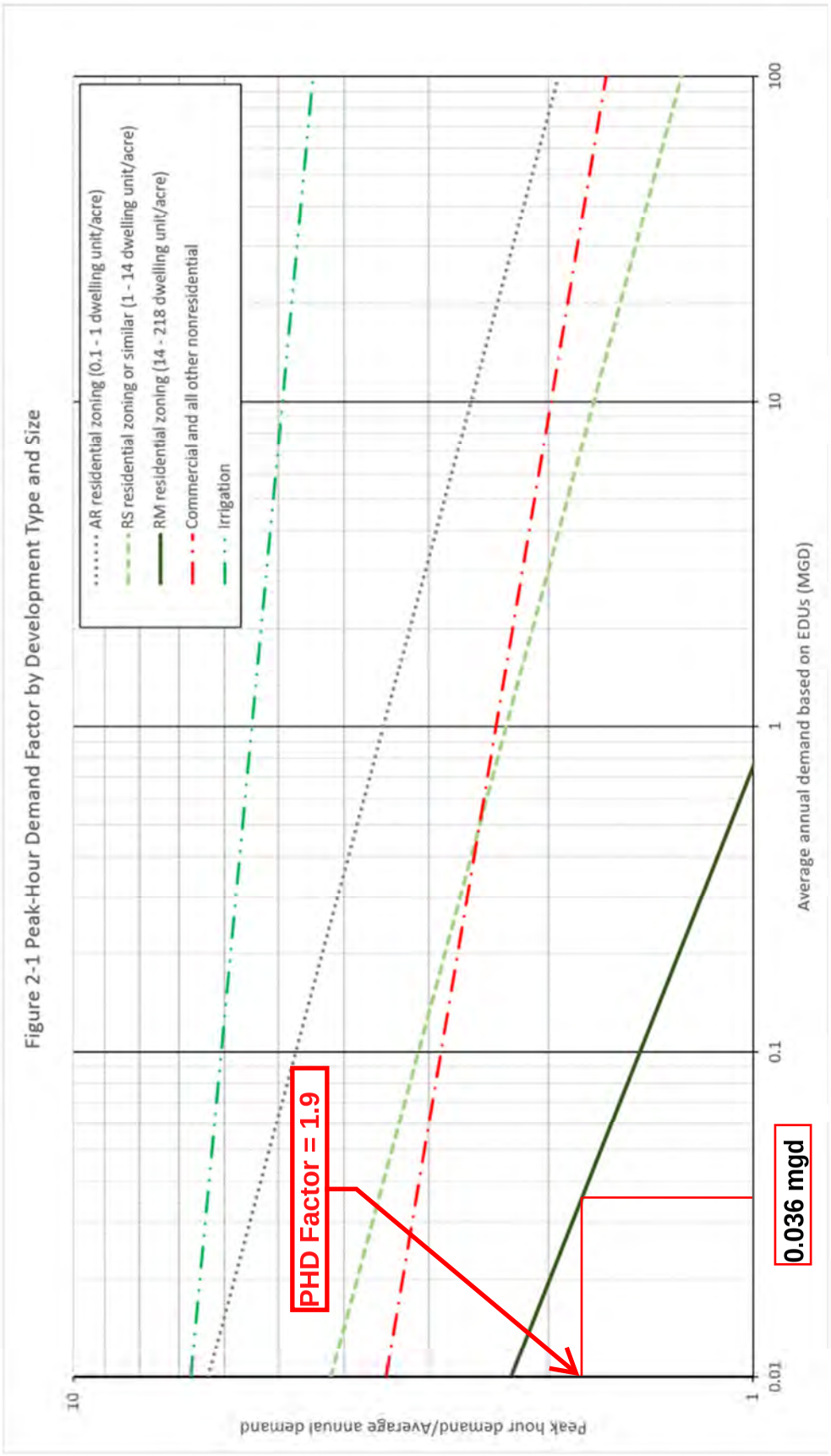


Figure 2-1 Peak-Hour Demand Factor by Development Type and Size

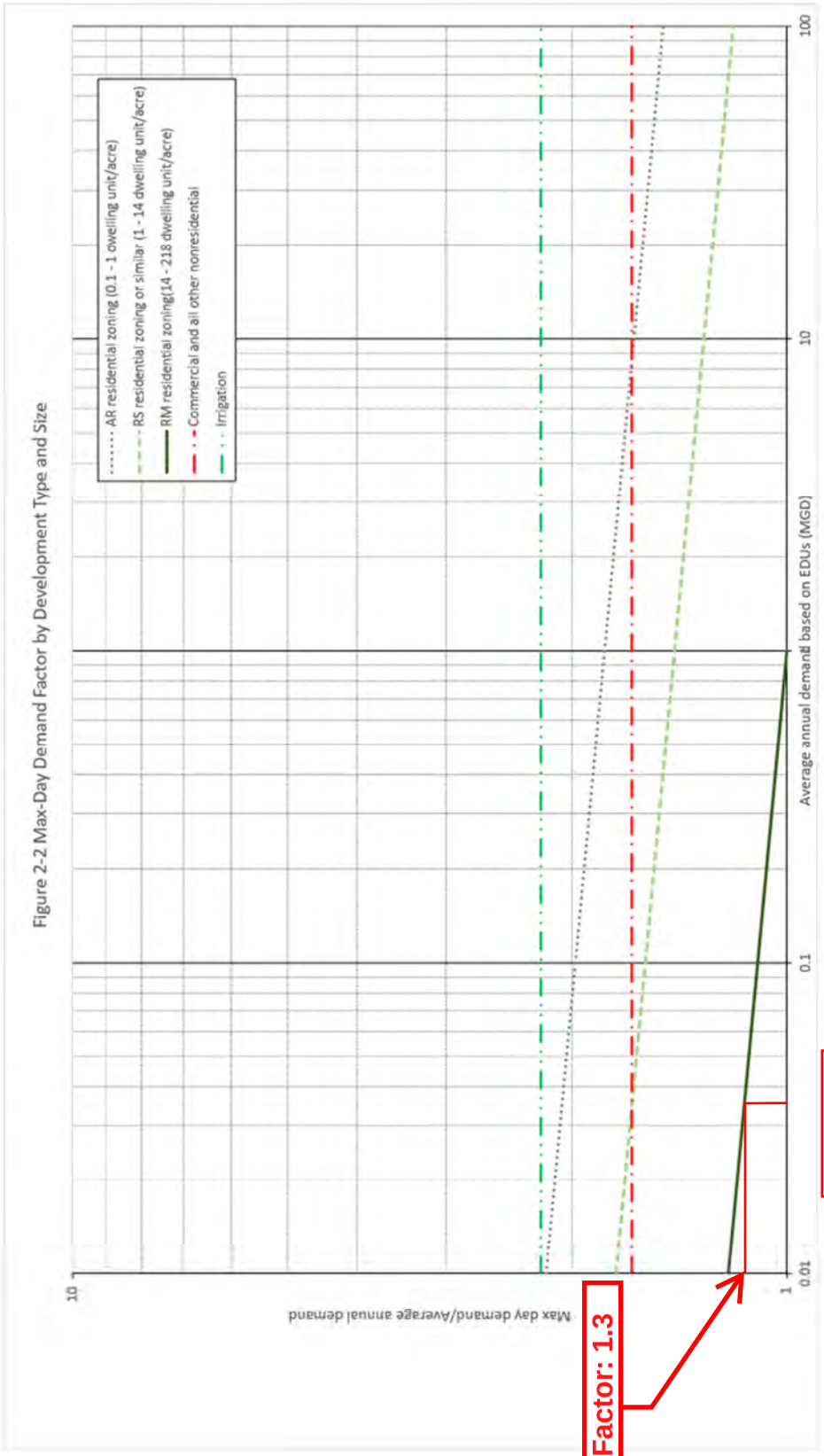


Figure 2-2 Max-Day Demand Factor by Development Type and Size
AR residential zoning (0.1 - 1 dwelling unit/acre)
RS residential zoning or similar (1 - 14 dwelling unit/acre)
RM residential zoning(14 - 218 dwelling unit/acre)
Commercial and all other nonresidential
Irrigation
Max day demand/Average annual demand
Average annual demand based on EDUs (MGD)
10
1
0.01
0.1
10
100
MDD Factor: 1.3
0.036 mgd

2.6 Fire Demands

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

Table 2-3
Fire Demands for Design Purposes

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

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

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

2.7 Pressure Criteria

2.7.1 Design Pressures

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

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

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

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

2.7.2 Domestic Pressure Criteria

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

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

2.7.3 Pressure Requirements During Fires

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

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

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

2.8 System Reliability

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

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

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

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

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

APPENDIX C

HYDRAULIC COMPUTER MODELING OUTPUT FROM APPROVED CALIFORNIA TERRACES WATER STUDY (OCTOBER 2003)

TABLE B-1A
PEAK HOUR

NODE No.	ELEVATION (ft)	HGL ZONE (ft)	STATIC PRESSURE (psi)	MODEL PRESSURE (psi)	ΔPRESSURE FROM STATIC (psi)
1454	525	680	67	48	19
202	512	680	73	54	19
204	490	680	82	63	19
206	440	680	104	85	19
208	490	680	82	63	19
210	494	680	81	62	19
212	504	680	76	57	19
214	514	680	72	53	19
216	515	680	71	52	19
218	519	680	70	51	19
220	518	680	70	51	19
222	526	680	67	48	19
224	505	680	76	57	19
226	515	680	71	53	19
228	517	680	71	52	19
229	505	680	76	57	19
230	494	680	81	62	19
232	497	680	79	61	19
234	507	680	75	56	19
236	504	680	76	57	19
238	501	680	77	59	19
240	496	680	80	61	19
242	497	680	79	60	19
244	464	680	94	75	19
246	495	680	80	61	19
248	490	680	82	63	19
250	500	680	78	59	19
252	499	680	78	59	19
254	495	680	80	61	19
256	499	680	78	59	19
258	502	680	77	58	19
260	502	680	77	58	19
262	507	680	75	56	19
264	506	680	75	56	19
266	503	680	77	57	19
268	502	680	77	58	19
270	493	680	81	62	19
272	514	680	72	52	19
274	491	680	82	62	19
276	492	680	81	62	19
278	486	680	84	65	19
280	480	680	87	67	19
282	483	680	85	66	19
284	504	680	76	57	19
286	498	680	79	60	19
288	500	680	78	59	19
290	512	680	73	54	19
292	505	680	76	57	19
294	523	680	68	49	19

NODE No.	ELEVATION (ft)	HGL ZONE (ft)	STATIC PRESSURE (psi)	MODEL PRESSURE (psi)	ΔPRESSURE FROM STATIC (psi)
296	508	680	74	56	19
298	523	680	68	49	19
300	504	680	76	57	19
302	512	680	73	54	19
304	515	680	71	53	19
306	523	680	68	49	19
308	522	680	68	50	19
310	525	680	67	48	19
312	528	680	66	47	19
314	515	680	71	53	19
316	518	680	70	51	19
318	521	680	69	50	19
320	519	680	70	51	19
322	517	680	71	52	19
326	524	680	68	49	19
328	521	680	69	50	19
330	523	680	68	49	19
4002	382	680	129	110	19
4004	387	680	127	108	19
4006	389	680	126	107	19
4008	392	680	125	106	19
4010	379	680	130	112	19
4012	511	680	73	54	19
4014	523	680	68	49	19
4016	522	680	68	49	19
4018	520	680	69	50	19
4026	519	680	70	51	19
4032	525	680	67	48	19
4034	527	680	66	47	19
4036	529	680	65	46	19
4038	531	680	65	45	20
4040	524	680	68	48	20
4042	522	680	68	49	20
4044	530	680	65	46	19
4046	533	680	64	45	19
4048	521	680	69	49	20
4050	520	680	69	50	19
4052	526	680	67	48	19
4054	535	680	63	44	19
4056	528	680	66	47	19
4058	534	680	63	44	19
4060	526	680	67	48	19
4062	530	680	65	46	19
4064	526	680	67	48	19
4066	527	680	66	47	19
4068	440	680	104	85	19
4070	528	680	66	47	19
6503	521	680	69	50	19
700	472	680	90	71	19
702	480	680	87	68	19
704	484	680	85	66	19
706	486	680	84	65	19

NODE No.	ELEVATION (ft)	HGL ZONE (ft)	STATIC PRESSURE (psi)	MODEL PRESSURE (psi)	ΔPRESSURE FROM STATIC (psi)
708	493	680	81	62	19
710	478	680	87	69	19
712	491	680	82	63	19
714	490	680	82	63	19
716	498	680	79	60	19
718	500	680	78	59	19
720	505	680	76	57	19
722	512	680	73	54	19
724	515	680	71	53	19
726	514	680	72	53	19
728	497	680	79	60	19
730	520	680	69	51	19
732	521	680	69	50	19
801	360	680	139	120	19
802	332	490	68	58	10
803	330	490	69	59	10
804	328	490	70	60	10
805	351	680	142	124	19
806	356	680	140	122	19
807	364	680	137	118	19
808	350	680	143	124	19
809	360	680	139	120	19
810	365	680	136	118	19
811	360	680	139	120	19
812	370	680	134	115	19
813	370	680	134	115	19
814	375	680	132	113	19
815	357	680	140	121	19
816	370	680	134	115	19
817	376	680	132	113	19
818	370	680	134	115	19
819	327	490	71	60	10
825	520	680	69	51	19
826	522	680	68	50	19
827	511	680	73	55	19
828	499	680	78	60	19
829	472	680	90	71	19
830	468	680	92	73	19
832	400	680	121	103	19
850	370	680	134	115	19

TABLE B-1B
PEAK HOUR

PIPE No.	DIAMETER (in)	FLOW (gpm)	VELOCITY (fps)
1002	30	-1637.64	0.74
200	16	-673.84	1.08
202	16	623.87	1.00
204	16	256.13	0.41
206	12	40.85	0.12
208	12	-333.12	0.94
210	12	-306.55	0.87
212	8	-24.28	0.16
214	8	76.42	0.49
216	8	-43.67	0.28
218	12	-318.26	0.90
220	8	-86.13	0.55
222	8	9.68	0.06
224	8	-102.73	0.66
226	8	16.63	0.11
228	8	-137.36	0.88
229	12	-257.06	0.73
230	12	-250.15	0.71
231	30	-159.62	0.07
232	8	-120.60	0.77
234	8	-23.22	0.15
236	8	9.68	0.06
238	8	-60.59	0.39
240	12	-210.44	0.60
242	8	-32.72	0.21
244	12	-211.23	0.60
246	12	-257.81	0.73
248	12	-98.56	0.28
250	8	13.86	0.09
252	12	133.19	0.38
254	8	9.68	0.06
256	12	-162.24	0.46
258	8	11.09	0.07
260	12	-198.28	0.56
262	8	13.86	0.09
264	12	-87.63	0.25
266	8	17.02	0.11
268	12	52.18	0.15
270	12	12.47	0.04
272	12	47.28	0.13
274	12	-77.06	0.22
276	12	65.92	0.19
278	12	28.85	0.08
280	12	-61.91	0.18
282	12	-111.40	0.32
284	12	-154.08	0.44
286	8	19.85	0.13
288	8	21.27	0.14
290	8	9.93	0.06
292	12	-155.74	0.44

PIPE No.	DIAMETER (in)	FLOW (gpm)	VELOCITY (fps)
294	8	11.35	0.07
296	8	17.02	0.11
298	8	21.13	0.13
300	8	29.92	0.19
302	8	17.15	0.11
304	8	9.92	0.06
306	8	7.09	0.05
308	8	43.96	0.28
312	8	4.26	0.03
314	8	28.36	0.18
316	8	11.35	0.07
318	8	7.09	0.05
320	8	194.69	1.24
322	8	6.91	0.04
324	8	165.64	1.06
326	8	6.91	0.04
328	8	121.52	0.78
330	8	11.09	0.07
332	8	96.57	0.62
334	8	55.14	0.35
336	8	6.91	0.04
338	8	24.69	0.16
340	8	-36.22	0.23
342	8	-108.33	0.69
344	8	-137.74	0.88
346	8	179.28	1.14
348	8	11.09	0.07
350	8	-9.68	0.06
352	8	12.35	0.08
354	8	-26.42	0.17
356	16	-27.49	0.04
358	24	198.32	0.14
4002	8	65.65	0.42
4004	8	12.86	0.08
4006	8	22.23	0.14
4008	8	12.86	0.08
4010	8	-3.48	0.02
4012	8	17.71	0.11
4014	8	1.37	0.01
4016	16	-818.06	1.31
4018	8	144.21	0.92
4020	8	127.49	0.81
4022	8	50.17	0.32
4030	8	6.31	0.04
4036	16	713.98	1.14
4038	16	-695.65	1.11
4040	12	741.47	2.10
4042	8	291.67	1.86
4044	8	90.30	0.58
4046	8	-111.08	0.71
4048	8	248.43	1.59
4050	8	245.60	1.57
4052	12	668.15	1.90

PIPE No.	DIAMETER (in)	FLOW (gpm)	VELOCITY (fps)
4054	8	-198.55	1.27
4056	8	268.23	1.71
4058	8	66.85	0.43
4060	12	350.09	0.99
4062	12	433.67	1.23
4064	12	323.42	0.92
4066	12	338.08	0.96
4068	12	-100.63	0.29
4070	12	313.79	0.89
4072	12	93.29	0.26
4076	8	47.23	0.30
4077	8	63.02	0.40
4078	8	-57.97	0.37
4079	12	12.01	0.03
4080	8	69.23	0.44
4082	12	6.50	0.02
4084	24	40.37	0.03
4086	12	50.96	0.14
4090	16	-328.52	0.52
4092	8	-43.86	0.28
4094	12	237.46	0.67
4096	8	41.02	0.26
427	24	-1675.46	1.19
700	16	337.38	0.54
702	12	179.15	0.51
704	24	326.50	0.23
706	24	249.03	0.18
708	12	155.28	0.44
710	8	70.25	0.45
712	8	13.98	0.09
714	8	32.51	0.21
716	8	9.78	0.06
718	8	20.58	0.13
720	8	47.14	0.30
722	8	8.39	0.05
724	12	76.50	0.22
726	12	-71.04	0.20
728	12	38.97	0.11
730	12	69.72	0.20
732	8	19.57	0.12
734	8	11.18	0.07
736	12	-128.44	0.36
801	12	17.06	0.05
802	8	11.81	0.08
803	8	-3.94	0.03
804	8	-4.59	0.03
806	8	-19.93	0.13
807	8	-40.44	0.26
808	12	-150.61	0.43
810	8	7.41	0.05
811	8	9.57	0.06
812	12	-103.34	0.29
813	8	-10.47	0.07

PIPE No.	DIAMETER (in)	FLOW (gpm)	VELOCITY (fps)
814	8	-36.44	0.23
815	8	36.02	0.23
816	8	13.67	0.09
817	8	-70.63	0.45
818	12	-13.87	0.04
819	8	10.94	0.07
820	8	61.99	0.40
821	8	53.79	0.34
822	8	92.50	0.59
823	8	140.62	0.90
825	30	-3011.60	1.37
826	30	746.06	0.34
827	30	-416.69	0.19
828	30	-693.25	0.31
829	30	-891.53	0.40
830	30	914.03	0.41
831	12	-218.86	0.62
852	12	-140.62	0.40

TABLE B-3A
MAX DAY + MF FIRE (4058, 4062) W/ 8" MAIN (p4076) OOS

NODE No.	ELEVATION (ft)	HGL ZONE (ft)	STATIC PRESSURE (psi)	MODEL PRESSURE (psi)	ΔPRESSURE FROM STATIC (psi)
1454	525	680	67	64	3
202	512	680	73	70	3
204	490	680	82	79	3
206	440	680	104	101	3
208	490	680	82	79	3
210	494	680	81	78	3
212	504	680	76	73	3
214	514	680	72	69	3
216	515	680	71	68	3
218	519	680	70	67	3
220	518	680	70	67	3
222	526	680	67	64	3
224	505	680	76	73	3
226	515	680	71	68	3
228	517	680	71	68	3
229	505	680	76	73	3
230	494	680	81	78	3
232	497	680	79	77	3
234	507	680	75	72	3
236	504	680	76	73	3
238	501	680	77	75	3
240	496	680	80	77	3
242	497	680	79	76	3
244	464	680	94	91	3
246	495	680	80	77	3
248	490	680	82	80	3
250	500	680	78	75	3
252	499	680	78	75	3
254	495	680	80	77	3
256	499	680	78	75	3
258	502	680	77	74	3
260	502	680	77	74	3
262	507	680	75	72	3
264	506	680	75	72	3
266	503	680	77	73	3
268	502	680	77	74	3
270	493	680	81	78	3
272	514	680	72	69	3
274	491	680	82	79	3
276	492	680	81	78	3
278	486	680	84	81	3
280	480	680	87	84	3
282	483	680	85	82	3
284	504	680	76	73	3
286	498	680	79	76	3
288	500	680	78	75	3
290	512	680	73	70	3
292	505	680	76	73	3
294	523	680	68	65	3

NODE No.	ELEVATION (ft)	HGL ZONE (ft)	STATIC PRESSURE (psi)	MODEL PRESSURE (psi)	ΔPRESSURE FROM STATIC (psi)
296	508	680	74	71	3
298	523	680	68	65	3
300	504	680	76	73	3
302	512	680	73	70	3
304	515	680	71	68	3
306	523	680	68	65	3
308	522	680	68	65	3
310	525	680	67	64	3
312	528	680	66	63	3
314	515	680	71	68	3
316	518	680	70	67	3
318	521	680	69	66	3
320	519	680	70	67	3
322	517	680	71	67	3
326	524	680	68	64	3
328	521	680	69	66	3
330	523	680	68	65	3
4002	382	680	129	127	2
4004	387	680	127	124	2
4006	389	680	126	124	2
4008	392	680	125	122	2
4010	379	680	130	128	2
4012	511	680	73	70	3
4014	523	680	68	65	3
4016	522	680	68	65	3
4018	520	680	69	66	3
4026	519	680	70	67	3
4032	525	680	67	64	3
4034	527	680	66	63	3
4036	529	680	65	62	3
4038	531	680	65	61	3
4040	524	680	68	64	3
4042	522	680	68	65	3
4044	530	680	65	62	3
4046	533	680	64	60	3
4048	521	680	69	65	3
4050	520	680	69	64	6
4052	526	680	67	61	5
4054	535	680	63	57	6
4056	528	680	66	60	6
4058	534	680	63	55	9
4060	526	680	67	60	7
4062	530	680	65	44	21
4064	526	680	67	58	8
4066	527	680	66	59	8
4068	440	680	104	101	3
4070	528	680	66	60	6
6503	521	680	69	66	3
700	472	680	90	87	3
702	480	680	87	83	3
704	484	680	85	82	3
706	486	680	84	81	3

NODE No.	ELEVATION (ft)	HGL ZONE (ft)	STATIC PRESSURE (psi)	MODEL PRESSURE (psi)	ΔPRESSURE FROM STATIC (psi)
708	493	680	81	78	3
710	478	680	87	84	3
712	491	680	82	79	3
714	490	680	82	79	3
716	498	680	79	76	3
718	500	680	78	75	3
720	505	680	76	72	3
722	512	680	73	70	3
724	515	680	71	68	3
726	514	680	72	69	3
728	497	680	79	76	3
730	520	680	69	66	3
732	521	680	69	66	3
801	360	680	139	136	2
802	332	490	68	61	7
803	330	490	69	62	7
804	328	490	70	63	7
805	351	680	142	140	2
806	356	680	140	138	2
807	364	680	137	134	2
808	350	680	143	141	2
809	360	680	139	136	2
810	365	680	136	134	2
811	360	680	139	136	2
812	370	680	134	132	2
813	370	680	134	132	2
814	375	680	132	130	2
815	357	680	140	137	2
816	370	680	134	132	2
817	376	680	132	129	2
818	370	680	134	132	2
819	327	490	71	64	7
825	520	680	69	66	3
826	522	680	68	65	3
827	511	680	73	70	3
828	499	680	78	76	3
829	472	680	90	87	3
830	468	680	92	89	3
832	400	680	121	119	2
850	370	680	134	132	2

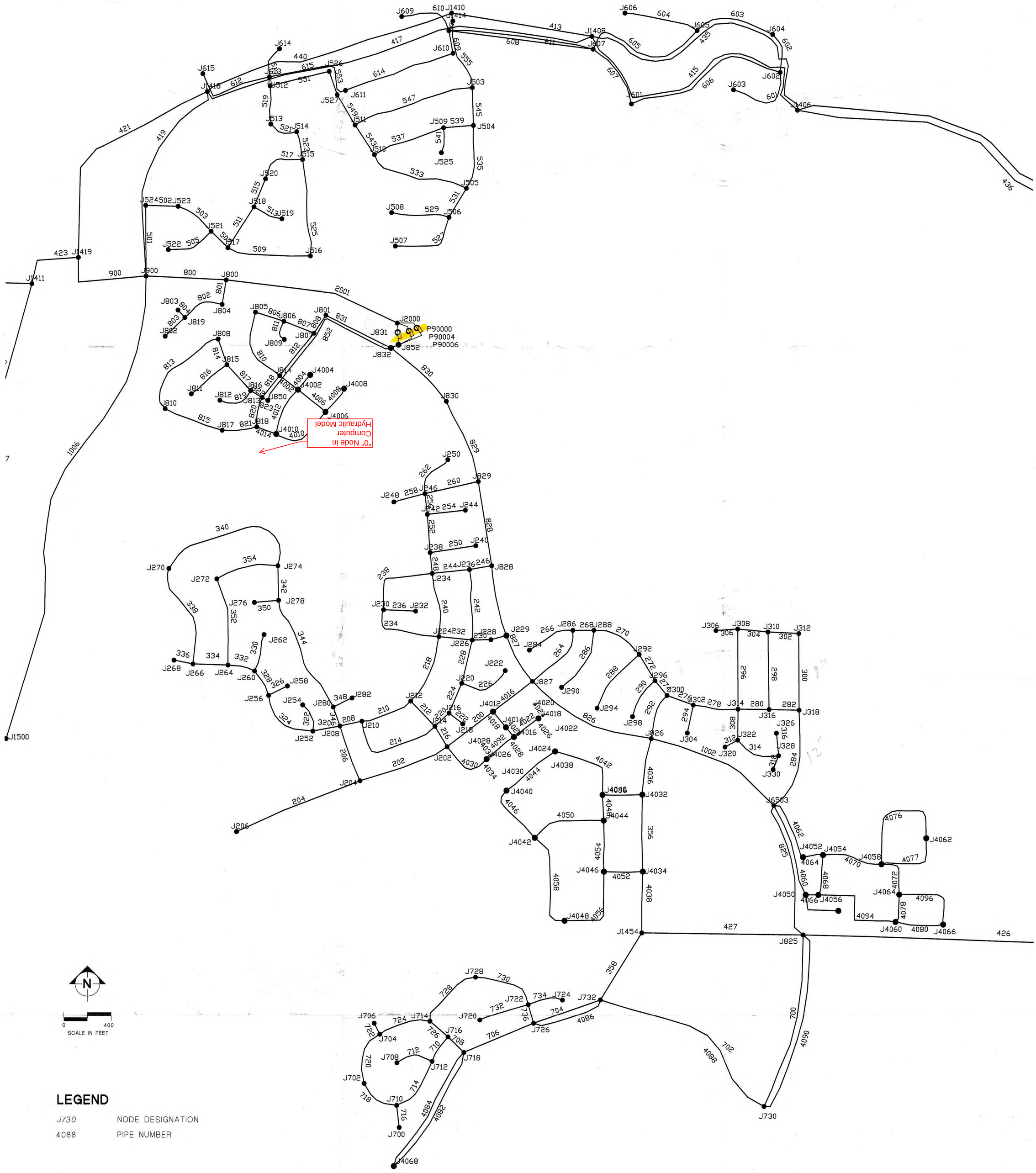
TABLE B-3B
MAX DAY + MF FIRE (4058, 4062) W/ 8" MAIN (p4076) OOS

PIPE No.	DIAMETER (in)	FLOW (gpm)	VELOCITY (fps)
1002	30	2389.30	1.08
200	16	-199.10	0.32
202	16	248.79	0.40
204	16	122.94	0.20
206	12	-31.06	0.09
208	12	-210.56	0.60
210	12	-198.07	0.56
212	8	52.74	0.34
214	8	36.43	0.23
216	8	68.53	0.44
218	12	-268.09	0.76
220	8	-66.18	0.42
222	8	4.65	0.03
224	8	-74.14	0.47
226	8	7.98	0.05
228	8	-90.76	0.58
229	12	37.70	0.11
230	12	41.02	0.12
231	30	-3456.50	1.57
232	8	44.79	0.29
234	8	-50.93	0.33
236	8	4.65	0.03
238	8	-68.87	0.44
240	12	-279.23	0.79
242	8	-98.95	0.63
244	12	-68.11	0.19
246	12	-173.71	0.49
248	12	-298.59	0.85
250	8	6.65	0.04
252	12	315.22	0.89
254	8	4.65	0.03
256	12	-329.16	0.93
258	8	5.32	0.03
260	12	-346.46	0.98
262	8	6.65	0.04
264	12	-248.75	0.71
266	8	8.17	0.05
268	12	231.73	0.66
270	12	212.67	0.60
272	12	-183.99	0.52
274	12	169.70	0.48
276	12	182.56	0.52
278	12	164.77	0.47
280	12	103.20	0.29
282	12	76.56	0.22
284	12	74.96	0.21
286	8	9.53	0.06
288	8	10.21	0.07
290	8	4.76	0.03
292	12	-18.99	0.05

PIPE No.	DIAMETER (in)	FLOW (gpm)	VELOCITY (fps)
294	8	5.45	0.03
296	8	24.17	0.15
298	8	13.02	0.08
300	8	-4.52	0.03
302	8	-10.64	0.07
304	8	-11.23	0.07
306	8	3.40	0.02
308	8	23.11	0.15
312	8	2.04	0.01
314	8	13.61	0.09
316	8	5.45	0.03
318	8	3.40	0.02
320	8	93.45	0.60
322	8	3.32	0.02
324	8	79.51	0.51
326	8	3.32	0.02
328	8	58.33	0.37
330	8	5.32	0.03
332	8	46.36	0.30
334	8	26.47	0.17
336	8	3.32	0.02
338	8	11.85	0.08
340	8	-17.39	0.11
342	8	-52.00	0.33
344	8	-66.11	0.42
346	8	86.06	0.55
348	8	5.32	0.03
350	8	-4.65	0.03
352	8	5.93	0.04
354	8	-12.68	0.08
356	16	176.13	0.28
358	24	120.88	0.09
4002	8	31.51	0.20
4004	8	6.17	0.04
4006	8	10.67	0.07
4008	8	6.17	0.04
4010	8	-1.67	0.01
4012	8	8.50	0.05
4014	8	0.66	0.00
4016	16	-252.51	0.40
4018	8	53.41	0.34
4020	8	45.39	0.29
4022	8	24.08	0.15
4030	8	18.84	0.12
4036	16	536.46	0.86
4038	16	-140.16	0.22
4040	12	360.33	1.02
4042	8	140.78	0.90
4044	8	44.12	0.28
4046	8	-52.54	0.34
4048	8	122.89	0.78
4050	8	118.13	0.75
4052	12	316.29	0.90

PIPE No.	DIAMETER (in)	FLOW (gpm)	VELOCITY (fps)
4054	8	-91.90	0.59
4056	8	127.74	0.82
4058	8	31.08	0.20
4060	12	1550.34	4.40
4062	12	1832.11	5.20
4064	12	1779.19	5.05
4066	12	1538.33	4.36
4068	12	-448.85	1.27
4070	12	2175.12	6.17
4072	12	-930.72	2.64
4076	8	0.00	0.00
4077	8	1552.92	9.91
4078	8	-687.91	4.39
4079	12	12.01	0.03
4080	8	348.65	2.23
4082	12	3.27	0.01
4084	24	19.23	0.01
4086	12	24.46	0.07
4090	16	-145.01	0.23
4092	8	-5.25	0.03
4094	12	1089.48	3.09
4096	8	-295.73	1.89
427	24	-636.16	0.45
700	16	148.93	0.24
702	12	60.30	0.17
704	24	156.72	0.11
706	24	119.53	0.08
708	12	74.53	0.21
710	8	33.72	0.22
712	8	6.71	0.04
714	8	15.60	0.10
716	8	4.70	0.03
718	8	9.88	0.06
720	8	22.63	0.14
722	8	4.03	0.03
724	12	36.72	0.10
726	12	-34.10	0.10
728	12	18.70	0.05
730	12	33.47	0.09
732	8	9.39	0.06
734	8	5.37	0.03
736	12	-61.65	0.17
801	12	11.38	0.03
802	8	7.88	0.05
803	8	-2.63	0.02
804	8	-3.06	0.02
806	8	-9.57	0.06
807	8	-19.41	0.12
808	12	-72.29	0.21
810	8	3.56	0.02
811	8	4.59	0.03
812	12	-49.60	0.14
813	8	-5.02	0.03

PIPE No.	DIAMETER (in)	FLOW (gpm)	VELOCITY (fps)
814	8	-17.49	0.11
815	8	17.29	0.11
816	8	6.56	0.04
817	8	-33.90	0.22
818	12	-6.66	0.02
819	8	5.25	0.03
820	8	29.76	0.19
821	8	25.82	0.16
822	8	44.40	0.28
823	8	67.50	0.43
825	30	-1127.53	0.51
826	30	-2955.24	1.34
827	30	-3418.80	1.55
828	30	-3601.51	1.63
829	30	-3947.97	1.79
830	30	3958.77	1.80
831	12	-105.05	0.30
852	12	-67.50	0.19



LEGEND

J730	NODE DESIGNATION
4088	PIPE NUMBER

PIPE AND NODE MAP

EXHIBIT B-1

NOTE: SEE FIGURE 2 FROM THE OTAY CORPORATE CENTER NORTH WATER STUDY ADDENDUM (JANUARY 2001) AND EXHIBIT 1 FROM THE CALIFORNIA TERRACES WATER STUDY (JUNE 1998) FOR THE SSD/OTAY MESA WATER SYSTEM PIPE AND NODE MAP.

APPENDIX D

COMPUTER MODELING OUTPUT

The following conditions were modeled:

1. Average Day Demand.

2. Peak Hour Demand.

3. Maximum Day Demand plus 3,000 gpm Fire Flow split between Nodes 110 and 154.

4. Maximum Day Demand plus 3,000 gpm Fire Flow split between Nodes 110 and 154. Pipe 41 closed.

5. Maximum Day Demand plus 3,000 gpm Fire Flow split between Nodes 110 and 154. Pipe 39 closed.

Project: California Terraces Planning Area 61 Lot 1 Residential Project
Date: 10/6/2021
Job Number: 648-032

Scenario: All Pipes Open - Average Day Demand

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi	Delta P from Static
J-4	533	680	63.69	60.67	3.02
J-8	535	680	62.82	59.8	3.02
J-12	548	680	57.19	54.17	3.02
J-16	527	680	66.29	63.27	3.02
J-18	527	680	66.29	63.27	3.02
J-20	544	680	58.93	55.9	3.03
J-24	544	680	58.93	55.9	3.03
J-28	548	680	57.19	54.17	3.02
J-32	539	680	61.09	58.07	3.02
J-36	534	680	63.26	60.23	3.03
J-110	530	680	64.99	55.9	9.09
J-114	530	680	64.99	55.9	9.09
J-118	530	680	64.99	55.9	9.09
J-122	530	680	64.99	55.9	9.09
J-126	528	680	65.86	56.77	9.09
J-130	528	680	65.86	56.77	9.09
J-134	528	680	65.86	56.77	9.09
J-150	527	680	66.29	57.2	9.09
J-152	529	680	65.42	56.33	9.09
J-154	529	680	65.42	56.33	9.09
J-156	529	680	65.42	56.33	9.09
O-RPDA-1	534	680	63.26	54.17	9.09
I-RPDA-2	527	680	66.29	63.27	3.02
I-RPDA-1	534	680	63.26	60.23	3.03
O-RPDA-2	527	680	66.29	57.2	9.09

Project: California Terraces Planning Area 61 Lot 1 Residential Project
Date: 10/6/2021
Job Number: 648-032

Scenario: Peak Hour Demand

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi	Delta P from Static
J-4	533	680	63.69	60.67	3.02
J-8	535	680	62.82	59.8	3.02
J-12	548	680	57.19	54.17	3.02
J-16	527	680	66.29	63.27	3.02
J-18	527	680	66.29	63.27	3.02
J-20	544	680	58.93	55.9	3.03
J-24	544	680	58.93	55.9	3.03
J-28	548	680	57.19	54.17	3.02
J-32	539	680	61.09	58.07	3.02
J-36	534	680	63.26	60.23	3.03
J-110	530	680	64.99	55.9	9.09
J-114	530	680	64.99	55.9	9.09
J-118	530	680	64.99	55.9	9.09
J-122	530	680	64.99	55.9	9.09
J-126	528	680	65.86	56.77	9.09
J-130	528	680	65.86	56.77	9.09
J-134	528	680	65.86	56.77	9.09
J-150	527	680	66.29	57.2	9.09
J-152	529	680	65.42	56.33	9.09
J-154	529	680	65.42	56.33	9.09
J-156	529	680	65.42	56.33	9.09
O-RPDA-1	534	680	63.26	54.17	9.09
I-RPDA-2	527	680	66.29	63.27	3.02
I-RPDA-1	534	680	63.26	60.23	3.03
O-RPDA-2	527	680	66.29	57.2	9.09

Project: California Terraces Planning Area 61 Lot 1 Residential Project
Date: 10/6/2021
Job Number: 648-032

Scenario: Maximum Day Demand plus 3000 gpm Fire Flow split between Nodes 110 and 154

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi
J-4	533	680	63.69	60.51
J-8	535	680	62.82	59.64
J-12	548	680	57.19	53.99
J-16	527	680	66.29	63.03
J-18	527	680	66.29	62.6
J-20	544	680	58.93	55.72
J-24	544	680	58.93	55.71
J-28	548	680	57.19	53.98
J-32	539	680	61.09	57.85
J-36	534	680	63.26	60.02
J-110	530	680	64.99	51.98
J-114	530	680	64.99	52.43
J-118	530	680	64.99	52.46
J-122	530	680	64.99	52.56
J-126	528	680	65.86	53.63
J-130	528	680	65.86	53.75
J-134	528	680	65.86	53.6
J-150	527	680	66.29	53.43
J-152	529	680	65.42	52.27
J-154	529	680	65.42	52.22
J-156	529	680	65.42	52.31
O-RPDA-1	534	680	63.26	51.2
I-RPDA-2	527	680	66.29	62.47
I-RPDA-1	534	680	63.26	59.71
O-RPDA-2	527	680	66.29	54.52

Project: California Terraces Planning Area 61 Lot 1 Residential Project
Date: 10/6/2021
Job Number: 648-032

Scenario: Maximum Day Demand plus 3000 gpm Fire Flow split between Nodes 110 and 154, Pipe 41 Closed

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi
J-4	533	680	63.69	60.51
J-8	535	680	62.82	59.63
J-12	548	680	57.19	53.94
J-16	527	680	66.29	63.11
J-18	527	680	66.29	52.76
J-20	544	680	58.93	55.66
J-24	544	680	58.93	55.65
J-28	548	680	57.19	53.91
J-32	539	680	61.09	57.75
J-36	534	680	63.26	59.91
J-110	530	680	64.99	45.39
J-114	530	680	64.99	45.39
J-118	530	680	64.99	45.39
J-122	530	680	64.99	45.39
J-126	528	680	65.86	46.26
J-130	528	680	65.86	46.26
J-134	528	680	65.86	46.26
J-150	527	680	66.29	47.42
J-152	529	680	65.42	45.92
J-154	529	680	65.42	45.82
J-156	529	680	65.42	45.83
O-RPDA-1	534	680	63.26	46.83
I-RPDA-2	527	680	66.29	52.76
I-RPDA-1	534	680	63.26	58.96
O-RPDA-2	527	680	66.29	46.69

Project: California Terraces Planning Area 61 Lot 1 Residential Project
Date: 10/6/2021
Job Number: 648-032

Scenario: Maximum Day Demand plus 3000 gpm Fire Flow split between Nodes 110 and 154, Pipe 39 Closed

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi
J-4	533	680	63.69	60.51
J-8	535	680	62.82	59.13
J-12	548	680	57.19	50.32
J-16	527	680	66.29	63.11
J-18	527	680	66.29	44.25
J-20	544	680	58.93	51.54
J-24	544	680	58.93	51.02
J-28	548	680	57.19	48.77
J-32	539	680	61.09	49.49
J-36	534	680	63.26	51.4
J-110	530	680	64.99	36.88
J-114	530	680	64.99	36.88
J-118	530	680	64.99	36.88
J-122	530	680	64.99	36.88
J-126	528	680	65.86	37.75
J-130	528	680	65.86	37.75
J-134	528	680	65.86	37.75
J-150	527	680	66.29	38.91
J-152	529	680	65.42	37.41
J-154	529	680	65.42	37.31
J-156	529	680	65.42	37.31
O-RPDA-1	534	680	63.26	38.31
I-RPDA-2	527	680	66.29	44.25
I-RPDA-1	534	680	63.26	50.45
O-RPDA-2	527	680	66.29	38.18

Project: California Terraces Planning Area 61 Lot 1 Residential Project
Date: 10/6/2021
Job Number: 648-032

Scenario: All Pipes Open - Average Day Demand

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
1	30	87	0.04
9	16	9.34	0.01
13	12	4.67	0.01
17	12	4.67	0.01
21	16	9.34	0.01
23	12	9.34	0.03
25	16	-9.34	0.01
29	12	-4.67	0.01
33	12	4.67	0.01
37	16	-9.34	0.01
39	16	70.01	0.11
41	12	7.65	0.02
43	10	7.65	0.03
45	24	7.65	0.01
101	10	-5.65	0.02
109	12	-5.65	0.02
113	12	-6.65	0.02
117	12	2.91	0.01
121	12	2.91	0.01
125	12	2.91	0.01
129	12	-2.91	0.01
133	12	-4.74	0.01
137	12	-4.74	0.01
141	12	7.65	0.02
161	12	-3.67	0.01
163	12	-1.98	0.01
165	12	-1.98	0.01
167	12	-1.98	0.01
171	12	-1.98	0.01

Project: California Terraces Planning Area 61 Lot 1 Residential Project
Date: 10/6/2021
Job Number: 648-032

Scenario: Peak Hour Demand

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
1	30	165.3	0.08
9	16	17.77	0.03
13	12	8.89	0.03
17	12	8.89	0.03
21	16	17.77	0.03
23	12	17.77	0.05
25	16	-17.77	0.03
29	12	-8.89	0.03
33	12	8.89	0.03
37	16	-17.77	0.03
39	16	133.19	0.21
41	12	14.34	0.04
43	10	14.34	0.06
45	24	14.34	0.01
101	10	-10.54	0.04
109	12	-10.54	0.03
113	12	-12.44	0.04
117	12	5.46	0.02
121	12	5.46	0.02
125	12	5.46	0.02
129	12	-5.46	0.02
133	12	-8.88	0.03
137	12	-8.88	0.03
141	12	14.34	0.04
161	12	-6.84	0.02
163	12	-3.7	0.01
165	12	-3.7	0.01
167	12	-3.7	0.01
171	12	-3.7	0.01

Project: California Terraces Planning Area 61 Lot 1 Residential Project
Date: 10/6/2021
Job Number: 648-032

Scenario: Maximum Day Demand plus 3000 gpm Fire Flow split between Nodes 110 and 154

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
1	30	3111.8	1.41
9	16	206.83	0.33
13	12	103.41	0.29
17	12	103.41	0.29
21	16	206.83	0.33
23	12	206.83	0.59
25	16	-206.83	0.33
29	12	-103.41	0.29
33	12	103.41	0.29
37	16	-206.83	0.33
39	16	1550.06	2.47
41	12	1354.91	3.84
43	10	1354.91	5.53
45	24	1354.91	0.96
101	10	1646.39	6.73
109	12	1646.39	4.67
113	12	-1353.61	3.84
117	12	515.98	1.46
121	12	515.98	1.46
125	12	515.98	1.46
129	12	-515.98	1.46
133	12	-838.92	2.38
137	12	-838.92	2.38
141	12	1354.91	3.84
161	12	677.62	1.92
163	12	968.77	2.75
165	12	968.77	2.75
167	12	-531.23	1.51
171	12	-531.23	1.51

Project: California Terraces Planning Area 61 Lot 1 Residential Project
Date: 10/6/2021
Job Number: 648-032

Scenario: Maximum Day Demand plus 3000 gpm Fire Flow split between Nodes 110 and 154, Pipe 41 Closed

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
1	30	3111.8	1.41
9	16	366.33	0.58
13	12	183.17	0.52
17	12	183.17	0.52
21	16	366.33	0.58
23	12	366.33	1.04
25	16	-366.33	0.58
29	12	-183.17	0.52
33	12	183.17	0.52
37	16	-366.33	0.58
39	16	2745.47	4.38
41	12		
43	10	0	0
45	24	0	0
101	10	3001.3	12.26
109	12	3001.3	8.51
113	12	1.3	0
117	12	0	0
121	12	0	0
125	12	0	0
129	12	0	0
133	12	0	0
137	12	0	0
141	12	0	0
161	12	1558.98	4.42
163	12	1442.32	4.09
165	12	1442.32	4.09
167	12	-57.68	0.16
171	12	-57.68	0.16

Project: California Terraces Planning Area 61 Lot 1 Residential Project
Date: 10/6/2021
Job Number: 648-032

Scenario: Maximum Day Demand plus 3000 gpm Fire Flow split between Nodes 110 and 154, Pipe 39 Closed

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
1	30	3111.8	1.41
9	16	3111.8	4.97
13	12	1555.9	4.41
17	12	1555.9	4.41
21	16	3111.8	4.97
23	12	3111.8	8.83
25	16	-3111.8	4.97
29	12	-1555.9	4.41
33	12	1555.9	4.41
37	16	-3111.8	4.97
39	16		
41	12		
43	10	0	0
45	24	0	0
101	10	3001.3	12.26
109	12	3001.3	8.51
113	12	1.3	0
117	12	0	0
121	12	0	0
125	12	0	0
129	12	0	0
133	12	0	0
137	12	0	0
141	12	0	0
161	12	1558.98	4.42
163	12	1442.32	4.09
165	12	1442.32	4.09
167	12	-57.68	0.16
171	12	-57.68	0.16

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* * * * * * * * * * * * *  K Y P I P E  * * * * * * * * * * * * *
*                                                                 *
*  Pipe Network Modeling Software                                 *
*                                                                 *
*  CopyRighted by KYPIPE LLC (www.kypipe.com)                     *
*  Version: 10.009  10/01/2019                                    *
*  Company:  Dexter        Serial #:  592169                      *
*  Interface:  Classic                                            *
*  Licensed for Pipe2018                                          *
*                                                                 *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
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Date & Time: Wed Oct 06 11:46:37 2021

Master File : \\artic\eng\648032\ky pipe\pa61 lot 1 residential oct 2021 ky pipe.KYP\pa61 lot 1 residential oct 2021 ky pipe.P2K

SUMMARY OF ORIGINAL DATA

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 (source)	J-4	1300.00	30.00	120.0000	0.00
P-9	J-4	J-8	200.00	16.00	120.0000	0.00
P-13	J-8	J-12	1100.00	12.00	120.0000	0.00
P-17	J-8	J-12	1100.00	12.00	120.0000	0.00
P-21	J-12	J-20	200.00	16.00	120.0000	0.00
P-23	J-20	J-24	50.00	12.00	120.0000	0.00
P-25	J-28	J-24	200.00	16.00	120.0000	0.00
P-29	J-32	J-28	1100.00	12.00	120.0000	0.00
P-33	J-28	J-32	1100.00	12.00	120.0000	0.00
P-37	J-36	J-32	100.00	16.00	120.0000	0.00
P-39	J-4	J-36	81.00	16.00	120.0000	0.00
P-41	J-16	J-18	190.00	12.00	120.0000	0.00
P-43	J-18	I-RPDA-2	25.00	10.00	120.0000	0.00
P-45	J-4	J-16	1100.00	24.00	120.0000	0.00
P-101	J-36	I-RPDA-1	40.00	10.00	120.0000	0.00
P-109	O-RPDA-1	J-150	250.00	12.00	120.0000	0.00
P-113	J-110	J-114	200.00	12.00	120.0000	0.00
P-117	J-118	J-114	100.00	12.00	120.0000	0.00
P-121	J-122	J-118	260.00	12.00	120.0000	0.00
P-125	J-126	J-122	530.00	12.00	120.0000	0.00
P-129	J-126	J-130	340.00	12.00	120.0000	0.00
P-133	J-134	J-130	170.00	12.00	120.0000	0.00
P-137	J-114	J-134	330.00	12.00	120.0000	0.00
P-141	O-RPDA-2	J-130	150.00	12.00	120.0000	0.00

P-161	J-150	J-110	250.00	12.00	120.0000	0.00
P-163	J-150	J-152	250.00	12.00	120.0000	0.00
P-165	J-152	J-154	40.00	12.00	120.0000	0.00
P-167	J-154	J-156	240.00	12.00	120.0000	0.00
P-171	J-156	J-110	250.00	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 RPDA-1 DESCRIBED BY THE FOLLOWING DATA: (ID= 1)

HEAD (ft)	FLOWRATE (gpm)	EFFICIENCY (%)
-14.00	0.00	75.00 (Default)
-16.00	1000.00	75.00 (Default)
-19.00	1500.00	75.00 (Default)
-21.00	2000.00	75.00 (Default)
-23.00	2500.00	75.00 (Default)
-28.00	3000.00	75.00 (Default)
-32.00	3500.00	75.00 (Default)
-34.00	3600.00	75.00 (Default)

THERE IS A DEVICE AT NODE RPDA-2 ....> (ID= 1)

N O D E D A T A

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	EXTERNAL GRADE (ft)
0 (source)		----	0.00	673.00
J-4		0.00	533.00	
J-8		0.00	535.00	
J-12		0.00	548.00	
J-16		0.00	527.00	
J-18		0.00	527.00	
J-20		0.00	544.00	
J-24		0.00	544.00	
J-28		0.00	548.00	
J-32		0.00	539.00	
J-36		85.00	534.00	
J-110		1.00	530.00	
J-114		1.00	530.00	
J-118		0.00	530.00	
J-122		0.00	530.00	
J-126		0.00	528.00	
J-130		0.00	528.00	
J-134		0.00	528.00	
J-150		0.00	527.00	
J-152		0.00	529.00	
J-154		0.00	529.00	
J-156		0.00	529.00	
O-RPDA-1		0.00	534.00	
I-RPDA-2		0.00	527.00	
I-RPDA-1		0.00	534.00	
O-RPDA-2		0.00	527.00	

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) = 29
NUMBER OF END NODES .....(J) = 23
NUMBER OF PRIMARY LOOPS .....(L) = 6
NUMBER OF SUPPLY NODES .....(F) = 1
NUMBER OF SUPPLY ZONES .....(Z) = 1

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Case: 1

C H A N G E S F O R N E X T S I M U L A T I O N (Change Number = 0)

Average Day Demand
PA61 Lot 1 Residential

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 (source)	J-4	87.00	0.00	0.00	0.04	0.00	0.00
P-9	J-4	J-8	9.34	0.00	0.00	0.01	0.00	0.00
P-13	J-8	J-12	4.67	0.00	0.00	0.01	0.00	0.00
P-17	J-8	J-12	4.67	0.00	0.00	0.01	0.00	0.00
P-21	J-12	J-20	9.34	0.00	0.00	0.01	0.00	0.00
P-23	J-20	J-24	9.34	0.00	0.00	0.03	0.00	0.00
P-25	J-28	J-24	-9.34	0.00	0.00	0.01	0.00	0.00
P-29	J-32	J-28	-4.67	0.00	0.00	0.01	0.00	0.00
P-33	J-28	J-32	4.67	0.00	0.00	0.01	0.00	0.00
P-37	J-36	J-32	-9.34	0.00	0.00	0.01	0.00	0.00
P-39	J-4	J-36	70.01	0.00	0.00	0.11	0.01	0.01
P-41	J-16	J-18	7.65	0.00	0.00	0.02	0.00	0.00
P-43	J-18	I-RPDA-2	7.65	0.00	0.00	0.03	0.00	0.00
P-45	J-4	J-16	7.65	0.00	0.00	0.01	0.00	0.00
P-101	J-36	I-RPDA-1	-5.65	0.00	0.00	0.02	0.00	0.00
P-109	O-RPDA-1	J-150	-5.65	0.00	0.00	0.02	0.00	0.00
P-113	J-110	J-114	-6.65	0.00	0.00	0.02	0.00	0.00
P-117	J-118	J-114	2.91	0.00	0.00	0.01	0.00	0.00
P-121	J-122	J-118	2.91	0.00	0.00	0.01	0.00	0.00
P-125	J-126	J-122	2.91	0.00	0.00	0.01	0.00	0.00
P-129	J-126	J-130	-2.91	0.00	0.00	0.01	0.00	0.00
P-133	J-134	J-130	-4.74	0.00	0.00	0.01	0.00	0.00
P-137	J-114	J-134	-4.74	0.00	0.00	0.01	0.00	0.00
P-141	O-RPDA-2	J-130	7.65	0.00	0.00	0.02	0.00	0.00
P-161	J-150	J-110	-3.67	0.00	0.00	0.01	0.00	0.00
P-163	J-150	J-152	-1.98	0.00	0.00	0.01	0.00	0.00
P-165	J-152	J-154	-1.98	0.00	0.00	0.01	0.00	0.00
P-167	J-154	J-156	-1.98	0.00	0.00	0.01	0.00	0.00
P-171	J-156	J-110	-1.98	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
Warning P2K107:Device RPDA-1 is operating out of range.												
RPDA-1	-5.65	139.00	125.00	-14.0	75.00	0.	0.0	0.0	**	**	172.2	1.0000
RPDA-2	7.65	146.00	132.00	-14.0	75.00	0.	0.0	0.0	**	**	179.2	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
0 (source)		----	673.00			
J-4		0.00	673.00	533.00	140.00	60.67
J-8		0.00	673.00	535.00	138.00	59.80
J-12		0.00	673.00	548.00	125.00	54.17
J-16		0.00	673.00	527.00	146.00	63.27
J-18		0.00	673.00	527.00	146.00	63.27
J-20		0.00	673.00	544.00	129.00	55.90
J-24		0.00	673.00	544.00	129.00	55.90
J-28		0.00	673.00	548.00	125.00	54.17
J-32		0.00	673.00	539.00	134.00	58.07
J-36		85.00	673.00	534.00	139.00	60.23
J-110		1.00	659.00	530.00	129.00	55.90
J-114		1.00	659.00	530.00	129.00	55.90
J-118		0.00	659.00	530.00	129.00	55.90
J-122		0.00	659.00	530.00	129.00	55.90
J-126		0.00	659.00	528.00	131.00	56.77
J-130		0.00	659.00	528.00	131.00	56.77
J-134		0.00	659.00	528.00	131.00	56.77
J-150		0.00	659.00	527.00	132.00	57.20
J-152		0.00	659.00	529.00	130.00	56.33
J-154		0.00	659.00	529.00	130.00	56.33
J-156		0.00	659.00	529.00	130.00	56.33
O-RPDA-1		0.00	659.00	534.00	125.00	54.17
I-RPDA-2		0.00	673.00	527.00	146.00	63.27
I-RPDA-1		0.00	673.00	534.00	139.00	60.23
O-RPDA-2		0.00	659.00	527.00	132.00	57.20

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-16	63.27	O-RPDA-1	54.17
J-18	63.27	J-28	54.17
I-RPDA-2	63.27	J-12	54.17

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-39	0.11	P-45	0.01
P-1	0.04	P-163	0.01
P-43	0.03	P-165	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 (source)	87.00	

NET SYSTEM INFLOW = 87.00
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 87.00

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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)

Peak Hour Demand
PA61 Lot 1 Residential

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 (source)	J-4	165.30	0.00	0.00	0.08	0.00	0.00
P-9	J-4	J-8	17.77	0.00	0.00	0.03	0.00	0.00
P-13	J-8	J-12	8.89	0.00	0.00	0.03	0.00	0.00
P-17	J-8	J-12	8.89	0.00	0.00	0.03	0.00	0.00
P-21	J-12	J-20	17.77	0.00	0.00	0.03	0.00	0.00
P-23	J-20	J-24	17.77	0.00	0.00	0.05	0.00	0.00
P-25	J-28	J-24	-17.77	0.00	0.00	0.03	0.00	0.00
P-29	J-32	J-28	-8.89	0.00	0.00	0.03	0.00	0.00
P-33	J-28	J-32	8.89	0.00	0.00	0.03	0.00	0.00
P-37	J-36	J-32	-17.77	0.00	0.00	0.03	0.00	0.00
P-39	J-4	J-36	133.19	0.00	0.00	0.21	0.02	0.02
P-41	J-16	J-18	14.34	0.00	0.00	0.04	0.00	0.00
P-43	J-18	I-RPDA-2	14.34	0.00	0.00	0.06	0.00	0.00
P-45	J-4	J-16	14.34	0.00	0.00	0.01	0.00	0.00
P-101	J-36	I-RPDA-1	-10.54	0.00	0.00	0.04	0.00	0.00
P-109	O-RPDA-1	J-150	-10.54	0.00	0.00	0.03	0.00	0.00
P-113	J-110	J-114	-12.44	0.00	0.00	0.04	0.00	0.00
P-117	J-118	J-114	5.46	0.00	0.00	0.02	0.00	0.00
P-121	J-122	J-118	5.46	0.00	0.00	0.02	0.00	0.00
P-125	J-126	J-122	5.46	0.00	0.00	0.02	0.00	0.00
P-129	J-126	J-130	-5.46	0.00	0.00	0.02	0.00	0.00
P-133	J-134	J-130	-8.88	0.00	0.00	0.03	0.00	0.00
P-137	J-114	J-134	-8.88	0.00	0.00	0.03	0.00	0.00
P-141	O-RPDA-2	J-130	14.34	0.00	0.00	0.04	0.00	0.00
P-161	J-150	J-110	-6.84	0.00	0.00	0.02	0.00	0.00
P-163	J-150	J-152	-3.70	0.00	0.00	0.01	0.00	0.00
P-165	J-152	J-154	-3.70	0.00	0.00	0.01	0.00	0.00
P-167	J-154	J-156	-3.70	0.00	0.00	0.01	0.00	0.00
P-171	J-156	J-110	-3.70	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
Warning P2K107:Device RPDA-1 is operating out of range.												
RPDA-1	-10.54	139.00	125.00	-14.0	75.00	0.	0.0	0.0	**	**	172.2	2.0000
RPDA-2	14.34	146.00	132.00	-14.0	75.00	0.	0.0	0.0	**	**	179.2	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
0 (source)		----	673.00			
J-4		0.00	673.00	533.00	140.00	60.67
J-8		0.00	673.00	535.00	138.00	59.80
J-12		0.00	673.00	548.00	125.00	54.17
J-16		0.00	673.00	527.00	146.00	63.27
J-18		0.00	673.00	527.00	146.00	63.27
J-20		0.00	673.00	544.00	129.00	55.90
J-24		0.00	673.00	544.00	129.00	55.90
J-28		0.00	673.00	548.00	125.00	54.17
J-32		0.00	673.00	539.00	134.00	58.07
J-36		161.50(1.90)	673.00	534.00	139.00	60.23
J-110		1.90(1.90)	659.00	530.00	129.00	55.90
J-114		1.90(1.90)	659.00	530.00	129.00	55.90
J-118		0.00	659.00	530.00	129.00	55.90
J-122		0.00	659.00	530.00	129.00	55.90
J-126		0.00	659.00	528.00	131.00	56.77
J-130		0.00	659.00	528.00	131.00	56.77
J-134		0.00	659.00	528.00	131.00	56.77
J-150		0.00	659.00	527.00	132.00	57.20
J-152		0.00	659.00	529.00	130.00	56.33
J-154		0.00	659.00	529.00	130.00	56.33
J-156		0.00	659.00	529.00	130.00	56.33
O-RPDA-1		0.00	659.00	534.00	125.00	54.17
I-RPDA-2		0.00	673.00	527.00	146.00	63.27
I-RPDA-1		0.00	673.00	534.00	139.00	60.23
O-RPDA-2		0.00	659.00	527.00	132.00	57.20

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-16	63.27	O-RPDA-1	54.17
J-18	63.27	J-28	54.17
I-RPDA-2	63.27	J-12	54.17

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-39	0.21	P-45	0.01
P-1	0.08	P-163	0.01
P-43	0.06	P-165	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 (source)	165.30	

NET SYSTEM INFLOW = 165.30
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 165.30

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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 = 2)

Maximum Day Demand plus 3,000 gpm Fire Flow Split Between Nodes 110 and 154
PA61 Lot 1 Residential

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 (source)	J-4	3111.80	0.36	0.00	1.41	0.28	0.28
P-9	J-4	J-8	206.83	0.01	0.00	0.33	0.04	0.04
P-13	J-8	J-12	103.41	0.05	0.00	0.29	0.04	0.04
P-17	J-8	J-12	103.41	0.05	0.00	0.29	0.04	0.04
P-21	J-12	J-20	206.83	0.01	0.00	0.33	0.04	0.04
P-23	J-20	J-24	206.83	0.01	0.00	0.59	0.16	0.16
P-25	J-28	J-24	-206.83	0.01	0.00	0.33	0.04	0.04
P-29	J-32	J-28	-103.41	0.05	0.00	0.29	0.04	0.04
P-33	J-28	J-32	103.41	0.05	0.00	0.29	0.04	0.04
P-37	J-36	J-32	-206.83	0.00	0.00	0.33	0.04	0.04
P-39	J-4	J-36	1550.06	0.13	0.00	2.47	1.63	1.63
P-41	J-16	J-18	1354.91	0.98	0.00	3.84	5.16	5.16
P-43	J-18	I-RPDA-2	1354.91	0.31	0.00	5.53	12.54	12.54
P-45	J-4	J-16	1354.91	0.19	0.00	0.96	0.18	0.18
P-101	J-36	I-RPDA-1	1646.39	0.72	0.00	6.73	17.99	17.99
P-109	O-RPDA-1	J-150	1646.39	1.85	0.00	4.67	7.41	7.41
P-113	J-110	J-114	-1353.61	1.03	0.00	3.84	5.15	5.15
P-117	J-118	J-114	515.98	0.09	0.00	1.46	0.86	0.86
P-121	J-122	J-118	515.98	0.22	0.00	1.46	0.86	0.86
P-125	J-126	J-122	515.98	0.46	0.00	1.46	0.86	0.86
P-129	J-126	J-130	-515.98	0.29	0.00	1.46	0.86	0.86
P-133	J-134	J-130	-838.92	0.36	0.00	2.38	2.12	2.12
P-137	J-114	J-134	-838.92	0.70	0.00	2.38	2.12	2.12
P-141	O-RPDA-2	J-130	1354.91	0.77	0.00	3.84	5.16	5.16
P-161	J-150	J-110	677.62	0.36	0.00	1.92	1.43	1.43
P-163	J-150	J-152	968.77	0.69	0.00	2.75	2.77	2.77
P-165	J-152	J-154	968.77	0.11	0.00	2.75	2.77	2.77
P-167	J-154	J-156	-531.23	0.22	0.00	1.51	0.91	0.91
P-171	J-156	J-110	-531.23	0.23	0.00	1.51	0.91	0.91

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
RPDA-1	1646.39	137.79	118.16	-19.6	75.00	-8.	0.0	0.0	**	**	170.3	3.0000
RPDA-2	1354.91	144.15	125.82	-18.3	75.00	-6.	0.0	0.0	**	**	176.9	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
0 (source)		----	673.00			
J-4		0.00	672.64	533.00	139.64	60.51
J-8		0.00	672.63	535.00	137.63	59.64
J-12		0.00	672.58	548.00	124.58	53.99
J-16		0.00	672.44	527.00	145.44	63.03
J-18		0.00	671.46	527.00	144.46	62.60
J-20		0.00	672.57	544.00	128.57	55.72
J-24		0.00	672.57	544.00	128.57	55.71
J-28		0.00	672.56	548.00	124.56	53.98
J-32		0.00	672.51	539.00	133.51	57.85
J-36		110.50(1.30)	672.51	534.00	138.51	60.02
J-110		1500.00(**)	649.95	530.00	119.95	51.98
J-114		1.30(1.30)	650.98	530.00	120.98	52.43
J-118		0.00	651.07	530.00	121.07	52.46
J-122		0.00	651.29	530.00	121.29	52.56
J-126		0.00	651.75	528.00	123.75	53.63
J-130		0.00	652.05	528.00	124.05	53.75
J-134		0.00	651.68	528.00	123.68	53.60
J-150		0.00	650.31	527.00	123.31	53.43
J-152		0.00	649.62	529.00	120.62	52.27
J-154		1500.00	649.51	529.00	120.51	52.22
J-156		0.00	649.73	529.00	120.73	52.31
O-RPDA-1		0.00	652.16	534.00	118.16	51.20
I-RPDA-2		0.00	671.15	527.00	144.15	62.47
I-RPDA-1		0.00	671.79	534.00	137.79	59.71
O-RPDA-2		0.00	652.82	527.00	125.82	54.52

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-16	63.03	O-RPDA-1	51.20
J-18	62.60	J-110	51.98
I-RPDA-2	62.47	J-154	52.22

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-101	6.73	P-13	0.29
P-43	5.53	P-17	0.29
P-109	4.67	P-29	0.29

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 (source)	3111.80	

NET SYSTEM INFLOW = 3111.80
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 3111.80

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Case: 4

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

Maximum Day Demand plus 3,000 gpm Fire Flow Split Between Nodes 110 and 154
Pipe 41 Closed
PA61 Lot 1 Residential

Pipe P-41 is CLOSED

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 (source)	J-4	3111.80	0.36	0.00	1.41	0.28	0.28
P-9	J-4	J-8	366.33	0.02	0.00	0.58	0.11	0.11
P-13	J-8	J-12	183.17	0.14	0.00	0.52	0.13	0.13
P-17	J-8	J-12	183.17	0.14	0.00	0.52	0.13	0.13
P-21	J-12	J-20	366.33	0.02	0.00	0.58	0.11	0.11
P-23	J-20	J-24	366.33	0.02	0.00	1.04	0.46	0.46
P-25	J-28	J-24	-366.33	0.02	0.00	0.58	0.11	0.11
P-29	J-32	J-28	-183.17	0.14	0.00	0.52	0.13	0.13
P-33	J-28	J-32	183.17	0.14	0.00	0.52	0.13	0.13
P-37	J-36	J-32	-366.33	0.01	0.00	0.58	0.11	0.11
P-39	J-4	J-36	2745.47	0.38	0.00	4.38	4.70	4.70
P-41-XX	J-16	J-18						
P-43	J-18	I-RPDA-2	0.00	0.00	0.00	0.00	0.00	0.00
P-45	J-4	J-16	0.00	0.00	0.00	0.00	0.00	0.00
P-101	J-36	I-RPDA-1	3001.30	2.19	0.00	12.26	54.71	54.71
P-109	O-RPDA-1	J-150	3001.30	5.63	0.00	8.51	22.52	22.52
P-113	J-110	J-114	1.30	0.00	0.00	0.00	0.00	0.00
P-117	J-118	J-114	0.00	0.00	0.00	0.00	0.00	0.00
P-121	J-122	J-118	0.00	0.00	0.00	0.00	0.00	0.00
P-125	J-126	J-122	0.00	0.00	0.00	0.00	0.00	0.00
P-129	J-126	J-130	0.00	0.00	0.00	0.00	0.00	0.00
P-133	J-134	J-130	0.00	0.00	0.00	0.00	0.00	0.00
P-137	J-114	J-134	0.00	0.00	0.00	0.00	0.00	0.00
P-141	O-RPDA-2	J-130	0.00	0.00	0.00	0.00	0.00	0.00
P-161	J-150	J-110	1558.98	1.67	0.00	4.42	6.69	6.69
P-163	J-150	J-152	1442.32	1.45	0.00	4.09	5.80	5.80
P-165	J-152	J-154	1442.32	0.23	0.00	4.09	5.80	5.80
P-167	J-154	J-156	-57.68	0.00	0.00	0.16	0.01	0.01
P-171	J-156	J-110	-57.68	0.00	0.00	0.16	0.01	0.01

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
RPDA-1	3001.30	136.07	108.06	-28.0	75.00	-21.	-0.4	-0.4	**	**	166.9	4.0000
Warning P2K107:Device RPDA-2 is operating out of range.												
RPDA-2	0.00	121.76	107.76	-14.0	75.00	0.	-0.3	-0.3	**	**	155.0	4.0000

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 (source)		----	673.00			
J-4		0.00	672.64	533.00	139.64	60.51
J-8		0.00	672.62	535.00	137.62	59.63
J-12		0.00	672.48	548.00	124.48	53.94
J-16		0.00	672.64	527.00	145.64	63.11
J-18		0.00	648.76	527.00	121.76	52.76
J-20		0.00	672.45	544.00	128.45	55.66
J-24		0.00	672.43	544.00	128.43	55.65
J-28		0.00	672.41	548.00	124.41	53.91
J-32		0.00	672.27	539.00	133.27	57.75
J-36		110.50(1.30)	672.26	534.00	138.26	59.91
J-110		1500.00(**)	634.76	530.00	104.76	45.39
J-114		1.30(1.30)	634.76	530.00	104.76	45.39
J-118		0.00	634.76	530.00	104.76	45.39
J-122		0.00	634.76	530.00	104.76	45.39
J-126		0.00	634.76	528.00	106.76	46.26
J-130		0.00	634.76	528.00	106.76	46.26
J-134		0.00	634.76	528.00	106.76	46.26
J-150		0.00	636.43	527.00	109.43	47.42
J-152		0.00	634.98	529.00	105.98	45.92
J-154		1500.00	634.75	529.00	105.75	45.82
J-156		0.00	634.75	529.00	105.75	45.83
O-RPDA-1		0.00	642.06	534.00	108.06	46.83
I-RPDA-2		0.00	648.76	527.00	121.76	52.76
I-RPDA-1		0.00	670.07	534.00	136.07	58.96
O-RPDA-2		0.00	634.76	527.00	107.76	46.69

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-16	63.11	J-122	45.39
J-4	60.51	J-110	45.39
J-36	59.91	J-114	45.39

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-101	12.26	P-117	0.00
P-109	8.51	P-121	0.00
P-161	4.42	P-125	0.00

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 (source)	3111.80	

NET SYSTEM INFLOW = 3111.80
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 3111.80

==========

Case: 5

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

Maximum Day Demand plus 3,000 gpm Fire Flow Split Between Nodes 110 and 154
Pipe 39 Closed
PA61 Lot 1 Residential

Pipe P-39 is CLOSED

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 (source)	J-4	3111.80	0.36	0.00	1.41	0.28	0.28
P-9	J-4	J-8	3111.80	1.19	0.00	4.97	5.93	5.93
P-13	J-8	J-12	1555.90	7.34	0.00	4.41	6.67	6.67
P-17	J-8	J-12	1555.90	7.34	0.00	4.41	6.67	6.67
P-21	J-12	J-20	3111.80	1.19	0.00	4.97	5.93	5.93
P-23	J-20	J-24	3111.80	1.20	0.00	8.83	24.07	24.07
P-25	J-28	J-24	-3111.80	1.19	0.00	4.97	5.93	5.93
P-29	J-32	J-28	-1555.90	7.34	0.00	4.41	6.67	6.67
P-33	J-28	J-32	1555.90	7.34	0.00	4.41	6.67	6.67
P-37	J-36	J-32	-3111.80	0.59	0.00	4.97	5.93	5.93
P-39-XX	J-4	J-36						
P-41-XX	J-16	J-18						
P-43	J-18	I-RPDA-2	0.00	0.00	0.00	0.00	0.00	0.00
P-45	J-4	J-16	0.00	0.00	0.00	0.00	0.00	0.00
P-101	J-36	I-RPDA-1	3001.30	2.19	0.00	12.26	54.71	54.71
P-109	O-RPDA-1	J-150	3001.30	5.63	0.00	8.51	22.52	22.52
P-113	J-110	J-114	1.30	0.00	0.00	0.00	0.00	0.00
P-117	J-118	J-114	0.00	0.00	0.00	0.00	0.00	0.00
P-121	J-122	J-118	0.00	0.00	0.00	0.00	0.00	0.00
P-125	J-126	J-122	0.00	0.00	0.00	0.00	0.00	0.00
P-129	J-126	J-130	0.00	0.00	0.00	0.00	0.00	0.00
P-133	J-134	J-130	0.00	0.00	0.00	0.00	0.00	0.00
P-137	J-114	J-134	0.00	0.00	0.00	0.00	0.00	0.00
P-141	O-RPDA-2	J-130	0.00	0.00	0.00	0.00	0.00	0.00
P-161	J-150	J-110	1558.98	1.67	0.00	4.42	6.69	6.69
P-163	J-150	J-152	1442.32	1.45	0.00	4.09	5.80	5.80
P-165	J-152	J-154	1442.32	0.23	0.00	4.09	5.80	5.80
P-167	J-154	J-156	-57.68	0.00	0.00	0.16	0.01	0.01
P-171	J-156	J-110	-57.68	0.00	0.00	0.16	0.01	0.01

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
RPDA-1	3001.30	116.42	88.41	-28.0	75.00	-21.	-1.1	-1.5	**	**	147.3	5.0000
Warning P2K107:Device RPDA-2 is operating out of range.												
RPDA-2	0.00	102.11	88.11	-14.0	75.00	0.	0.0	-0.3	**	**	135.3	5.0000

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 (source)		----	673.00			
J-4		0.00	672.64	533.00	139.64	60.51
J-8		0.00	671.45	535.00	136.45	59.13
J-12		0.00	664.12	548.00	116.12	50.32
J-16		0.00	672.64	527.00	145.64	63.11
J-18		0.00	629.11	527.00	102.11	44.25
J-20		0.00	662.93	544.00	118.93	51.54
J-24		0.00	661.73	544.00	117.73	51.02
J-28		0.00	660.54	548.00	112.54	48.77
J-32		0.00	653.21	539.00	114.21	49.49
J-36		110.50(1.30)	652.61	534.00	118.61	51.40
J-110		1500.00(**)	615.11	530.00	85.11	36.88
J-114		1.30(1.30)	615.11	530.00	85.11	36.88
J-118		0.00	615.11	530.00	85.11	36.88
J-122		0.00	615.11	530.00	85.11	36.88
J-126		0.00	615.11	528.00	87.11	37.75
J-130		0.00	615.11	528.00	87.11	37.75
J-134		0.00	615.11	528.00	87.11	37.75
J-150		0.00	616.78	527.00	89.78	38.91
J-152		0.00	615.33	529.00	86.33	37.41
J-154		1500.00	615.10	529.00	86.10	37.31
J-156		0.00	615.11	529.00	86.11	37.31
O-RPDA-1		0.00	622.41	534.00	88.41	38.31
I-RPDA-2		0.00	629.11	527.00	102.11	44.25
I-RPDA-1		0.00	650.42	534.00	116.42	50.45
O-RPDA-2		0.00	615.11	527.00	88.11	38.18

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-16	63.11	J-110	36.88
J-4	60.51	J-114	36.88
J-8	59.13	J-118	36.88

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-101	12.26	P-113	0.00
P-23	8.83	P-167	0.16
P-109	8.51	P-171	0.16

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 (source)	3111.80	

NET SYSTEM INFLOW = 3111.80
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 3111.80

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

APPENDIX E

PA61 PRIVATE WATER INFORMATION

PA61 Overall

Job Number 648-032
Date 10/6/2021

Water Fixture Units:

DESCRIPTION	Unit 1			Unit 2			Unit 3			Unit 4			Unit 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	1	4	4	1	4	4	3	4	12
SHOWER	1	2	2	1	2	2	1	2	2	1	2	2	2	2	4
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	4	1	4	4	1	4	4	1	4	4	1	4	5	1	5
WATER CLOSET (1.6 GPF, private)	3	2.5	7.5	3	2.5	7.5	3	2.5	7.5	3	2.5	7.5	4	2.5	10
DRINKING FOUNTAIN	1	0.5	0.5	1	0.5	0.5	1	0.5	0.5	1	0.5	0.5	1	0.5	0.5
HOSE BIBB	1	2.5	2.5	1	2.5	2.5	1	2.5	2.5	1	2.5	2.5	1	2.5	2.5
EACH ADDTL HB	0	1	0	0	1	0	0	1	0	0	1	0	0	1	0
TOTAL			27.5			31.5			27.5			27.5			41

Plan Type	Quantity	WFU	Total			
Unit 1	41	27.5	1127.5			
Unit 2	41	31.5	1291.5			
Unit 3	71	27.5	1952.5			
Unit 4	79	27.5	2172.5			
Unit 5	50	41	2050			
Totals	**282**		**8594**	**=**	**~1,015 gpm**	(based on linear extrapolation of CA Plumbing Code Chart A-103.1)

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.

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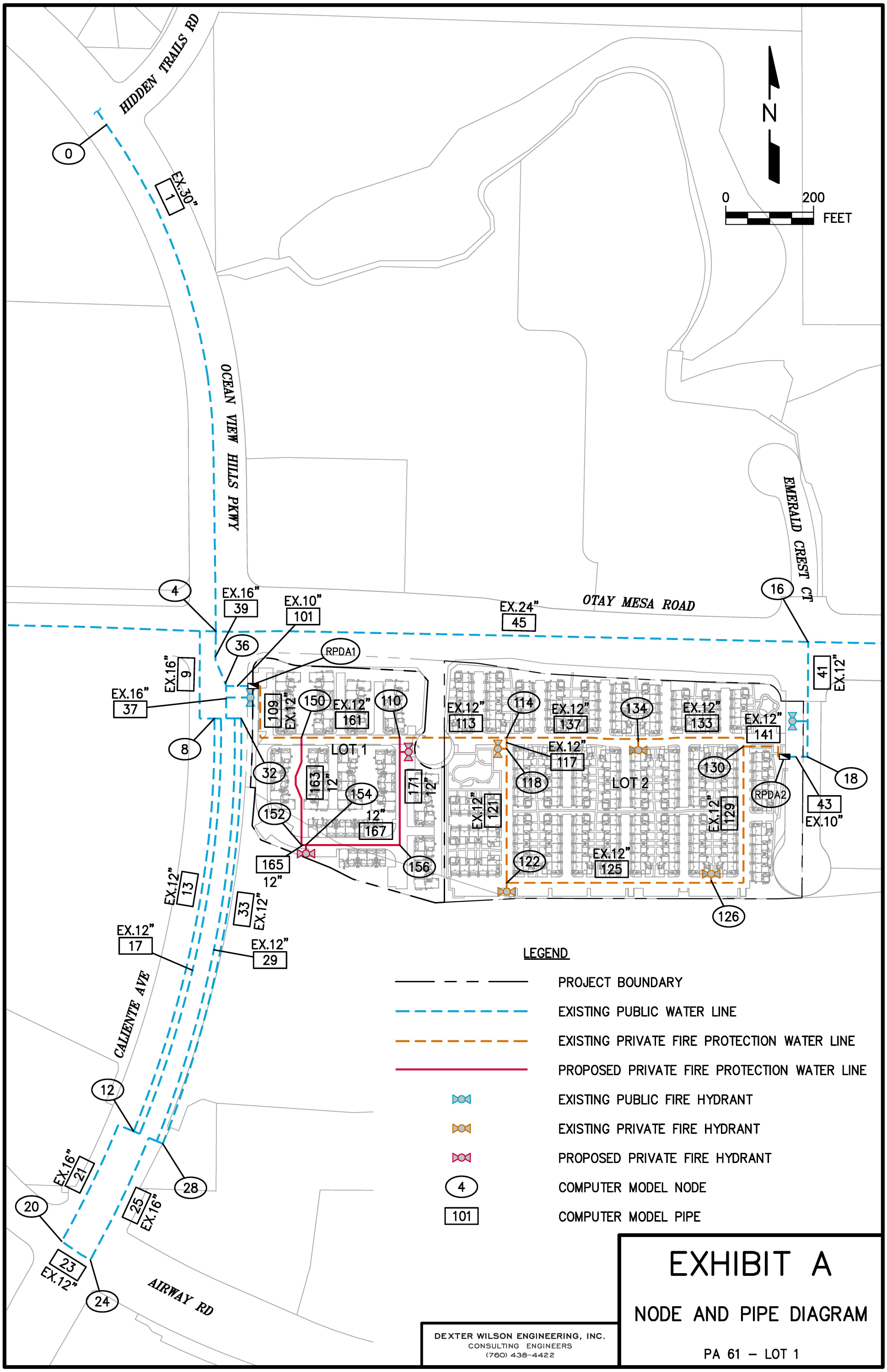

EXHIBIT A

NODE AND PIPE DIAGRAM

PA 61 – LOT 1

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