

Scottish Rite Center San Diego, California

Private Domestic Water System Sizing Calculations

Prepared by:

**Dexter Wilson Engineering, Inc.
2234 Faraday Avenue
Carlsbad, CA 92008
(760) 438-4422**

Job Number 536-013/4



Prepared for:

San Dieguito Engineering, Inc.

Approach to the Project:

Sizing of the domestic (potable) water system for the Scottish Rite project is based on an approach consistent with the 2016 California Plumbing Code, Chapter 6 Water Supply and Distribution, and Appendix A Recommended Rules for Sizing the Water Supply System, and Appendix I Installation Standards, PVC Cold Water Building Supply and Yard Piping (IAPMO IS 8).

The procedure we followed was to estimate the number of Water Fixture Units for the two-story building within the project. Once the Water Fixture Units (WFUs) are determined, we used the Plumbing Code Chart A-103.1 to convert WFUs to water demand in gallons per minute (gpm). Using the gpm flow in any given pipe segment based on the number of WFUs being serviced by that pipe segment, we calculated the recommended pipe diameter based on a maximum flow velocity of 8 feet per second.

Detailed Presentation of the Calculations:

The following page includes the spreadsheet calculations done to determine the total project WFUs. Architectural plans were provided which illustrate some of the proposed water fixtures; the layout of the kitchen facility is unknown. Assumptions were made related to the fixtures in the kitchen area as well as addition of hose bibbs and mop sinks which may be necessary but not available on architectural plans at this time.

Project Name Scottish Rite Center
Domestic Water System Analysis

Job Number 536-013/4
Date 1/15/2020

Water Fixture Units:

The basis for the Water Fixture Units is the 2016 California Plumbing Code.

DESCRIPTION	First Floor			Second Floor		
	QUANTITY	FIXTURE UNITS EACH	TOTAL FIXTURE UNITS	QUANTITY	FIXTURE UNITS EACH	TOTAL FIXTURE UNITS
CLOTHES WASHER	0	4	0	0	4	0
TUB/SHOWER	0	4	0	0	4	0
SHOWER	0	2	0	0	2	0
KITCHEN SINK	4	1.5	6	0	1.5	0
BAR SINK	0	2	0	0	2	0
WASHUP FAUCET	2	2	4	0	2	0
DISHWASHER	2	1.5	3	0	1.5	0
LAUNDRY SINK	0	1.5	0	0	1.5	0
SERVICE SINK	2	3	6	1	3	3
LAVATORY	7	1	7	5	1	5
URINAL	3	5	15	2	5	10
WATER CLOSET (1.6 GPF FT, private)	0	2.5	0	0	2.5	0
WATER CLOSET (1.6 GPF FV, private)	10	8	80	9	8	72
DRINKING FOUNTAIN	2	0.75	1.5	2	0.75	1.5
HOSE BIBB	1	2.5	2.5	0	2.5	0
EACH ADDTL HB	1	1	1	0	1	0
POOL EQUIPMENT	0	30	0	0	30	0
TOTAL			126			91.5

*Estimated based on preliminary information.

*Assembly use assumed.

TOTAL WFU = 217.5

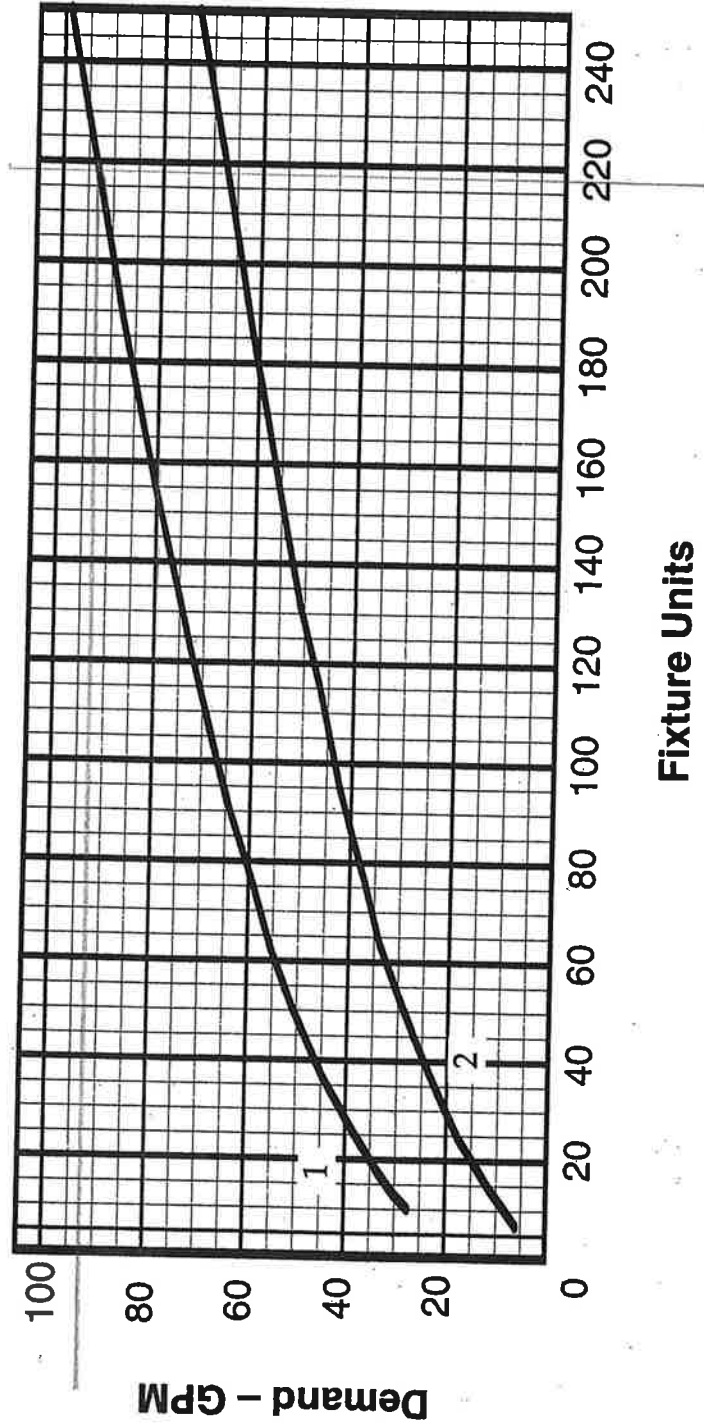
Using the total Water Fixture Unit count of 217.5 WFUs for the two-story building, we used the Plumbing Code Chart A-103.1 to convert the WFUs into a peak flow in gallons per minute (gpm). Included for reference is Chart A-103.1 which was used to convert WFUs to water demand.

SCOTTISH RITE
CENTER

Appendix A

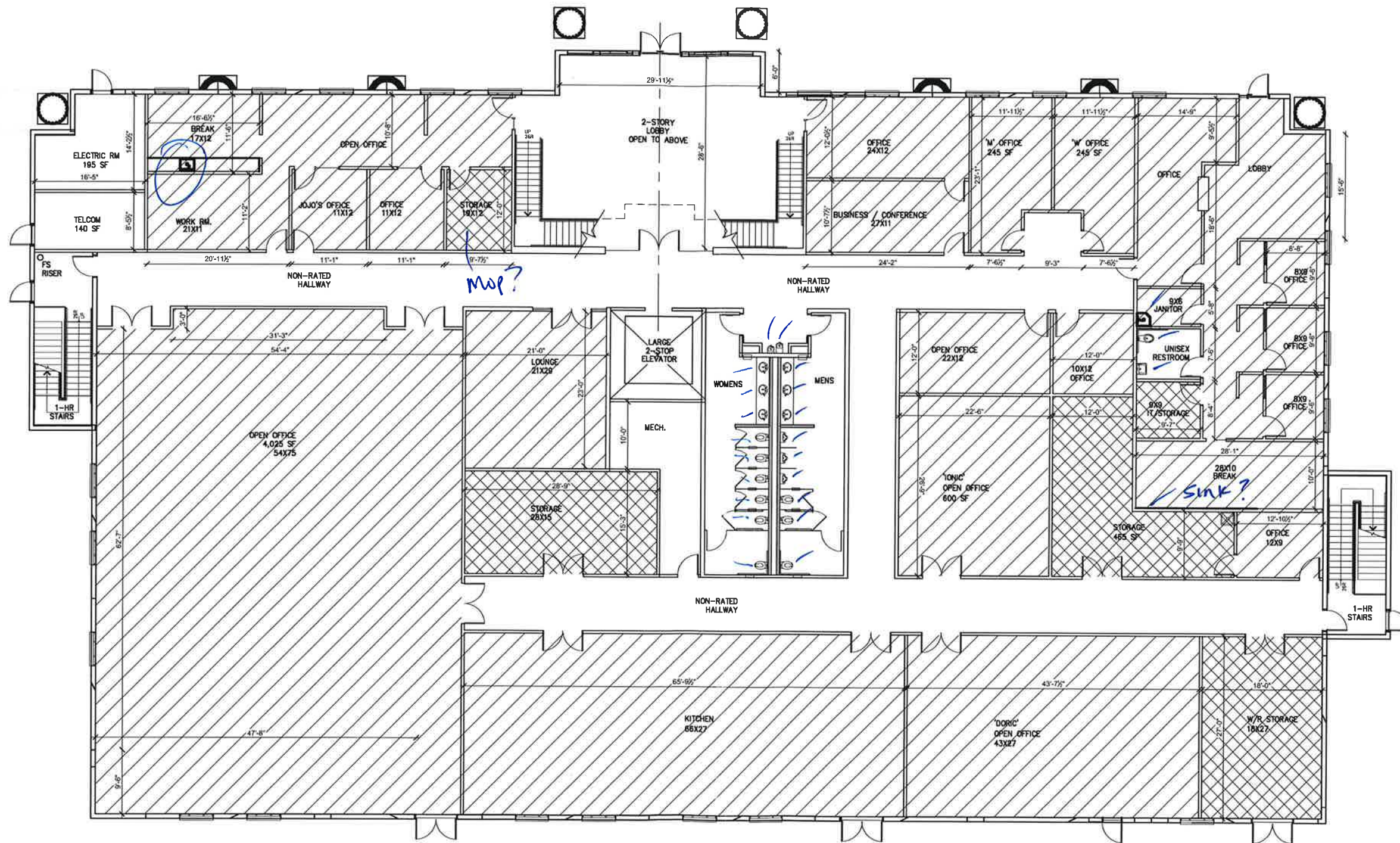
UNIFORM PLUMBING CODE

Chart A-3
Enlarged Scale Demand Load






93
gpm

217.5

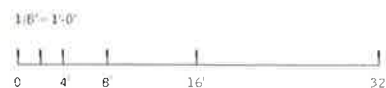


10 g WC
 3 Urinal
 7 1/2 Lav
 2 Water Ftn
 2 + Sink (other) *
 2 + Mop *
 2' Hose Bib *
 2 Dishwasher **
 4 Sinks **

* Assumed
 ** Assumed kitchen

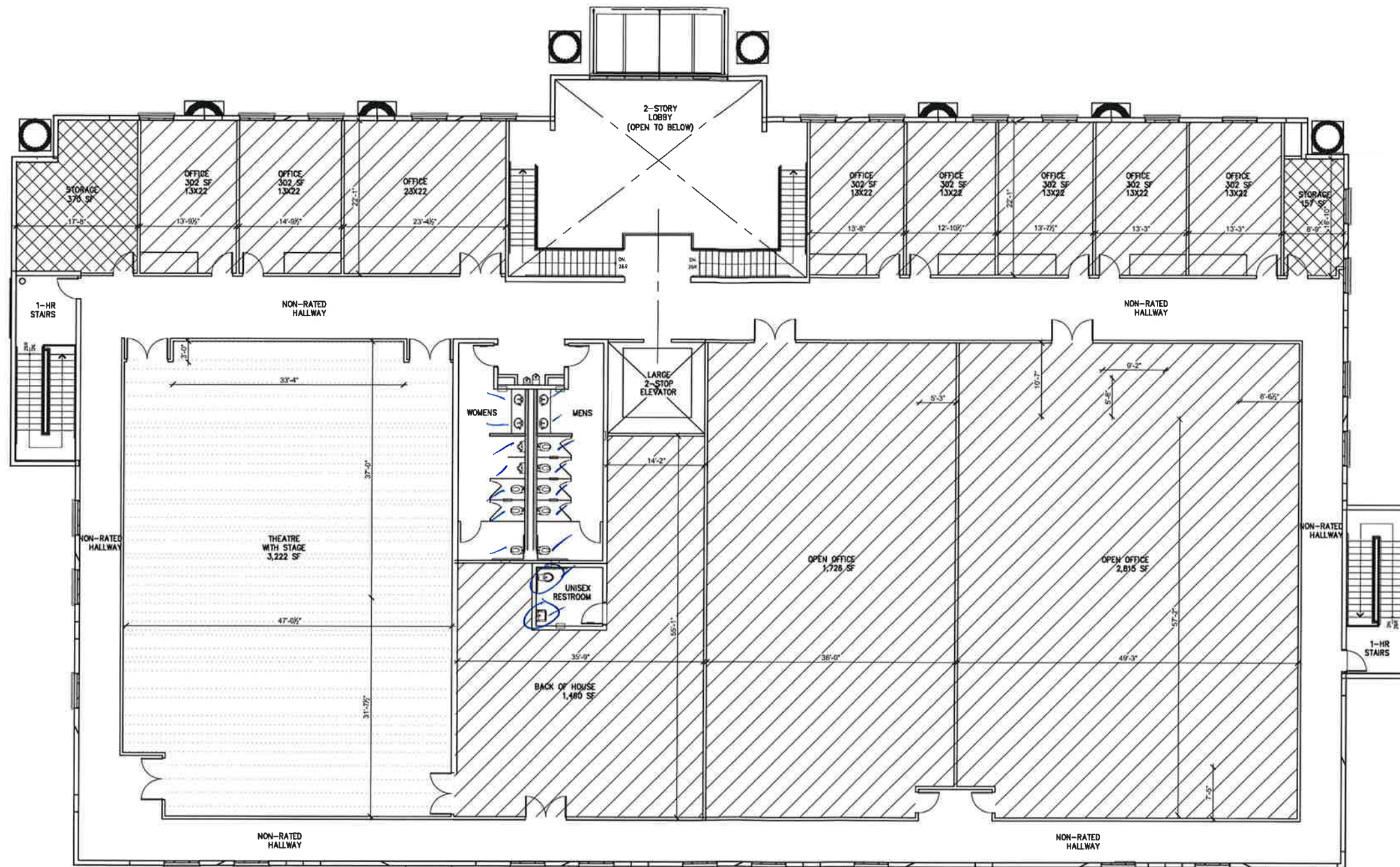
	BUSINESS USE	+/-12,413 SF
	STORAGE	+/-1,472 SF
	ASSEMBLY USE	

This conceptual design is based upon a preliminary review of preliminary site information and on site files and possibly incomplete site building information, and is intended solely to assist in exploring how the project might be developed.



1st Floor
 Dexter Wilson Engineering, Inc.
 1-15-2020








9 WC
2 Urinal
5 Lav
2 Water Ftn
0 Sink (other)
1 Mop *

* Assumed

2ND FLOOR

-  BUSINESS USE +/- 8,457 SF
-  STORAGE +/- 496 SF
-  ASSEMBLY USE +/- 3,161 SF

This conceptual design is based upon a preliminary review of requirements, requirements and an unverified and possibly incomplete site and/or building information. It is intended solely to assist in exploring how the project might be designed.



Dexter Wilson Engineering, Inc.
1-15-2020



WARE MALCOMB
Leading Design for Commercial Real Estate



SCOTTISH RITE /
HOME DEPOT
1895 & 1561 CAMINO DEL RIO S
SAN DIEGO, CA 92108

FLOOR-02
A-SR-3
(2020-01-16) 18134.00

Water Meter Sizing:

The total WFU count for the Scottish Rite Center is estimated to be 217.5 WFUs. Using Chart A-103.1, this converts to 93 gpm.

The Scottish Rite Center project demand can be satisfied using one 2-inch meter rated for a maximum allowable flow rate of 128 gpm. A 2-inch meter has an AWWA rated capacity of 160 gpm; however, the City of San Diego uses 80% of the meter rating as their maximum allowable flow rate. Reference the chart on the following sheet. Thus, a single 2-inch meter is required for the project.

The 2-inch meter will be followed by a 2-inch reduced pressure principle backflow preventer. A single lateral will supply the 2-inch meter.

A note regarding meters, City of San Diego requires simultaneous exchange and purchase for meter capacity credit of existing meters.

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.

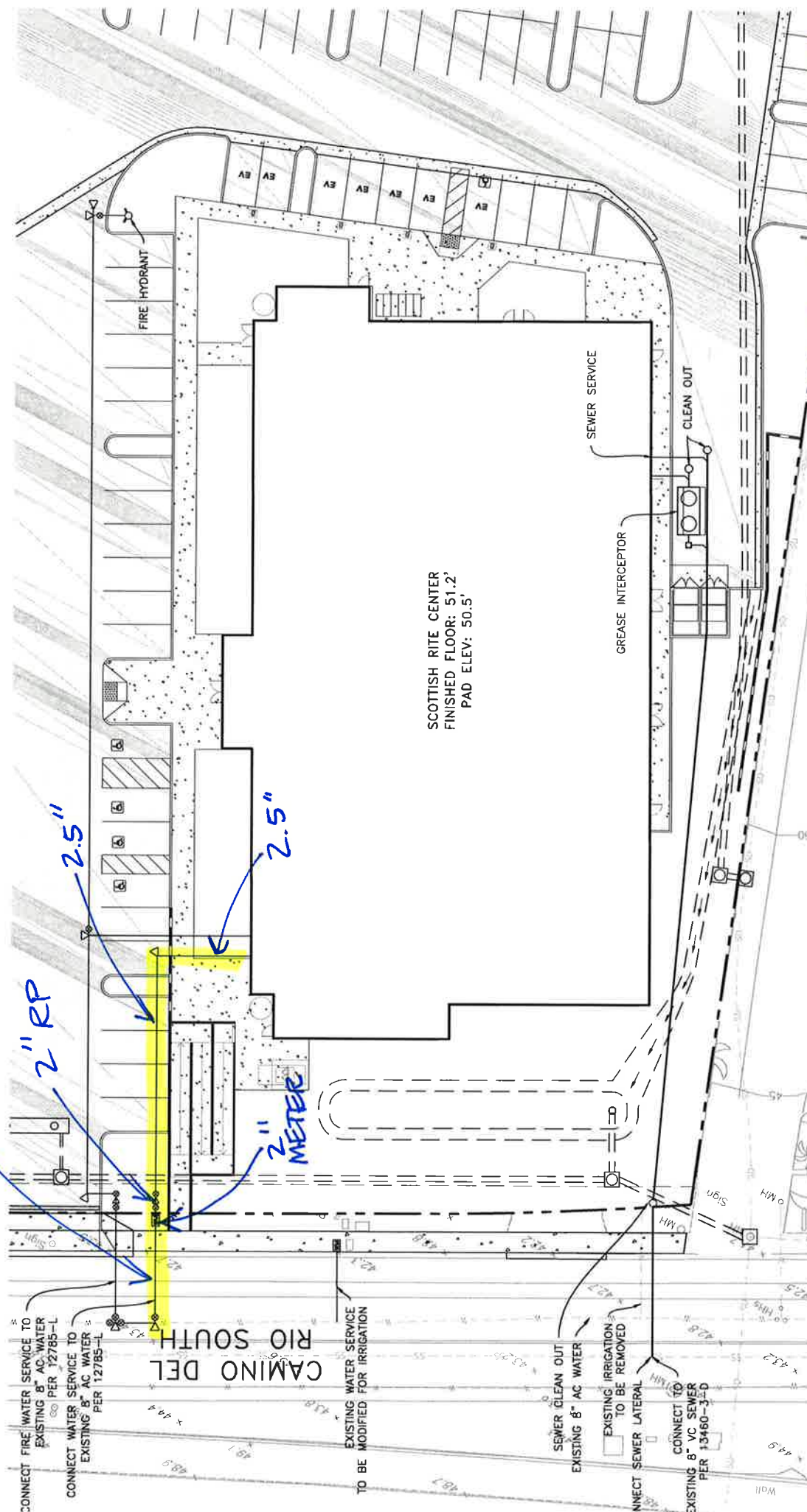
*This is from Leonard Wilson 8-25-2016, but it is not
officially approved by the City yet.*

Domestic Water Building Supply Sizing:

Figure 1 on the next page shows the pipe segments which make up the domestic water distribution system for the Scottish Rite Center project. Pipe sizes are determined based on maintaining less than 8 feet per second velocity in the pipes. Table 1 on the second following page presents the range of Water Fixture Units for a given pipe size that will keep the pipeline flow velocity below 8 fps in accordance with the Plumbing Code. These pipe sizes are the minimum required sizes; larger diameters may be used to simplify installation and allow for a more uniform layout of the piping within the project site.

For smaller than 4-inch piping, use copper piping or PVC Schedule 80 with solvent cemented joints.

2" LATERAL (MIN.)



BASE FILE REC'D 1/13/2020 SDC

FIGURE 1
DOMESTIC

<p>TABLE 1</p> <p>SIZE OF PRIVATE DOMESTIC SYSTEM PIPING BASED ON NUMBER OF WATER FIXTURE UNITS SERVED</p>	
Number of Fixture Units	Minimum System Pipe Size¹
0 - 13	1 1/4-inch
14 - 35	1 1/2-inch
36 - 155	2-inch
156 - 355	2 1/2-inch
356 - 725	3-inch
726 - 1,920	4-inch
1,921 - 3,575	5-inch
3,576 - 6,175	6-inch

¹ Based on maximum velocity of 8 ft/s

Based on Curve 1 for WC, Valves

Domestic Water Service Pressure:

The maximum static water service pressure for the Scottish Rite Center project is based on service from the City of San Diego Alvarado 390 HGL Pressure Zone. Based on the finished floor elevation for the building of 51.2 feet, the maximum static water pressure for the site will be 146 psi.

The expected working pressure within the Scottish Rite Center site will be reduced from the maximum static pressure both by the available hydraulic grade line which is less than 390 feet (approximately 377 feet per City 2/2019 Fire Flow Test), and the pressure loss through the domestic meter (10 psi) and backflow preventer (15 psi). The estimated working pressure within the site will be approximately 116 psi at a finish floor elevation of 51.2 feet. Building pressure should be reduced to 80 psi as part of the final building design.

Scottish Rite Center San Diego, California

Private Fire Protection System Sizing Calculations

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Approach to the Project:

Sizing of the private fire protection system for the Scottish Rite Center project is based on two design parameters: first is the required fire hydrant flow; and second is the required individual building fire sprinkler flow. Since the fire hydrant flow requirement is generally much greater than the fire sprinkler flow, the fire hydrant flow dictates the piping sizes.

These calculations are for only the required fire hydrant flow. Calculations for the fire sprinkler system laterals are expected to be prepared by the fire sprinkler designer/installer. The following calculations only address sizing of the private fire protection system to achieve the fire hydrant flow requirements for the Scottish Rite Center project.

The general approach which will be followed is to determine from the City of San Diego Water Department Planning and Design Guide the required fire hydrant flow based on land use. Then, hydraulic calculations of the proposed private fire protection system will be prepared, and analyses performed to ensure adequate pipe sizing to achieve the required fire flow at greater than 20 psi residual pressure.

Fire Flow Requirement:

The fire hydrant flow from on the City of San Diego Water Department Planning and Design Guide is based on conservative planning criteria dependent upon the type of land use. For commercial land use, the planning level fire flow requirement is 4,000 gpm at 20 psi residual.

The City of San Diego Fire Department has always maintained that any single fire hydrant should be capable of delivering 1,500 gpm at greater than 20 psi residual. In addition, the Fire Department allows for a reduction in fire hydrant flow for buildings installing fire sprinkler systems.

The Scottish Rite Center project is anticipating (per SDE) to install one fire hydrant within its site. Additionally, there is an existing public fire hydrant located approximately 150 feet east of the project on Camino Del Rio South. The final fire flow requirements for the project have not yet been established.

The Scottish Rite Center will have fire sprinkler systems. Therefore, the planning guideline fire flow of 4,000 gpm could be reduced by as much as 50 percent to 2,000 gpm. One final consideration is that a single fire hydrant within the project has a practical limitation of 1,500 gpm. This is due to the maximum pumping capacity of a fire engine pumper truck which has the capability to connect to the 4" outlet on the fire hydrant. That being said, the approach taken in these calculations is to

demonstrate an onsite fire flow requirement of 2,000 gpm could be delivered to the single fire hydrant at a residual pressure greater than 20 psi.

In this approach we will be achieving the City Water Department planning guide for fire flow for a Commercial development with the assumed 50% reduction for fire sprinklers. If the fire flow requirement is increased beyond 2,000 gpm the proposed sizing should be reviewed. If the fire flow requirement is reduced, to say 1,500 gpm, it is anticipated that the piping would remain the same but the backflow preventer could be decreased to 8-inch.

Available Pressure During a Fire Flow:

A fire flow report was prepared by the City of San Diego for the existing public fire hydrant as part of the Home Depot fire designer (Telgian) work for the overall redevelopment project. It is presented as an appendix to their February 2019 report and is included in the following four sheets.

A worksheet (fifth sheet) is prepared to calculate the available hydraulic grade line at that existing City of San Diego modeled hydrant location based on the project's assumed fire flow requirement of 2,000 gpm.



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:
Telgian

Telephone No:
480-505-2331

Fax No:

E-mail Address:
crainier@telgian.com

Project Number for the Building Permits:

Location of Hydrants:

1895 Camino Del Rio South

Cross Street:

Qualcomm Way Texas St

City:

San Diego

State:

CA

ZIP Code:

92108

FOR CITY USE ONLY

Facility Sequence Number: (FSN):

15621907

Static: 144.33 PSI

Elevation: 44 FEET

Pitot: 0 PSI

Residual: 128.96 PSI

Date: 02-01-19

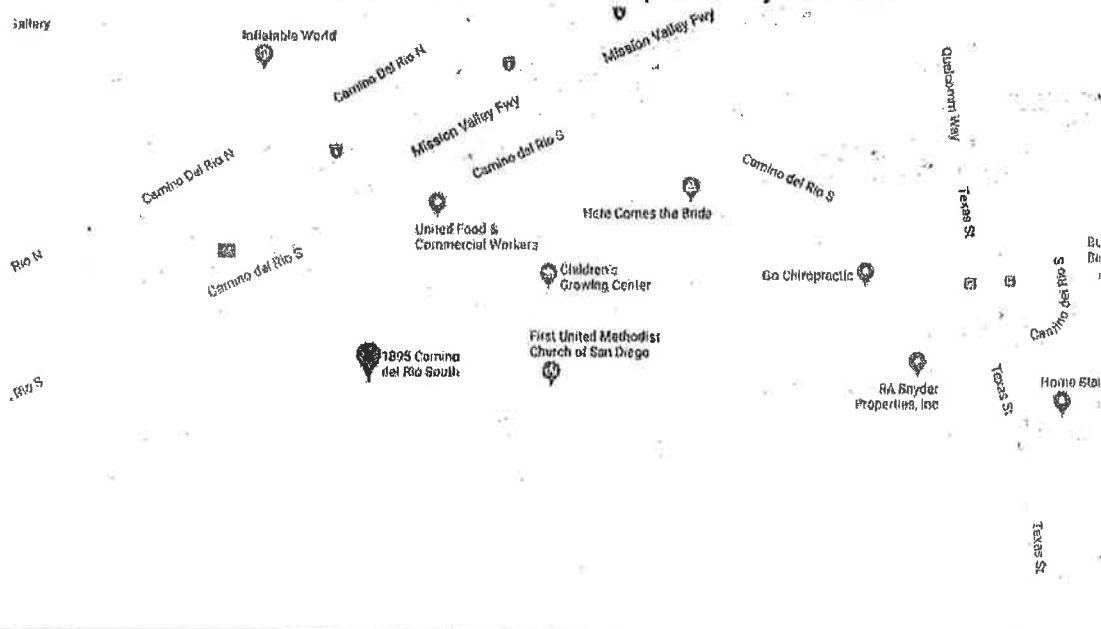
Flow: 1741.81 GPM

Researched in database by:

MARIA INIGUEZ

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



Printed on recycled paper. Visit our web site at www.sandiego.gov/development-services.

Upon request, this information is available in alternative formats for persons with disabilities.

DS-160 (10-16)

Field	Value
Fire Hydrant Name	H5621907
FSN	5621907
Size (inches)	6
Location	2150 W TEXAS S
Address	1895 CAM DEL RIO SOUTH
Elevation (feet) at Street	44
Static Pressure (psi)	144.3
Flow (gpm)	1741.8116
Residual Pressure (psi)	128.9627



Fire Hydrants

Main

Print

Copy

Attribute	Value
F&N	5621907
Size (inches)	6
Location	2150 W TEXAS S
Address	1895 CAM DEL RIO SOUTH
Elevation (feet) at Street	44
Static Pressure (psi)	144.3
Flow (gpm)	1741 @116
Residual Pressure (psi)	128.9627



Project: Scottish Rite Center

Job: 536-013/4

Date: 1/15/2020

HGL CALCULATION FROM FIRE FLOW TEST DATA

FLOW TEST INFORMATION

<u>Flow Test Location</u>	<u>Test Location Data</u>
1895 Camino Del Rio South (east of project)	Date: 2/1/2018 Elevation: 44 ft Static Pressure: 144.33 psi Residual Pressure: 128.96 psi Fire Flow Rate: 1741.81 gpm

HGL CALCULATION

System Factor "K" Calculation

$$K = \frac{\Delta h}{Q^{1.85}}$$

Δh = Static Pressure - Residual Pressure

$$\begin{aligned}\Delta h &= 15.37 \text{ psi} \\ &= 35.47 \text{ ft} \\ Q &= 1741.81 \text{ gpm}\end{aligned}$$

$$K = 3.58\text{E-}05$$

Residual Pressure Calculation

Project Demands

Hose Demand = 0 gpm
Fire Flow Requirement = 2000 gpm

$$K = 3.58\text{E-}05$$

$$\begin{aligned}\Delta h &= 49.26 \text{ ft} \\ &= 21.34 \text{ psi}\end{aligned}$$

$$\begin{aligned}\text{Residual Pressure} &= \text{Static Pressure} - \Delta h \\ &= 122.99 \text{ psi} \\ &= 283.86 \text{ ft}\end{aligned}$$

HGL Determination

HGL = Residual Pressure (ft) + Elevation (ft)

$$\text{HGL} = 283.86 + 44.00 \text{ ft}$$

$$\text{HGL} = 327.86 \text{ ft}$$

Hydraulic Calculations of Fire Flow:

The hydraulic calculations incorporate the required reduced pressure principle detector assembly at the proposed private fire protection system connection point in Camino Del Rio South. The candidate backflow device used for this analysis is the Watts 909RPDA. The data sheets for this backflow assembly are included as the following three sheets in this calculation package. Other reduced pressure principle detector check devices are acceptable to use for this purpose, provided they meet the requirements of USC Foundation for Cross Connection Control and Hydraulic Research.

The hydraulic calculations also incorporate minor losses for valves and fittings which are part of the private fire protection water system. Allowances for these components were made by utilizing “k” values for minor losses.

For Health Hazard Applications

Job Name _____
 Job Location _____
 Engineer _____
 Approval _____

Contractor _____
 Approval _____
 Contractor's P.O. No. _____
 Representative _____

Series 909RPDA

Reduced Pressure Detector Assemblies

Sizes: 2½" – 10" (65 – 250mm)

Series 909RPDA Reduced Pressure Detector Assemblies are used in health hazard applications and are designed exclusively for use in accordance with water utility authority containment requirements. It is mandatory to prevent the reverse flow of fire protection system substances, i.e., glycerin wetting agents, stagnant water and water of non-potable quality from being pumped or siphoned into the potable water line.

Benefits: Detects leaks . . . with emphasis on the cost of unaccountable water; incorporates a meter which allow the water utility to:

- detect leaks that historically create great annual cost due to waste
- provide a detection point for unauthorized use. It can help locate illegal taps

Modular check design concept facilitates maintenance and assembly access. All sizes are standardly equipped with AWWA epoxy coated, UL/FM listed OSY resilient seated gate valves, CFM (cubic feet per minute) or GPM (gallon per minute) meter and ball type test cocks. A pressure differential relief valve is located in a zone between the check valves.

Modular Design

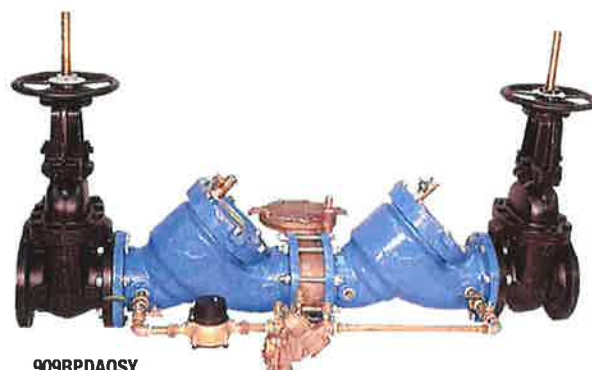
Features a modular design concept which facilitates maintenance and assembly access. All sizes are standardly equipped with gate valves and ball type test cocks.

Features

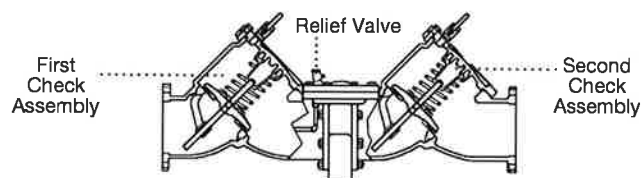
- Body construction fused epoxy coated cast iron
- Replaceable bronze seats
- Maximum flow at low pressure drop
- Compact for economy combined with performance
- Design simplicity for easy maintenance
- Furnished with ⅝" x ¾" (16 x 19mm) meter
- Air-in/Water-out relief valve design provides maximum capacity during emergency conditions.
- No special tools required

Specifications

A Reduced Pressure Detector Assembly shall be installed on fire protection systems when connected to a public water supply. Degree of hazard present is determined by the local authority having jurisdiction. The unit shall be a complete assembly including UL listed and FM approved OSY shutoff valves. Including an auxiliary line consisting of an approved backflow preventer and water meter. The assembly shall meet the requirements of AWWA C511-92; ASSE 1047; UL Classified File No. EX3185; CSA B64 and USC Manual 8th. Edition. Assembly shall be a Watts Series 909RPDA.

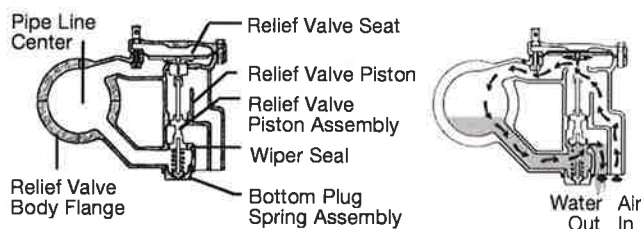


909RPDAOSY



How it operates

The unique relief valve construction incorporates two channels: one for air, one for water. When the relief valve opens, as in the accompanying air-in/water-out diagram, the right-hand channel admits air to the top of the reduced pressure zone, relieving the zone vacuum. The channel on the left then drains the zone to atmosphere. Therefore, if both check valves foul, and simultaneous negative supply and positive backpressure develops, the relief valve uses the air-in/water-out principle to stop potential backflow.



Now AVAILABLE
WattsBox Insulated Enclosures.

For more information, send for literature ES-WB.

NOTICE

The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product.

NOTICE

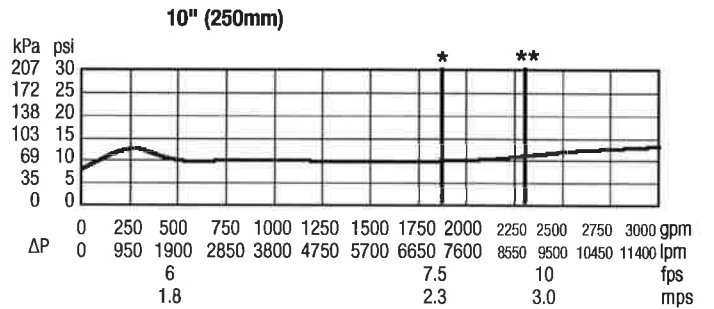
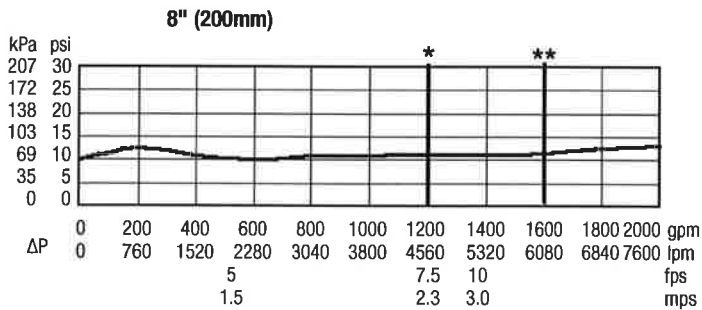
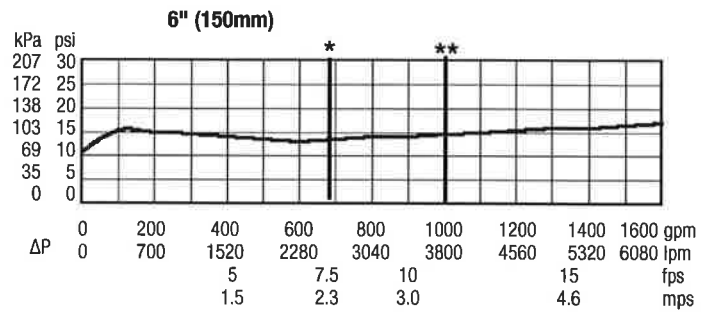
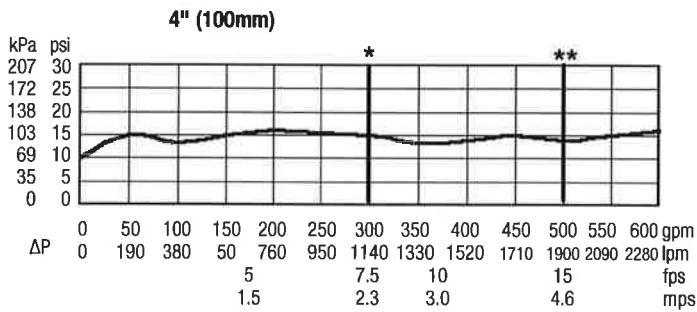
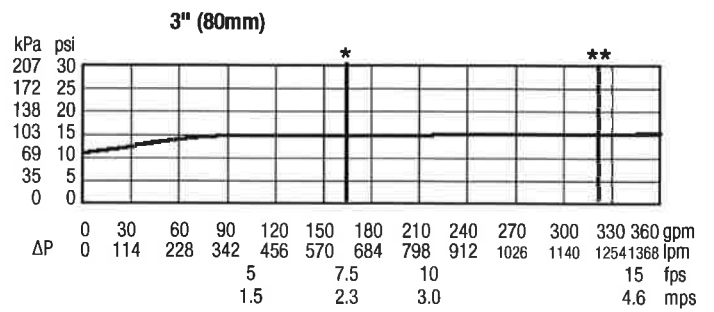
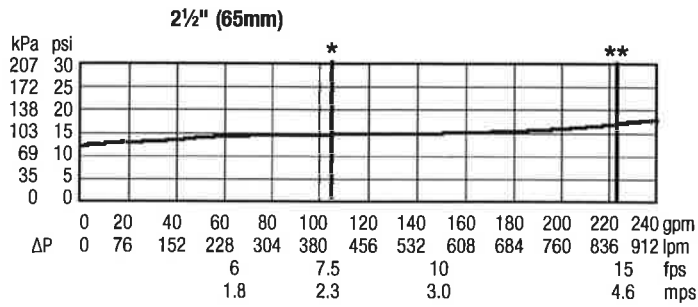
Inquire with governing authorities for local installation requirements

Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Watts Technical Service. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.

WATTS®

Capacity

*Typical maximum flow rate (7.5 feet/sec.) **UL rated flow



Hydraulic Calculation Results

The following sheets present the results of hydraulic calculations prepared to verify the ability of the proposed and recommended private fire protection system to deliver the anticipated fire hydrant flow requirement at residual pressures greater than 20 psi.

The results show that for a fire flow of 2,000 gpm, the residual pressure at the fire hydrant in the Scottish Rite Center site is 77 psi.

Figure 1 identifies the recommended pipe sizes and backflow size for the private fire protection system.

As stated at the beginning of this package of calculations, the fire sprinkler laterals which serve only the building fire sprinkler systems have not been included in the sizing calculations herein. The sizing of the private fire sprinkler lines is expected to be completed by the fire sprinkler system designer.

Project: Scottish Rite Center - Fire Protection System
 Job: 536-013/4
 Date: 1/15/2020

DESIGN FLOWRATE

$$Q = 2,000 \text{ gpm}$$

$$\begin{aligned} \text{Velocity} &= 12.8 \text{ fps} \\ D &= 8 \text{ in} \\ A &= 0.348889 \text{ sf} \\ Q_{\text{cfs}} &= 4.456328 \end{aligned}$$

$$\begin{aligned} \text{Velocity} &= 12.8 \text{ fps} \\ D &= 8 \text{ in} \\ A &= 0.348889 \text{ sf} \\ Q_{\text{cfs}} &= 4.456328 \end{aligned}$$

8-INCH PIPING

PIPING LENGTH

$$\text{Piping length from Fire Test to POC} = 300.00 \text{ ft}$$

FRICTION LOSSES IN PIPING - H(f)

$$\text{Hazen-Williams Formula} \quad H_f = \frac{10.44 * \left(\frac{Q}{C} \right)^{1.852} * L}{D^{4.8655}}$$

$$\begin{aligned} H(f) &= \text{friction losses in ft} \\ Q &= 2,000 \text{ gpm} \\ C &= 120 \text{ for design} \\ L &= 300.00 \text{ ft} \\ D &= 8 \text{ in} \end{aligned}$$

$$\text{Therefore, } H(f) = 23.16 \text{ ft}$$

MINOR LOSSES - H(m)

Piping

$$H_m = \sum K \frac{V^2}{2g}$$

$$\begin{aligned} H(m) &= \text{minor losses, ft} \\ \sum K &= \text{sum of minor loss coefficients} \\ V &= 12.8 \text{ fps} \\ g &= \text{gravitational constant} \\ &= 32.17 \text{ fps} \end{aligned}$$

Project: Scottish Rite Center - Fire Protection System
 Job: 536-013/4
 Date: 1/15/2020

Minor loss coefficients

<u>Description</u>	<u>Quantity</u>	<u>K-value</u>	<u>K-value, total</u>
90 degree bend	2	0.3	0.6
45 degree bend	5	0.2	1.0
Tee-thru, flanged	0	0.3	0.0
Plug valve	1	1.0	1.0
Tee-branch, flanged	1	0.8	0.8
Wye	0	0.5	0.0
Check valve	0	2.5	0.0
Exit Loss	1	0.3	0.3

$$\sum K = 3.7$$

Therefore, $H(m) = 9.26 \text{ ft}$

ONSITE PIPING

PIPING LENGTH

Piping length from Street POC to Hydrant = 360.00 ft

FRICTION LOSSES IN PIPING - H(f)

Hazen-Williams Formula

$$H_f = \frac{10.44 * \left(\frac{Q}{C}\right)^{1.852} * L}{D^{4.8655}}$$

H(f) = friction losses in ft

Q = 2,000 gpm

C = 120 for design

L = 360.00 ft

D = 8 in

Therefore, $H(f) = 27.79 \text{ ft}$

MINOR LOSSES - H(m)

Piping

$$H_m = \sum K \frac{V^2}{2g}$$

H(m) = minor losses, ft

$\sum K$ = sum of minor loss coefficients

V = 12.8 fps

g = gravitational constant

= 32.17 fps

Project: Scottish Rite Center - Fire Protection System
 Job: 536-013/4
 Date: 1/15/2020

Minor loss coefficients

<u>Description</u>	<u>Quantity</u>	<u>K-value</u>	<u>K-value, total</u>
90 degree bend	1	0.3	0.3
45 degree bend	0	0.2	0.0
Tee-thru, flanged	0	0.3	0.0
Isolation Valve	1	1.0	1.0
Tee-branch, flanged	0	0.8	0.0
Wye	0	0.5	0.0
Check valve	0	2.5	0.0
Gate Valve	2	0.3	0.6

$$\sum K = 1.9$$

Therefore, H(m) = 4.82 ft

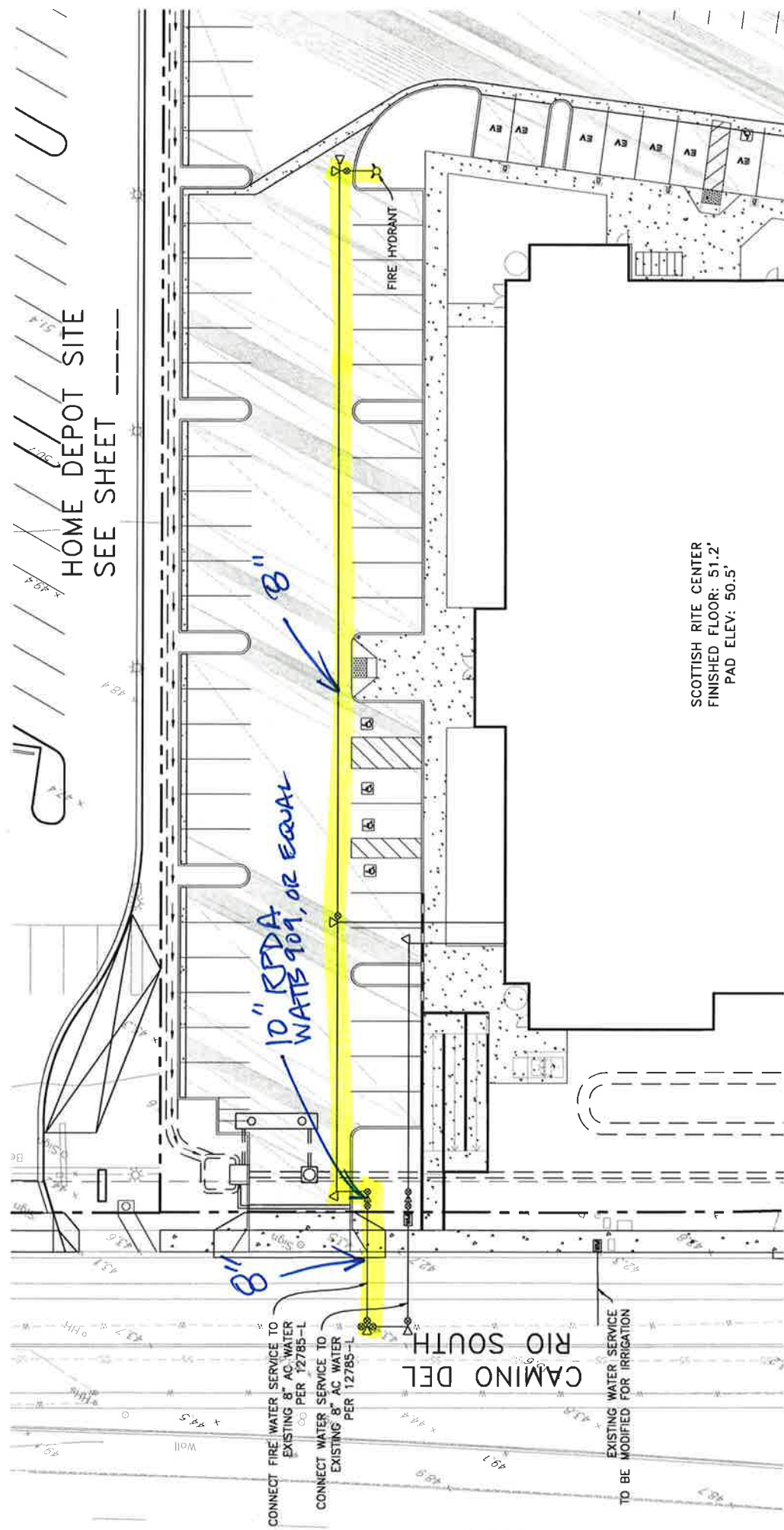
ADDITIONAL HEADLOSSES

Meter Loss	0	psi	
Backflow Preventer Lc	15	psi	Assumed
Total	15	psi	
	34.62	ft	

TOTAL LOSSES 99.64 ft

RESIDUAL PRESSURE AT HYDRANT

Available HGL per FF Test	327.86 ft	
Total Losses	99.64 ft	
Hydrant Elevation (5' outside bui	50.50 ft	Building Pad Elevation
Residual Pressure at Hydrant	77.00 psi	



Base File Rec'd 1/13/2020 SDE

FIGURE 1
FIRE

February 11, 2019

Mr. Bob Burnside, Construction Manager
The Home Depot
3800 West Chapman Avenue
Orange, CA 92628
Phone: 741-940-3549
Email: bob_burnside@homedepot.com

**RE: Home Depot
Water Supply Test and Site Flow Analysis
Mission Valley - San Diego, CA**

Dear Mr. Burnside:

The requested water supply test and site flow analysis for the subject project are detailed in this report and submitted for review and posting.

SUMMARY OF RESULTS (CONCLUSION C1 - AS DESIGNED)

- o Fireline Base of Riser (BOR) static pressure at Finish Floor Elevation (FFE): 123.5 psi
- o Fireline BOR high static pressure at FFE: 144.0 psi
- o Fireline BOR residual pressure at FFE: (Alternate ESFR Demand) 90.0 psi @ 2318 gpm
- o Fireline BOR residual pressure at FFE: (Standard Prototypical Demand) 91.5 psi @ 2250 gpm
- o Assumed Fireline BOR FFE: 57-ft. AMSL
- o Safety Factor Utilized in Calculations: -5.0 psi
- o Fireline Backflow Preventer Required: Reduced Pressure Detector Assembly Type Backflow Preventer Located at the Property Line (8-inch Colt C500 is assumed for calculations) There are two backflows, one for each assumed tap location for the loop.
- o **A FIRE PUMP SHOULD NOT BE REQUIRED FOR THE 2318 GPM DEMAND. (Note: While the pressures indicate it does not meet the required demand by 1 psi, minor adjustments to sprinkler system design should be possible to avoid a pump).**
- o **A FIRE PUMP WILL NOT BE REQUIRED FOR THE 2250 GPM DEMAND.**
- o **A WATER STORAGE TANK WILL NOT BE REQUIRED FOR EITHER OF THE FIRE SPRINKLER DEMANDS.**

Telgian Engineering & Consulting
ENGINEERS • CONSULTANTS • ANALYSTS • ASSESSORS
19009 33rd Avenue West, Suite 206 Lynnwood, WA 98036 USA

SUMMARY OF RESULTS (CONCLUSION C2 – AS DESIGNED)

- o Fire hydrant static pressure at Finish Floor Elevation (FFE): 123.5 psi
- o Fire hydrant residual pressure at FFE: 58.5 psi @ 3750 gpm
- o Assumed fire hydrant FFE: 54-ft. AMSL
- o Safety Factor Utilized in Calculations: -5.0 psi
- o **A FIRE PUMP WILL NOT BE REQUIRED.**
- o **A WATER STORAGE TANK WILL NOT BE REQUIRED.**

Assumptions:

Water supply calculations presented herein are based on Telgian's best understanding of the final fire suppression system riser and lead-in locations. Actual system demands may vary depending on several factors. Calculations presented in this report take as many variables into account as possible but recommendations may change in some situations where available water pressure is borderline. It is highly recommended that additional reviews and, if necessary, calculations be completed if assumptions presented in this report change in any way.

Information Gathered:

1. The City of San Diego Development Services conducted a water model on February 1, 2019. Telgian received the results of the water model via email on February 4, 2019. This analysis is based on results from that test.
2. Water main sizes and layout were provided by Maria Iniguez with the City of San Diego Development Services.
3. Telgian obtained information on backflow prevention requirements from Edson Renyo with the City of San Diego Development Services and the City of San Diego Development Services website <https://www.sandiego.gov/development-services>. For fire services, a reduced pressure detector assembly, (Ames C500) is required. This device shall be located at the property line.

The Site:

This site is located in Mission Valley in the northern portion of San Diego along the south side of Camino Del Rio South near exit 6A from Interstate 8. A 30-inch public distribution main from the Alvarado Water Distribution Plant is located along the north side of Camino Del Rio South which supplies an 8-inch asbestos cement lined public water main that is located along the south side of Camino Del Rio South which is assumed that it is to supply an 8-inch service loop to this property. The arrangement of the lines in the immediate vicinity of the property are shown on Attachment #1 – Location Sketch/ Area water map. It is assumed that sprinkler protection for this facility is to be provided by an 8-inch lead from the 8-inch fire service loop for the property, as shown on Attachment #1.

The Public System:

The City of San Diego imports the majority of its water supply, the bulk of which is raw water purchased from the San Diego County Water Authority. All raw water is treated before entering the City's drinking water distribution system. Less than 10 percent of the imported water purchased from the Water Authority is a blend of treated water from the Metropolitan Water District (MWD) Skinner Water Treatment Plant, the Water Authority's Twin Oaks Water Treatment Plant or the Carlsbad Desalination Plant. The majority of imported water from the Water Authority is a blend from the Colorado River and State Water Project. The water is stored in nine different reservoirs which are mainly surface lakes in elevated locations throughout the city having a total overall capacity of approximately 185 billion gallons when at full capacity. The reservoirs total current capacity is approximately 92 billion gallons. The water treatment plant serving this area is the Alvarado Water Treatment Plant, which has a capacity of 120 million gallons per day. Additional information was requested, however, no information was available due to security reasons.

Water Model Information Provided:

A water model was provided at the connection of the existing hydrant # H5621907 to the 8-inch public main in Camino Del Rio South in front of the proposed site approximately 80-feet east of the assumed 8-inch tap to the site. A total flow of 1742 gpm was noted at a residual pressure of 129 psi and a static pressure of 144 psi. The water model was figured at an elevation of 44 ft., AMSL, which is 13 feet below the assumed finish floor elevation of the building (57 ft., AMSL). This test is effective at the connection of the pressure hydrant to the 8-inch public main along Camino Del Rio South in front of the site for friction loss purposes. Please see enclosed Attachment #2 for graphical representation of this test and necessary calculations. The Water Model was made on February 1, 2019.

* Adjustments were made for assumed pipe friction loss to the site entry point, (-9.5 psi), elevation change (-5.5 psi), safety factor (-5.0 psi) and two backflow prevention devices (-8.5 and -9.0 psi). See following comments for additional information.

Additional Comments:

Note: The alternate sprinkler demand noted anticipates the use of an ESFR sprinkler system should it be utilized to eliminate the need for smoke removal due to the roof top parking deck.

Information was requested regarding testing procedures for MIC within the water system. Currently the system is not tested for MIC at this time, and no evidence has been recorded to date.

The public system can be considered a reliable supply with respect to Home Depot duration requirements. This acceptability is based upon the system capability to maintain the required fire flow for the design 120 minute duration.

A 50 % reduction for fully sprinklered buildings is acceptable in the determination of fire flows in accordance with the California Fire Code, Appendix B assuming city amendments. Based upon the assumed size of the building and its classification as a Type IIB per the California Building Code, the required flow rate reduces to 3750 gpm at 20 psi from the remote hydrants on the property, labeled H, H2, H3 and SRC on Attachment #1. (See attached calculations)

Conclusions:

C1. FIRE WATER SUPPLY: The available public supplies combined with the assumed fire protection lead-in sizing and arrangement, as shown on Attachment #1, should yield a base of riser supply of 123.5 psi static and 2318 gpm flowing at a 90.0 psi residual and 2250 gpm flowing at a 91.5 psi residual. This supply is downstream of two (2) assumed 8-inch Ames Colt C500 reduced pressure double detector check type backflow preventers. This should meet (with minor sprinkler system design modifications) the assumed minimum alternative target demand of 2318 gpm at 91 psi for the supply of sprinkler protection without a pump and it exceeds the minimum prototypical target demand of 2250 gpm at 50 psi for the supply of sprinkler protection without a pump. See Attachment #2 for a graphical representation and necessary calculations.

C2. FIRE HYDRANT FLOW SUPPLY: The available public supplies combined with the assumed water line sizing and arrangement, as shown on Attachment #1, should yield a fire hydrant flow rate of 3750 gpm at 58.5 psi. This exceeds the minimum target demand of 3750 gpm at 20 psi required by the California Fire Code. See Attachment #3 for a graphical representation and necessary calculations.

This analysis assumes that the installation meets the design parameters and information stated herein. If changes are made, they should be analyzed to determine resultant effects on the water supply.

If you need additional information, please feel free to contact us.

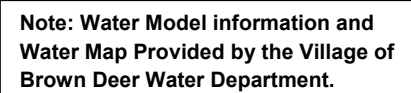
Sincerely,

Brian S. Garland, CET
Senior Fire Protection Consultant
Email: bgarland@telgian.com
Phone: 480-313-8742

ATTACHMENTS:

Attachment #1 – Location Sketch/ Area Water Map
Attachment #2 – Water Supply Plot – Fire Sprinkler Calculations
Attachment #3 – Water Supply Plot – Fire Hydrant Calculations
Attachment #4 – Water Model – Provided by the City of San Diego Development Services

Store # TBA – Mission Valley – San Diego, CA
Notes by: Brian Garland, Telgian Corporation
Water Model Provided by: Maria Iniguez, City of San Diego
Development Services



**WATER SUPPLY SITE SURVEY
FIRE SPRINKLER DEMAND**

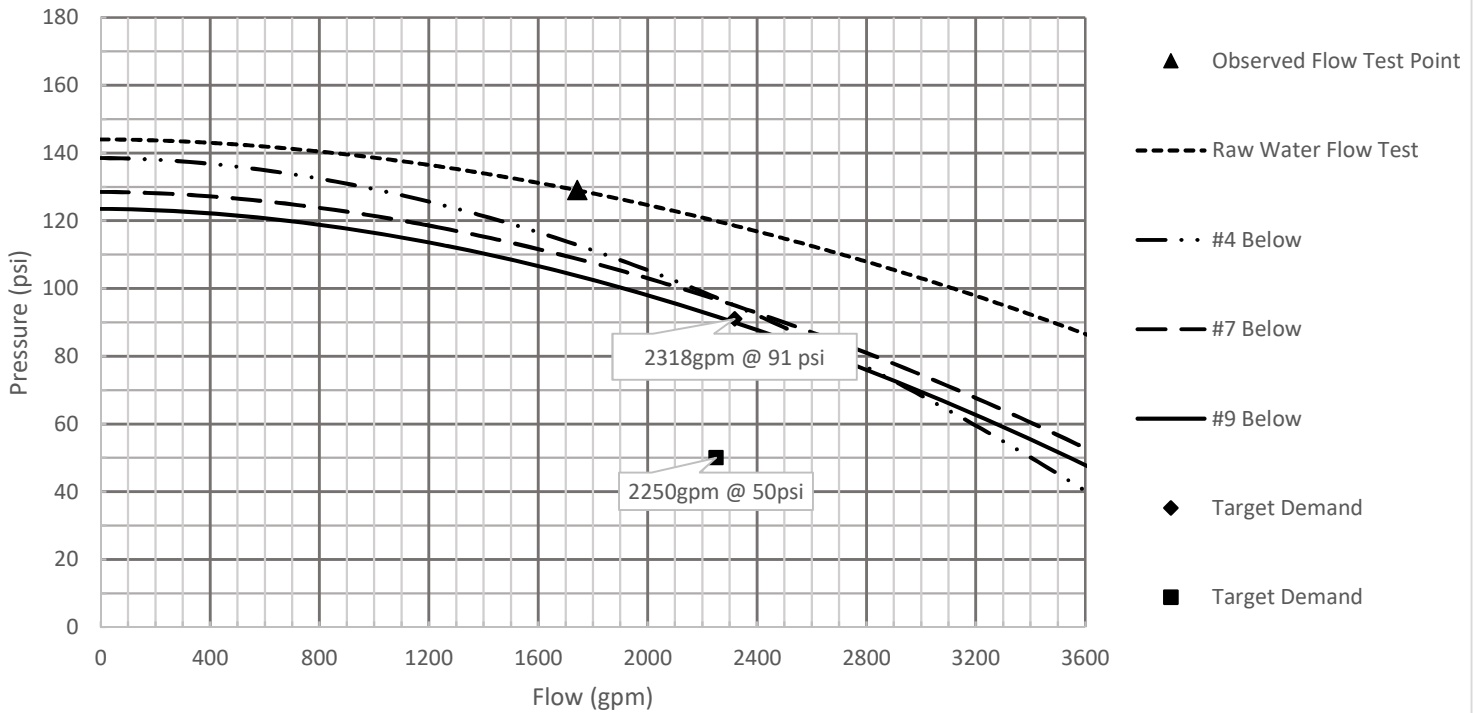
PROJECT: The Home Depot
LOCATION: Mission Valley
CITY/STATE: San Diego, CA

Static (psi)	Residual (psi)	Flow (gpm)
144	129	1742

Gauge Hydrant Elevation (ft)	Building FFE (ft)
44	57

Outlet Diameter #1 (in)	Hydrant Coefficient #1	Pitot #1 (psi)	Outlet Diameter #2 (in)	Hydrant Coefficient #2	Pitot #2 (psi)	Outlet Diameter #3 (in)	Hydrant Coefficient #3	Pitot #3 (psi)	Outlet Diameter #4 (in)	Hydrant Coefficient #4	Pitot #4 (psi)
2.5	0.899	27	2.5	0.899	27						

Gauge Hydrant Location:	At connection of hydrant # H5621907 to 8" public main in Camino Del Rio S. approximately 80 ft. east of assumed tap for site.											
Flow Hydrant Location:	At connection of hydrant # H5621907 to 8" public main in Camino Del Rio S. approximately 80 ft. east of assumed tap for site.											
Test By:	Water Model from City of San Diego Development Services					Date:		2/1/2019		Time:		N/A
Backflow Prevention:	Size:	8-inch	Type:	Reduced Pressure Detector		Mfg:	Colt		Model:		C500	
Water Meter:	Size:	None	Mfg:			Model:						



Flow Rate (gpm)		0	2318	2250	
		Static (psi)	Residual (psi)		
1.	Pressure available at test	144	118.5	120.0	
2.	Elevation Adjustment	-5.5	Included in Calcs	Included in Calcs	
3.	Pressure loss due to friction	0	Included in Calcs	Included in Calcs	
4.	Pressure at base of riser upstream of BFP & meter	138.5	95	96.5	
5.	BFP loss/preload	-10	0	0	
6.	Water meter loss	0	0	0	
7.	Pressure at base of riser downstream of BFP & meter	128.5	95	96.5	
8.	Safety factor	-5	-5	-5	
9.	Total base of riser pressure	123.5	90	91.5	

Calculated Demands	
gpm	psi
2318	91
2250	50

Additional Demands	
gpm	psi

DATE: 2/11/2019\HASS\THD MISSION VALLEY - SAN DIEGO, CA - LOOP - 2318.SDF

JOB TITLE: Attachment #2

WATER SUPPLY DATA

SOURCE NODE TAG	STATIC PRESS. (PSI)	RESID. PRESS. (PSI)	FLOW @ (GPM)	AVAIL. PRESS. (PSI)	TOTAL @ DEMAND (GPM)	REQ'D PRESS. (PSI)
SRC	144.3	129.0	1741.8	118.3	2318.0	

AGGREGATE FLOW ANALYSIS:

TOTAL FLOW AT SOURCE	2318.0 GPM
TOTAL HOSE STREAM ALLOWANCE AT SOURCE	0.0 GPM
OTHER HOSE STREAM ALLOWANCES	2318.0 GPM
TOTAL DISCHARGE FROM ACTIVE SPRINKLERS	0.0 GPM

NODE ANALYSIS DATA

NODE TAG	ELEVATION (FT)	NODE TYPE	PRESSURE (PSI)	DISCHARGE (GPM)
F	57.0	HOSE STREAM	94.8	1918.0
1	54.0	- - - -	99.0	- - -
2	44.0	- - - -	117.4	- - -
3	52.0	- - - -	112.6	- - -
4	44.0	- - - -	118.3	- - -
BF1	44.0	- - - -	115.8	- - -
BF2	44.0	- - - -	106.8	- - -
BF3	52.0	- - - -	111.9	- - -
BF4	52.0	- - - -	103.9	- - -
H	54.0	HOSE STREAM	99.5	400.0
H2	54.0	- - - -	101.9	- - -
H3	54.0	- - - -	100.2	- - -
SRC	44.0	SOURCE	118.3	2318.0

DATE: 2/11/2019\HASS\THD MISSION VALLEY - SAN DIEGO, CA - LOOP - 2318.SDF

JOB TITLE: Attachment #2

PIPE DATA

PIPE TAG	END	ELEV.	NOZ.	PT	DISC.	Q (GPM)	DIA (IN)	LENGTH	PRESS.	
	NODES	(FT)	(K)	(PSI)	(GPM)	VEL (FPS)	HW (C)	(FT)	SUM.	
							FL/FT		(PSI)	
F 1	Pipe: 1					-1918.0	8.390	PL 65.00	PF	2.9
		57.0	H.S.	94.8	1918.0	11.1	140	FTG ETG	PE	1.3
		54.0	0.0	99.0	0.0		0.018	TL 162.00	PV	
1 H	Pipe: 2					-1012.4	7.980	PL 45.00	PF	0.5
		54.0	0.0	99.0	0.0	6.5	150	FTG EG	PE	0.0
		54.0	H.S.	99.5	400.0		0.006	TL 78.00	PV	
H BF2	Pipe: 3					-1412.4	7.980	PL 200.00	PF	2.9
		54.0	H.S.	99.5	400.0	9.1	150	FTG 2E	PE	4.3
		44.0	0.0	106.8	0.0		0.012	TL 254.00	PV	
BF1 BF2	Pipe: 4									
		44.0	0.0	115.8	0.0					
		44.0	0.0	106.8	0.0					
FIXED PRESSURE LOSS DEVICE 9.0 psi, 1412.4 gpm										
BF1 2	Pipe: 5					-1412.4	7.980	PL 30.00	PF	1.7
		44.0	0.0	115.8	0.0	9.1	150	FTG 2ETG	PE	0.0
		44.0	0.0	117.4	0.0		0.012	TL 143.00	PV	
2 4	Pipe: 6					-1412.4	8.390	PL 80.00	PF	0.8
		44.0	0.0	117.4	0.0	8.2	140	FTG ----	PE	0.0
		44.0	0.0	118.3	0.0		0.010	TL 80.00	PV	
1 H3	Pipe: 7					-905.6	7.980	PL 220.00	PF	1.2
		54.0	0.0	99.0	0.0	5.8	150	FTG G	PE	0.0
		54.0	0.0	100.2	0.0		0.005	TL 226.00	PV	
H3 H2	Pipe: 8					-905.6	7.980	PL 320.00	PF	1.8
		54.0	0.0	100.2	0.0	5.8	150	FTG E	PE	0.0
		54.0	0.0	101.9	0.0		0.005	TL 347.00	PV	
H2 BF4	Pipe: 9					-905.6	7.980	PL 150.00	PF	1.1
		54.0	0.0	101.9	0.0	5.8	150	FTG 2EG	PE	0.9
		52.0	0.0	103.9	0.0		0.005	TL 210.00	PV	
BF3 BF4	Pipe: 10									
		52.0	0.0	111.9	0.0					
		52.0	0.0	103.9	0.0					
FIXED PRESSURE LOSS DEVICE 8.0 psi, 905.6 gpm										
BF3 3	Pipe: 11					-905.6	7.980	PL 30.00	PF	0.7
		52.0	0.0	111.9	0.0	5.8	150	FTG 2ETG	PE	0.0
		52.0	0.0	112.6	0.0		0.005	TL 143.00	PV	
3 4	Pipe: 12					-905.6	8.390	PL 485.00	PF	2.2
		52.0	0.0	112.6	0.0	5.3	140	FTG ----	PE	3.5
		44.0	0.0	118.3	0.0		0.005	TL 485.00	PV	
4 SRC	Pipe: 13					-2318.0	7.980	PL 0.25	PF	0.0
		44.0	0.0	118.3	0.0	14.9	150	FTG ----	PE	0.0
		44.0	SRCE	118.3	(N/A)		0.029	TL 0.25	PV	

DATE: 2/11/2019\HASS\THD MISSION VALLEY - SAN DIEGO, CA - LOOP - 2250.SDF

JOB TITLE: Attachment #2

WATER SUPPLY DATA

SOURCE NODE TAG	STATIC PRESS. (PSI)	RESID. PRESS. (PSI)	FLOW @ (GPM)	AVAIL. PRESS. (PSI)	TOTAL @ DEMAND (GPM)	REQ'D PRESS. (PSI)
SRC	144.3	129.0	1741.8	119.7	2250.0	

AGGREGATE FLOW ANALYSIS:

TOTAL FLOW AT SOURCE	2250.0 GPM
TOTAL HOSE STREAM ALLOWANCE AT SOURCE	0.0 GPM
OTHER HOSE STREAM ALLOWANCES	2250.0 GPM
TOTAL DISCHARGE FROM ACTIVE SPRINKLERS	0.0 GPM

NODE ANALYSIS DATA

NODE TAG	ELEVATION (FT)	NODE TYPE	PRESSURE (PSI)	DISCHARGE (GPM)
F	57.0	HOSE STREAM	96.7	1850.0
1	54.0	- - - -	100.8	- - -
2	44.0	- - - -	118.9	- - -
3	52.0	- - - -	114.1	- - -
4	44.0	- - - -	119.7	- - -
BF1	44.0	- - - -	117.3	- - -
BF2	44.0	- - - -	108.3	- - -
BF3	52.0	- - - -	113.4	- - -
BF4	52.0	- - - -	105.4	- - -
H	54.0	HOSE STREAM	101.2	400.0
H2	54.0	- - - -	103.5	- - -
H3	54.0	- - - -	101.9	- - -
SRC	44.0	SOURCE	119.7	2250.0

DATE: 2/11/2019\HASS\THD MISSION VALLEY - SAN DIEGO, CA - LOOP - 2250.SDF

JOB TITLE: Attachment #2

PIPE DATA

PIPE TAG	END	ELEV.	NOZ.	PT	DISC.	Q (GPM)	DIA (IN)	LENGTH	PRESS.	
	NODES	(FT)	(K)	(PSI)	(GPM)	VEL (FPS)	HW (C)	(FT)	SUM.	
							FL/FT		(PSI)	
F 1	Pipe: 1					-1850.0	8.390	PL 65.00	PF	2.8
		57.0	H.S.	96.7	1850.0	10.7	140	FTG ETG	PE	1.3
		54.0	0.0	100.8	0.0		0.017	TL 162.00	PV	
1 H	Pipe: 2					-969.0	7.980	PL 45.00	PF	0.5
		54.0	0.0	100.8	0.0	6.2	150	FTG EG	PE	0.0
		54.0	H.S.	101.2	400.0		0.006	TL 78.00	PV	
H BF2	Pipe: 3					-1369.0	7.980	PL 200.00	PF	2.8
		54.0	H.S.	101.2	400.0	8.8	150	FTG 2E	PE	4.3
		44.0	0.0	108.3	0.0		0.011	TL 254.00	PV	
BF1 BF2	Pipe: 4						FIXED PRESSURE LOSS DEVICE			
		44.0	0.0	117.3	0.0		9.0 psi, 1369.0 gpm			
		44.0	0.0	108.3	0.0					
BF1 2	Pipe: 5					-1369.0	7.980	PL 30.00	PF	1.6
		44.0	0.0	117.3	0.0	8.8	150	FTG 2ETG	PE	0.0
		44.0	0.0	118.9	0.0		0.011	TL 143.00	PV	
2 4	Pipe: 6					-1369.0	8.390	PL 80.00	PF	0.8
		44.0	0.0	118.9	0.0	7.9	140	FTG ----	PE	0.0
		44.0	0.0	119.7	0.0		0.010	TL 80.00	PV	
1 H3	Pipe: 7					-881.0	7.980	PL 220.00	PF	1.1
		54.0	0.0	100.8	0.0	5.7	150	FTG G	PE	0.0
		54.0	0.0	101.9	0.0		0.005	TL 226.00	PV	
H3 H2	Pipe: 8					-881.0	7.980	PL 320.00	PF	1.7
		54.0	0.0	101.9	0.0	5.7	150	FTG E	PE	0.0
		54.0	0.0	103.5	0.0		0.005	TL 347.00	PV	
H2 BF4	Pipe: 9					-881.0	7.980	PL 150.00	PF	1.0
		54.0	0.0	103.5	0.0	5.7	150	FTG 2EG	PE	0.9
		52.0	0.0	105.4	0.0		0.005	TL 210.00	PV	
BF3 BF4	Pipe: 10						FIXED PRESSURE LOSS DEVICE			
		52.0	0.0	113.4	0.0		8.0 psi, 881.1 gpm			
		52.0	0.0	105.4	0.0					
BF3 3	Pipe: 11					-881.0	7.980	PL 30.00	PF	0.7
		52.0	0.0	113.4	0.0	5.7	150	FTG 2ETG	PE	0.0
		52.0	0.0	114.1	0.0		0.005	TL 143.00	PV	
3 4	Pipe: 12					-881.0	8.390	PL 485.00	PF	2.1
		52.0	0.0	114.1	0.0	5.1	140	FTG ----	PE	3.5
		44.0	0.0	119.7	0.0		0.004	TL 485.00	PV	
4 SRC	Pipe: 13					-2250.0	7.980	PL 0.25	PF	0.0
		44.0	0.0	119.7	0.0	14.4	150	FTG ----	PE	0.0
		44.0	SRCE	119.7	(N/A)		0.027	TL 0.25	PV	

WATER SUPPLY SITE SURVEY
FIRE HYDRANT DEMAND

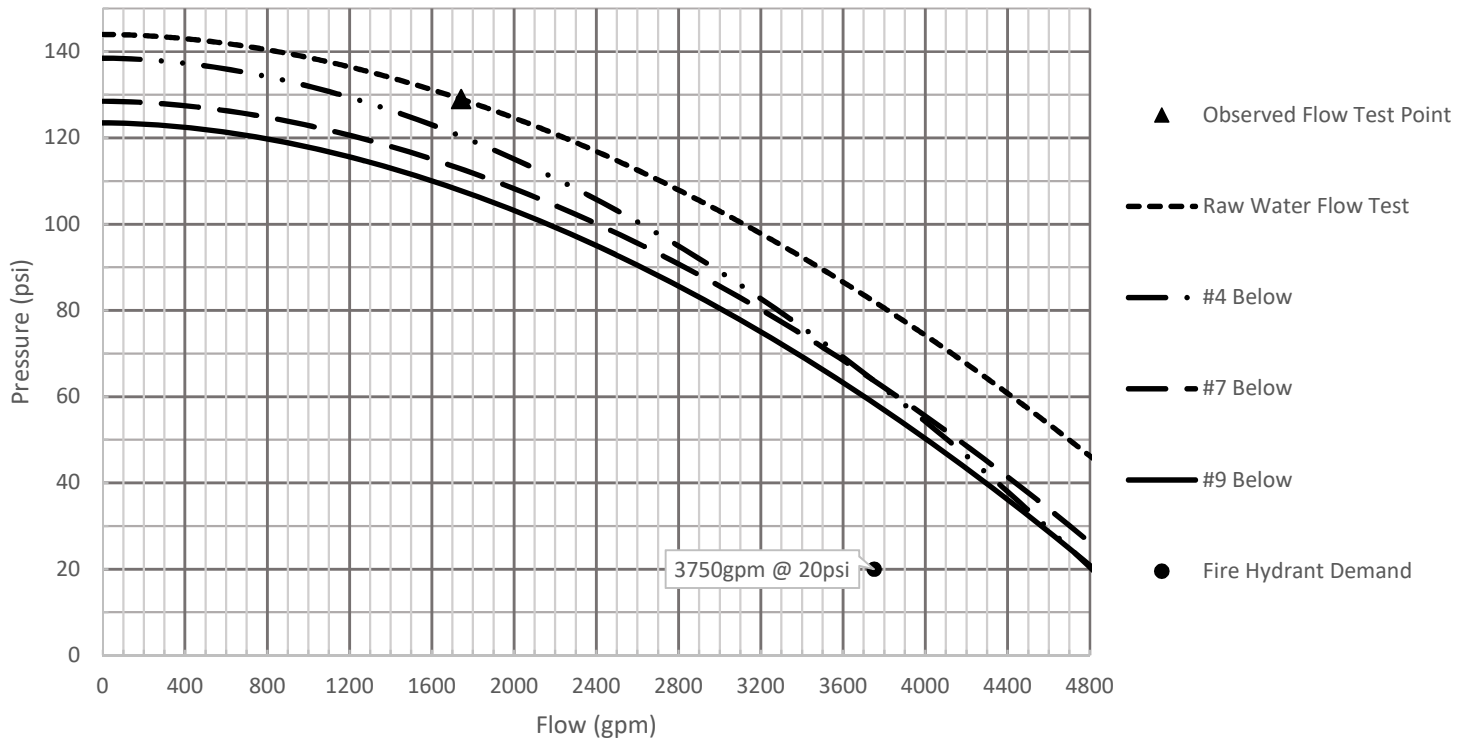
PROJECT: The Home Depot
LOCATION: Mission Valley
CITY/STATE: San Diego, CA

Static (psi)	Residual (psi)	Flow (gpm)
144	129	1742

Gauge Hydrant Elevation (ft)	Building FFE (ft)
44	57

Outlet Diameter #1 (in)	Hydrant Coefficient #1	Pitot #1 (psi)	Outlet Diameter #2 (in)	Hydrant Coefficient #2	Pitot #2 (psi)	Outlet Diameter #3 (in)	Hydrant Coefficient #3	Pitot #3 (psi)	Outlet Diameter #4 (in)	Hydrant Coefficient #4	Pitot #4 (psi)
2.5	0.899	27	2.5	0.899	27						

Gauge Hydrant Location:	At connection of hydrant # H5621907 to 8" public main in Camino Del Rio S. approximately 80 ft. east of assumed tap for site.										
Flow Hydrant Location:	At connection of hydrant # H5621907 to 8" public main in Camino Del Rio S. approximately 80 ft. east of assumed tap for site.										
Test By:	Water Model from City of San Diego Development Services					Date:	2/1/2019			Time:	N/A
Backflow Prevention:	Size:	8-inch	Type:	Reduced Pressure Detector			Mfg:	Ames		Model:	C500
Water Meter:	Size:	None	Mfg:				Model:				



Distributed Fire Flows (gpm)		0	1000	1000	1000	750
		Static (psi)	Residual (psi)			
1.	Pressure available at test	144	82.0	82.0	82.0	82.0
2.	Elevation Adjustment	-5.5	Included in Calcs	Included in Calcs	Included in Calcs	Included in Calcs
3.	Pressure loss due to friction	0	Included in Calcs	Included in Calcs	Included in Calcs	Included in Calcs
4.	Pressure at remote hydrants upstream of BFP & meter	138.5	58.3	58	57.6	80.9
5.	BFP loss/preload	-10	0	0	0	0
6.	Water meter loss	0	0	0	0	0
7.	Pressure at remote hydrants downstream of BFP & meter	128.5	58.3	58	57.6	80.9
8.	Safety factor	-5	-5	-5	-5	-5
9.	Available combined pressure at Total Fire Flow Demand	123.5	58.5			

Telgian Corporation

Total Fire Flow Demand	
gpm	psi
3750	20

DATE: 2/11/2019\THD MISSION VALLEY - SAN DIEGO, CA - LOOP - FIRE FLOW.SDF

JOB TITLE: Attachment #3

WATER SUPPLY DATA

SOURCE NODE TAG	STATIC PRESS. (PSI)	RESID. PRESS. (PSI)	FLOW @ (GPM)	AVAIL. PRESS. (PSI)	TOTAL @ DEMAND (GPM)	REQ'D PRESS. (PSI)
SRC	144.3	129.0	1741.8	80.9	3750.0	

AGGREGATE FLOW ANALYSIS:

TOTAL FLOW AT SOURCE	3750.0 GPM
TOTAL HOSE STREAM ALLOWANCE AT SOURCE	750.0 GPM
OTHER HOSE STREAM ALLOWANCES	3000.0 GPM
TOTAL DISCHARGE FROM ACTIVE SPRINKLERS	0.0 GPM

NODE ANALYSIS DATA

NODE TAG	ELEVATION (FT)	NODE TYPE	PRESSURE (PSI)	DISCHARGE (GPM)
F	57.0	- - - -	56.8	- - -
1	54.0	- - - -	58.1	- - -
2	44.0	- - - -	79.9	- - -
3	52.0	- - - -	72.5	- - -
4	44.0	- - - -	80.9	- - -
BF1	44.0	- - - -	77.8	- - -
BF2	44.0	- - - -	66.3	- - -
BF3	52.0	- - - -	70.8	- - -
BF4	52.0	- - - -	61.3	- - -
H	54.0	HOSE STREAM	58.3	1000.0
H2	54.0	HOSE STREAM	58.0	1000.0
H3	54.0	HOSE STREAM	57.6	1000.0
SRC	44.0	SOURCE	80.9	3000.0

DATE: 2/11/2019\THD MISSION VALLEY - SAN DIEGO, CA - LOOP - FIRE FLOW.SDF

JOB TITLE: Attachment #3

PIPE DATA

PIPE TAG						Q (GPM)	DIA (IN)	LENGTH	PRESS.		
END	ELEV.	NOZ.	PT	DISC.	VEL (FPS)	HW (C)		(FT)	SUM.		
NODES	(FT)	(K)	(PSI)	(GPM)		FL/FT			(PSI)		
F 1	Pipe: 1					0.0	8.390	PL	65.00	PF	0.0
	57.0	0.0	56.8	0.0	0.0		140	FTG	ETG	PE	1.3
	54.0	0.0	58.1	0.0			0.000	TL	162.00	PV	
1 H	Pipe: 2					-590.7	7.980	PL	45.00	PF	0.2
	54.0	0.0	58.1	0.0	3.8		150	FTG	EG	PE	0.0
	54.0	H.S.	58.3	1000.0			0.002	TL	78.00	PV	
H BF2	Pipe: 3					-1590.7	7.980	PL	200.00	PF	3.7
	54.0	H.S.	58.3	1000.0	10.2		150	FTG	2E	PE	4.3
	44.0	0.0	66.3	0.0			0.014	TL	254.00	PV	
BF1 BF2	Pipe: 4						FIXED PRESSURE LOSS DEVICE				
	44.0	0.0	77.8	0.0		11.5 psi, 1590.7 gpm					
	44.0	0.0	66.3	0.0							
BF1 2	Pipe: 5					-1590.7	7.980	PL	30.00	PF	2.1
	44.0	0.0	77.8	0.0	10.2		150	FTG	2ETG	PE	0.0
	44.0	0.0	79.9	0.0			0.014	TL	143.00	PV	
2 4	Pipe: 6					-1590.7	8.390	PL	80.00	PF	1.0
	44.0	0.0	79.9	0.0	9.2		140	FTG	----	PE	0.0
	44.0	0.0	80.9	0.0			0.013	TL	80.00	PV	
1 H3	Pipe: 7					590.7	7.980	PL	220.00	PF	0.5
	54.0	0.0	58.1	0.0	3.8		150	FTG	G	PE	0.0
	54.0	H.S.	57.6	1000.0			0.002	TL	226.00	PV	
H3 H2	Pipe: 8					-409.3	7.980	PL	320.00	PF	0.4
	54.0	H.S.	57.6	1000.0	2.6		150	FTG	E	PE	0.0
	54.0	H.S.	58.0	1000.0			0.001	TL	347.00	PV	
H2 BF4	Pipe: 9					-1409.3	7.980	PL	150.00	PF	2.4
	54.0	H.S.	58.0	1000.0	9.0		150	FTG	2EG	PE	0.9
	52.0	0.0	61.3	0.0			0.012	TL	210.00	PV	
BF3 BF4	Pipe: 10						FIXED PRESSURE LOSS DEVICE				
	52.0	0.0	70.8	0.0		9.5 psi, 1409.3 gpm					
	52.0	0.0	61.3	0.0							
BF3 3	Pipe: 11					-1409.3	7.980	PL	30.00	PF	1.6
	52.0	0.0	70.8	0.0	9.0		150	FTG	2ETG	PE	0.0
	52.0	0.0	72.5	0.0			0.012	TL	143.00	PV	
3 4	Pipe: 12					-1409.3	8.390	PL	485.00	PF	5.0
	52.0	0.0	72.5	0.0	8.2		140	FTG	----	PE	3.5
	44.0	0.0	80.9	0.0			0.010	TL	485.00	PV	
4 SRC	Pipe: 13					-3000.0	7.980	PL	0.25	PF	0.0
	44.0	0.0	80.9	0.0	19.2		150	FTG	----	PE	0.0
	44.0	SRCE	80.9	(N/A)			0.047	TL	0.25	PV	



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@sanidiego.gov, or mail request to the above address.

Please print or type legibly.

Company Requesting Hydrant Flow:
Telgian

Telephone No:
 480-505-2331

Fax No:

E-mail Address:
crainier@telgian.com

Project Number for the Building Permits:

Location of Hydrants:
1895 Camino Del Rio South

Cross Street:
Qualcomm Way Texas St

City:
San Diego

State:
CA

ZIP Code:
92108

FOR CITY USE ONLY

Facility Sequence Number: (FSN): **H5621907**

Static: **144.33** PSI Elevation: **44** FEET

Pitot: **0** PSI Residual: **128.96** PSI

Date: **02-01-19** Flow: **1741.81** GPM

Researched in database by: **MARIA INIGUEZ**

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@sanidiego.gov as soon as possible.

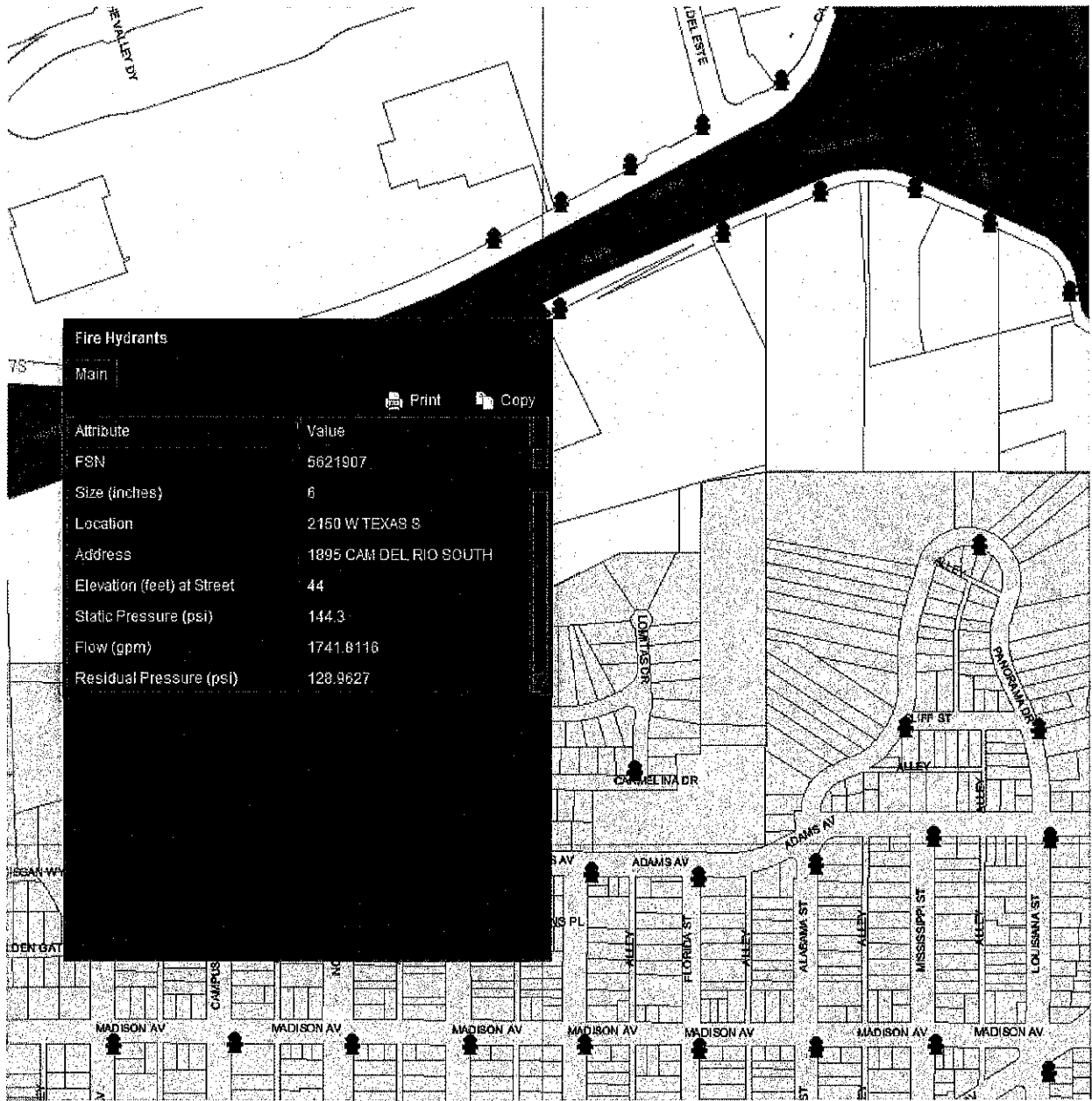
Please draw an accurate map for fire hydrant data



Printed on recycled paper. Visit our web site at www.sandiego.gov/development-services.

Upon request, this information is available in alternative formats for persons with disabilities.

Attribute	Value
Fire Hydrant Name	H5621907
FSN	5621907
Size (inches)	6
Location	2150 W TEXAS S
Address	1895 CAM DEL RIO SOUTH
Elevation (feet) at Street	44
Static Pressure (psi)	144.3
Flow (gpm)	1741.8116
Residual Pressure (psi)	128.9627



Fire Hydrants

Main

Print Copy

Attribute	Value
FSN	5621907
Size (inches)	6
Location	2150 W TEXAS S
Address	1895 CAM DEL RIO SOUTH
Elevation (feet) at Street	44
Static Pressure (psi)	144.3
Flow (gpm)	1741.8116
Residual Pressure (psi)	128.9627



The Home Depot, Mission Valley

San Diego, California

Private Domestic Water System Sizing Calculations

Prepared by:

**Dexter Wilson Engineering, Inc.
2234 Faraday Avenue
Carlsbad, CA 92008
(760) 438-4422**

Job Number 536-013/5



Prepared for:

San Dieguito Engineering, Inc.

Approach to the Project:

Sizing of the domestic (potable) water system for The Home Depot project is based on an approach consistent with the 2016 California Plumbing Code, Chapter 6 Water Supply and Distribution, and Appendix A Recommended Rules for Sizing the Water Supply System, and Appendix I Installation Standards, PVC Cold Water Building Supply and Yard Piping (IAPMO IS 8).

The procedure we followed was to estimate the number of Water Fixture Units for the store area/garden center within the project. Once the Water Fixture Units (WFUs) were determined, we used the Plumbing Code Chart A-103.1 to convert WFUs to water demand in gallons per minute (gpm). Using the gpm flow in any given pipe segment based on the number of WFUs being serviced by that pipe segment, we calculated the recommended pipe diameter based on a maximum flow velocity of 8 feet per second.

Detailed Presentation of the Calculations:

The following page includes the spreadsheet calculations done to determine the total project WFUs. Architectural plans were provided which illustrate some of the proposed water fixtures; the layout of the kitchen facility and ancillary water fixtures such as hose bibs and mop sinks is unknown. Assumptions were made related to the

***The Home Depot
San Diego, California
Private Domestic Water System Sizing Calculations***

***January 21, 2020
Dexter Wilson Engineering, Inc.
Job No. 536-013/5***

fixtures in the kitchen area as well as addition of hose bibbs and mop sinks which may be necessary but not available on architectural plans at this time.

Project Name Home Depot, Mission Valley
Water System Analysis

Job Number 536-013/5
Date 1/15/2020

Water Fixture Units:

The basis for the Water Fixture Units is the 2016 California Plumbing Code.

DESCRIPTION	Store/Garden Center		
	FIXTURE		TOTAL
	QUANTITY	UNITS EACH	FIXTURE UNITS
CLOTHES WASHER	0	4	0
TUB/SHOWER	0	4	0
SHOWER	0	2	0
KITCHEN SINK	2	1.5	3
BAR SINK	0	2	0
WASHUP FAUCET	1	2	2
DISHWASHER	2	1.5	3
LAUNDRY SINK	0	1.5	0
SERVICE SINK	2	3	6
LAVATORY	8	1	8
URINAL	2	4	8
WATER CLOSET (1.6 GPF FT, private)	0	2.5	0
WATER CLOSET (1.6 GPF FV, private)	10	5	50
DRINKING FOUNTAIN	4	0.5	2
HOSE BIBB	1	2.5	2.5
EACH ADDTL HB	7	1	7
POOL EQUIPMENT	0	30	0
TOTAL			91.5

*Estimated based on preliminary information.

*Public use assumed.

TOTAL WFU = 91.5

***The Home Depot
San Diego, California***

Private Domestic Water System Sizing Calculations

***January 21, 2020
Dexter Wilson Engineering, Inc.
Job No. 536-013/5***

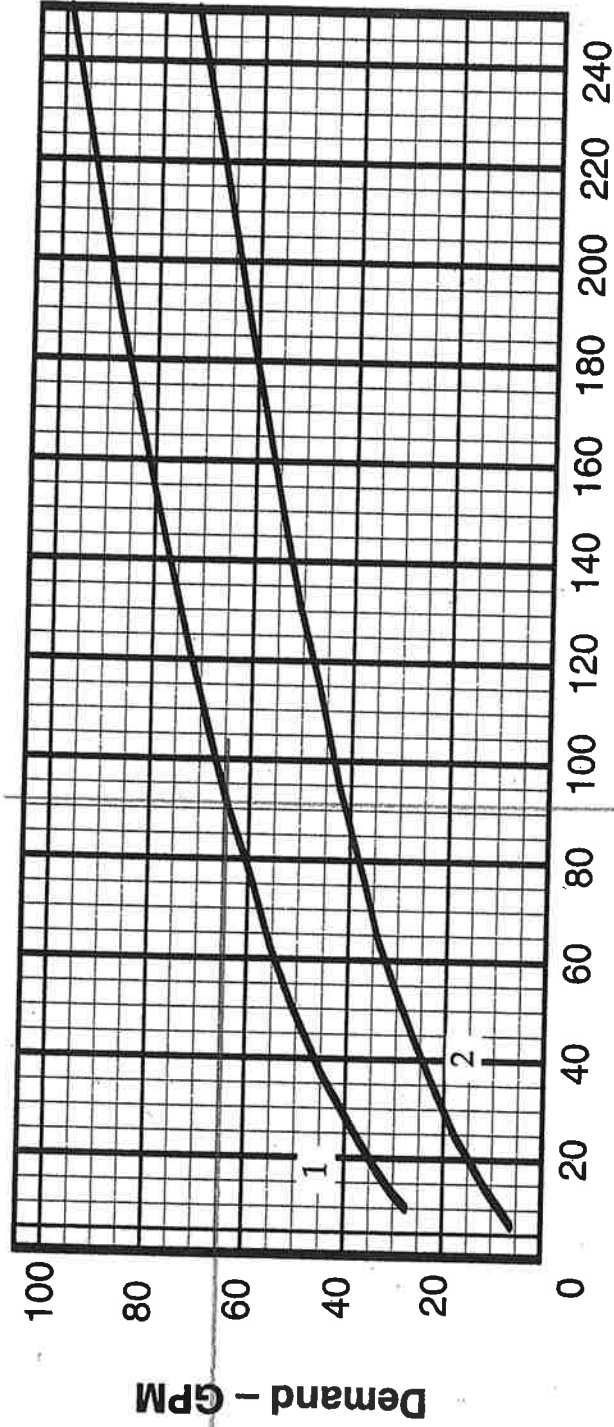
Using the total Water Fixture Unit count of 91.5 WFUs for the store area/garden center, we used the Plumbing Code Chart A-103.1 to covert the WFUs into a peak flow in gallons per minute (gpm). Included for reference is Chart A-103.1 which was used to convert WFUs to water demand.

UNIFORM PLUMBING CODE

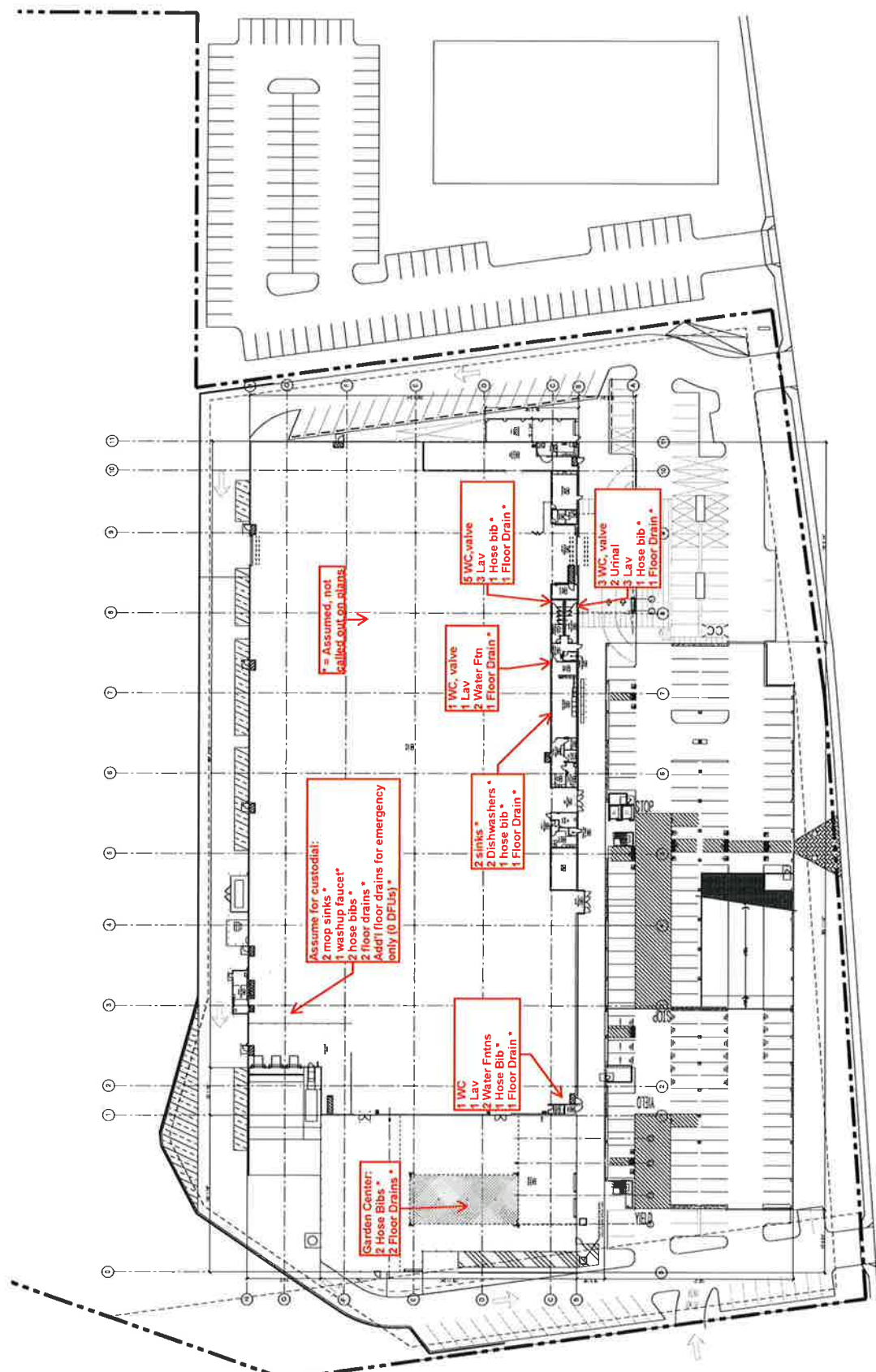
Appendix A

Chart A-3

Enlarged Scale Demand Load



91.5 Fixture Units
WFLS



01 FLOOR PLAN
 SCALE: 1/32" = 1'-0"



WARE MALCOMB
 Leading Design for Commercial Real Estate



Water Meter Sizing:

The total WFU count for The Home Depot is estimated to be 91.5 WFUs. Using Chart A-103.1, this converts to 65 gpm.

The Home Depot project demand can be satisfied using one 1.5-inch meter rated for a maximum allowable flow rate of 80 gpm. A 1.5-inch meter has an AWWA rated capacity of 100 gpm; however, the City of San Diego uses 80% of the meter rating as their maximum allowable flow rate. Reference the chart on the following sheet. Thus, a single 1.5-inch meter is required for the project.

The 1.5-inch meter will be followed by a 1.5-inch reduced pressure principle backflow preventer. A single 2-inch lateral will supply the 1.5-inch meter.

A note regarding meters, the City of San Diego requires simultaneous exchange and purchase for meter capacity credit of existing meters.

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

← THD

August 23, 2016

Notes:

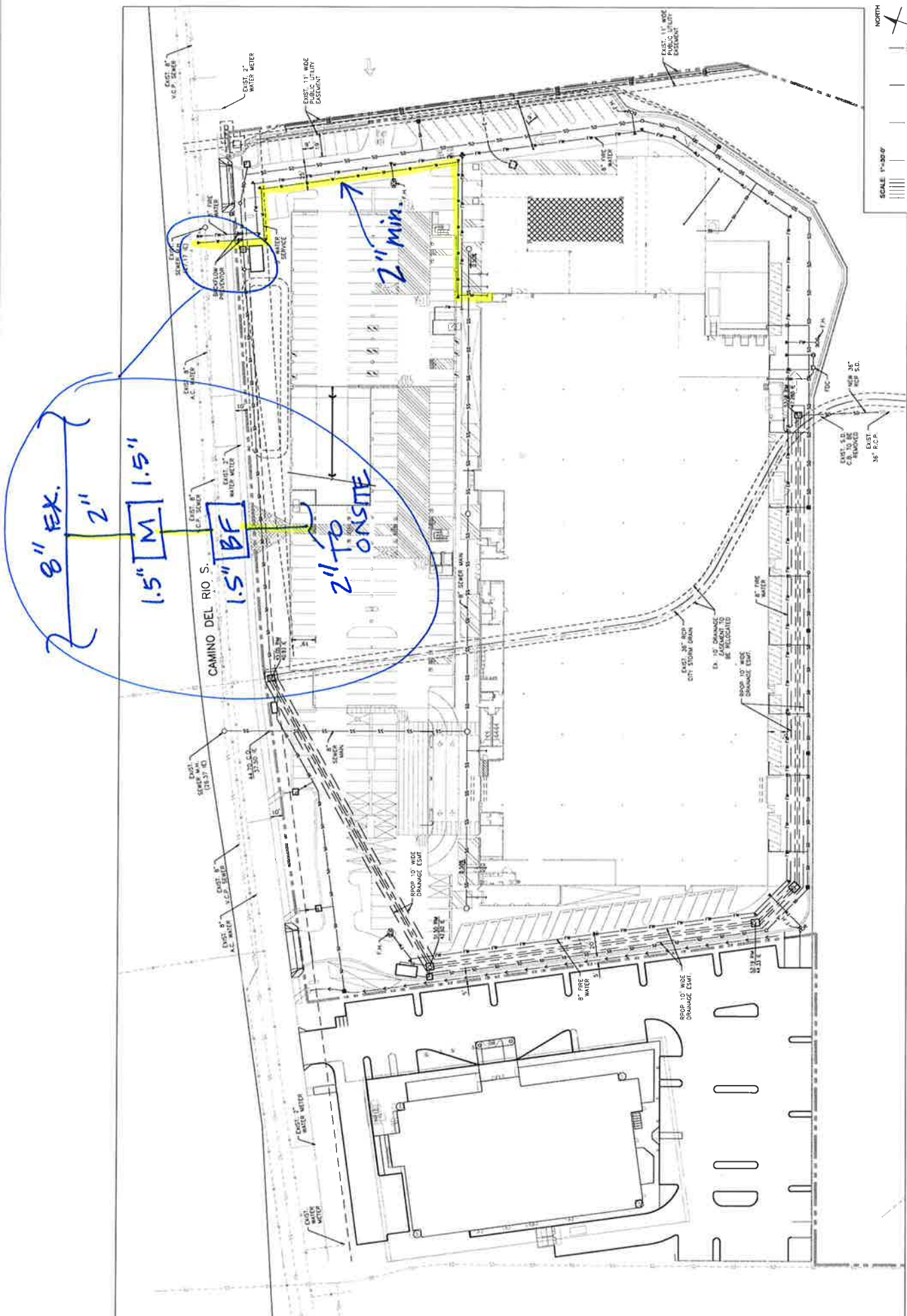
1. Most large water meters are Compound Type Meters.
2. Installation of a Turbine meter requires approval from the Water Systems Technician Supervisor.

*This is from Leonard Wilson 8-25-2016, but it is not
officially approved by the City yet.*

Domestic Water Building Supply Sizing:

Figure 1 on the next page shows the pipe segments which make up the domestic water distribution system for The Home Depot project. Pipe sizes are determined based on maintaining less than 8 feet per second velocity in the pipes. Table 1 on the second following page presents the range of Water Fixture Units for a given pipe size that will keep the pipeline flow velocity below 8 fps in accordance with the Plumbing Code. These pipe sizes are the minimum required sizes; larger diameters may be used to simplify installation and allow for a more uniform layout of the piping within the project site.

For 4-inch and larger piping, use AWWA C900 PVC DR18 pipe. For smaller than 4-inch piping, use copper piping or PVC Schedule 80 with solvent cemented joints.



THE HOME DEPOT
1895 CAMINO DEL RIO S
SAN DIEGO, CA 92108

PROGRESS PRINT - 01/06/2020

SAN DIEGO ENGINEERING, INC.
CIVIL ENGINEER
4415 STOKES AVE. SUITE 202 - SAN DIEGO, CALIFORNIA 92123
TEL: 619 345-1148 FAX: 619 345-1151 WWW.SDEI-INC.COM



JAMES ANDERSON & ASSOCIATES, INC.
CIVIL ENGINEER
2700 MONTEVISTA LANE SUITE 100
SAN DIEGO, CA 92108

FIGURE 1
DOMESTIC



SCALE 1"=30'-0"
0 15 30 45 60 75 90 105 120
NORTH

TABLE 1 SIZE OF PRIVATE DOMESTIC SYSTEM PIPING BASED ON NUMBER OF WATER FIXTURE UNITS SERVED	
Number of Fixture Units	Minimum System Pipe Size ¹
0 - 13	1 ¼-inch
14 - 35	1 ½-inch
36 - 155	2-inch
156 - 355	2 ½-inch
356 - 725	3-inch
726 - 1,920	4-inch
1,921 - 3,575	5-inch
3,576 - 6,175	6-inch

¹ Based on maximum velocity of 8 ft/s

Based on Curve 1 for WC, Valves

Domestic Water Service Pressure:

The maximum static water service pressure for The Home Depot project is based on service from the City of San Diego Alvarado 390 HGL Pressure Zone. Based on an estimated finished floor elevation for the building of 51.0 feet, the maximum static water pressure for the site will be 149 psi.

The expected working pressure within The Home Depot site will be reduced from the maximum static pressure both by the available hydraulic grade line which is less than 390 feet (approximately 377 feet per City 2/2019 Fire Flow Test), and the pressure loss through the domestic meter (10 psi) and backflow preventer (15 psi). Minor losses were also accounted for by adjusting the “k” value and “C” factor of 120 was assumed. The attached two pages of calculations demonstrate the anticipated residual pressure at the building POC (5 feet outside the building) to be 76 psi. If greater working pressures are desired, the pipeline size may be increased to reduce headloss.

Building pressure should be reduced to 80 psi as part of the final building design.

Project: Home Depot, Mission Valley - Domestic System
 Job: 536-013/5
 Date: 1/15/2020

DESIGN FLOWRATE

$$\begin{aligned}
 Q &= 80 \text{ gpm} \\
 \text{Velocity} &= 0.5 \text{ fps} \\
 D &= 8 \text{ in} \\
 A &= 0.348889 \text{ sf} \\
 Q_{\text{cfs}} &= 0.178253 \\
 \text{Velocity} &= 8.2 \text{ fps} \\
 D &= 2 \text{ in} \\
 A &= 0.021806 \text{ sf} \\
 Q_{\text{cfs}} &= 0.178253
 \end{aligned}$$

8-INCH PIPING

PIPING LENGTH

Piping length from Fire Test to POC = 1,000.00 ft

FRICION LOSSES IN PIPNG - H(f)

Hazen-Williams Formula

$$H_f = \frac{10.44 * \left(\frac{Q}{C}\right)^{1.852} * L}{D^{4.8653}}$$

H(f) = friction losses in ft

$$\begin{aligned}
 Q &= 80 \text{ gpm} \\
 C &= 120 \text{ for design} \\
 L &= 1,000.00 \text{ ft} \\
 D &= 8 \text{ in}
 \end{aligned}$$

Therefore, H(f) = 0.20 ft

MINOR LOSSES - H(m)

Piping

$$H_m = \sum K \frac{V^2}{2g}$$

$\sum K$ = minor losses, ft
 $\sum K$ = sum of minor loss coefficients
 V = 0.5 fps
 g = gravitational constant
 $= 32.17 \text{ fps}$

Minor loss coefficients

Description	Quantity	K-value	K-value total
90 degree bend	2	0.3	0.6
45 degree bend	5	0.2	1.0
Tee-thru, flanged	0	0.3	0.0
Plug valve	1	1.0	1.0
Tee-branch, flanged	1	0.8	0.8
Wye	0	0.5	0.0
Check valve	0	2.5	0.0
Exit Loss	1	0.3	0.3

$$\sum K = 3.7$$

Therefore, H(m) = 0.01 ft

Project: Home Depot, Mission Valley - Domestic System
 Job: 536-013/5
 Date: 1/15/2020
ONSITE PIPING

PIPING LENGTH

Piping length from Street POC to Building POC = 502.00 ft

FRICTION LOSSES IN PIPING - H(f)

$$\text{Hazen-Williams Formula } H_f = \frac{10.44 * \left(\frac{Q}{C}\right)^{1.852}}{D^{4.8655}} * L$$

H(f) = friction losses in ft
 Q = 80 gpm
 C = 120 for design
 L = 502.00 ft
 D = 2 in

Therefore, H(f) = 84.84 ft

MINOR LOSSES - H(m)

Piping

$$H_m = \sum K \frac{V^2}{2g}$$

H(m) = minor losses, ft
 $\sum K$ = sum of minor loss coefficients
 V = 8.2 fps
 g = gravitational constant
 = 32.17 fps

Minor loss coefficients

Description	Quantity	K-value	K-value, total
90 degree bend	8	0.3	2.4
45 degree bend	2	0.2	0.4
Tee-thru, flanged	0	0.3	0.0
Isolation Valve	1	1.0	1.0
Tee-branch, flanged	1	0.8	0.8
Wye	0	0.5	0.0
Check valve	0	2.5	0.0
Gate Valve	0	0.3	0.0

$$\sum K = 4.6$$

Therefore, H(m) = 4.73 ft

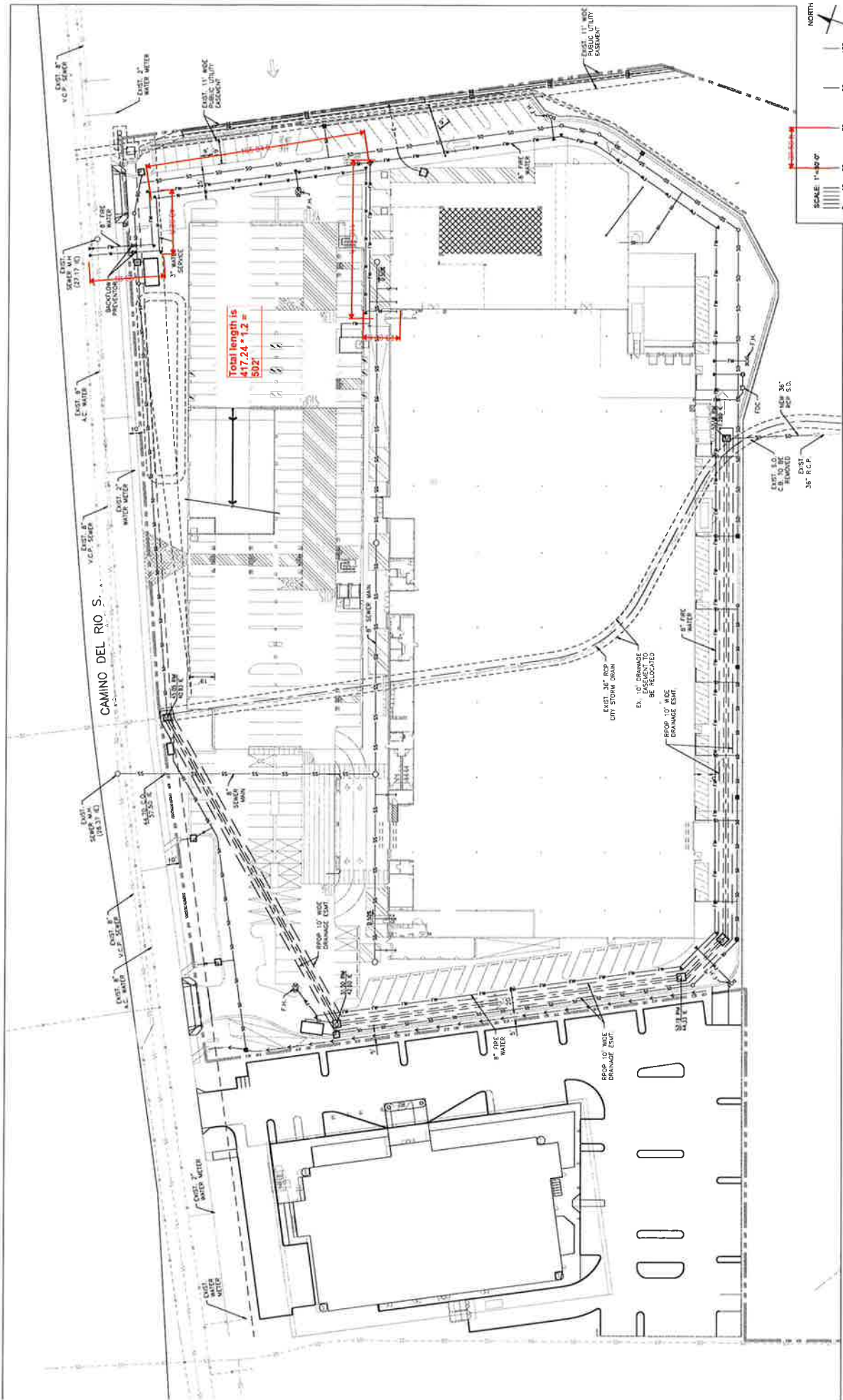
ADDITIONAL HEADLOSSES

Meter Loss	10	psi	Assumed
Backflow Preventer Lc	15	psi	Assumed
Total	25	psi	
	57.7	ft	

TOTAL LOSSES 147.48 ft

RESIDUAL PRESSURE AT BUILDING POC

Available HGL per FF Test	376 ft	
Total Losses	147.48 ft	
POC Elevation (5' outside buildin	51.00 ft	Estimate Building Pad Elevation
Residual Pressure at POC	76.91 psi	



THE HOME DEPOT
1895 CAMINO DEL RIO S
SAN DIEGO, CA 92108

PROGRESS PRINT - 01/06/2020

SAN DIEGO ENGINEERING, INC.
CIVIL ENGINEERING - PLANNING AND SURVEYING
445 STEVENS AVE., 3RD FLOOR - SAN DIEGO, CALIFORNIA 92101
TEL: 619 542-1149 FAX: 619 542-1151 WWW.SDEINC.COM



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CIVIL ENGINEER - LAND SURVEYING
1010 MONTELEONE AVE., SUITE 100
SAN ANTONIO, TEXAS 78205



UTILITY PLAN
C-2

