DEXTER WILSON ENGINEERING, INC.

WATER • WASTEWATER • RECYCLED WATER

CONSULTING ENGINEERS

WATER STUDY
FOR THE TOWNE CENTER VIEW PROJECT
IN THE CITY OF SAN DIEGO
PTS# 624751

July 20, 2021

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

WATER STUDY
FOR THE TOWNE CENTRE VIEW PROJECT
IN THE CITY OF SAN DIEGO

PTS# 624751

July 20, 2021

7-20-2021

Prepared by:
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Job No. 574-018

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July 20, 2021

574-018

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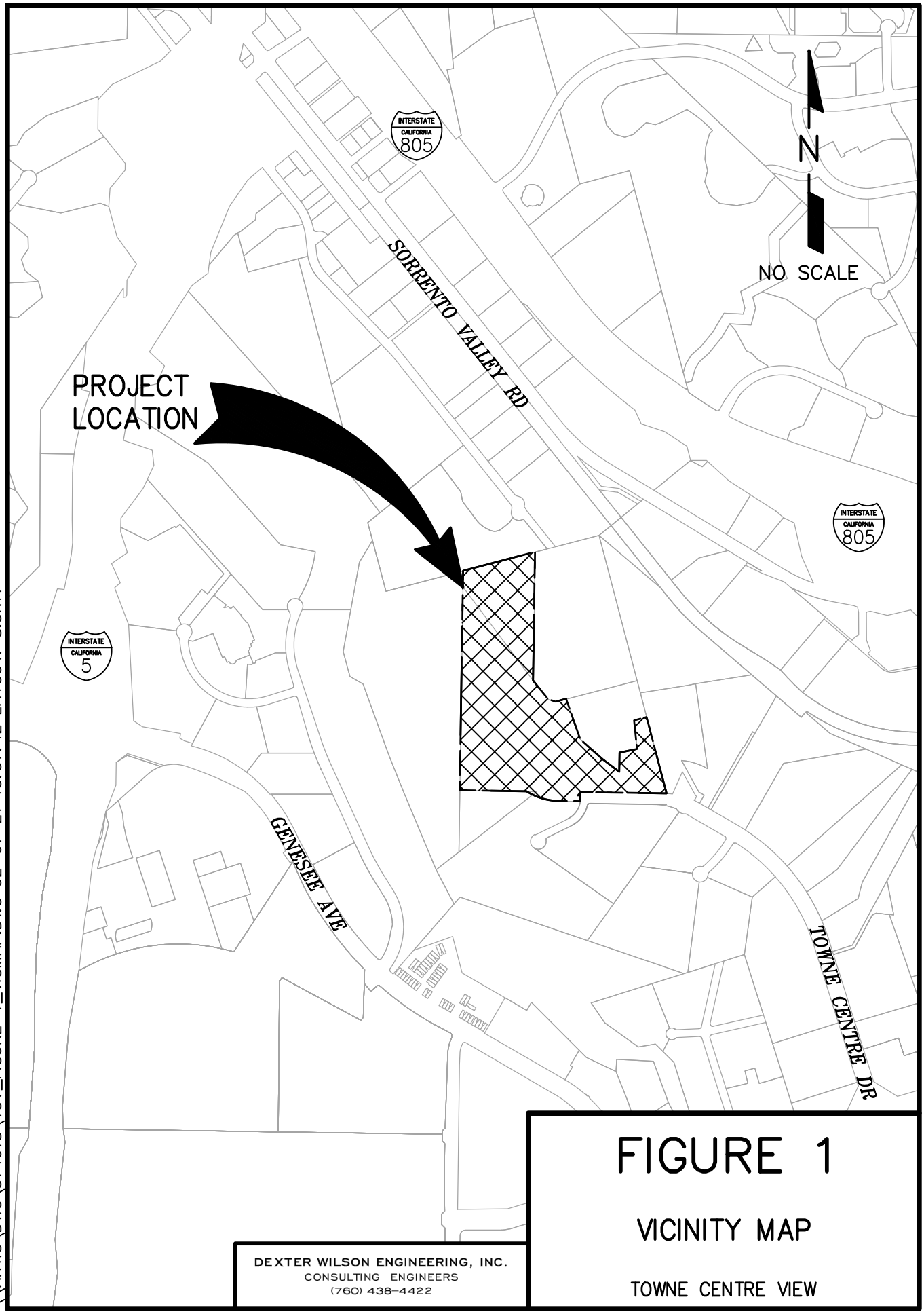
Attention: Greg Lang, P.E., Principal

Subject: Water Study for the Towne Centre View Project in the City of San Diego

Introduction

This report provides a water study for the Towne Centre View project in the City of San Diego (PTS# 624751). The Project involves redevelopment of the Project with a five-building campus (Buildings A through E), which would include scientific R&D, laboratories, technology, and office uses, with supporting parking structures and surface parking areas, recreational facilities, amenities, and landscaping. Offsite improvements consist of three driveway entrances and a non-contiguous sidewalk along the project frontage at Towne Centre Drive.

The project proposes 999,386 SF of scientific research space spread across several scientific research buildings. The 33.5 gross-acre project site is located north of the Town Centre Drive cul-de-sac, which is northwest of the intersection of Town Centre Drive and Eastgate Mall, directly between the I-5 and I-805 freeways. The site is currently zoned IP-1-1 (Industrial Park with research & development and some limited manufacturing). Figure 1 provides a vicinity map for the project and a preliminary utility plan is attached as Appendix A.



\\ARTIC\DWG\574018\TCV_FIGURE-1_VICMAP.DWG 02-01-21 13:57:42 LAYOUT: 8.5X11

FIGURE 1

VICINITY MAP

TOWNE CENTRE VIEW

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Purpose of Study

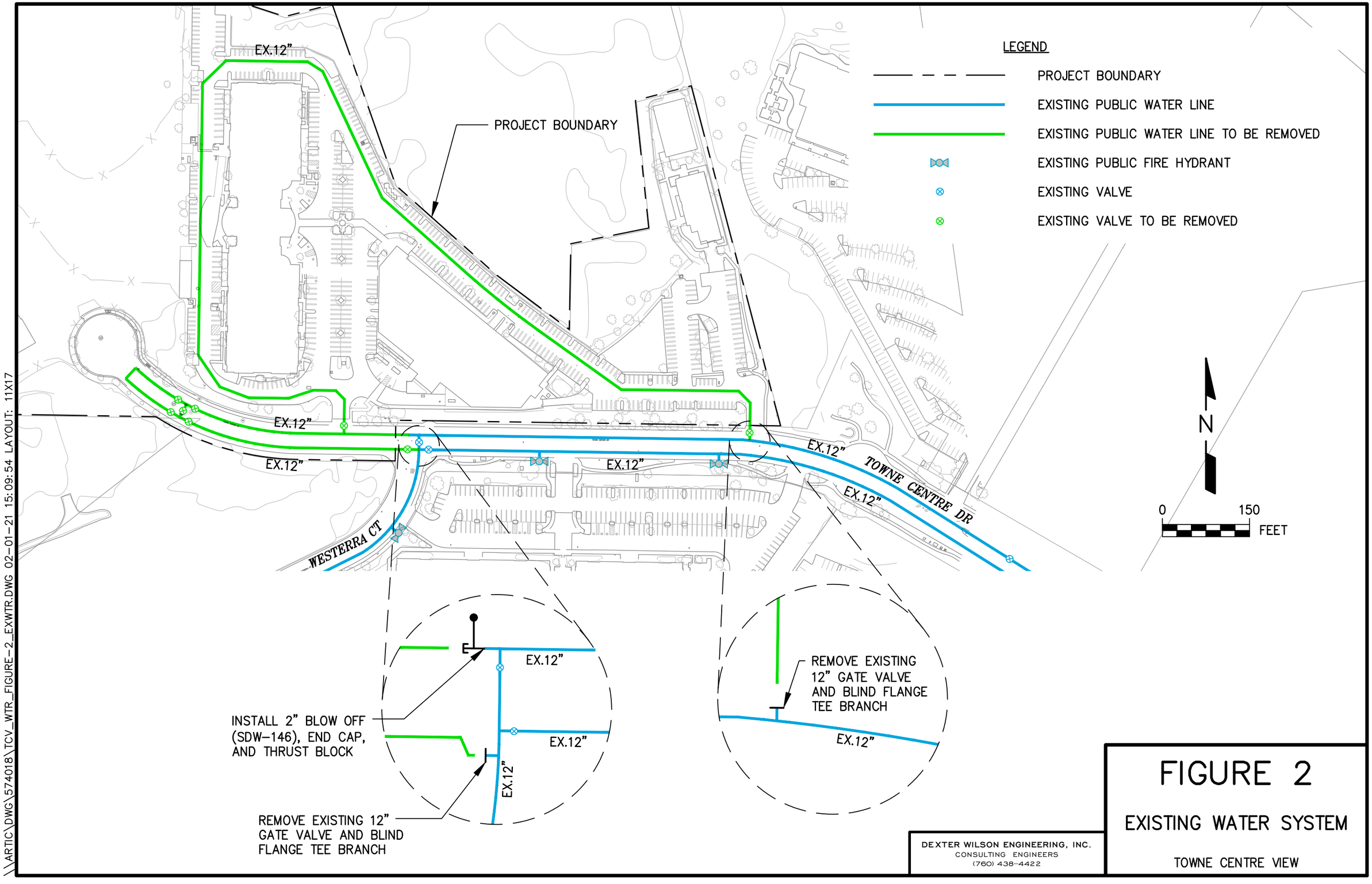
The purpose of this study is to analyze and determine if the existing public water system is able to provide adequate domestic and fire protection service for the Towne Centre View project. This report will address if any offsite (public) water system improvements and/or modifications are needed for 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 private fire protection system will be constructed as part of the onsite water system and connected to the existing City public water system. Each building will have its own domestic water meter and building supply piping.

Study Area

The study area for this report is the boundary of the Towne Centre View 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 North City 610 Zone distribution system that serves the area. Figure 2 presents the existing public water system that is surrounding and within the project area.

Note that several modifications to the existing public water lines and appurtenances will be required by the project in the adjacent Towne Centre Drive. These modifications to restore the original operational nature of the adjacent public water system without the western Towne Centre Drive cul-de-sac extension are shown graphically within Figure 2. The modifications include demolition and removal of existing public water lines in Towne Centre Drive and onsite, inclusion of blind flanges at points of abandonment, and a new blow-off assembly at the Towne Centre Drive and Westerra Court intersection.



\\ARTIC\DWG\574018\TCV_WTR_FIGURE-2_EXWTR.DWG 02-01-21 15:09:54 LAYOUT: 11X17

FIGURE 2

EXISTING WATER SYSTEM

TOWNE CENTRE VIEW

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

Towne Centre View Project Water Demand

The water demands were developed in accordance with the City of San Diego Design Guidelines and Standards. Industrial water demand is estimated based on total net acreage. The Towne Centre View project comprises industrial park use over 20.6 net acres. A site plan for the Towne Centre View project included in Appendix A illustrates this 20.6-acres as disturbed area/project footprint. Table 2-1 in the City of San Diego Design Guidelines and Standards, attached as Appendix B, indicates that industrial land use merits a unit water demand of 6,250 gpd/net-acre.

Table 1 presents the projected potable water demand for the Towne Centre View project.

TABLE 1
TOWNE CENTRE VIEW PROJECT
POTABLE WATER DEMAND

Land Use	Quantity	Demand Factor	Average Water Use, gpd
Industrial	20.6 Net Acres[1]	6,250 gpd/net-acre	128,750
TOTAL			**128,750 = 89 gpm**

1 Appendix A site plan includes net/disturbed area for Towne Centre View

From the City of San Diego Guidelines and Standards, Figure 2-2, the maximum day demand to average annual demand ratio is approximately 1.8 based on the Commercial and all other nonresidential peaking curve, resulting in an estimated maximum day demand in the pressure zone of 231,750 gpd (161 gpm).

From the City of San Diego Guidelines and Standards, Figure 2-1, the peak hour demand to average annual demand ratio is approximately 2.3 based on the Commercial and all other nonresidential peaking curve, resulting in an estimated peak hour demand of 296,125 gpd (206 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 Pressure Drop – Domestic Pressure	25 psi
Minimum Pressure – Domestic Pressure	40 psi
Minimum Pressure – Max Day plus Fire	20 psi
Maximum Pipeline Velocity (Fire Flow)[1]	15 fps
Maximum Pipeline Velocity (Normal Operating Conditions)[2]	5 fps

Static Pressures

Maximum static pressures within the Towne Centre View project are calculated based on the North City 610 Water Service Pressure Zone. Finished floor elevations onsite range from 355 feet to 360 feet. Using the maximum potential hydraulic grade line of 610 feet, maximum static pressures within the project will range between 108 psi and 110 psi.

Fire Flow

The fire flow requirement for the project site was estimated based on the 2019 California Fire Code. The fire code takes into account building area and construction type. The largest building proposed for the project site is estimated to be 280,006 square feet. Construction Type IA is proposed for the onsite buildings. This results in an estimated fire flow requirement of 5,750 gpm. After the expected reduction of 75% for an NFPA approved fire sprinkler system, the final fire flow requirement for the project site equates to 1,438 gpm. However, it is noted in the fire code that the reduced fire flow shall be not less than 1,500 gpm. Hence, 1,500 gpm is used as the fire hydrant flow requirement for Towne Centre View. The excerpt from the 2019 California Fire Code pertaining to fire flow requirements and project information on building area and construction type are shown in Appendix C.

Existing and Proposed Water System

There are existing public water facilities directly adjacent to the Towne Centre View project site. The existing facilities are part of the North City 610 Zone and are graphically shown on Figure 2 earlier in this study. There are existing dual 12-inch diameter public water lines in Towne Centre Drive adjacent to the project. The project will be connecting to these existing dual 12-inch diameter public water lines.

The existing parallel 12-inch diameter water lines in Towne Centre Drive will provide redundant water supply to the Towne Centre View project. This existing redundant water supply for the industrial area the project is located within is sufficient for all demand scenarios even with one 12-inch diameter water line in Towne Centre Drive out of service.

The proposed public water facilities in the vicinity of the project are shown on Figure 3 and a pressure zones map is presented on Figure 4. The pressure zones map shows existing water service areas and pressure zones in the vicinity of the proposed project.

Note that separate private domestic water systems will be established for each individual building within the Towne Centre View project site. The sizing of the private domestic water facilities will be under a separate report/study.

Water System Computer Model

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

The model for this analysis includes existing public, proposed public, and proposed private water lines in the near vicinity and within the project site. The hydraulic grade line (HGL) was determined by a hydrant flow test performed by the Development Services Department of the City. Using the data provided by the hydrant flow test, an extrapolation calculation was done to determine the HGL at various flow values. The location of the test hydrant is on Towne Centre Drive adjacent to the project and is indicated on Figure 2.

This location also was chosen as the source of the water model. Making the test hydrant the location of the water model source allows for a more accurate calculation of the HGL in the vicinity of the project. Utilizing the hydrant flow test and extrapolation calculation described above, an HGL of approximately 597 feet was determined for a static condition and an HGL of approximately 569 feet was determined for a 1,500 gpm fire flow condition. This was inputted as a variable pressure source in the hydraulic model.

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

PROJECT BOUNDARY

8"

8"

BLDG. B

8"

BLDG. C

8"

8"

BLDG. A

8"

8"

BLDG. D

8"

BLDG. E

8"

PARKING STRUCTURE

EX.12"

EX.12"

TOWNE CENTRE DR

EX.12"

WESTERRA CT

EX.12"

HYDRANT TEST

PUBLIC FIRE SERVICE CONNECTION

PUBLIC FIRE SERVICE CONNECTION

LEGEND

- PROJECT BOUNDARY
- EXISTING PUBLIC WATER LINE
- PROPOSED PRIVATE DOMESTIC WATER LINE
- PROPOSED PRIVATE FIRE PROTECTION LINE
- EXISTING PUBLIC FIRE HYDRANT
- PROPOSED PRIVATE FIRE HYDRANT
- PROPOSED WATER METER
- PROPOSED BACKFLOW PREVENTER
- EXISTING VALVE

NOTE:
ALL PROPOSED FIRE SERVICE LATERALS ARE 8" DIAMETER AND ALL PROPOSED FIRE SERVICE BACKFLOW PREVENTERS ARE 8" RPDA DEVICES

N

0 200 FEET

FIGURE 3

PROPOSED WATER SYSTEM

TOWNE CENTRE VIEW

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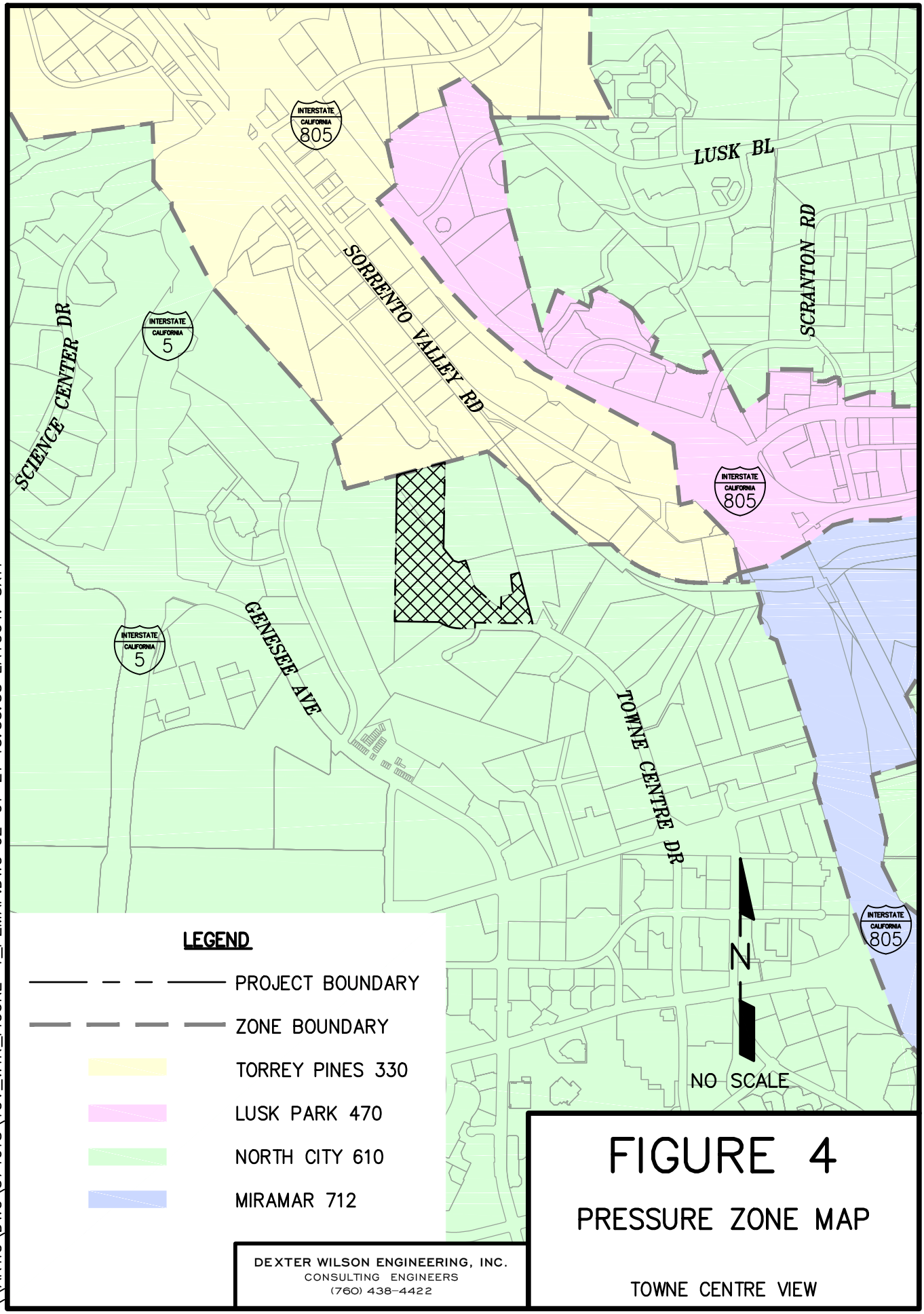

FIGURE 4

PRESSURE ZONE MAP

TOWNE CENTRE VIEW

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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 stipulated fire flow requirement of 1,500 gpm was modeled throughout the proposed site at several locations within the project. The fire flow requirement of 1,500 gpm is being met with a minimum residual pressure of greater than 72 psi and a maximum pipeline velocity of 9.6 feet per second (fps) in the proposed 8-inch private fire protection line in the eastern portion of the project.

A pipe break scenario was also modeled. The fire flow requirement of 1,500 gpm is being met during a pipe break scenario with a minimum residual pressure of greater than 72 psi and a maximum pipeline velocity of 10.7 feet per second (fps) in the proposed 8-inch fire service lateral and corresponding private fire protection line in the western portion of the project.

The results of the computer hydraulic analyses for the Towne Centre View project indicate that with the proposed connections off Towne Centre Drive, the existing and proposed water system can provide sufficient flow and pressure for the Towne Centre View projects' domestic and fire protection service needs.

Conclusions and Recommendations

The following conclusions and recommendations are summarized based on the water system analysis prepared for the Towne Centre View project.

1. The Towne Centre View project will be supplied from the North City 610 Zone system.

2. Maximum static pressure within the project will range between 108 psi and 110 psi.

3. Figure 2 presents the existing public water system within and surrounding the project.

4. A portion of the existing public water system will be demolished as shown in in Figure 2. The proposed onsite water systems will be private.

5. A 1,500 gpm fire flow scenario can be met at the project site with all residual pressures greater than 72 psi, respectively, and pipeline velocities less than 15 fps under all scenarios.

6. 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.

7. Figure 3 presents the proposed water systems surrounding and within the project.

8. If PVC pipe is used for the water lines within the project, we recommend pipes 4-inch through 12-inch diameter to be AWWA C900 DR 18 Class 235 for domestic and fire protection system piping. Pipes smaller than 4-inch in diameter should be solvent welded Schedule 40 PVC; as an alternative, copper piping may be used.

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

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

Dexter Wilson Engineering, Inc.

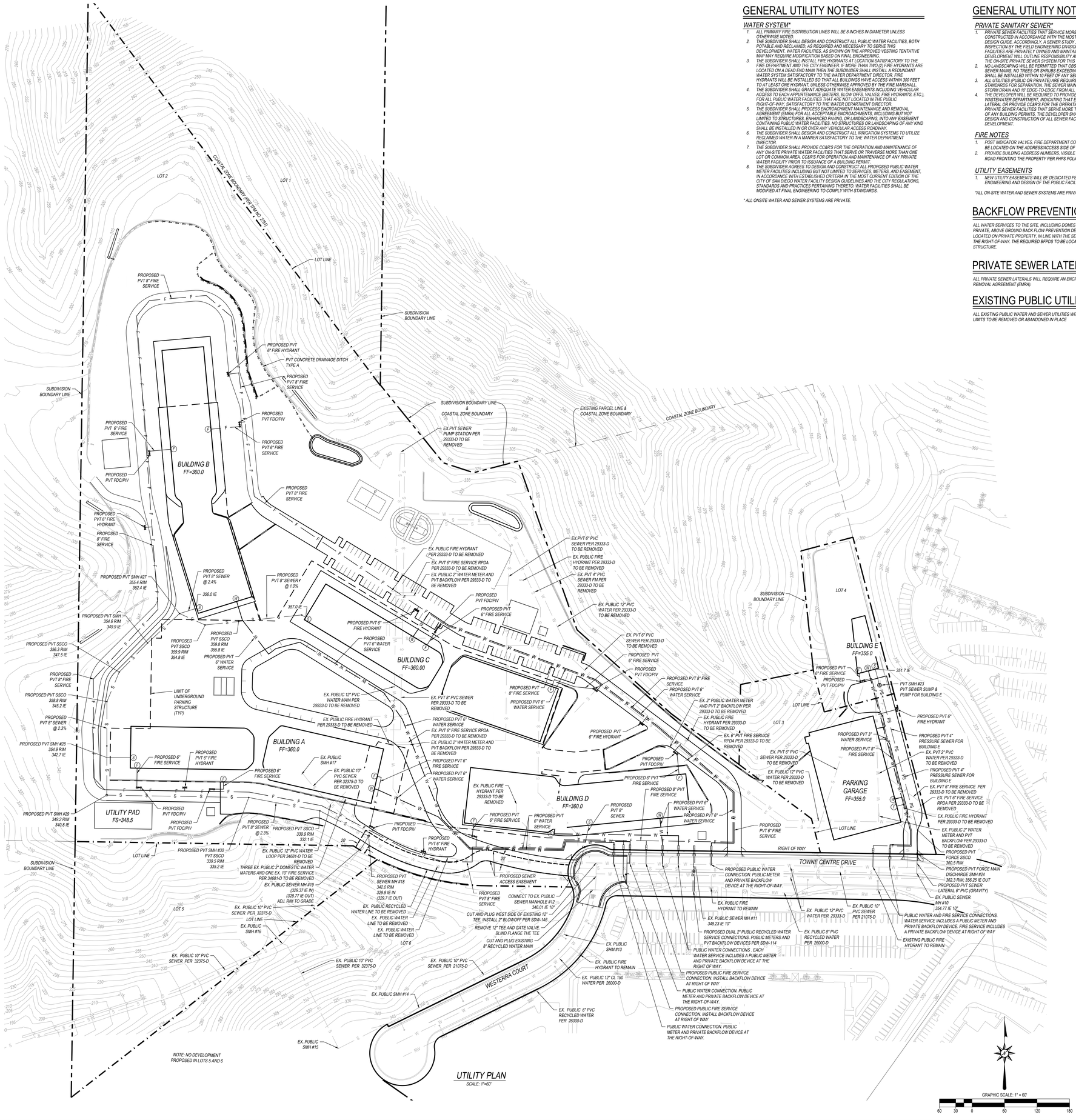
Steven Henderson, P.E.

SH:AO:ah

Attachments

APPENDIX A

TOWNE CENTRE VIEW PRELIMINARY UTILITY PLAN



GENERAL UTILITY NOTES

*WATER SYSTEM**

1. *ALL PRIMARY FIRE DISTRIBUTION LINES WILL BE 8 INCHES IN DIAMETER UNLESS OTHERWISE NOTED.*
2. *THE SUBDIVIDER SHALL DESIGN AND CONSTRUCT ALL PUBLIC WATER FACILITIES, BOTH POTABLE AND RECLAIMED, AS REQUIRED AND NECESSARY TO SERVE THIS DEVELOPMENT. WATER FACILITIES, AS SHOWN ON THE APPROVED VESTING TENTATIVE MAP MAY REQUIRE MODIFICATION BASED ON FINAL ENGINEERING.*
3. *THE SUBDIVIDER SHALL INSTALL FIRE HYDRANTS AT LOCATION SATISFACTORY TO THE FIRE DEPARTMENT AND THE CITY ENGINEER. IF MORE THAN TWO (2) FIRE HYDRANTS ARE LOCATED ON A DEAD END MAIN THEN THE SUBDIVIDER SHALL INSTALL A REDUNDANT WATER SYSTEM SATISFACTORY TO THE WATER DEPARTMENT DIRECTOR. FIRE HYDRANTS WILL BE INSTALLED SO THAT ALL BUILDINGS HAVE ACCESS WITHIN 300 FEET TO AT LEAST ONE HYDRANT, UNLESS OTHERWISE APPROVED BY THE FIRE MARSHALL.*
4. *THE SUBDIVIDER SHALL GRANT ADEQUATE WATER EASEMENTS INCLUDING VEHICULAR ACCESS TO EACH APPURTENANCE (METERS, BLOW OFFS, VALVES, FIRE HYDRANTS, ETC.), FOR ALL PUBLIC WATER FACILITIES THAT ARE NOT LOCATED IN THE PUBLIC RIGHT-OF-WAY, SATISFACTORY TO THE WATER DEPARTMENT DIRECTOR.*
5. *THE SUBDIVIDER SHALL PROCESS ENCROACHMENT MAINTENANCE AND REMOVAL AGREEMENT (EMRA) FOR ALL ACCEPTABLE ENCROACHMENTS, INCLUDING BUT NOT LIMITED TO STRUCTURES, ENHANCED PAVING, OR LANDSCAPING, INTO ANY EASEMENT CONTAINING PUBLIC WATER FACILITIES. NO STRUCTURES OR LANDSCAPING OF ANY KIND SHALL BE INSTALLED IN OR OVER ANY VEHICULAR ACCESS ROADWAY.*
6. *THE SUBDIVIDER SHALL DESIGN AND CONSTRUCT ALL IRRIGATION SYSTEMS TO UTILIZE RECLAIMED WATER IN A MANNER SATISFACTORY TO THE WATER DEPARTMENT DIRECTOR.*
7. *THE SUBDIVIDER SHALL PROVIDE CC&RS FOR THE OPERATION AND MAINTENANCE OF ANY ON-SITE PRIVATE WATER FACILITIES THAT SERVE OR TRAVERSE MORE THAN ONE LOT OR COMMON AREA. CC&RS FOR OPERATION AND MAINTENANCE OF ANY PRIVATE WATER FACILITY PRIOR TO ISSUANCE OF A BUILDING PERMIT.*
8. *THE SUBDIVIDER AGREES TO DESIGN AND CONSTRUCT ALL PROPOSED PUBLIC WATER METER FACILITIES INCLUDING BUT NOT LIMITED TO SERVICES, METERS, AND EASEMENT, IN ACCORDANCE WITH ESTABLISHED CRITERIA IN THE MOST CURRENT EDITION OF THE CITY OF SAN DIEGO WATER FACILITY DESIGN GUIDELINES AND THE CITY REGULATIONS, STANDARDS AND PRACTICES PERTAINING THERETO. WATER FACILITIES SHALL BE MODIFIED AT FINAL ENGINEERING TO COMPLY WITH STANDARDS.*

** ALL ONSITE WATER AND SEWER SYSTEMS ARE PRIVATE.*

GENERAL UTILITY NOTES (CONTINUED)

*PRIVATE SANITARY SEWER**

1. *PRIVATE SEWER FACILITIES THAT SERVICE MORE THAN ONE LOT WILL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH THE MOST CURRENT CITY OF SAN DIEGO SEWER DESIGN GUIDE. ACCORDINGLY, A SEWER STUDY, IMPROVEMENT DRAWINGS, AND INSPECTION BY THE FIELD ENGINEERING DIVISION WILL BE REQUIRED. ALL SEWERAGE FACILITIES ARE PRIVATELY OWNED AND MAINTAINED. THE CC&RS FOR THIS DEVELOPMENT WILL OUTLINE RESPONSIBILITY AND MAINTENANCE REQUIREMENTS FOR THE ON-SITE PRIVATE SEWER SYSTEM FOR THIS PROJECT.*
2. *NO LANDSCAPING WILL BE PERMITTED THAT OBSTRUCTS VEHICULAR ACCESS TO THE SEWER MAINS. NO TREES OR SHRUBS EXCEEDING THREE FEET IN HEIGHT AT MATURITY SHALL BE INSTALLED WITHIN 10 FEET OF ANY SEWER FACILITY OR LATERALS.*
3. *ALL UTILITIES (PUBLIC OR PRIVATE) ARE REQUIRED TO MEET THE CITY'S DESIGN STANDARDS FOR SEPARATION. THE SEWER MAINS MUST BE 5' EDGE-TO-EDGE FROM STORM DRAIN AND 10' EDGE-TO-EDGE FROM ALL OTHER UTILITIES OR IMPROVEMENTS.*
4. *THE DEVELOPER WILL BE REQUIRED TO PROVIDE EVIDENCE, SATISFACTORY TO THE WASTEWATER DEPARTMENT, INDICATING THAT EACH LOT WILL HAVE ITS OWN SEWER LATERAL OR PROVIDE CC&RS FOR THE OPERATION AND MAINTENANCE OF ON-SITE PRIVATE SEWER FACILITIES THAT SERVE MORE THAN ONE LOT, PRIOR TO THE ISSUANCE OF ANY BUILDING PERMITS. THE DEVELOPER SHALL ASSURE, BY PERMIT AND BOND, THE DESIGN AND CONSTRUCTION OF ALL SEWER FACILITIES NECESSARY TO SERVE THIS DEVELOPMENT.*

FIRE NOTES

1. *POST INDICATOR VALVES, FIRE DEPARTMENT CONNECTIONS, AND ALARM BELLS ARE TO BE LOCATED ON THE ADDRESS/ACCESS SIDE OF THE STRUCTURE.*
2. *PROVIDE BUILDING ADDRESS NUMBERS, VISIBLE AND LEGIBLE FROM THE STREET OR ROAD FRONTING THE PROPERTY PER FHPS POLICY P-00-6.*

UTILITY EASEMENTS

1. *NEW UTILITY EASEMENTS WILL BE DEDICATED PER THE FINAL MAP BASED ON THE FINAL ENGINEERING AND DESIGN OF THE PUBLIC FACILITIES.*

**ALL ON-SITE WATER AND SEWER SYSTEMS ARE PRIVATE.*

BACKFLOW PREVENTION

ALL WATER SERVICES TO THE SITE, INCLUDING DOMESTIC, IRRIGATION AND FIRE, WILL REQUIRE PRIVATE, ABOVE GROUND BACK FLOW PREVENTION DEVICES (BFPDS). BFPDS SHALL BE LOCATED ON PRIVATE PROPERTY, IN LINE WITH THE SERVICE AND IMMEDIATELY ADJACENT TO THE RIGHT-OF-WAY. THE REQUIRED BFPDS TO BE LOCATED BELOW GRADE OR WITHIN THE STRUCTURE.

PRIVATE SEWER LATERALS

ALL PRIVATE SEWER LATERALS WILL REQUIRE AN ENCROACHMENT, MAINTENANCE AND REMOVAL AGREEMENT (EMRA).

EXISTING PUBLIC UTILITY NOTE

ALL EXISTING PUBLIC WATER AND SEWER UTILITIES WITHIN THE PROJECT LIMITS TO BE REMOVED OR ABANDONED IN PLACE

LEGEND

- SUBDIVISION BOUNDARY LINE
- RIGHT-OF-WAY
- PROPOSED LOT LINE
- PROPOSED EASEMENT LINE
- ADJACENT PARCEL LINE
- ROADWAY CENTERLINE
- EXISTING INDEX CONTOUR — 350
- EXISTING SEWER MANHOLE / MAIN — S — S
- EXISTING PUBLIC SANITARY SEWER MAIN — S — S
- EXISTING PUBLIC WATER MAIN — W — W
- EXISTING RECYCLED WATER LINE — RW — RW
- EXISTING STORM DRAIN STRUCTURE
- EXISTING GATE VALVE
- PROPOSED INDEX CONTOUR — 350
- PROPOSED INTERVAL CONTOUR — 351
- PROPOSED 6" PCC CURB
- PROPOSED 6" PCC CURB & GUTTER
- LIMIT OF GRADING LINE
- PROPOSED SEWER MANHOLE (SMH) — S — S
- PROPOSED PRIVATE FIRE MAIN — F — F
- PROPOSED PRIVATE WATER MAIN — W — W
- PROPOSED PRIVATE SANITARY SEWER MAIN — S — S
- PROPOSED PRIVATE PUMP AND 4" PVC FORCED SANITARY SEWER LATERAL — PS — PS
- PROPOSED STORM DRAIN — SD
- PROPOSED RECYCLED WATER LINE — RW — RW
- PROPOSED STORM DRAIN STRUCTURE / INLET
- PROPOSED UNDERGROUND STORM WATER STORAGE VAULT
- BUILDING FIRE SERVICE (F)
- BUILDING WATER SERVICE (W)
- BUILDING SEWER SERVICE (S)
- BUILDING ROOF DRAIN (RD)
- PROPOSED BROW DITCH
- PROPOSED RETAINING WALL
- EXISTING BROW DITCH
- EXISTING RETAINING WALL
- LIMIT OF SUBTERRANEAN PARKING STRUCTURE
- PROPOSED COMMERCIAL DRIVEWAY
- WATER METER & BACKFLOW PREVENTER — WM — BFPD
- FIRE SERVICE BACKFLOW PREVENTER — RP
- RECYCLED WATER METER & BACKFLOW PREVENTER — WM — BFPD

APPROVAL NUMBERS:

TENTATIVE MAP APPROVAL NO. 2507560
ROW VACATION APPROVAL NO. 2507558
CDP APPROVAL NO. 2237940
SDP APPROVAL NO. 2237939

PROJECT TEAM:

ARCHITECT:

Perkins&Will

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Seattle, WA 98101
t 206.381.6000

CIVIL:

PASCO LARET SUITER & ASSOCIATES

Pasco Laret Suiter & Associates
535 N Highway 101, Suite A
Solana Beach, CA 92075
t 858.259.8212

LANDSCAPE:

OJB THE OFFICE OF JAMES BURNETT

Office of James Burnett
550 Lomas Santa Fe Dr
Solana Beach, CA 92075
t 858.793.6970

PROJECT NAME / ADDRESS:

TOWNE CENTRE VIEW

TOWNE CENTRE DRIVE,
SAN DIEGO, CA

DEVELOPER:

BIOMED REALTY

17190 BERNARDO CENTER DR
SAN DIEGO, CA 92128

KEYPLAN

REVISION CHART

REVISION 14	DATE:	
REVISION 13	DATE:	
REVISION 12	DATE:	
REVISION 11	DATE:	
REVISION 10	DATE:	
REVISION 09	DATE:	
REVISION 08	DATE:	
REVISION 07	DATE:	
REVISION 06	DATE:	
REVISION 05	DATE:	
REVISION 04	DATE:	
REVISION 03	DATE:	
REVISION 02	DATE:	
REVISION 01	DATE:	02/03/2021

ORIGINAL ISSUANCE DATE

10/07/2020

SHEET TITLE

UTILITY PLAN

SHEET NUMBER

C7-00

TOTAL SHEET COUNT

9 OF 34

SUMMARY OF DRAINAGE MANAGEMENT AREAS

DMA	DRAINAGE AREA (AC)	IMPERVIOUS AREA (AC)	% IMP	DMA RUNOFF COEFFICIENT, C	DCV (CF)	STRUCTURAL BMP ID	STRUCTURAL BMP TYPE	STRUCTURAL BMP PERFORMANCE
DMA-A1	2.42	1.71	70.7%	0.72	3,228	BMP-1	CISTERN	HYDROMODIFICATION
						BMP-2	MWS	WQ TREATMENT
DMA-A2	1.35	0.73	54.07%	0.63	1,575	BMP-3	CISTERN	HYDROMODIFICATION
						BMP-4	MWS	WQ TREATMENT
DMA-A3	1.88	0.91	48.4%	0.59	2,051	BMP-5	N/A	N/A - SELF-RETAINING
DMA-B1	0.85	0.05	5.88%	0.33	520	BMP-6	N/A	N/A - SELF-RETAINING
DMA-B2	0.59	0.09	15.25%	0.39	428	BMP-7	N/A	N/A - SELF-RETAINING
DMA-C1	1.31	0.06	4.58%	0.33	799	BMP-8	N/A	N/A - SELF-RETAINING
DMA-C2	4.13	2.12	49.19%	0.61	4,669	BMP-9	CISTERN	HYDROMODIFICATION
						BMP-10	BIOFILTRATION	WQ TREATMENT
DMA-D1	3.38	1.62	47.92%	0.59	3,694	BMP-11	CISTERN	HYDROMODIFICATION
						BMP-12	MWS	WQ TREATMENT
DMA-D2	3.40	2.03	59.71%	0.66	4,160	BMP-13	CISTERN	HYDROMODIFICATION
						BMP-14	BIOFILTRATION	WQ TREATMENT
DMA-D3	0.51	0.21	41.17%	0.56	525	BMP-15	N/A	N/A - SELF-RETAINING
DMA-D4a	1.14	0.61	53.51%	0.62	1,310	BMP-16	CISTERN	HYDROMODIFICATION
						BMP-17	MWS	WQ TREATMENT
DMA-D4b	0.45	0.29	64.44%	0.68	566	BMP-18	CISTERN	HYDROMODIFICATION
						BMP-19	MWS	WQ TREATMENT

LEGEND

DESCRIPTION	SYMBOL
wLDI¢thCr² !,	
twht9w€, [¦b9	
5a ! .h¦b5!w,	
twhth{95¦a t9w±¿h¦{ !w9!	
twhth{95 t9w±¿h¦{ !w9!	
twhth{95 ±! ¦[¢	
twhth{95 ah5¦[!w ²9€[!b5 {,{€9a ¿a ²{i	
twhth{95 .ihO¿[¢w!¢hb . !{¿b	

HYDROLOGIC SOIL GROUP

HYDROLOGIC SOIL TYPE: C AND D

DEPTH TO GROUNDWATER

DEPTH TO GROUNDWATER > 20 FT

PROJECT CHARACTERISTICS

TOTAL SITE AREA:	33.52 AC
PROPOSED DISTURBED AREA:	20.64 AC
PROPOSED IMPERVIOUS AREA:	10.62 AC
PROPOSED LANDSCAPE AREA:	10.02 AC

CCSYAS

THE PROJECT IS ENTIRELY EXEMPT/NOT SUBJECT TO RPO REQUIREMENTS WITHOUT UTILIZATION OF RPO EXEMPTIONS AS THERE ARE NO AREAS ONSITE OR UPSTREAM TO PROTECT. THEREFORE THE PROJECT EFFECTIVELY AVOIDS AND BYPASSES SOURCES OF MAPPED CCSYAS PER APPROACHES OUTLINED IN APPENDIX H.2 AND H.3 AS NONE WERE IDENTIFIED.

REFER TO THE WMAA MAP INCLUDED IN THE "COUNTY OF SAN DIEGO PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP FOR OTAY ENRICO."

STRUCTURAL BMPS

- UNDERGROUND DETENTION VAULT (HU-1) — V
- MODULAR WELTAND SYSTEM (BF-3) — MW
- BIOFILTRATION BASNI WITH LINER (BF-1) — BF

BASELINE SITE DESIGN BMPS

SD-G	MAINTAIN & CONSERVE NATURAL FEATURES
SD-B	DISPERSE IMPERVIOUS AREAS
SD-I	MINIMIZE IMPERVIOUS AREAS
SD-J	USE WATER EFFICIENT LANDSCAPING
SD-K	INSTALL EFFICIENT IRRIGATION SYSTEMS
SD-L	MINIMIZE EROSION OF SLOPES AND SURFACES

BASELINE SOURCE CONTROL BMPS

TRASH & REFUSE STORAGE

SC-B PLUMB TO SANITARY SEWER
PROVIDE CONTAMINATION FOR SPILLS AND DISCHARGES
PREVENT CONTACT WITH RAINFALL
ISOLATE FLOWS FROM ADJACENT AREAS
PREVENT WIND DISPERSAL

ING & UNLOADING
PLUMB TO SANITARY SEWER
PROVIDE CONTAMINATION FOR SPILLS AND DISCHARGES
PREVENT CONTACT WITH RAINFALL
ISOLATE FLOWS FROM ADJACENT AREAS

DRAIN INLETS & CATCH BASINS
LABEL WITH STENCILS OR SIGNAGE

T SPRINKLER DISCHARGES
PLUMB TO SANITARY SEWER
PROVIDE CONTAMINATION FOR SPILLS AND DISCHARGES

POC 4
DMA C1
PROP. LINE
DMA B2
POC 3
DMA C2
BMP 10
BIOFILTRATION BASIN WITH LINER FOR WATER AREA = 1977 SQ FT
VAULT OUTLET
1.4" ORIFICE
6"Wx2"H ORIFICE AT 4.5'
12 FT WEIR AT 9.5'
POC 5
BMP 9
UNDERGROUND STORAGE VAULT FOR HYDROMODIFICATION AND 100 YEAR DETENTION
VOLUME = 20,000 CF
HEIGHT = 10 FT
POC 6
BMP 14
BIOFILTRATION BASIN WITH LINER FOR WATER QUALITY TREATMENT
AREA = 1566 SQ FT
VAULT OUTLET
1.5" ORIFICE
10 FT WEIR AT 5.17'
BMP 13
UNDERGROUND STORAGE VAULT FOR HYDROMODIFICATION AND 100 YEAR DETENTION
VOLUME = 10,200 CF
HEIGHT = 5.67 FT
BMP 12
MWS-L-4-15
FOR WATER QUALITY TREATMENT
PROPERTY LINE
VAULT OUTLET
1.5" ORIFICE
10 FT WEIR AT 5.17'
BMP 11
UNDERGROUND STORAGE VAULT FOR HYDROMODIFICATION AND 100 YEAR DETENTION
VOLUME = 10,200 CF
HEIGHT = 5.67'
PROPERTY LINE
DMA D3
BMP 18
UNDERGROUND STORAGE VAULT FOR HYDROMODIFICATION AND 100 YEAR DETENTION
VOLUME = 2270 CF
HEIGHT = 5.67'
VAULT OUTLET
0.7" ORIFICE
3 FT WEIR AT 5.17'
BMP 19
MWS-L-4-6
FOR WATER QUALITY TREATMENT
DMA D4b
POC 7
BMP 17
MWS-L-4-6
FOR WATER QUALITY TREATMENT
VAULT OUTLET
0.8" ORIFICE
12"WX3"H ORIFICE AT 4'
5 FT WEIR AT 5.17'
BMP 16
UNDERGROUND STORAGE VAULT FOR HYDROMODIFICATION AND 100 YEAR DETENTION
VOLUME = 5670 CF
HEIGHT = 5.67'
DMA D4a
POC 2
DMA B1
DMA A3
DMA A1
DMA A2
DMA D2
DMA D1
BMP 1
UNDERGROUND STORAGE VAULT FOR HYDROMODIFICATION AND 100 YEAR DETENTION
VOLUME = 9640 CF
HEIGHT = 5.67 FT
VAULT OUTLET
1.5" ORIFICE
8 FT WEIR AT 5.17'
BMP 2
MWS-L-4-15
FOR WATER QUALITY TREATMENT
POC 1
BMP 4
MWS-L-4-8
FOR WATER QUALITY TREATMENT
VAULT OUTLET
0.9" ORIFICE
6 FT WEIR AT 5.17'
BMP 3
UNDERGROUND STORAGE VAULT FOR HYDROMODIFICATION AND 100 YEAR DETENTION
VOLUME = 2835 CF
HEIGHT = 5.67'
TOWNE CENTRE DRIVE

30' 0 60' 120'
SCALE: 1" = 60'

PROPOSED CONDITION DMA EXHIBIT

TOWNE CENTRE VIEW
SAN DIEGO, CALIFORNIA
PLSA JOB NO. 3342
SCALE: 1" = 60'
DATE: JULY, 2021
SHEET 1 OF 1

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

APPENDIX B

CITY OF SAN DIEGO
DESIGN GUIDELINES AND STANDARDS
AND PEAKING FACTOR TABLES

Chapter 2

WATER DEMANDS AND SERVICE CRITERIA

2.1 General

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

2.2 Service Area

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

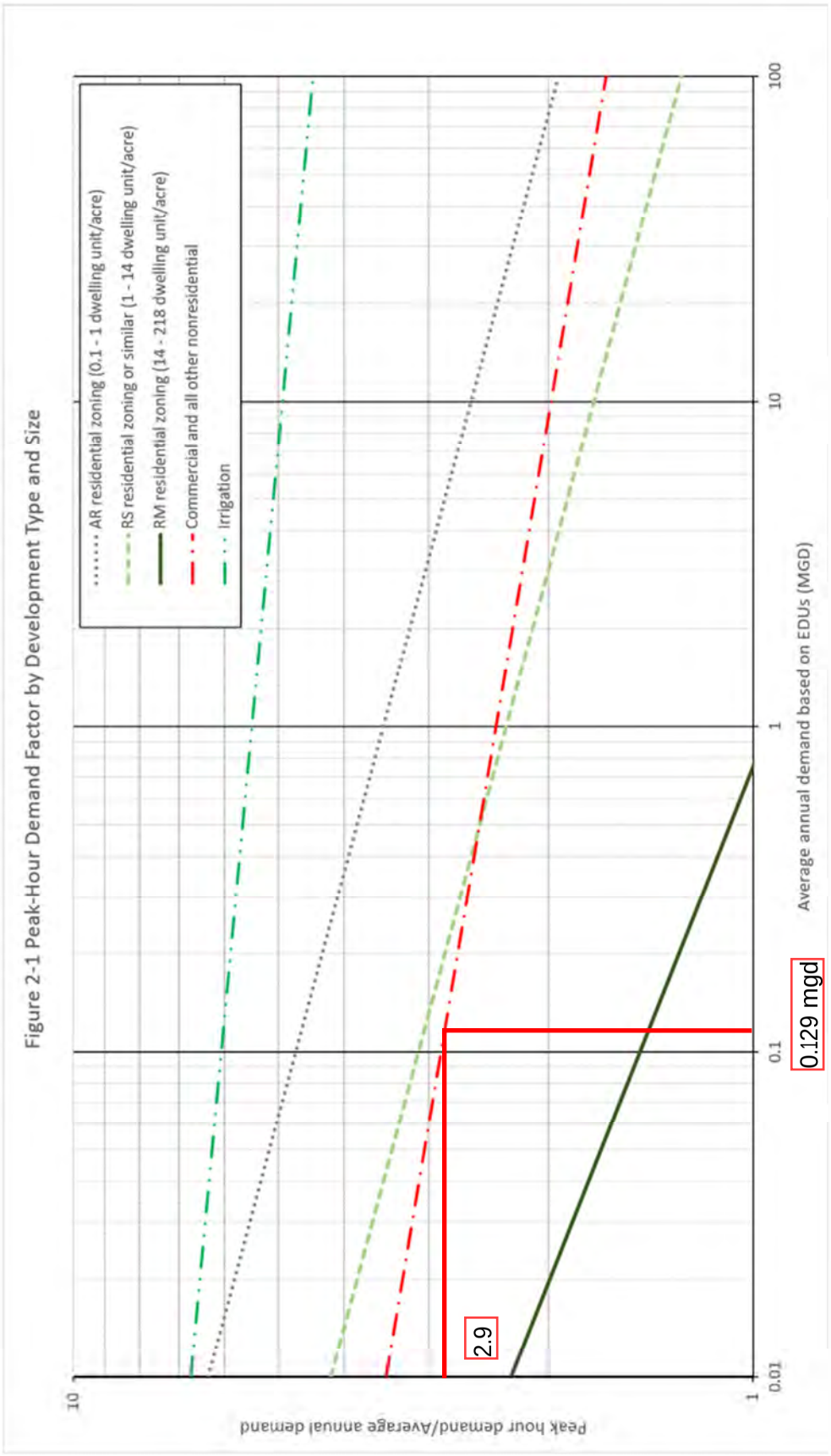


Figure 2-1 Peak-Hour Demand Factor by Development Type and Size
AR residential zoning (0.1 - 1 dwelling unit/acre)
RS residential zoning or similar (1 - 14 dwelling unit/acre)
RM residential zoning (14 - 218 dwelling unit/acre)
Commercial and all other nonresidential
Irrigation
Peak hour demand/Average annual demand
Average annual demand based on EDUs (MGD)
10
1
0.01
100
10
1
0.1
2.9
0.129 mgd

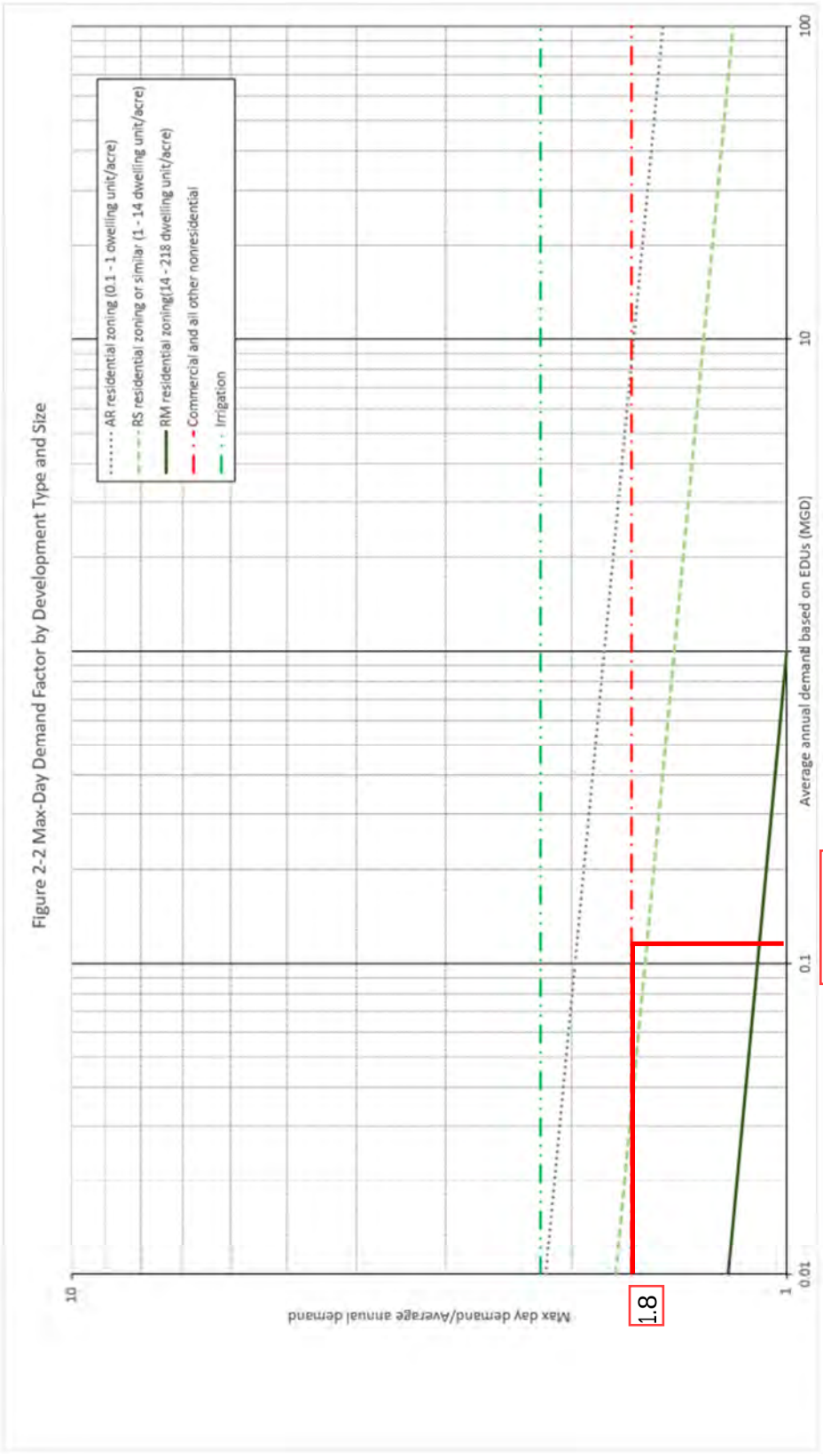


Figure 2-2 Max-Day Demand Factor by Development Type and Size

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

HYDRANT FLOW TEST AND OTHER FIRE FLOW INFORMATION

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

Hydrant Flow Request

FORM
DS-160
October 2016

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

Please print or type legibly.

Company Requesting Hydrant Flow:
Dexter Wilson Engineering

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

Project Number for the Building Permits:

Location of Hydrants:
Towne Centre Drive

Cross Street:	City:	State:	ZIP Code:
Westerra Court	San Diego	CA	92121

FOR CITY USE ONLY

Facility Sequence Number: (FSN): 519831

Static: 103 PSI

Elevation: 360 FEET

Pitot: --- PSI

Residual: 91 PSI

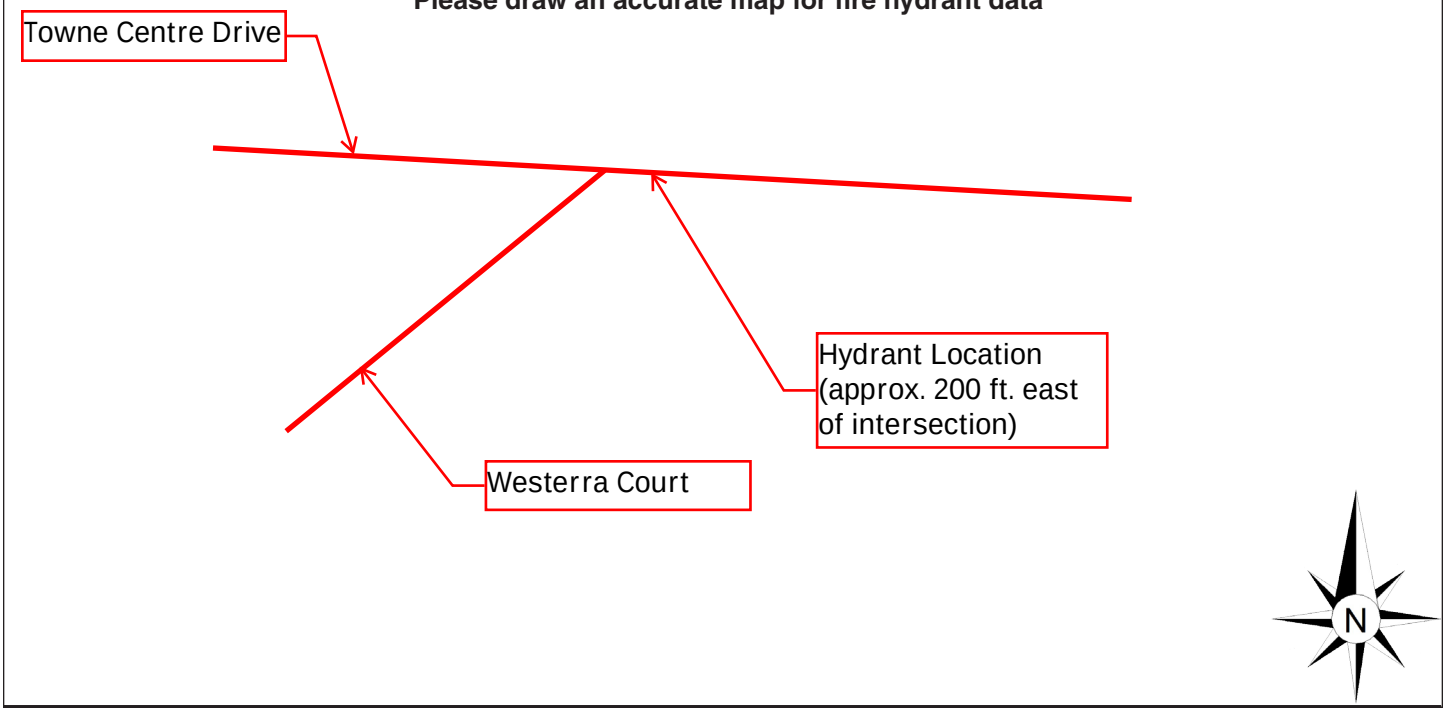
Date: 10/1/20

Flow: 1475 GPM

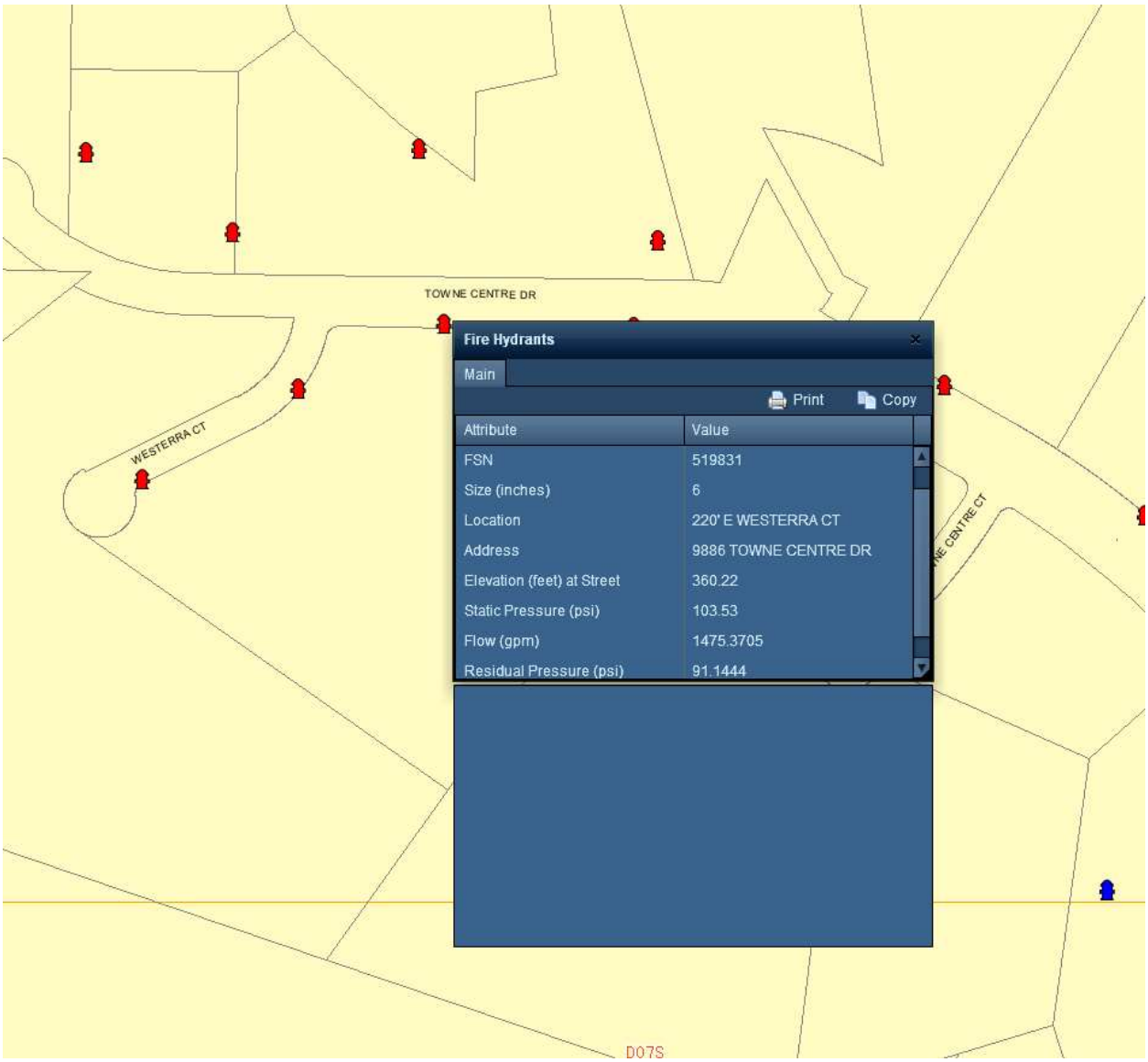
Researched in database by: Miguel Tamayo

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

Please draw an accurate map for fire hydrant data



Attribute	Value
Fire Hydrant Name	H519831
FSN	519831
Size (inches)	6
Location	220' E WESTERRA CT
Address	9886 TOWNE CENTRE DR
Elevation (feet) at Street	360.22
Static Pressure (psi)	103.53
Flow (gpm)	1475.3705
Residual Pressure (psi)	91.1444


TOWNE CENTRE DR
WESTERRA CT
Fire Hydrants
Main
Print
Copy
Attribute
Value
FSN
519831
Size (inches)
6
Location
220' E WESTERRA CT
Address
9886 TOWNE CENTRE DR
Elevation (feet) at Street
360.22
Static Pressure (psi)
103.53
Flow (gpm)
1475.3705
Residual Pressure (psi)
91.1444
D07S

Fire Hydrant Flow Test Date October 1, 2020

Input Flow Test Results

Static Pressure	103	PSI		
Residual Pressure	91	PSI		
Hydrant Flow	1475	GPM		
Actual Hydrant Elevation	360	Feet	HGL	597.7 Feet
Estimated Hydrant Elevation	360	Feet	HGL	597.7 Feet

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

k = 3.80322E-05

Extrapolated Calculations

Q, gpm	Residual Pressure	Available HGL
500	101.4 psi	594.0 ft
750	99.6 psi	589.8 ft
1000	97.2 psi	584.2 ft
1250	94.2 psi	577.3 ft
1500	90.6 psi	569.2 ft
1750	86.5 psi	559.7 ft
2000	81.9 psi	549.1 ft
2250	76.8 psi	537.2 ft
2500	71.2 psi	524.2 ft
2750	65.0 psi	510.0 ft
3000	58.4 psi	494.7 ft
3250	51.3 psi	478.3 ft
3500	43.6 psi	460.7 ft
3750	35.6 psi	442.1 ft
4000	27.0 psi	422.4 ft

Residual Pressure, psi	Available Flow, gpm
0 psi	4,715
10 psi	4,462
20 psi	4,196
30 psi	3,914
40 psi	3,615
50 psi	3,292
60 psi	2,940
70 psi	2,548
80 psi	2,097
90 psi	1,540
100 psi	697
110 psi	Residual Pressure Exceeds Static Pressure
120 psi	Residual Pressure Exceeds Static Pressure

APPENDIX B

FIRE-FLOW REQUIREMENTS FOR BUILDINGS

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

User note:

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

SECTION B101
GENERAL

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

SECTION B102
DEFINITIONS

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

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

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

SECTION B103
MODIFICATIONS

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

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

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

SECTION B104
FIRE-FLOW CALCULATION AREA

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

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

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

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

SECTION B105
FIRE-FLOW REQUIREMENTS FOR BUILDINGS

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

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

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

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

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

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

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

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

b. Measured at 20 psi residual pressure.

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

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

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

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

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

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

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

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

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

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

SECTION B106
REFERENCED STANDARDS

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

BUILDING AREAS

EXEMPT AREAS:

AREA EXEMPT FROM GROSS FLOOR AREA AND FAR CALCULATIONS PER CITY OF SAN DIEGO MUNICIPAL CODE CHAPTER 11, ARTICLE 3, DIVISION 1

A. BELOW-GRADE PARKING AND TENANT SPACE
B. ABOVE-GRADE OPEN PARKING STRUCTURES
C. BALCONIES AND ROOF DECKS

AREA EXEMPT FROM GFA

Level	Space Type	Area
BUILDING A		
LEVEL 02	BALCONY	2,484 SF
LEVEL 03	BALCONY	2,488 SF
LEVEL 04	BALCONY	2,488 SF
LEVEL 05	BALCONY	2,488 SF
LEVEL 06	ROOF DECK	3,004 SF
		12,953 SF
BUILDING B		
LEVEL 02	BALCONY	2,682 SF
LEVEL 03	BALCONY	2,682 SF
LEVEL 04	BALCONY	2,682 SF
LEVEL 05	BALCONY	2,682 SF
LEVEL 06	ROOF DECK	3,421 SF
		14,149 SF
BUILDING C		
LEVEL 02	BALCONY	2,623 SF
LEVEL 03	BALCONY	2,624 SF
LEVEL 04	BALCONY	2,624 SF
LEVEL 05	BALCONY	2,624 SF
LEVEL 06	ROOF DECK	3,151 SF
		13,645 SF
BUILDING D		
LEVEL 02	BALCONY	1,395 SF
LEVEL 03	BALCONY	1,391 SF
LEVEL 04	BALCONY	1,391 SF
LEVEL 05	ROOF DECK	2,693 SF
		6,869 SF
PODIUM - BLDG SUPPORT		
LEVEL P4	BLDG SUPP	2,896 SF
LEVEL P3	BLDG SUPP	2,896 SF
LEVEL P2	BLDG SUPP	2,896 SF
LEVEL P1	AMENITY	3,772 SF
LEVEL P1	BLDG SUPP	28,423 SF
LEVEL P1	STORAGE	12,265 SF
		53,148 SF
PODIUM - PARKING		
LEVEL P4	PARKING	161,241 SF
LEVEL P3	PARKING	185,969 SF
LEVEL P2	PARKING	185,969 SF
LEVEL P1	LOADING	37,775 SF
LEVEL P1	PARKING	117,221 SF
		688,177 SF
PODIUM - TENANT		
LEVEL P1	TENANT	76,437 SF
		76,437 SF
TOTAL AREA		865,378 SF

GROSS FLOOR AREAS:

GROSS FLOOR AREAS MEASURED PER THE FOLLOWING STANDARDS IN CITY OF SAN DIEGO MUNICIPAL CODE CHAPTER 11, ARTICLE 3, DIVISION 1

A. PERIMETER BOUNDARY LINE DRAWN AT EXTERIOR FACE OF EXTERIOR ASSEMBLIES
B. IN ADDITION TO OCCUPIED INTERIOR SPACES, NON-EXEMPT AREAS INCLUDE:
   a. INTERIOR SHAFTS (STAIRS, ELEVATORS, MECHANICAL SHAFTS)
   b. COVERED MECHANICAL PENTHOUSES

GROSS FLOOR AREA (GFA)

Level	Space Type	Area
BUILDING A (TRANSITION ZONE)		
LEVEL 01	TENANT	38,593 SF
LEVEL 02	TENANT	48,722 SF
LEVEL 03	TENANT	48,714 SF
LEVEL 04	TENANT	48,696 SF
LEVEL 05	TENANT	48,714 SF
LEVEL 06	MECHANICAL	7,610 SF
LEVEL 06	TENANT	13,309 SF
		254,358 SF
BUILDING B (APZ II ZONE)		
LEVEL 01	TENANT	40,364 SF
LEVEL 02	TENANT	50,815 SF
LEVEL 03	TENANT	54,166 SF
LEVEL 04	TENANT	54,166 SF
LEVEL 05	TENANT	54,166 SF
LEVEL 06	MECHANICAL	8,442 SF
LEVEL 06	TENANT	17,946 SF
		280,066 SF
BUILDING C (TRANSITION ZONE)		
LEVEL 01	TENANT	40,051 SF
LEVEL 02	TENANT	51,547 SF
LEVEL 03	TENANT	51,549 SF
LEVEL 04	TENANT	51,549 SF
LEVEL 05	TENANT	51,549 SF
LEVEL 06	MECHANICAL	9,483 SF
LEVEL 06	TENANT	15,203 SF
		270,932 SF
BUILDING D (TRANSITION ZONE)		
LEVEL 01	TENANT	35,729 SF
LEVEL 02	TENANT	45,167 SF
LEVEL 03	TENANT	45,171 SF
LEVEL 04	TENANT	45,172 SF
LEVEL 05	MECHANICAL	5,706 SF
LEVEL 05	TENANT	11,160 SF
		188,106 SF
BUILDING E (APZ II ZONE)		
LEVEL 01	TENANT	3,250 SF
LEVEL 02	TENANT	2,674 SF
		5,924 SF
TOTAL AREA		999,386 SF

APPENDIX D

COMPUTER MODELING OUTPUT

The following conditions were modeled:

1. Static Pressures.
2. 1,500 gpm Fire Flow at Node 10.
3. 1,500 gpm Fire Flow at Node 8.
4. 1,500 gpm Fire Flow at Node 2.
5. 1,500 gpm Fire Flow at Node 10, Pipe 4 Closed.

Project: Towne Centre View City of San Diego
Date: 07/20/2021
Job Number: 574-018

Scenario: Static Pressures

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi
Hydrant Te				
O-BF-1	360	610	108.3	100.7
I-BF-2	360	610	108.3	103.9
O-BF-3	360	610	108.3	99.0
J-1	360	610	108.3	102.6
J-2	360	610	108.3	99.0
J-3	360	610	108.3	102.9
J-4	360	610	108.3	102.6
J-5	360	610	108.3	101.7
J-6	360	610	108.3	102.9
J-7	360	610	108.3	102.8
J-8	360	610	108.3	102.6
J-9	360	610	108.3	102.3
J-10	360	610	108.3	102.1
J-11	360	610	108.3	101.9
J-12	360	610	108.3	101.8
J-13	360	610	108.3	102.7
J-14	360	610	108.3	102.2
J-15	360	610	108.3	102.9
I-BF-1	360	610	108.3	103.4
O-BF-2	360	610	108.3	101.1
I-BF-3	360	610	108.3	102.9

Project: Towne Centre View City of San Diego
Date: 07/20/2021
Job Number: 574-018

Scenario: 1,500 gpm Fire Flow at Node 10

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi
Hydrant Te				
O-BF-1	360	610	108.3	83.8
I-BF-2	360	610	108.3	87.3
O-BF-3	360	610	108.3	83.3
J-1	360	610	108.3	87.2
J-2	360	610	108.3	83.3
J-3	360	610	108.3	87.2
J-4	360	610	108.3	87.2
J-5	360	610	108.3	83.8
J-6	360	610	108.3	85.0
J-7	360	610	108.3	82.9
J-8	360	610	108.3	79.9
J-9	360	610	108.3	75.5
J-10	360	610	108.3	72.0
J-11	360	610	108.3	77.0
J-12	360	610	108.3	80.8
J-13	360	610	108.3	87.2
J-14	360	610	108.3	73.3
J-15	360	610	108.3	87.2
I-BF-1	360	610	108.3	86.0
O-BF-2	360	610	108.3	83.7
I-BF-3	360	610	108.3	87.2

Project: Towne Centre View City of San Diego
Date: 07/20/2021
Job Number: 574-018

Scenario: 1,500 gpm Fire Flow at Node 8

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi
Hydrant Te				
O-BF-1	360	610	108.3	83.7
I-BF-2	360	610	108.3	87.4
O-BF-3	360	610	108.3	83.3
J-1	360	610	108.3	87.2
J-2	360	610	108.3	83.3
J-3	360	610	108.3	87.2
J-4	360	610	108.3	87.2
J-5	360	610	108.3	83.9
J-6	360	610	108.3	84.7
J-7	360	610	108.3	80.5
J-8	360	610	108.3	74.5
J-9	360	610	108.3	77.0
J-10	360	610	108.3	79.0
J-11	360	610	108.3	81.0
J-12	360	610	108.3	82.6
J-13	360	610	108.3	87.2
J-14	360	610	108.3	78.2
J-15	360	610	108.3	87.2
I-BF-1	360	610	108.3	85.8
O-BF-2	360	610	108.3	83.8
I-BF-3	360	610	108.3	87.2

Project: Towne Centre View City of San Diego
Date: 07/20/2021
Job Number: 574-018

Scenario: 1,500 gpm Fire Flow at Node 2

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi
Hydrant Te				
O-BF-1	360	610	108.3	85.3
I-BF-2	360	610	108.3	88.2
O-BF-3	360	610	108.3	79.9
J-1	360	610	108.3	87.3
J-2	360	610	108.3	72.1
J-3	360	610	108.3	87.2
J-4	360	610	108.3	87.3
J-5	360	610	108.3	86.1
J-6	360	610	108.3	87.4
J-7	360	610	108.3	87.3
J-8	360	610	108.3	87.1
J-9	360	610	108.3	86.8
J-10	360	610	108.3	86.6
J-11	360	610	108.3	86.4
J-12	360	610	108.3	86.2
J-13	360	610	108.3	87.2
J-14	360	610	108.3	86.7
J-15	360	610	108.3	86.0
I-BF-1	360	610	108.3	88.0
O-BF-2	360	610	108.3	85.5
I-BF-3	360	610	108.3	85.0

Project: Towne Centre View City of San Diego
Date: 07/20/2021
Job Number: 574-018

Scenario: 1,500 gpm Fire Flow at Node 10 - Pipe 4 Closed

Node No.	Node El. Ft.	HGL Zone Ft. (Static)*	Static P psi	Model Run P, psi
Hydrant Te				
O-BF-1	360	610	108.3	84.8
I-BF-2	360	610	108.3	89.7
O-BF-3	360	610	108.3	85.8
J-1	360	610	108.3	89.7
J-2	360	610	108.3	85.8
J-3	360	610	108.3	89.7
J-4	360	610	108.3	87.2
J-5	360	610	108.3	85.9
J-6	360	610	108.3	86.6
J-7	360	610	108.3	84.5
J-8	360	610	108.3	81.6
J-9	360	610	108.3	77.3
J-10	360	610	108.3	73.9
J-11	360	610	108.3	79.0
J-12	360	610	108.3	82.8
J-13	360	610	108.3	89.7
J-14	360	610	108.3	75.1
J-15	360	610	108.3	89.7
I-BF-1	360	610	108.3	87.3
O-BF-2	360	610	108.3	85.9
I-BF-3	360	610	108.3	89.7

Project: Towne Centre View City of San Diego
Date: 07/20/2021
Job Number: 574-018

Scenario: Static Pressures

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
P-1	12	171	0.49
P-2	12	5	0.01
P-3	8	-1458.35	9.31
P-4	12	-1292.35	3.67
P-5	8	1463.35	9.34
P-6	8	148.24	0.95
P-7	8	-1315.12	8.39
P-8	8	148.24	0.95
P-9	8	148.24	0.95
P-10	8	148.24	0.95
P-11	8	143.24	0.91
P-12	8	143.24	0.91
P-13	8	-143.24	0.91
P-14	8	-1458.35	9.31
P-15	8	1463.35	9.34
P-16	8	5	0.03
P-17	12	-1292.35	3.67
P-18	12	-1292.35	3.67
P-19	8	143.24	0.91
P-20	8	5	0.03

Project: Towne Centre View City of San Diego
Date: 07/20/2021
Job Number: 574-018

Scenario: 1,500 gpm Fire Flow at Node 10

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
P-1	12	1671	4.74
P-2	12	5	0.01
P-3	8	-498.69	3.18
P-4	8	-332.69	0.94
P-5	8	2003.7	12.79
P-6	8	689.46	4.4
P-7	8	-1314.23	8.39
P-8	8	689.46	4.4
P-9	8	689.46	4.4
P-10	8	689.46	4.4
P-11	8	-815.54	5.21
P-12	8	-815.54	5.21
P-13	8	815.54	5.21
P-14	8	-498.69	3.18
P-15	8	2003.7	12.79
P-16	8	5	0.03
P-17	12	-332.69	0.94
P-18	12	-332.69	0.94
P-19	8	684.46	4.37
P-20	8	5	0.03

Project: Towne Centre View City of San Diego
Date: 07/20/2021
Job Number: 574-018

Scenario: 1,500 gpm Fire Flow at Node 8

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
P-1	12	1671	4.74
P-2	12	5	0.01
P-3	8	-555.72	3.55
P-4	8	-389.72	1.11
P-5	8	2060.72	13.15
P-6	8	994.8	6.35
P-7	8	-1065.92	6.8
P-8	8	994.8	6.35
P-9	8	-505.2	3.22
P-10	8	-505.2	3.22
P-11	8	-510.2	3.26
P-12	8	-510.2	3.26
P-13	8	510.2	3.26
P-14	8	-555.72	3.55
P-15	8	2060.72	13.15
P-16	8	5	0.03
P-17	12	-389.72	1.11
P-18	12	-389.72	1.11
P-19	8	-510.2	3.26
P-20	8	5	0.03

Project: Towne Centre View City of San Diego
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Scenario: 1,500 gpm Fire Flow at Node 2

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
P-1	12	1666	4.73
P-2	12	1500	4.25
P-3	8	-1502.35	9.59
P-4	8	158.65	0.45
P-5	8	1507.35	9.62
P-6	8	152.63	0.97
P-7	8	-1354.71	8.65
P-8	8	152.63	0.97
P-9	8	152.63	0.97
P-10	8	152.63	0.97
P-11	8	147.63	0.94
P-12	8	147.63	0.94
P-13	8	-147.63	0.94
P-14	8	-1502.35	9.59
P-15	8	1507.35	9.62
P-16	8	1500	9.57
P-17	12	158.65	0.45
P-18	12	158.65	0.45
P-19	8	147.63	0.94
P-20	8	1500	9.57

Project: Towne Centre View City of San Diego
Date: 07/20/2021
Job Number: 574-018

Scenario: 1,500 gpm Fire Flow at Node 10 - Pipe 4 Closed

Pipe No.	Pipe Size (inches)	Model Run Flow (gpm)	Model Run Velocity (fps)
P-1	12	1671	4.74
P-2	12	5	0.01
P-3	8	-166	1.06
P-4	8		
P-5	8	1671	10.66
P-6	8	681.38	4.35
P-7	8	-989.62	6.32
P-8	8	681.38	4.35
P-9	8	681.38	4.35
P-10	8	681.38	4.35
P-11	8	-823.62	5.26
P-12	8	-823.62	5.26
P-13	8	823.62	5.26
P-14	8	-166	1.06
P-15	8	1671	10.66
P-16	8	5	0.03
P-17	12	0	0
P-18	12	0	0
P-19	8	676.38	4.32
P-20	8	5	0.03

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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: Mon Jul 19 17:06:24 2021

Master File : \\artic\eng\574018\towne centre view ky pipe july 2021.KYP\towne centre view ky pipe july 2021.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	Hydrant Te	J-4	180.00	12.00	120.0000	0.00
P-2	J-3	J-15	470.00	12.00	120.0000	0.00
P-3	J-3	I-BF-2	50.00	8.00	120.0000	0.00
P-4	J-4	J-1	40.00	12.00	120.0000	0.00
P-5	J-4	O-BF-1	100.00	8.00	120.0000	0.00
P-6	J-6	J-7	460.00	8.00	120.0000	0.00
P-7	J-5	J-6	80.00	8.00	120.0000	0.00
P-8	J-7	J-8	660.00	8.00	120.0000	0.00
P-9	J-8	J-9	940.00	8.00	120.0000	0.00
P-10	J-9	J-14	490.00	8.00	120.0000	0.00
P-11	J-10	J-11	790.00	8.00	120.0000	0.00
P-12	J-11	J-12	600.00	8.00	120.0000	0.00
P-13	J-5	J-12	480.00	8.00	120.0000	0.00
P-14	O-BF-2	J-5	30.00	8.00	120.0000	0.00
P-15	I-BF-1	J-6	30.00	8.00	120.0000	0.00
P-16	O-BF-3	J-2	400.00	8.00	120.0000	0.00
P-17	J-1	J-13	50.00	12.00	120.0000	0.00
P-18	J-13	J-3	90.00	12.00	120.0000	0.00
P-19	J-14	J-10	270.00	8.00	120.0000	0.00
P-20	J-15	I-BF-3	50.00	8.00	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 Hydrant Te DESCRIBED BY THE FOLLOWING DATA: (ID= 1)

HEAD (ft)	FLOWRATE (gpm)	EFFICIENCY (%)
597.00	0.00	75.00 (Default)
594.00	500.00	75.00 (Default)
584.00	1000.00	75.00 (Default)
569.00	1500.00	75.00 (Default)
549.00	2000.00	75.00 (Default)
524.00	2500.00	75.00 (Default)
494.00	3000.00	75.00 (Default)
460.00	3500.00	75.00 (Default)
422.00	4000.00	75.00 (Default)

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

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

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

THERE IS A DEVICE AT NODE BF-3 .....> (ID= 2)

N O D E D A T A

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	EXTERNAL GRADE (ft)
Hydrant Te		0.00	0.00	
O-BF-1		0.00	360.00	
I-BF-2		0.00	360.00	
O-BF-3		0.00	360.00	
J-1		0.00	360.00	
J-2		5.00	360.00	
J-3		161.00	360.00	
J-4		0.00	360.00	
J-5		0.00	360.00	
J-6		0.00	360.00	
J-7		0.00	360.00	
J-8		0.00	360.00	
J-9		0.00	360.00	
J-10		0.00	360.00	
J-11		0.00	360.00	
J-12		0.00	360.00	
J-13		0.00	360.00	
J-14		5.00	360.00	
J-15		0.00	360.00	
I-BF-1		0.00	360.00	
O-BF-2		0.00	360.00	
I-BF-3		0.00	360.00	

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) = 20
NUMBER OF END NODES .....(J) = 18
NUMBER OF PRIMARY LOOPS .....(L) = 2
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)

Towne Centre View Water Analysis
Static Pressures

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 3 TRIALS: ACCURACY = 0.41185E-04

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	Hydrant Te	J-4	171.00	0.02	0.00	0.49	0.11	0.11
P-2	J-3	J-15	5.00	0.00	0.00	0.01	0.00	0.00
P-3	J-3	I-BF-2	-1458.35	2.13	0.00	9.31	42.61	42.61
P-4	J-4	J-1	-1292.35	0.19	0.00	3.67	4.73	4.73
P-5	J-4	O-BF-1	1463.35	4.29	0.00	9.34	42.88	42.88
P-6	J-6	J-7	148.24	0.28	0.00	0.95	0.62	0.62
P-7	J-5	J-6	-1315.12	2.82	0.00	8.39	35.19	35.19
P-8	J-7	J-8	148.24	0.41	0.00	0.95	0.62	0.62
P-9	J-8	J-9	148.24	0.58	0.00	0.95	0.62	0.62
P-10	J-9	J-14	148.24	0.30	0.00	0.95	0.62	0.62
P-11	J-10	J-11	143.24	0.46	0.00	0.91	0.58	0.58
P-12	J-11	J-12	143.24	0.35	0.00	0.91	0.58	0.58
P-13	J-5	J-12	-143.24	0.28	0.00	0.91	0.58	0.58
P-14	O-BF-2	J-5	-1458.35	1.28	0.00	9.31	42.61	42.61
P-15	I-BF-1	J-6	1463.35	1.29	0.00	9.34	42.88	42.88
P-16	O-BF-3	J-2	5.00	0.00	0.00	0.03	0.00	0.00
P-17	J-1	J-13	-1292.35	0.24	0.00	3.67	4.73	4.73
P-18	J-13	J-3	-1292.35	0.43	0.00	3.67	4.73	4.73
P-19	J-14	J-10	143.24	0.16	0.00	0.91	0.58	0.58
P-20	J-15	I-BF-3	5.00	0.00	0.00	0.03	0.00	0.00

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

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft	EFFIC-ENCY %	USEFUL POWER Hp	INCREMTL COST $	TOTAL COST $	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. ft	Case
Hydrant Te	171.00	0.00	596.69	596.7	75.00	26.	1.3	2.6	**	**	33.2	1.0000
Warning P2K107:Device			BF-1 is operating out of range.									
BF-1	-1463.35	238.70	232.38	-6.3	75.00	2.	0.1	0.2	**	**	270.5	1.0000
Warning P2K107:Device			BF-2 is operating out of range.									
BF-2	-1458.35	239.65	233.32	-6.3	75.00	2.	0.1	0.2	**	**	271.5	1.0000
BF-3	5.00	237.52	228.52	-9.0	75.00	0.	0.0	0.0	**	**	270.7	1.0000

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
Hydrant Te		0.00	596.69			
O-BF-1		0.00	592.38	360.00	232.38	100.70
I-BF-2		0.00	599.65	360.00	239.65	103.85
O-BF-3		0.00	588.52	360.00	228.52	99.02
J-1		0.00	596.86	360.00	236.86	102.64
J-2		5.00	588.52	360.00	228.52	99.02
J-3		161.00	597.52	360.00	237.52	102.93
J-4		0.00	596.67	360.00	236.67	102.56
J-5		0.00	594.60	360.00	234.60	101.66
J-6		0.00	597.41	360.00	237.41	102.88
J-7		0.00	597.13	360.00	237.13	102.76
J-8		0.00	596.72	360.00	236.72	102.58
J-9		0.00	596.14	360.00	236.14	102.33
J-10		0.00	595.68	360.00	235.68	102.13
J-11		0.00	595.22	360.00	235.22	101.93
J-12		0.00	594.88	360.00	234.88	101.78
J-13		0.00	597.10	360.00	237.10	102.74
J-14		5.00	595.84	360.00	235.84	102.20
J-15		0.00	597.52	360.00	237.52	102.93
I-BF-1		0.00	598.70	360.00	238.70	103.44
O-BF-2		0.00	593.32	360.00	233.32	101.11
I-BF-3		0.00	597.52	360.00	237.52	102.93

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

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
I-BF-2	103.85	J-2	99.02
I-BF-1	103.44	O-BF-3	99.02
J-3	102.93	O-BF-1	100.70

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-5	9.34	P-2	0.01
P-15	9.34	P-16	0.03
P-3	9.31	P-20	0.03

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

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

NODE NAME	FLOWRATE gpm	NODE TITLE
Hydrant Tes	171.00	

NET SYSTEM INFLOW = 171.00
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 171.00

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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)

Towne Centre View Water Analysis
1,500 gpm Fire Flow at Node 10

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 28 TRIALS: ACCURACY = 0.79977E-04

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	Hydrant Te	J-4	1671.00	1.37	0.00	4.74	7.61	7.61
P-2	J-3	J-15	5.00	0.00	0.00	0.01	0.00	0.00
P-3	J-3	I-BF-2	-498.69	0.29	0.00	3.18	5.84	5.84
P-4	J-4	J-1	-332.69	0.02	0.00	0.94	0.38	0.38
P-5	J-4	O-BF-1	2003.70	7.67	0.00	12.79	76.75	76.75
P-6	J-6	J-7	689.46	4.90	0.00	4.40	10.64	10.64
P-7	J-5	J-6	-1314.23	2.81	0.00	8.39	35.14	35.14
P-8	J-7	J-8	689.46	7.02	0.00	4.40	10.64	10.64
P-9	J-8	J-9	689.46	10.00	0.00	4.40	10.64	10.64
P-10	J-9	J-14	689.46	5.21	0.00	4.40	10.64	10.64
P-11	J-10	J-11	-815.54	11.47	0.00	5.21	14.52	14.52
P-12	J-11	J-12	-815.54	8.71	0.00	5.21	14.52	14.52
P-13	J-5	J-12	815.54	6.97	0.00	5.21	14.52	14.52
P-14	O-BF-2	J-5	-498.69	0.18	0.00	3.18	5.84	5.84
P-15	I-BF-1	J-6	2003.70	2.30	0.00	12.79	76.75	76.75
P-16	O-BF-3	J-2	5.00	0.00	0.00	0.03	0.00	0.00
P-17	J-1	J-13	-332.69	0.02	0.00	0.94	0.38	0.38
P-18	J-13	J-3	-332.69	0.03	0.00	0.94	0.38	0.38
P-19	J-14	J-10	684.46	2.83	0.00	4.37	10.50	10.50
P-20	J-15	I-BF-3	5.00	0.00	0.00	0.03	0.00	0.00

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

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft	EFFIC-ENCY %	USEFUL POWER Hp	INCREMTL COST $	TOTAL COST $	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. ft	Case
Hydrant Te	1671.00	0.00	562.51	562.5	75.00	238.	1.3	3.8	**	**	33.2	2.0000
Warning P2K107:Device			BF-1 is operating out of range.									
BF-1	-2003.70	198.48	193.46	-5.0	75.00	3.	0.1	0.3	**	**	229.1	2.0000
Warning P2K107:Device			BF-2 is operating out of range.									
BF-2	-498.69	201.50	193.19	-8.3	75.00	1.	0.1	0.3	**	**	234.5	2.0000
BF-3	5.00	201.21	192.21	-9.0	75.00	0.	0.0	0.0	**	**	234.4	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
Hydrant Te		0.00	562.51			
O-BF-1		0.00	553.46	360.00	193.46	83.83
I-BF-2		0.00	561.50	360.00	201.50	87.32
O-BF-3		0.00	552.21	360.00	192.21	83.29
J-1		0.00	561.15	360.00	201.15	87.17
J-2		5.00	552.21	360.00	192.21	83.29
J-3		161.00	561.21	360.00	201.21	87.19
J-4		0.00	561.14	360.00	201.14	87.16
J-5		0.00	553.37	360.00	193.37	83.79
J-6		0.00	556.18	360.00	196.18	85.01
J-7		0.00	551.28	360.00	191.28	82.89
J-8		0.00	544.26	360.00	184.26	79.85
J-9		0.00	534.26	360.00	174.26	75.51
J-10		1500.00	526.21	360.00	166.21	72.02
J-11		0.00	537.68	360.00	177.68	77.00
J-12		0.00	546.40	360.00	186.40	80.77
J-13		0.00	561.17	360.00	201.17	87.18
J-14		5.00	529.04	360.00	169.04	73.25
J-15		0.00	561.21	360.00	201.21	87.19
I-BF-1		0.00	558.48	360.00	198.48	86.01
O-BF-2		0.00	553.19	360.00	193.19	83.72
I-BF-3		0.00	561.21	360.00	201.21	87.19

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
I-BF-2	87.32	J-10	72.02
J-3	87.19	J-14	73.25
J-15	87.19	J-9	75.51

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-5	12.79	P-2	0.01
P-15	12.79	P-16	0.03
P-7	8.39	P-20	0.03

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

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

NODE NAME	FLOWRATE gpm	NODE TITLE
Hydrant Tes	1671.00	

NET SYSTEM INFLOW = 1671.00
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 1671.00

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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)

Towne Centre View Water Analysis
1,500 gpm Fire Flow at Node 8

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 36 TRIALS: ACCURACY = 0.84888E-04

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	Hydrant Te	J-4	1671.00	1.37	0.00	4.74	7.61	7.61
P-2	J-3	J-15	5.00	0.00	0.00	0.01	0.00	0.00
P-3	J-3	I-BF-2	-555.72	0.36	0.00	3.55	7.14	7.14
P-4	J-4	J-1	-389.72	0.02	0.00	1.11	0.51	0.51
P-5	J-4	O-BF-1	2060.72	8.08	0.00	13.15	80.84	80.84
P-6	J-6	J-7	994.80	9.65	0.00	6.35	20.98	20.98
P-7	J-5	J-6	-1065.92	1.91	0.00	6.80	23.85	23.85
P-8	J-7	J-8	994.80	13.85	0.00	6.35	20.98	20.98
P-9	J-8	J-9	-505.20	5.62	0.00	3.22	5.98	5.98
P-10	J-9	J-14	-505.20	2.93	0.00	3.22	5.98	5.98
P-11	J-10	J-11	-510.20	4.81	0.00	3.26	6.09	6.09
P-12	J-11	J-12	-510.20	3.66	0.00	3.26	6.09	6.09
P-13	J-5	J-12	510.20	2.92	0.00	3.26	6.09	6.09
P-14	O-BF-2	J-5	-555.72	0.21	0.00	3.55	7.14	7.14
P-15	I-BF-1	J-6	2060.72	2.43	0.00	13.15	80.84	80.84
P-16	O-BF-3	J-2	5.00	0.00	0.00	0.03	0.00	0.00
P-17	J-1	J-13	-389.72	0.03	0.00	1.11	0.51	0.51
P-18	J-13	J-3	-389.72	0.05	0.00	1.11	0.51	0.51
P-19	J-14	J-10	-510.20	1.65	0.00	3.26	6.09	6.09
P-20	J-15	I-BF-3	5.00	0.00	0.00	0.03	0.00	0.00

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

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft	EFFIC-ENCY %	USEFUL POWER Hp	INCREMTL COST $	TOTAL COST $	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. ft	Case
Hydrant Te	1671.00	0.00	562.51	562.5	75.00	238.	11.8	15.6	**	**	33.2	3.0000
Warning P2K107:Device			BF-1 is operating out of range.									
BF-1	-2060.72	197.93	193.05	-4.9	75.00	3.	0.1	0.5	**	**	228.4	3.0000
Warning P2K107:Device			BF-2 is operating out of range.									
BF-2	-555.72	201.59	193.38	-8.2	75.00	1.	0.1	0.4	**	**	234.6	3.0000
BF-3	5.00	201.23	192.23	-9.0	75.00	0.	0.0	0.0	**	**	234.4	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
Hydrant Te		0.00	562.51			
O-BF-1		0.00	553.05	360.00	193.05	83.66
I-BF-2		0.00	561.59	360.00	201.59	87.35
O-BF-3		0.00	552.23	360.00	192.23	83.30
J-1		0.00	561.16	360.00	201.16	87.17
J-2		5.00	552.23	360.00	192.23	83.30
J-3		161.00	561.23	360.00	201.23	87.20
J-4		0.00	561.14	360.00	201.14	87.16
J-5		0.00	553.60	360.00	193.60	83.89
J-6		0.00	555.50	360.00	195.50	84.72
J-7		0.00	545.85	360.00	185.85	80.54
J-8		1500.00	532.00	360.00	172.00	74.53
J-9		0.00	537.63	360.00	177.63	76.97
J-10		0.00	542.20	360.00	182.20	78.95
J-11		0.00	547.02	360.00	187.02	81.04
J-12		0.00	550.67	360.00	190.67	82.62
J-13		0.00	561.19	360.00	201.19	87.18
J-14		5.00	540.56	360.00	180.56	78.24
J-15		0.00	561.23	360.00	201.23	87.20
I-BF-1		0.00	557.93	360.00	197.93	85.77
O-BF-2		0.00	553.38	360.00	193.38	83.80
I-BF-3		0.00	561.23	360.00	201.23	87.20

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
I-BF-2	87.35	J-8	74.53
J-3	87.20	J-9	76.97
J-15	87.20	J-14	78.24

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-5	13.15	P-2	0.01
P-15	13.15	P-16	0.03
P-7	6.80	P-20	0.03

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

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

NODE NAME	FLOWRATE gpm	NODE TITLE
Hydrant Tes	1671.00	

NET SYSTEM INFLOW = 1671.00
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 1671.00

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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)

Towne Centre View Water Analysis
1,500 gpm Fire Flow at Node 2

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 49 TRIALS: ACCURACY = 0.98172E-04

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	Hydrant Te	J-4	1666.00	1.36	0.00	4.73	7.57	7.57
P-2	J-3	J-15	1500.00	2.93	0.00	4.25	6.23	6.23
P-3	J-3	I-BF-2	-1502.35	2.25	0.00	9.59	45.02	45.02
P-4	J-4	J-1	158.65	0.00	0.00	0.45	0.10	0.10
P-5	J-4	O-BF-1	1507.35	4.53	0.00	9.62	45.30	45.30
P-6	J-6	J-7	152.63	0.30	0.00	0.97	0.65	0.65
P-7	J-5	J-6	-1354.71	2.97	0.00	8.65	37.18	37.18
P-8	J-7	J-8	152.63	0.43	0.00	0.97	0.65	0.65
P-9	J-8	J-9	152.63	0.61	0.00	0.97	0.65	0.65
P-10	J-9	J-14	152.63	0.32	0.00	0.97	0.65	0.65
P-11	J-10	J-11	147.63	0.48	0.00	0.94	0.61	0.61
P-12	J-11	J-12	147.63	0.37	0.00	0.94	0.61	0.61
P-13	J-5	J-12	-147.63	0.29	0.00	0.94	0.61	0.61
P-14	O-BF-2	J-5	-1502.35	1.35	0.00	9.59	45.02	45.02
P-15	I-BF-1	J-6	1507.35	1.36	0.00	9.62	45.30	45.30
P-16	O-BF-3	J-2	1500.00	17.96	0.00	9.57	44.89	44.89
P-17	J-1	J-13	158.65	0.00	0.00	0.45	0.10	0.10
P-18	J-13	J-3	158.65	0.01	0.00	0.45	0.10	0.10
P-19	J-14	J-10	147.63	0.17	0.00	0.94	0.61	0.61
P-20	J-15	I-BF-3	1500.00	2.24	0.00	9.57	44.89	44.89

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
Hydrant Te	1666.00	0.00	562.70	562.7	75.00	237.	11.8	27.4	**	**	33.2	4.0000
Warning P2K107:Device			BF-1 is operating out of range.									
BF-1	-1507.35	203.03	196.81	-6.2	75.00	2.	0.1	0.6	**	**	234.8	4.0000
Warning P2K107:Device			BF-2 is operating out of range.									
BF-2	-1502.35	203.58	197.35	-6.2	75.00	2.	0.1	0.5	**	**	235.3	4.0000
BF-3	1500.00	196.15	184.39	-11.8	75.00	-4.	0.0	0.0	**	**	227.9	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
Hydrant Te		0.00	562.70			
O-BF-1		0.00	556.81	360.00	196.81	85.29
I-BF-2		0.00	563.58	360.00	203.58	88.22
O-BF-3		0.00	544.39	360.00	184.39	79.90
J-1		0.00	561.34	360.00	201.34	87.25
J-2		1500.00(**)	526.43	360.00	166.43	72.12
J-3		161.00	561.32	360.00	201.32	87.24
J-4		0.00	561.34	360.00	201.34	87.25
J-5		0.00	558.70	360.00	198.70	86.10
J-6		0.00	561.67	360.00	201.67	87.39
J-7		0.00	561.37	360.00	201.37	87.26
J-8		0.00	560.94	360.00	200.94	87.07
J-9		0.00	560.33	360.00	200.33	86.81
J-10		0.00	559.84	360.00	199.84	86.60
J-11		0.00	559.36	360.00	199.36	86.39
J-12		0.00	558.99	360.00	198.99	86.23
J-13		0.00	561.33	360.00	201.33	87.24
J-14		5.00	560.01	360.00	200.01	86.67
J-15		0.00	558.40	360.00	198.40	85.97
I-BF-1		0.00	563.03	360.00	203.03	87.98
O-BF-2		0.00	557.35	360.00	197.35	85.52
I-BF-3		0.00	556.15	360.00	196.15	85.00

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
I-BF-2	88.22	J-2	72.12
I-BF-1	87.98	O-BF-3	79.90
J-6	87.39	I-BF-3	85.00

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-5	9.62	P-4	0.45
P-15	9.62	P-17	0.45
P-3	9.59	P-18	0.45

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
Hydrant Tes	1666.00	

NET SYSTEM INFLOW = 1666.00
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 1666.00

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Case: 5

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

Towne Centre View Water Analysis
1,500 gpm Fire Flow at Node 10
Pipe 4 Closed

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

Pipe P-4 is CLOSED

RESULTS OBTAINED AFTER 3 TRIALS: ACCURACY = 0.19791E-04

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	Hydrant Te	J-4	1671.00	1.37	0.00	4.74	7.61	7.61
P-2	J-3	J-15	5.00	0.00	0.00	0.01	0.00	0.00
P-3	J-3	I-BF-2	-166.00	0.04	0.00	1.06	0.76	0.76
P-4-XX	J-4	J-1						
P-5	J-4	O-BF-1	1671.00	5.48	0.00	10.66	54.83	54.83
P-6	J-6	J-7	681.38	4.79	0.00	4.35	10.41	10.41
P-7	J-5	J-6	-989.62	1.66	0.00	6.32	20.78	20.78
P-8	J-7	J-8	681.38	6.87	0.00	4.35	10.41	10.41
P-9	J-8	J-9	681.38	9.79	0.00	4.35	10.41	10.41
P-10	J-9	J-14	681.38	5.10	0.00	4.35	10.41	10.41
P-11	J-10	J-11	-823.62	11.68	0.00	5.26	14.79	14.79
P-12	J-11	J-12	-823.62	8.87	0.00	5.26	14.79	14.79
P-13	J-5	J-12	823.62	7.10	0.00	5.26	14.79	14.79
P-14	O-BF-2	J-5	-166.00	0.02	0.00	1.06	0.76	0.76
P-15	I-BF-1	J-6	1671.00	1.64	0.00	10.66	54.83	54.83
P-16	O-BF-3	J-2	5.00	0.00	0.00	0.03	0.00	0.00
P-17	J-1	J-13	0.00	0.00	0.00	0.00	0.00	0.00
P-18	J-13	J-3	0.00	0.00	0.00	0.00	0.00	0.00
P-19	J-14	J-10	676.38	2.77	0.00	4.32	10.27	10.27
P-20	J-15	I-BF-3	5.00	0.00	0.00	0.03	0.00	0.00

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

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft	EFFIC-ENCY %	USEFUL POWER Hp	INCREMTL COST $	TOTAL COST $	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. ft	Case
Hydrant Te	1671.00	0.00	562.51	562.5	75.00	238.	11.8	39.2	**	**	33.2	5.0000
Warning P2K107:Device			BF-1 is operating out of range.									
BF-1	-1671.00	201.49	195.66	-5.8	75.00	2.	0.1	0.7	**	**	232.9	5.0000
Warning P2K107:Device			BF-2 is operating out of range.									
BF-2	-166.00	206.98	198.16	-8.8	75.00	0.	0.1	0.6	**	**	240.2	5.0000
BF-3	5.00	206.95	197.94	-9.0	75.00	0.	-0.2	-0.2	**	**	240.1	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
Hydrant Te		0.00	562.51			
O-BF-1		0.00	555.66	360.00	195.66	84.78
I-BF-2		0.00	566.98	360.00	206.98	89.69
O-BF-3		0.00	557.94	360.00	197.94	85.78
J-1		0.00	566.95	360.00	206.95	89.68
J-2		5.00	557.94	360.00	197.94	85.78
J-3		161.00	566.95	360.00	206.95	89.68
J-4		0.00	561.14	360.00	201.14	87.16
J-5		0.00	558.18	360.00	198.18	85.88
J-6		0.00	559.84	360.00	199.84	86.60
J-7		0.00	555.05	360.00	195.05	84.52
J-8		0.00	548.18	360.00	188.18	81.55
J-9		0.00	538.39	360.00	178.39	77.30
J-10		1500.00	530.52	360.00	170.52	73.89
J-11		0.00	542.21	360.00	182.21	78.96
J-12		0.00	551.08	360.00	191.08	82.80
J-13		0.00	566.95	360.00	206.95	89.68
J-14		5.00	533.29	360.00	173.29	75.09
J-15		0.00	566.95	360.00	206.95	89.68
I-BF-1		0.00	561.49	360.00	201.49	87.31
O-BF-2		0.00	558.16	360.00	198.16	85.87
I-BF-3		0.00	566.95	360.00	206.95	89.68

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
I-BF-2	89.69	J-10	73.89
J-1	89.68	J-14	75.09
J-3	89.68	J-9	77.30

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-5	10.66	P-2	0.01
P-15	10.66	P-16	0.03
P-7	6.32	P-20	0.03

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

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

        NODE       FLOWRATE       NODE
        NAME        gpm           TITLE
     ----------------------------------------
      Hydrant Tes    1671.00

 NET SYSTEM INFLOW  =   1671.00
 NET SYSTEM OUTFLOW =      0.00
 NET SYSTEM DEMAND  =   1671.00
================================================================================

           ***** HYDRAULIC ANALYSIS COMPLETED *****
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EXHIBIT A

NODE AND PIPE DIAGRAM

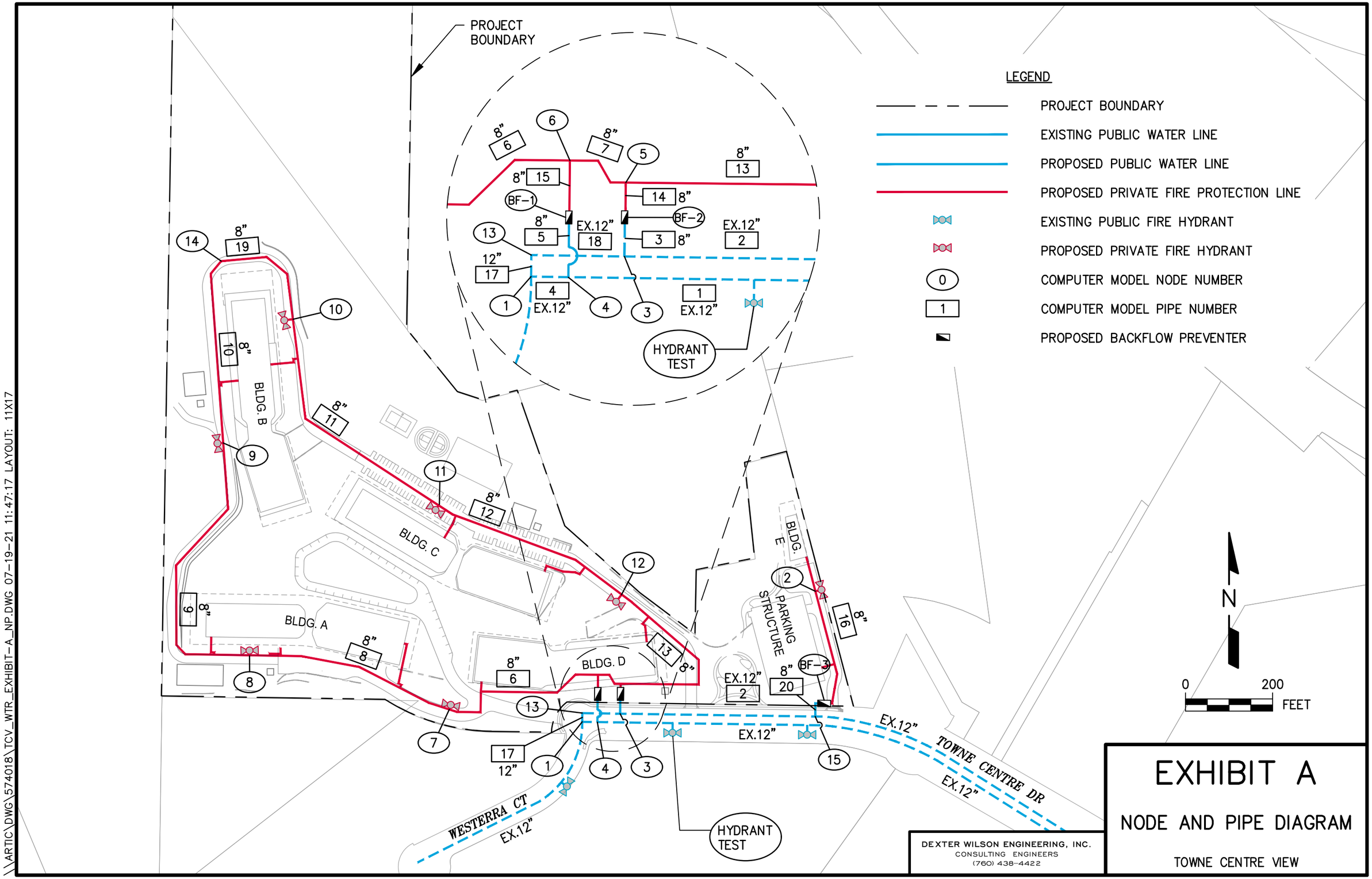

EXHIBIT A

NODE AND PIPE DIAGRAM

TOWNE CENTRE VIEW

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