PUBLIC WATER SYSTEM ANALYSIS
FOR THE
SHARP MEDICAL CENTER EXPANSION
IN THE CITY OF CHULA VISTA

January 10, 2014

REGISTERED PROFESSIONAL ENGINEER
ANDREW M. OVEN
C 41015
EXP 3/31/2015
CIVIL
STATE OF CALIFORNIA

1-10-2014

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

Job No. 505-124

DEXTER WILSON ENGINEERING, INC.

DEXTER S. WILSON, P.E.
ANDREW M. OVEN, P.E.
STEPHEN M. NIELSEN, P.E.
DIANE H. SHAUGHNESSY, P.E.
NATALIE J. FRASCHETTI, P.E.

January 10, 2014 505-124

Rick Engineering Company
5620 Friars Road
San Diego, CA 92110

Attention: Tim Scheg, P.E., Project Manager

Subject: Public Water System Analysis for the Sharp Medical Center Expansion in the City of Chula Vista

Introduction

The Sharp Medical Center is in the City of Chula Vista and is located south of Telegraph Canyon Road, north of East Palomar Street, west of Paseo Ladera, and east of Medical Center Drive. The Sharp Medical Center is proposing a multi-phase expansion of its existing hospital which will increase hospital beds from 243 beds to 342 beds. The expansion is proposed to be completed in several phases; the last phase is estimated to be in 2030. All the proposed facilities will be constructed within the existing campus footprint with hospital space expansion occurring vertically rather than horizontally. The existing Birch Patrick Medical Building is to the south and east of the Sharp Medical Center hospital.

Finish grades at the existing Medical Center range from 446 feet elevation on the north side of the site to 405 feet elevation on the southwestern corner at Medical Center Court.

2234 FARADAY AVENUE • CARLSBAD, CA 92008 • (760) 438-4422 • FAX (760) 438-0173

The purpose of this letter report is to present a hydraulic analysis of the public water system on the project site which will be providing domestic service, fire hydrant flow, and fire sprinkler flow for fire protection purposes within the Sharp Medical Center site.

Fire Protection System Design Criteria

Fire protection service for the Sharp Medical Center hospital will be provided from the existing public water system in Medical Center Court. The expansion project anticipates construction of a new access road on the north and east sides of the existing site such that there will be a loop access road from Medical Center Court to the Sharp Cancer Center Private Driveway. This access road will be used for the alignment of a new public water main sized to provide the required fire flow for the ultimate Sharp Medical Center hospital build-out project.

The public water system analysis will determine the required water system improvement which will enable the water system to deliver the required fire flow for the project at the necessary residual pressure as stipulated by the Chula Vista Fire Department.

The public water system is designed to provide a minimum residual pressure greater than 20 psi at any location within the system under a Maximum Day Demand plus Fire Hydrant Flow.

Pipeline velocities during a Maximum Day Demand plus Fire Hydrant Flow are desired to be a maximum of 10 feet per second (fps).

Fire Flow Requirement. The fire flow requirement for the Sharp Medical Center expansion project cannot be determined precisely at this time because architectural plans for the various expansion phases have not been prepared. However, because the new access road being constructed as part of the initial phase of work, and because the public water main is best constructed with the road improvements, it is necessary to determine the expected fire flow for the expansion project and complete the water system analysis so that no future water system upgrades will be needed as the phased hospital expansion work progresses.

The fire flow requirement will be established using the expected type of construction and the square footage of the hospital buildings and Table B105.1 of the 2013 California Fire Code which table identifies the minimum required fire flow and duration for buildings based on fire area.

Presently, the following is known about the existing hospital and the proposed expansion project. The existing Sharp Medical Center comprises 227,213 square feet of floor space. The East Tower expansion includes 141,091 square feet. The proposed 2030 West Tower has 141,216 square feet of space. Generally the existing and proposed construction included large areas.

The expected types of construction for the hospital are Type IA or Type IB which include steel and concrete structural elements. While fire area determination for Type IA and Type IB construction is based on three consecutive floors, such information is not available at this point in the planning of the expansion. However, a review of Table B105.1 shows that for Type IA or Type IB construction, the maximum required fire flow tops out at 6,000 gpm for 295,901 square feet.

For planning purposes, it is best to proceed with the water system analysis assuming a 6,000 gpm fire flow. Dissecting the square footage numbers for the expansion project may not yield a significant reduction in fire flow. Secondly, if we analyze and design the public water system for 6,000 gpm, it is not likely that any proposed expansion phase will trigger a greater fire flow requirement unless there is a major change in the Fire Code in the future. Thus, by designing the water delivery system for 6,000 gpm, the Sharp Medical Center expansion can proceed with the greatest assurance available today that all of the proposed expansion work will be able to be permitted without any further water system improvements.

Fire Sprinkler Flow Requirements. Fire sprinkler system flow cannot be established for the project buildings at the current level of planning. However, it is relatively safe to assume that the fire sprinkler flow requirement will be less than 6,000 gpm. Thus, by designing for a fire hydrant flow of 6,000 gpm we will inherently design a water system that will be able to deliver the necessary fire sprinkler flow to the new construction on this project.

This report cannot address the required sizes for fire sprinkler system laterals for the proposed buildings. The Chula Vista Fire Department has standardized on minimum 6-inch fire service laterals for commercial and industrial buildings. If better information is known at the time of the construction of the water system improvements, then that information should be used to set the sizes for fire sprinkler system laterals. It is likely that fire sprinkler system laterals will be installed and connected to the public water main as part of the expansion construction.

Existing Water System

The Sharp Medical Center is within the City of Chula Vista and will obtain water service from the Otay Water District's public water system. Water service to the project will be from the 711 Pressure Zone. This pressure zone provides a minimum static water pressure on the site of 114 psi based on a site elevation of 446 feet. Maximum static pressure based on an elevation of 405 feet is 133 psi.

The public water system in the vicinity of the Sharp Medical Center project is well developed. To the west, in Medical Center Drive, there is an existing 16-inch 711 Zone water main which extends between a 20-inch main in Telegraph Canyon Road and parallel 10-inch and 12-inch mains in Medical Center Court. These parallel mains extend south and east in Medical Center Court to nearly the Sharp Cancer Center Private Driveway (only a single 12-inch main extends to this driveway).

From the Sharp Cancer Center Private Driveway there is a 16-inch water main in Medical Center Court which connects to a 16-inch water main in East Palomar Street. To the east in Paseo Ladera there is a 16-inch 711 Zone water main which connects between East Palomar Street and the 20-inch water main in Telegraph Canyon Road.

Within the Sharp Cancer Center Private Driveway which is located just south of the Birch Patrick Medical Building there is an existing 8-inch public water main which extends east to the Sharp Cancer Center, makes a loop around the building, and extends east as a 12-inch main connecting to the existing 16-inch water main in Paseo Ladera. See Exhibit A

and Exhibit A.1 at the back of this report which show the existing and proposed public water system.

The As-Built base files for the Sharp Medical Center Expansion show an existing private water system adjacent to the Medical Center. Exhibit A shows a private domestic water line extending from a 4" meter in Medical Center Court around the south side of the building. Similarly, a private fire protection water system loop is shown surrounding the Medical Center building and this loop includes several private fire hydrants. It appears that the private fire protection system is connected to the public water system in Medical Center Court through a 4" meter and backflow, but this information has not been confirmed as of the date of this report.

Water Service Overview

Water service to the Sharp Medical Center buildings will be from the 711 Pressure Zone system. A 12-inch public water line will be extended from the end of the existing 8-inch water main in the Sharp Cancer Center Private Driveway and looped north and west around the Sharp Medical Center buildings to the existing 12-inch 711 Zone water main in Medical Center Court. Off of this new 12-inch water main will extend new fire hydrant services, new fire sprinkler laterals, and new domestic and irrigation services.

Fire sprinkler system laterals which will supply the individual building fire sprinkler systems shall be sized by the fire sprinkler design company employed for the project and are outside the scope of work for this report. The Chula Vista Fire Department has standardized on minimum 6-inch fire service laterals for commercial and industrial buildings.

Available Water System Hydraulic Grade Line

The available hydraulic grade line in the vicinity of the Sharp Medical Center project was obtained from the fire flow calculations prepared by the Otay Water District dated January 9, 2014. These calculations were prepared for the Sharp Cancer Center project for a

maximum day demand plus fire flow of 6,000 gpm. The Otay Water District fire flow calculation data is included in Appendix A.

Water System Pipe Sizing

All fire hydrants and fire sprinkler services for the project will be connected to the onsite public water system which will supply domestic, irrigation, and fire protection services. The onsite public water system was sized based on the required fire hydrant flow for the site plus the estimated maximum day domestic and irrigation demands for the proposed and existing buildings.

In order to calculate the required water system pipe sizing, a water system computer model was generated for the public water system piping within the Sharp Medical Center Expansion project area. Several maximum day demand plus fire flow scenarios were modeled which provided data upon which the recommended pipe sizing is based.

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

Fitting and Valve Minor Losses. To simulate minor losses through pipe fittings and valves, equivalent lengths of piping were added to the straight pipe lengths and included in the hydraulic model. Appendix B provides the equivalent length reference table utilized for the determination of minor losses within the computer modeling analysis.

Hydraulic Grade Line Available. The public water system was modeled with an estimated hydraulic grade line calculated at two points. Two offsite locations were selected to ensure that the computer modeling within the project site was representative of the performance of the 711 Pressure Zone system in the vicinity of the project. The two locations are:

- The intersection of Paseo Ladera and East Palomar Street
- The intersection of Paseo Ladera and Telegraph Canyon Road

The hydraulic grade lines were obtained from the Otay Water District fire flow calculation letter described earlier in this report. The Otay Water District letter provided the residual water system pressures at the two locations during a fire flow of 6,000 gpm near the project site. The Otay Water District calculations are included in Appendix A. The available hydraulic grade lines are:

- At Paseo Ladera and East Palomar Street – 644.6 feet
- At Paseo Ladera and Telegraph Canyon Road – 653.7 feet

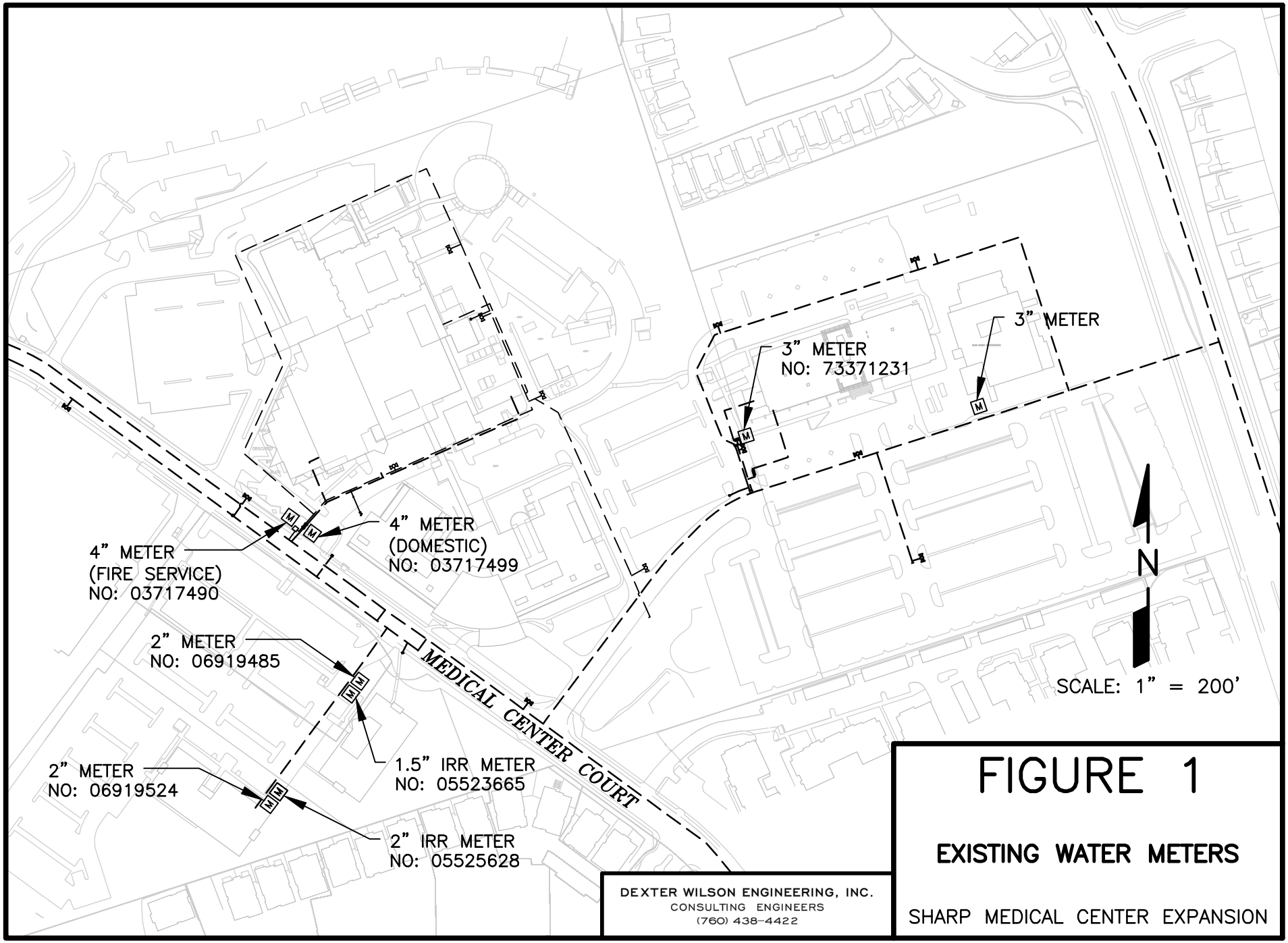
These available hydraulic grade lines were applied at their respective locations as part of the computer modeling for the fire flow on the project site.

The public water system has been designed to provide a minimum residual pressure greater than 20 psi under a maximum day demand plus fire flow scenario at all locations within the Sharp Medical Center site.

Domestic and Irrigation Demands

Figure 1 shows the location and size of the existing meters serving the Sharp Medical Center. The main Sharp Medical Center hospital building shows two 4" meters. It is believed that one 4" meter provides domestic service to the building, and the second 4" meter is the private fire protection system which includes fire hydrants and fire sprinkler service laterals.

\\PACIFIC\DWG\505124\FIGURE_1.DWG 01-10-14 14:39:46 LAYOUT: LAYOUT1



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CONSULTING ENGINEERS
(760) 438-4422

FIGURE 1

EXISTING WATER METERS

SHARP MEDICAL CENTER EXPANSION

The irrigation meters shown on Figure 1 are connected to the Otay Water District's potable water system. There are also irrigation meters which are connected to the Otay Water District's recycled water distribution system; the recycled water meters are not shown on Figure 1.

For the purposes of modeling the water system in the vicinity of the Sharp Medical Center, maximum day domestic demand is estimated to be one-third of the maximum allowable flowrate for the domestic and irrigation meters. Otay Water District sets the following maximum flows for their meters in their Code of Ordinances Section 27.03:

1.5"	80 gpm
2"	128 gpm
3"	400 gpm
4"	800 gpm
6"	1,600 gpm

These meter capacities were used to generate the maximum day demands for the buildings in the vicinity of the Sharp Medical Center for the purposes of the computer modeling analyses.

New Parking Garage

As part of the initial work, the Sharp Medical Center is building a new parking garage at the southeast corner of the hospital site. Plans for this structure have been reviewed by the Chula Vista Fire Department and the Fire Department has issued a Project Requirements letter which includes the requirement for 2,250 gpm fire hydrant flow. This report will included analysis of the existing water system at the Medical Center to show that a fire flow of 2,250 gpm can be satisfied without making any improvements to the existing public water system.

New Domestic Water Meter

The expansion of the Sharp Medical Center is estimated to increase the building square footage by 72 percent over its current size. Presently, the Medical Center has 227,213 square feet of building space. Ultimately it is estimated to have 391,229 square feet. For domestic water meter capacity, we will add a 25 percent to the projected space increase which will provide a basis to determine the expected domestic water meter size for the ultimate expansion.

The total space expansion is 164,016 square feet. Increasing this by 25 percent yields a space expansion of 205,020 square feet. This is nearly the amount of existing building space. Since the Sharp Medical Center hospital is served presently with a 4" domestic water meter, we recommend that the ultimate planning for the Medical Center hospital expansion include an additional 4" domestic meter.

Ultimate Medical Center Expansion Fire Flow Analysis

Appendix C presents the computer modeling results for the computer modeling analyses of the ultimate water system configuration for the Sharp Medical Center expansion public water system. For each demand scenario, the fire flow requirement of 6,000 gpm was modeled at six (6) adjacent computer model node locations with a flow of 1,000 gpm at each node.

Note that the computer modeling includes the fire flow split between adjacent node and not fire hydrants. The reason for this is that the final fire hydrant locations are not known at present. In order to assure that any fire hydrant configuration will yield satisfactory results with regard to meeting the 6,000 gpm fire flow, our analysis takes this conservative approach.

Maximum day demands plus fire flow analyses were completed for several combinations of scenarios to ensure that the required fire flow can be met at any location around the Medical Center. Under each demand scenario, the fire flow requirement is being met with greater than 20 psi residual pressure at all locations within the site. Minimum pressures are greater than 74 psi under all fire flow scenarios.

The design of the new piping for the public water system for the Sharp Medical Center expansion considered maintaining pipeline velocities below 10 fps during a maximum day demand plus 6,000 gpm fire flow. For this reason the new loop piping on the northwest and northeast sides of the Medical Center hospital is proposed to be 12" diameter. For the majority of fire flow scenarios modeled, all the piping in the vicinity of the Medical Center has velocities below 10 fps.

There are two scenarios which are very similar under which velocities exceed 10 fps in a few pipelines. These two scenarios are when all 6,000 gpm fire flow is taken along the loop road along the north and northeast sides of the Medical Center hospital. When part of the 6,000 gpm fire flow is taken off of hydrants in Medical Center Court, or the Cancer Center Private Driveway, velocities do not exceed 10 fps.

When the fire flow is taken at Nodes 6, 26, 30, 33, 36, and 39, the proposed 12" Pipes 40 and 43 connected to Medical Center Court at the northwest end of the loop piping flow at 10.17 fps. The other circumstance is when fire flow is taken at Nodes 26, 30, 33, 36, 39, and 42. Under this scenario two existing 8" pipes (Pipe 23 and 25) on the west side of the Cancer Center Buildings are flowing at 11.61 fps and the proposed 12" Pipe 43 connected to Medical Center Court at the northwest corner flows at 12.05 fps. The reason that the proposed 12" pipe flows over 10 fps is because all of the fire flow is being taken out of the new loop line closest to Medical Center Court. Thus the existing 8" water line is the Cancer Center Private Driveway cannot contribute as much to the 6,000 gpm demand the velocity in the proposed 12" loop line exceeds 10 fps.

Because this situation is unique, residual pressures are achieved, and other demand scenarios do not exceed 10 fps, we recommend keeping this segment of pipe at 12" diameter. To increase this pipe segment, Pipe 43, to a 16" diameter pipe would be unusual considering that it would be connected on both sides to 12" piping. Thus the recommendation is to

construct a 12" diameter loop pipe from the existing 12" water line in Medical Center Court on the northwest end of the Sharp Medical Center hospital to the existing 8" water line in the Cancer Center Private Driveway.

The recommended public water system pipe sizes for the Sharp Medical Center expansion are shown in Exhibit A at the back of this report.

New Parking Garage Fire Flow Analysis

The new parking garage project has a fire flow requirement of 2,250 gpm. This proposed project has been reviewed by the Chula Vista Fire Department; their review letter outlining the Fire Department requirements is presented in Appendix D.

The New Parking Garage is proposed to be constructed as part of the first phase of improvements to the Sharp Medical Center. It will be built prior to any new water main improvements being completed. Thus, the fire flow analysis for the New Parking Garage is based on only the existing public water system piping. Exhibit B presents the Node and Pipe Diagram for the onsite water system and Exhibit A.1 shows the offsite piping diagram.

The fire flow analyses were run using two existing fire hydrants. These hydrants are off of the public water system and are located to the west of the Cancer Center buildings just across the street from the proposed New Parking Garage (Nodes 6 and 24). Three demand scenarios were run. Under two scenarios the fire flow requirement of 2,250 was split between the two fire hydrants with 1,500 gpm from one and 750 gpm from the other, then vice-versa. For the third scenario both hydrants flowed 1,125 gpm. Under each demand scenario, the fire flow requirement is being met with greater than 20 psi residual pressure at all locations within the site. Minimum pressures are greater than 84 psi under all fire flow scenarios.

Code Compliance

The fire flow requirement for the Sharp Medical Center expansion is in accordance with the California Fire Code 2013. Because the fire hydrant flow has the largest required flowrate, the public water system sizing is based on meeting the fire flow. Since no private water systems are being sized in this report, the California Plumbing Code has not been applied to this project. When new domestic water services need to be sized the California Plumbing Code will come into play.

Existing Private Fire Service System

As stated earlier in this document, there is an existing private fire service loop around the existing Sharp Medical Center hospital. This loop appears to provide fire sprinkler service to the hospital building; it also has private fire hydrants connected to it. This report's analysis did not include this private water protection system as making any contribution to the required 6,000 gpm fire hydrant flow.

In addition, it is not known what flow capacity exists in this private system, nor is it clear whether this private system is intended to be retained as part of the expansion project or replaced or abandoned. Again, those determinations are not a part of this study.

Conclusion and Recommendations

The following recommendations and conclusions are presented based upon the public water system analyses performed for the Sharp Medical Center Expansion project.

1. Water service to the project will be provided by the Otay Water District 711 Pressure Zone water system.

2. Maximum static pressure within the Sharp Medical Center will be 132 psi based on the lowest finish grade elevation of the site of 405 feet. Pressure regulation of the

domestic water service to the building must be provided in accordance with the California Plumbing Code.

3. Exhibit A at the back of this report provides a layout of the Sharp Medical Center site showing the recommended public water system pipeline sizes. The existing public water system is also presented in this exhibit for reference.

4. The fire flow available to the project site meets the 6,000 gpm flow requirement anticipated for the expansion of the Sharp Medical Center hospital based on the expected type of construction and the size of the ultimate hospital expansion.

5. The recommended public water system improvement includes a new 12-inch diameter pipe loop from the existing 12" water line in Medical Center Court to the existing 8" water main at the northwest corner of the existing westerly Cancer Center Building as shown in Exhibit A.

6. Fire sprinkler water lines and laterals which will supply the individual building fire sprinkler system shall be sized by the fire sprinkler design company employed for the site and are not included in the scope of this report. The Chula Vista Fire Department has standardized on minimum 6-inch fire service laterals for commercial and industrial buildings.

7. This report presents the sizing and a general schematic layout of the proposed public water system. The design engineer for the water system should incorporate valves, fittings, and appurtenances as needed for proper operation of this water system.

8. If PVC pipe is used for the private fire protection system water lines within the project, we recommend the following: pipes 4" through 12" diameter shall be AWWA C900, DR 14 (Class 305).

Thank you for the opportunity to assist you with the fire protection water system planning for the Sharp Medical Center Expansion project. If you have any questions regarding the information presented in this report, please do not hesitate to call.

Dexter Wilson Engineering, Inc.

Andrew Oven, P.E.

AO:ps

Attachments

cc: Andy Ziemniak, Ziemniak Consulting

APPENDIX A

FIRE HYDRANT FLOW CALCULATIONS
FOR THE SHARP MEDICAL CENTER BUILDING
FROM THE OTAY WATER DISTRICT

OTAY ...Dedicated to Community Service
2554 SWEETWATER SPRINGS BLVD, SPRING VALLEY, CA 91978-2088
TELEPHONE: (619) 670-2222

January 9, 2014

District Ref. No. FLW-14-001
Project No. p1438-003000-3104

Mr. Andrew Oven
DEXTER WILSON ENGINEERING, INC
2234 FARADAY AVE
CARLSBAD, CA 92008

SUBJECT: Fire Flow Calculations for SHARP CHULA VISTA - EXPANSION PROJECT (PZ 711)
APN(S): 641-010-21, 28,29-00 & 641-020-17-00

Dear Mr. Andrew Oven,

Fire flow calculations for the subject site were performed by District Consultant using InfoWATER Version 10.0, under the following assumptions:

The water levels in storage facilities at the time of a fire are approximate to the operating levels that typically occur during a maximum day.
The prescribed ***four-hour*** fire duration coincides with a maximum day demand condition.
The immediate area around the fire flow node maintains a minimum pressure of 20 PSI.

The results are as follows:

(711 Zone - 15 ft (half of tank depth) = 696 feet HGL
696 - (177 × 2.308) = 287.5 ft elevation of hydrant

STATIC PRESSURE: 177 PSI *(Based on tanks half-full at **Hydrant H-096-145- Node 1**)*

RESIDUAL PRESSURE: 161 PSI *(System and fire flow demand of 6,000 gallons per minute at **Hydrant H-096-145-Node 1**)* (161 × 2.308) + 287.5 = 659.1 ft HGL at Telegraph & Paseo Ladera

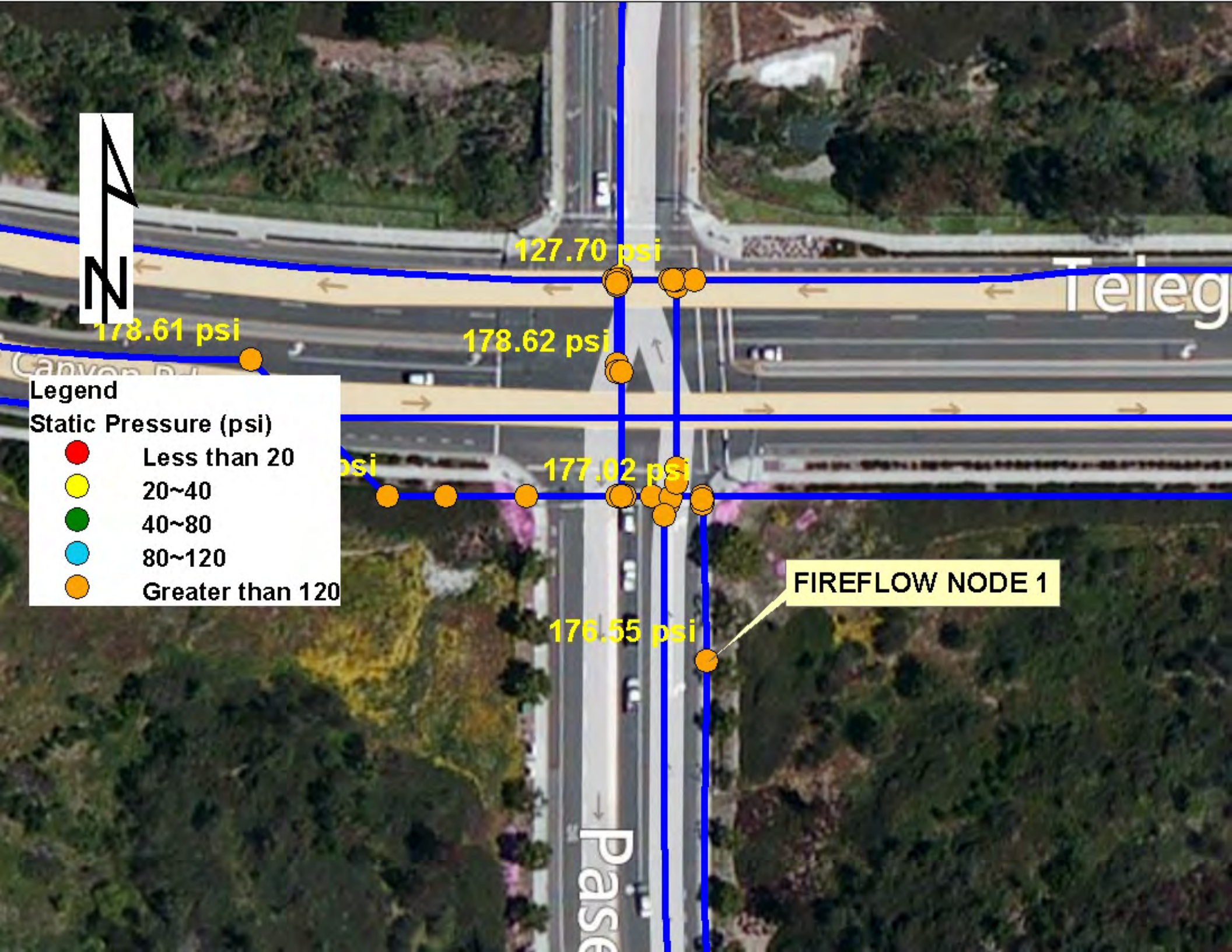
STATIC PRESSURE: 105 PSI *(Based on tanks half-full at **Hydrant H-081-151-Node 2**)*

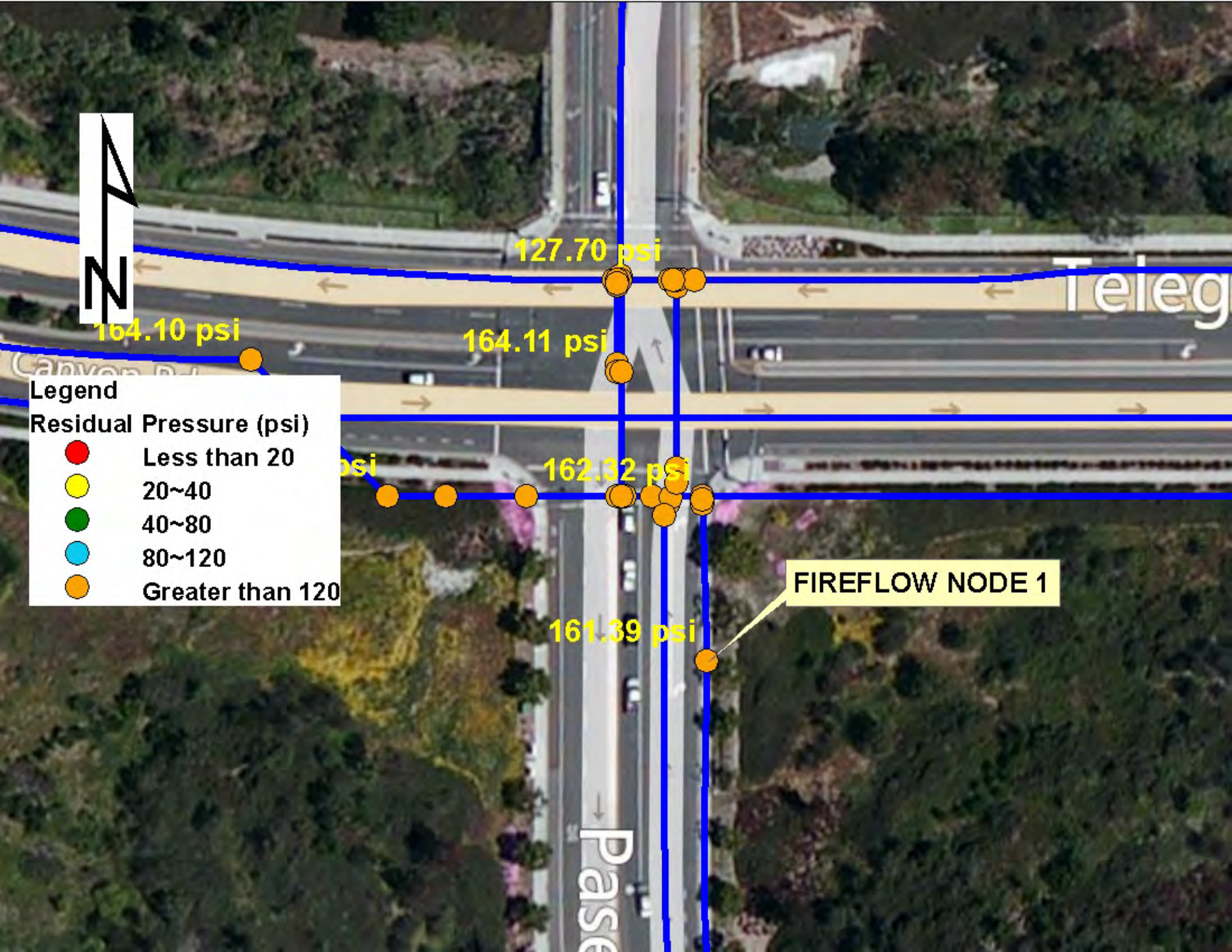
RESIDUAL PRESSURE: 91 PSI *(System and fire flow demand of 6,000 gallons per minute at **H-081-151-Node 2**)*

(711 - 15') = 696 feet HGL
696 - (105 × 2.308) = 453.7 ft elev.
(91 × 2.308) + 453.7 ft = 663.7 feet HGL at E. Palomar & Paseo Ladera

Sincerely,

OTAY WATER DISTRICT
ENGINEERING PUBLIC SERVICES


127.70 psi
178.61 psi
178.62 psi
177.02 psi
176.55 psi
FIREFLOW NODE 1
Legend
Static Pressure (psi)
Less than 20
20~40
40~80
80~120
Greater than 120


127.70 psi
164.10 psi
164.11 psi
162.32 psi
161.39 psi
FIREFLOW NODE 1
Legend
Residual Pressure (psi)
Less than 20
20~40
40~80
80~120
Greater than 120

N
Legend
Static Pressure (psi)
Less than 20
20~40
40~80
80~120
Greater than 120
51.47 psi
Paseo Ladera
104.99 psi
51.38 psi
51.34 psi
51.36 psi
104.99 psi
104.99 psi
Static Pressure at Node 2

N
Legend
Residual Pressure (psi)
Less than 20
20~40
40~80
80~120
Greater than 120
51.47 psi
Paseo Ladera
91.18 psi
91.14 psi
51.34 psi
51.36 psi
91.14 psi
91.14 psi
Residual Pressure at Node 2

APPENDIX B

MINOR LOSS TABLES OF EQUIVALENT LENGTHS FOR FITTINGS AND VALVES

Table 2.2 also shows the equivalent length of pipe for various fittings in a tabular form.

Table 2.2 Equivalent Length of Pipe for Various Fittings

	For Nominal Pipe Diameter Shown, Equivalent Length of Pipe, Ft.																		
	½ in.	1 in.	1½ in.	2 in.	3 in.	4 in.	6 in.	8 in.	10 in.	12 in.	14 in.	16 in.	18 in.	20 in.	24 in.	30 in.	36 in.	42 in.	48 in.
Gate valve, open	0.3	0.6	0.9	1.2	1.7	2.3	3.5	4.5	5.8	6.9	8.0	9.0	10	12	14	17	20	23	27
Gate valve, ½ open	11	17	25	34	50	67	100	135	170	195	230	260	300	330	400	500	600	710	790
Globe valve, open	16	27	43	54	80	110	160	210	280	330	380	430	480	540	670	830	1,000	1,200	1,300
Angle valve, open	9.0	15	22	28	42	57	85	110	140	160	190	220	250	280	340	420	500	600	690
Check valve	3.9	6.5	11	14	19	25	40	51	66	77	90	110	120	130	160	200	230	280	320
Standard tee,	3.4	5.7	9	12	17	22	34	44	57	67	75	89	100	110	130	170	200	240	270
Standard tee,	3.4	5.7	9	12	17	22	34	44	57	67	75	89	100	110	130	170	200	240	270
Standard tee,	1.1	1.7	2.7	3.5	5.1	6.9	11	14	18	20	23	27	30	34	42	52	61	72	82
90° Elbow, std.	1.5	2.7	4.4	5.4	8.1	11	17	21	26	31	37	42	48	52	63	80	98	110	130
90° Elbow, long radius	1.1	1.7	2.7	3.5	5.1	6.9	11	14	18	20	23	27	30	34	42	52	61	72	82
180° Return bend	3.6	6.1	10	13	18	23	36	48	60	72	83	100	110	125	150	180	220	260	300
45° Elbow	0.8	1.2	1.9	2.5	3.7	5.0	7.4	10	13	15	17	19	21	23	30	37	44	52	60
Ordinary entrance,	0.9	1.5	2.3	3.0	4.5	5.9	9.0	12	15	18	20	23	25	30	35	45	52	61	70
Sudden enlargement																			
$d/D = 1/4$	1.5	2.7	4.4	5.4	8.1	11	17	21	26	31	37	42	48	52	63	80	98	110	130
$d/D = 1/2$	1.0	1.5	2.6	3.2	4.8	6.3	10	13	16	19	22	24	28	31	38	47	58	68	78
$d/D = 3/4$	0.3	0.6	0.9	1.2	1.7	2.3	3.5	4.5	5.8	6.9	8.0	9.0	10	12	14	17	20	23	27
Sudden contraction																			
$d/D = 1/4$	0.8	1.2	1.9	2.5	3.7	5.0	7.4	10	13	15	17	19	21	23	30	37	44	52	60
$d/D = 1/2$	0.6	0.9	1.5	1.9	2.8	3.7	5.7	7.5	9.7	12	13	15	17	18	22	27	33	40	45
$d/D = 3/4$	0.3	0.6	0.9	1.2	1.7	2.3	3.5	4.5	5.8	6.9	8.0	9.0	10	12	14	17	20	23	27

(Ref: Gallant, Robert N., "Sizing Pipe for Liquids and Vapors", *Chemical Engineering*, Page 104, February 24, 1969.)

APPENDIX C

COMPUTER RUNS

SHARP MEDICAL CENTER EXPANSION
WATER SYSTEM ANALYSIS

NODE AND PIPE DIAGRAM REFERENCE:

Exhibits A and A.1 at the back of the report.

CONDITIONS MODELED:

1. Maximum Day Demands.

2. Maximum Day Demands plus fire flow of 6,000 gpm split between Nodes 33, 36, 39, 42, 108, and 109.

3. Maximum Day Demands plus fire flow of 6,000 gpm split between Nodes 6, 26, 30, 33, 36, and 39.

4. Maximum Day Demands plus fire flow of 6,000 gpm split between Nodes 6, 26, 30, 33, 36, and 106.

5. Maximum Day Demands plus fire flow of 6,000 gpm split between Nodes 26, 30, 33, 36, 39, and 42.

FLOWRATE IS EXPRESSED IN GPM AND PRESSURE IN PSIG

A SUMMARY OF THE ORIGINAL DATA FOLLOWS

PIPE NO.	NODE NOS.		LENGTH (FEET)	DIAMETER (INCHES)	ROUGHNESS	MINOR LOSS K	FIXED GRADE
1	106	3	534.0	8.0	120.0	.00	
4	3	6	140.0	8.0	120.0	.00	
7	3	9	228.0	8.0	120.0	.00	
8	9	14	183.0	8.0	120.0	.00	
10	9	12	276.0	7.7	120.0	.00	
11	14	15	186.0	11.2	120.0	.00	
13	15	18	504.0	7.7	120.0	.00	
16	15	21	350.0	11.2	120.0	.00	
19	18	24	353.0	7.7	120.0	.00	
22	26	24	130.0	7.7	120.0	.00	
23	27	26	194.0	7.7	120.0	.00	
25	3	27	140.0	7.7	120.0	.00	
28	26	30	250.0	11.2	120.0	.00	
31	30	33	220.0	11.2	120.0	.00	
34	33	36	280.0	11.2	120.0	.00	
37	39	36	250.0	11.2	120.0	.00	
40	42	39	250.0	11.2	120.0	.00	
43	109	42	250.0	11.2	120.0	.00	
101	0	100	50.0	16.0	120.0	.00	659.10
104	100	21	1100.0	16.0	120.0	.00	
107	100	103	880.0	16.0	120.0	.00	
110	103	106	1000.0	16.0	120.0	.00	
113	118	21	1700.0	16.0	120.0	.00	
116	121	106	300.0	12.0	120.0	.00	
118	108	121	350.0	12.0	120.0	.00	
119	108	109	350.0	12.0	120.0	.00	
120	110	109	200.0	12.0	120.0	.00	
122	112	110	600.0	12.0	120.0	.00	
125	112	121	1500.0	10.0	120.0	.00	
128	115	112	2400.0	16.0	120.0	.00	
131	118	115	1680.0	20.0	120.0	.00	
134	0	118	50.0	20.0	120.0	.00	663.70

JUNCTION NUMBER	DEMAND	ELEVATION	CONNECTING PIPES			
3	.00	444.00	1	4	7	25
6	134.00	445.00	4			
9	.00	449.00	7	8	10	
12	.00	452.00	10			
14	160.00	451.00	8	11		
15	.00	453.00	11	13	16	
18	.00	449.00	13	19		
21	.00	450.00	16	104	113	
24	.00	447.00	19	22		
26	.00	446.00	22	23	28	

27	.00	445.00	23	25	
30	.00	435.00	28	31	
33	.00	438.00	31	34	
36	534.00	440.00	34	37	
39	.00	430.00	37	40	
42	.00	425.00	40	43	
100	.00	430.00	101	104	107
103	.00	435.00	107	110	
106	.00	435.00	1	110	116
108	907.00	446.00	118	119	
109	.00	405.00	43	119	120
110	200.00	375.00	120	122	
112	.00	355.00	122	125	128
115	.00	273.00	128	131	
118	.00	293.00	113	131	134
121	662.00	441.00	116	118	125

OUTPUT SELECTION: ALL RESULTS ARE OUTPUT EACH PERIOD
6 VALUES ARE OUTPUT FOR MAXIMUM AND MINIMUM PRESSURES

THIS SYSTEM HAS 32 PIPES WITH 26 JUNCTIONS , 5 LOOPS AND 2 FGNS

THE RESULTS ARE OBTAINED AFTER 5 TRIALS WITH AN ACCURACY = .00021

Sharp Medical Center Chula Vista **505124F**
Fire Protection System Analysis for Ultimate Buildout
Maximum Day Demands

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	106	3	-22.93	-.01	.00	.00	-.15	-.02
4	3	6	134.00	.07	.00	.00	.86	.51
7	3	9	-279.48	-.46	.00	.00	-1.78	-2.00
8	9	14	-279.48	-.37	.00	.00	-1.78	-2.00
10	9	12	.00	.00	.00	.00	.00	.00
11	14	15	-439.48	-.17	.00	.00	-1.43	-.90
13	15	18	188.92	.60	.00	.00	1.31	1.18
16	15	21	-628.40	-.61	.00	.00	-2.05	-1.74
19	18	24	188.92	.42	.00	.00	1.31	1.18
22	26	24	-188.92	-.15	.00	.00	-1.31	-1.18
23	27	26	122.55	.10	.00	.00	.85	.53
25	3	27	122.55	.07	.00	.00	.85	.53
28	26	30	311.47	.12	.00	.00	1.01	.47
31	30	33	311.47	.10	.00	.00	1.01	.47
34	33	36	311.47	.13	.00	.00	1.01	.47
37	39	36	222.53	.06	.00	.00	.72	.25

40	42	39	222.53	.06	.00	.00	.72	.25
43	109	42	222.53	.06	.00	.00	.72	.25
101	0	100	-479.16	-.01	.00	.00	-.76	-.19
104	100	21	-1128.17	-1.00	.00	.00	-1.80	-.91
107	100	103	649.00	.29	.00	.00	1.04	.33
110	103	106	649.00	.33	.00	.00	1.04	.33
113	118	21	1756.57	3.50	.00	.00	2.80	2.06
116	121	106	-671.93	-.42	.00	.00	-1.91	-1.41
118	108	121	-406.64	-.19	.00	.00	-1.15	-.56
119	108	109	-500.36	-.29	.00	.00	-1.42	-.82
120	110	109	722.89	.32	.00	.00	2.05	1.61
122	112	110	922.89	1.52	.00	.00	2.62	2.53
125	112	121	396.71	1.93	.00	.00	1.62	1.29
128	115	112	1319.60	2.91	.00	.00	2.11	1.21
131	118	115	1319.60	.69	.00	.00	1.35	.41
134	0	118	3076.16	.10	.00	.00	3.14	1.96

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
3	.00	658.51	444.00	92.95
6	134.00	658.44	445.00	92.49
9	.00	658.96	449.00	90.98
12	.00	658.96	452.00	89.68
14	160.00	659.33	451.00	90.28
15	.00	659.50	453.00	89.48
18	.00	658.90	449.00	90.96
21	.00	660.11	450.00	91.05
24	.00	658.48	447.00	91.64
26	.00	658.33	446.00	92.01
27	.00	658.43	445.00	92.49
30	.00	658.21	435.00	96.73
33	.00	658.11	438.00	95.38
36	534.00	657.98	440.00	94.46
39	.00	658.04	430.00	98.82
42	.00	658.10	425.00	101.01
100	.00	659.11	430.00	99.28
103	.00	658.82	435.00	96.99
106	.00	658.50	435.00	96.85
108	907.00	657.88	446.00	91.81
109	.00	658.17	405.00	109.71
110	200.00	658.49	375.00	122.85
112	.00	660.01	355.00	132.17
115	.00	662.92	273.00	168.96
118	.00	663.60	293.00	160.59
121	662.00	658.08	441.00	94.07
	MAXIMUM PRESSURES			
115	.00	662.92	273.00	168.96
118	.00	663.60	293.00	160.59
112	.00	660.01	355.00	132.17
110	200.00	658.49	375.00	122.85
109	.00	658.17	405.00	109.71
42	.00	658.10	425.00	101.01

MINIMUM PRESSURES

15	.00	659.50	453.00	89.48
12	.00	658.96	452.00	89.68
14	160.00	659.33	451.00	90.28
18	.00	658.90	449.00	90.96
9	.00	658.96	449.00	90.98
21	.00	660.11	450.00	91.05

THE NET SYSTEM DEMAND = 2597.00

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
101	-479.16
134	3076.16

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 3076.16
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = -479.16

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
108	1907.00
109	1000.00
42	1000.00
39	1000.00
36	1534.00
33	1000.00

THE RESULTS ARE OBTAINED AFTER 4 TRIALS WITH AN ACCURACY = .00051

Sharp Chula Vista Medical Center
6000 gpm Fire Flow Split Between Nodes 33 36 39 42 108 and 109

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	106	3	367.99	1.78	.00	.00	2.35	3.33
4	3	6	134.00	.07	.00	.00	.86	.51
7	3	9	-961.95	-4.50	.00	.00	-6.14	-19.72
8	9	14	-961.95	-3.61	.00	.00	-6.14	-19.72
10	9	12	.00	.00	.00	.00	.00	.00
11	14	15	-1121.95	-.95	.00	.00	-3.65	-5.09
13	15	18	902.03	10.76	.00	.00	6.25	21.35
16	15	21	-2023.97	-5.32	.00	.00	-6.59	-15.19

19	18	24	902.03	7.54	.00	.00	6.25	21.35
22	26	24	-902.03	-2.78	.00	.00	-6.25	-21.35
23	27	26	1195.94	6.98	.00	.00	8.28	36.00
25	3	27	1195.94	5.04	.00	.00	8.28	36.00
28	26	30	2097.96	4.06	.00	.00	6.83	16.23
31	30	33	2097.96	3.57	.00	.00	6.83	16.23
34	33	36	1097.96	1.37	.00	.00	3.58	4.89
37	39	36	436.04	.22	.00	.00	1.42	.88
40	42	39	1436.04	2.01	.00	.00	4.68	8.04
43	109	42	2436.04	5.35	.00	.00	7.93	21.41
101	0	100	3295.33	.33	.00	.00	5.26	6.59
104	100	21	-27.43	.00	.00	.00	-.04	.00
107	100	103	3322.77	5.89	.00	.00	5.30	6.70
110	103	106	3322.77	6.70	.00	.00	5.30	6.70
113	118	21	2051.41	4.66	.00	.00	3.27	2.74
116	121	106	-2954.77	-6.56	.00	.00	-8.38	-21.87
118	108	121	-2936.48	-7.57	.00	.00	-8.33	-21.62
119	108	109	1029.48	1.09	.00	.00	2.92	3.10
120	110	109	2406.56	2.99	.00	.00	6.83	14.96
122	112	110	2606.56	10.40	.00	.00	7.39	17.34
125	112	121	643.71	4.74	.00	.00	2.63	3.16
128	115	112	3250.26	15.43	.00	.00	5.19	6.43
131	118	115	3250.26	3.64	.00	.00	3.32	2.17
134	0	118	5301.67	.27	.00	.00	5.41	5.37

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
3	.00	644.40	444.00	86.84
6	134.00	644.33	445.00	86.38
9	.00	648.90	449.00	86.62
12	.00	648.90	452.00	85.32
14	160.00	652.51	451.00	87.32
15	.00	653.46	453.00	86.86
18	.00	642.69	449.00	83.93
21	.00	658.77	450.00	90.47
24	.00	635.15	447.00	81.53
26	.00	632.38	446.00	80.76
27	.00	639.36	445.00	84.22
30	.00	628.32	435.00	83.77
33	1000.00	624.75	438.00	80.92
36	1534.00	623.38	440.00	79.46
39	1000.00	623.60	430.00	83.89
42	1000.00	625.61	425.00	86.93
100	.00	658.77	430.00	99.13
103	.00	652.88	435.00	94.41
106	.00	646.18	435.00	91.51
108	1907.00	632.05	446.00	80.62
109	1000.00	630.96	405.00	97.92
110	200.00	633.96	375.00	112.21
112	.00	644.36	355.00	125.39
115	.00	659.79	273.00	167.61
118	.00	663.43	293.00	160.52
121	662.00	639.62	441.00	86.07

MAXIMUM PRESSURES

115	.00	659.79	273.00	167.61
118	.00	663.43	293.00	160.52
112	.00	644.36	355.00	125.39
110	200.00	633.96	375.00	112.21
100	.00	658.77	430.00	99.13
109	1000.00	630.96	405.00	97.92

MINIMUM PRESSURES

36	1534.00	623.38	440.00	79.46
108	1907.00	632.05	446.00	80.62
26	.00	632.38	446.00	80.76
33	1000.00	624.75	438.00	80.92
24	.00	635.15	447.00	81.53
30	.00	628.32	435.00	83.77

THE NET SYSTEM DEMAND = 8597.00

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
101	3295.33
134	5301.67

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 8597.00
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
39	1000.00
36	1534.00
33	1000.00
30	1000.00
26	1000.00
6	1134.00

THE RESULTS ARE OBTAINED AFTER 3 TRIALS WITH AN ACCURACY = .00072

Sharp Chula Vista Medical Center
6000 gpm Fire Flow Split Between Nodes 6 26 30 33 36 39

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	106	3	1106.88	13.65	.00	.00	7.06	25.57
4	3	6	1134.00	3.74	.00	.00	7.24	26.74
7	3	9	-1334.17	-8.24	.00	.00	-8.52	-36.14
8	9	14	-1334.17	-6.61	.00	.00	-8.52	-36.14
10	9	12	.00	.00	.00	.00	.00	.00
11	14	15	-1494.17	-1.61	.00	.00	-4.87	-8.66
13	15	18	1103.94	15.65	.00	.00	7.65	31.04
16	15	21	-2598.11	-8.44	.00	.00	-8.46	-24.12
19	18	24	1103.94	10.96	.00	.00	7.65	31.04
22	26	24	-1103.94	-4.04	.00	.00	-7.65	-31.04
23	27	26	1307.05	8.23	.00	.00	9.05	42.44
25	3	27	1307.05	5.94	.00	.00	9.05	42.44
28	26	30	1410.99	1.95	.00	.00	4.59	7.79
31	30	33	410.99	.17	.00	.00	1.34	.79
34	33	36	-589.01	-.43	.00	.00	-1.92	-1.54
37	39	36	2123.01	4.15	.00	.00	6.91	16.59
40	42	39	3123.01	8.48	.00	.00	10.17	33.91
43	109	42	3123.01	8.48	.00	.00	10.17	33.91
101	0	100	3633.66	.40	.00	.00	5.80	7.90
104	100	21	476.58	.20	.00	.00	.76	.18
107	100	103	3157.08	5.36	.00	.00	5.04	6.09
110	103	106	3157.08	6.09	.00	.00	5.04	6.09
113	118	21	2121.52	4.96	.00	.00	3.39	2.92
116	121	106	-2050.20	-3.33	.00	.00	-5.82	-11.12
118	108	121	-2026.82	-3.81	.00	.00	-5.75	-10.88
119	108	109	1119.82	1.27	.00	.00	3.18	3.63
120	110	109	2003.19	2.13	.00	.00	5.68	10.65
122	112	110	2203.19	7.62	.00	.00	6.25	12.70
125	112	121	638.62	4.67	.00	.00	2.61	3.11
128	115	112	2841.81	12.03	.00	.00	4.53	5.01
131	118	115	2841.81	2.84	.00	.00	2.90	1.69
134	0	118	4963.33	.24	.00	.00	5.07	4.75

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
3	.00	633.60	444.00	82.16
6	1134.00	629.85	445.00	80.10
9	.00	641.84	449.00	83.56
12	.00	641.84	452.00	82.26
14	160.00	648.45	451.00	85.56
15	.00	650.06	453.00	85.39
18	.00	634.42	449.00	80.35
21	.00	658.50	450.00	90.35
24	.00	623.46	447.00	76.47
26	1000.00	619.42	446.00	75.15
27	.00	627.66	445.00	79.15
30	1000.00	617.48	435.00	79.07
33	1000.00	617.30	438.00	77.70

36	1534.00	617.73	440.00	77.02
39	1000.00	621.88	430.00	83.15
42	.00	630.36	425.00	88.99
100	.00	658.70	430.00	99.11
103	.00	653.34	435.00	94.62
106	.00	647.25	435.00	91.98
108	907.00	640.11	446.00	84.11
109	.00	638.84	405.00	101.33
110	200.00	640.97	375.00	115.25
112	.00	648.59	355.00	127.22
115	.00	660.62	273.00	167.97
118	.00	663.46	293.00	160.53
121	662.00	643.92	441.00	87.93

MAXIMUM PRESSURES

115	.00	660.62	273.00	167.97
118	.00	663.46	293.00	160.53
112	.00	648.59	355.00	127.22
110	200.00	640.97	375.00	115.25
109	.00	638.84	405.00	101.33
100	.00	658.70	430.00	99.11

MINIMUM PRESSURES

26	1000.00	619.42	446.00	75.15
24	.00	623.46	447.00	76.47
36	1534.00	617.73	440.00	77.02
33	1000.00	617.30	438.00	77.70
30	1000.00	617.48	435.00	79.07
27	.00	627.66	445.00	79.15

THE NET SYSTEM DEMAND = 8597.00

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
101	3633.66
134	4963.33

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 8597.00
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
106	1000.00
6	1134.00
26	1000.00
30	1000.00
33	1000.00
36	1534.00

THE RESULTS ARE OBTAINED AFTER 3 TRIALS WITH AN ACCURACY = .00002

Sharp Chula Vista Medical Center
6000 gpm Fire Flow Split Between Nodes 6 26 30 33 36 and 106

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	106	3	937.38	10.04	.00	.00	5.98	18.80
4	3	6	1134.00	3.74	.00	.00	7.24	26.74
7	3	9	-1289.54	-7.74	.00	.00	-8.23	-33.93
8	9	14	-1289.54	-6.21	.00	.00	-8.23	-33.93
10	9	12	.00	.00	.00	.00	.00	.00
11	14	15	-1449.54	-1.52	.00	.00	-4.72	-8.19
13	15	18	1002.84	13.10	.00	.00	6.94	25.98
16	15	21	-2452.38	-7.59	.00	.00	-7.99	-21.67
19	18	24	1002.84	9.17	.00	.00	6.94	25.98
22	26	24	-1002.84	-3.38	.00	.00	-6.94	-25.98
23	27	26	1092.92	5.91	.00	.00	7.57	30.47
25	3	27	1092.92	4.27	.00	.00	7.57	30.47
28	26	30	1095.75	1.22	.00	.00	3.57	4.88
31	30	33	95.75	.01	.00	.00	.31	.05
34	33	36	-904.25	-.96	.00	.00	-2.94	-3.42
37	39	36	2438.25	5.36	.00	.00	7.94	21.44
40	42	39	2438.25	5.36	.00	.00	7.94	21.44
43	109	42	2438.25	5.36	.00	.00	7.94	21.44
101	0	100	3743.26	.42	.00	.00	5.97	8.35
104	100	21	344.57	.11	.00	.00	.55	.10
107	100	103	3398.68	6.15	.00	.00	5.42	6.98
110	103	106	3398.68	6.98	.00	.00	5.42	6.98
113	118	21	2107.80	4.90	.00	.00	3.36	2.88
116	121	106	-1461.31	-1.78	.00	.00	-4.15	-5.94
118	108	121	-1513.15	-2.22	.00	.00	-4.29	-6.33
119	108	109	606.15	.41	.00	.00	1.72	1.16
120	110	109	1832.10	1.81	.00	.00	5.20	9.03
122	112	110	2032.10	6.56	.00	.00	5.76	10.94
125	112	121	713.84	5.74	.00	.00	2.92	3.83
128	115	112	2745.94	11.29	.00	.00	4.38	4.70
131	118	115	2745.94	2.67	.00	.00	2.80	1.59
134	0	118	4853.74	.23	.00	.00	4.96	4.56

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
3	.00	635.52	444.00	82.99
6	1134.00	631.77	445.00	80.94
9	.00	643.25	449.00	84.18
12	.00	643.25	452.00	82.88
14	160.00	649.46	451.00	86.00
15	.00	650.99	453.00	85.79
18	.00	637.89	449.00	81.85
21	.00	658.57	450.00	90.38
24	.00	628.72	447.00	78.74

26	1000.00	625.34	446.00	77.71
27	.00	631.25	445.00	80.71
30	1000.00	624.12	435.00	81.95
33	1000.00	624.11	438.00	80.65
36	1534.00	625.07	440.00	80.20
39	.00	630.43	430.00	86.85
42	.00	635.79	425.00	91.34
100	.00	658.68	430.00	99.10
103	.00	652.54	435.00	94.27
106	1000.00	645.55	435.00	91.24
108	907.00	641.56	446.00	84.74
109	.00	641.15	405.00	102.33
110	200.00	642.95	375.00	116.11
112	.00	649.52	355.00	127.62
115	.00	660.81	273.00	168.05
118	.00	663.47	293.00	160.54
121	662.00	643.77	441.00	87.87

MAXIMUM PRESSURES

115	.00	660.81	273.00	168.05
118	.00	663.47	293.00	160.54
112	.00	649.52	355.00	127.62
110	200.00	642.95	375.00	116.11
109	.00	641.15	405.00	102.33
100	.00	658.68	430.00	99.10

MINIMUM PRESSURES

26	1000.00	625.34	446.00	77.71
24	.00	628.72	447.00	78.74
36	1534.00	625.07	440.00	80.20
33	1000.00	624.11	438.00	80.65
27	.00	631.25	445.00	80.71
6	1134.00	631.77	445.00	80.94

THE NET SYSTEM DEMAND = 8597.00

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
101	3743.26
134	4853.74

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 8597.00
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
26	1000.00
30	1000.00
33	1000.00
36	1534.00
39	1000.00
42	1000.00

THE RESULTS ARE OBTAINED AFTER 3 TRIALS WITH AN ACCURACY = .00005

Sharp Chula Vista Medical Center
6000 gpm Fire Flow Split Between Nodes 26 30 33 36 39 and 42

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	106	3	743.96	6.54	.00	.00	4.75	12.25
4	3	6	134.00	.07	.00	.00	.86	.51
7	3	9	-1066.39	-5.44	.00	.00	-6.81	-23.87
8	9	14	-1066.39	-4.37	.00	.00	-6.81	-23.87
10	9	12	.00	.00	.00	.00	.00	.00
11	14	15	-1226.39	-1.12	.00	.00	-3.99	-6.01
13	15	18	1156.60	17.06	.00	.00	8.01	33.84
16	15	21	-2382.99	-7.19	.00	.00	-7.76	-20.55
19	18	24	1156.60	11.95	.00	.00	8.01	33.84
22	26	24	-1156.60	-4.40	.00	.00	-8.01	-33.84
23	27	26	1676.35	13.05	.00	.00	11.61	67.29
25	3	27	1676.35	9.42	.00	.00	11.61	67.29
28	26	30	1832.94	3.16	.00	.00	5.97	12.64
31	30	33	832.94	.65	.00	.00	2.71	2.93
34	33	36	-167.06	-.04	.00	.00	-.54	-.15
37	39	36	1701.06	2.75	.00	.00	5.54	11.01
40	42	39	2701.06	6.48	.00	.00	8.80	25.92
43	109	42	3701.06	11.61	.00	.00	12.05	46.45
101	0	100	3486.70	.37	.00	.00	5.56	7.32
104	100	21	298.54	.08	.00	.00	.48	.08
107	100	103	3188.15	5.46	.00	.00	5.09	6.20
110	103	106	3188.15	6.20	.00	.00	5.09	6.20
113	118	21	2084.45	4.80	.00	.00	3.33	2.82
116	121	106	-2444.20	-4.62	.00	.00	-6.93	-15.39
118	108	121	-2392.04	-5.18	.00	.00	-6.79	-14.79
119	108	109	1485.04	2.14	.00	.00	4.21	6.12
120	110	109	2216.02	2.57	.00	.00	6.29	12.84
122	112	110	2416.02	9.04	.00	.00	6.85	15.07
125	112	121	609.84	4.29	.00	.00	2.49	2.86
128	115	112	3025.86	13.51	.00	.00	4.83	5.63
131	118	115	3025.86	3.19	.00	.00	3.09	1.90
134	0	118	5110.31	.25	.00	.00	5.22	5.01

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
3	.00	640.53	444.00	85.16
6	134.00	640.46	445.00	84.70
9	.00	645.97	449.00	85.35
12	.00	645.97	452.00	84.05
14	160.00	650.34	451.00	86.38
15	.00	651.46	453.00	86.00
18	.00	634.40	449.00	80.34
21	.00	658.65	450.00	90.41
24	.00	622.45	447.00	76.03
26	1000.00	618.06	446.00	74.56
27	.00	631.11	445.00	80.65
30	1000.00	614.90	435.00	77.95
33	1000.00	614.25	438.00	76.38
36	1534.00	614.29	440.00	75.53
39	1000.00	617.04	430.00	81.05
42	1000.00	623.52	425.00	86.03
100	.00	658.73	430.00	99.12
103	.00	653.28	435.00	94.59
106	.00	647.07	435.00	91.90
108	907.00	637.28	446.00	82.89
109	.00	635.14	405.00	99.73
110	200.00	637.70	375.00	113.84
112	.00	646.74	355.00	126.42
115	.00	660.26	273.00	167.81
118	.00	663.45	293.00	160.53
121	662.00	642.45	441.00	87.30
	MAXIMUM PRESSURES			
115	.00	660.26	273.00	167.81
118	.00	663.45	293.00	160.53
112	.00	646.74	355.00	126.42
110	200.00	637.70	375.00	113.84
109	.00	635.14	405.00	99.73
100	.00	658.73	430.00	99.12
	MINIMUM PRESSURES			
26	1000.00	618.06	446.00	74.56
36	1534.00	614.29	440.00	75.53
24	.00	622.45	447.00	76.03
33	1000.00	614.25	438.00	76.38
30	1000.00	614.90	435.00	77.95
18	.00	634.40	449.00	80.34

THE NET SYSTEM DEMAND = 8597.00

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
101	3486.70
134	5110.31

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 8597.00
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

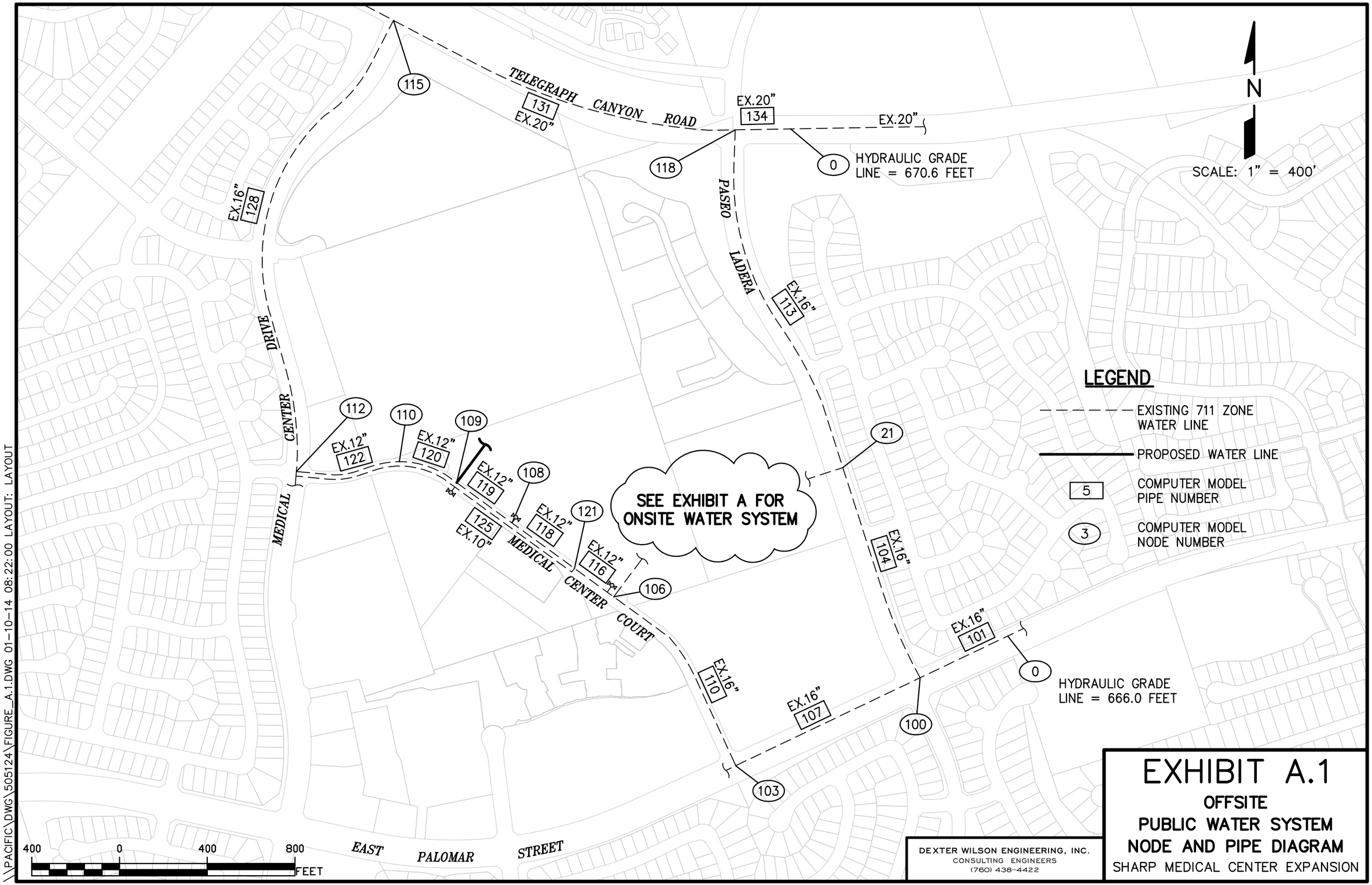


EXHIBIT A.1

OFFSITE
PUBLIC WATER SYSTEM
NODE AND PIPE DIAGRAM
SHARP MEDICAL CENTER EXPANSION

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

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APPENDIX D

CHULA VISTA FIRE DEPARTMENT
REVIEW LETTER FOR
NEW PARKING GARAGE

DISCIPLINE: Fire Department
REVIEWER: Darin Golden
CONTACT: (619) 409-5968

SUBJECT: DRC 13-31/PCC13-045/PCM13-22 Sharp Hospital Parking Structure

Planning Case #: DRC-13-31; PCC-13-045; PCM-13-22

Project Accounting #: BL1049

Address: 751 Medical Center Ct – Sharp Hospital

Project Description: New Open Parking Garage

Reviewed by: Darin Golden – Sr. Fire Inspector (619) 409-5968

Date: 12/6/13

Project Requirements:

General:

1. The applicant shall apply for required building permits. Permits shall comply with applicable codes and requirements, including but not limited to: the current California edition of Building Code (CBC), Fire Code (CFC), Mechanical Code, and Residential Code as adopted and amended by the State of California and the City of Chula Vista.

2. Provide a separate site plan that includes fire apparatus access roads and existing/proposed fire hydrants as part of this submittal. This information is needed to evaluate fire department access and associated requirements.

Fire Department Underground Fire Service Utilities:

3. For 41,880 square feet of Type IA construction, this project will require a fire flow of **2250** gallons per minute for a 2-hour duration at 20 p.s.i. The fire flow calculation area per CFC Appendix B is the largest single floor area for type IA and IB Open Parking Garages.

4. Based upon the required fire flow for Type IA construction type, a minimum of **2** fire hydrant(s) are/is required to serve this project.

5. Where a portion of the building is more than **400** feet from a hydrant on a fire apparatus access road, as measured by an approved route around the exterior of the building, on site fire hydrants and mains shall be provided.

6. Fire Hydrants shall be located and spaced in accordance with California Fire Code, **Appendix C.** For this projects required fire flow, hydrants shall be spaced at an average of 450 feet. The maximum distance from any point on a fire apparatus access road to a hydrant shall not exceed 250 feet.

7. Water supply data is required. An official water flow analysis can be obtained from the respective water authority. The water flow requirements shall be based upon the currently adopted California Fire Code. The date of the water flow test shall be no older than six months from the time of the plan submittal. **No reductions in fire flow will be granted for buildings protected throughout by an approved automatic fire sprinkler system.**

Fire Department Access:

8. Fire apparatus access roads shall be provided for every facility or building and shall extend to within **150** feet of all portions of the facility and all portions of the exterior walls of the first story of the building as measured by an approved route around the exterior of the building.

9. Fire apparatus access road dimensions shall be a minimum of 20 feet in width and have an unobstructed vertical clearance of 13 feet 6 inches.

10. Fire apparatus access roads shall be marked as Fire Lanes in accordance with CVFD standards.

11. The building(s) shall be addressed in accordance with the following criteria:
    - 0 – 50ft from the building to the face of the curb = 6-inches in height with a 1-inch stroke
    - 51 – 150ft from the building to the face of the curb = 10-inches in height with a 1 ½ -inch stroke
    - 151ft from the building to the face of the curb = 16-inches in height with a 2-inch stroke

12. Grades for any access roadway shall be restricted to the following
    - Asphalt < 11%
    - Concrete =/> 11%

Manual Standpipe System:

13. This project is to be protected throughout by a Class I Manual Standpipe system in accordance with CFC Section 905.3.1 exception #2.

Fire Department Web Page:

Chula Vista Fire Prevention Division maintains an up-to-date web page, which contains several details as mentioned within this comment sheet. Please use the web address below to access these standard details/requirements:

http://www.chulavistaca.gov/City_Services/Public_Safety/Fire_Department/Safety/prevention.asp

APPENDIX E

COMPUTER RUNS

SHARP MEDICAL CENTER EXPANSION
NEW PARKING GARAGE FIRE FLOW ANALYSIS

NODE AND PIPE DIAGRAM REFERENCE:

Exhibits B and A.1 at the back of the report.

CONDITIONS MODELED:

1. Maximum Day Demands plus fire flow of 2,250 gpm split between Nodes 6 (1,500 gpm) and 24 (750 gpm).

2. Maximum Day Demands plus fire flow of 2,250 gpm split between Nodes 6 (750 gpm) and 24 (1,500 gpm).

3. Maximum Day Demands plus fire flow of 2,250 gpm split between Nodes 6 (1,125 gpm) and 24 (1,125 gpm).

FLOWRATE IS EXPRESSED IN GPM AND PRESSURE IN PSIG

A SUMMARY OF THE ORIGINAL DATA FOLLOWS

PIPE NO.	NODE NOS.		LENGTH (FEET)	DIAMETER (INCHES)	ROUGHNESS	MINOR LOSS K	FIXED GRADE
1	106	3	534.0	8.0	120.0	.00	
4	3	6	140.0	8.0	120.0	.00	
7	3	9	228.0	8.0	120.0	.00	
8	9	14	183.0	8.0	120.0	.00	
10	9	12	276.0	7.7	120.0	.00	
11	14	15	186.0	11.2	120.0	.00	
13	15	18	504.0	7.7	120.0	.00	
16	15	21	350.0	11.2	120.0	.00	
19	18	24	353.0	7.7	120.0	.00	
22	26	24	130.0	7.7	120.0	.00	
23	27	26	194.0	7.7	120.0	.00	
25	3	27	140.0	7.7	120.0	.00	
101	0	100	50.0	16.0	120.0	.00	659.10
104	100	21	1100.0	16.0	120.0	.00	
107	100	103	880.0	16.0	120.0	.00	
110	103	106	1000.0	16.0	120.0	.00	
113	118	21	1700.0	16.0	120.0	.00	
116	121	106	300.0	12.0	120.0	.00	
118	108	121	350.0	12.0	120.0	.00	
119	108	109	350.0	12.0	120.0	.00	
120	110	109	200.0	12.0	120.0	.00	
122	112	110	600.0	12.0	120.0	.00	
125	112	121	1500.0	10.0	120.0	.00	
128	115	112	2400.0	16.0	120.0	.00	
131	118	115	1680.0	20.0	120.0	.00	
134	0	118	50.0	20.0	120.0	.00	663.70

JUNCTION NUMBER	DEMAND	ELEVATION	CONNECTING PIPES			
3	.00	444.00	1	4	7	25
6	134.00	445.00	4			
9	.00	449.00	7	8	10	
12	.00	452.00	10			
14	160.00	451.00	8	11		
15	.00	453.00	11	13	16	
18	.00	449.00	13	19		
21	.00	428.00	16	104	113	
24	.00	447.00	19	22		
26	.00	446.00	22	23		

27	.00	445.00	23	25	
100	.00	458.00	101	104	107
103	.00	440.00	107	110	
106	.00	439.00	1	110	116
108	907.00	446.00	118	119	
109	.00	405.00	119	120	
110	200.00	375.00	120	122	
112	.00	355.00	122	125	128
115	.00	273.00	128	131	
118	.00	293.00	113	131	134
121	662.00	441.00	116	118	125

OUTPUT SELECTION: ALL RESULTS ARE OUTPUT EACH PERIOD
4 VALUES ARE OUTPUT FOR MAXIMUM AND MINIMUM PRESSURES

THIS SYSTEM HAS 26 PIPES WITH 21 JUNCTIONS , 4 LOOPS AND 2 FGNS

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
6	1634.00
24	750.00

THE RESULTS ARE OBTAINED AFTER 4 TRIALS WITH AN ACCURACY = .00137

Sharp Medical Center Chula Vista - New Open Parking Garage **505124P**
2250 gpm Fire Flow Split Between Nodes 6 and 24

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	106	3	901.89	9.34	.00	.00	5.76	17.50
4	3	6	1634.00	7.36	.00	.00	10.43	52.60
7	3	9	-893.07	-3.92	.00	.00	-5.70	-17.18
8	9	14	-893.07	-3.14	.00	.00	-5.70	-17.18
10	9	12	.00	.00	.00	.00	.00	.00
11	14	15	-1053.07	-.84	.00	.00	-3.43	-4.53
13	15	18	589.04	4.89	.00	.00	4.08	9.70
16	15	21	-1642.11	-3.61	.00	.00	-5.35	-10.31
19	18	24	589.04	3.42	.00	.00	4.08	9.70
22	26	24	160.96	.11	.00	.00	1.11	.88
23	27	26	160.96	.17	.00	.00	1.11	.88

25	3	27	160.96	.12	.00	.00	1.11	.88
101	0	100	903.05	.03	.00	.00	1.44	.60
104	100	21	-346.51	-.11	.00	.00	-.55	-.10
107	100	103	1249.55	.96	.00	.00	1.99	1.09
110	103	106	1249.55	1.09	.00	.00	1.99	1.09
113	118	21	1988.62	4.40	.00	.00	3.17	2.59
116	121	106	-347.67	-.12	.00	.00	-.99	-.42
118	108	121	-148.32	-.03	.00	.00	-.42	-.09
119	108	109	-758.68	-.62	.00	.00	-2.15	-1.76
120	110	109	758.68	.35	.00	.00	2.15	1.76
122	112	110	958.68	1.63	.00	.00	2.72	2.72
125	112	121	462.65	2.57	.00	.00	1.89	1.71
128	115	112	1421.33	3.33	.00	.00	2.27	1.39
131	118	115	1421.33	.79	.00	.00	1.45	.47
134	0	118	3409.95	.12	.00	.00	3.48	2.37

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
3	.00	647.67	444.00	88.26
6	1634.00	640.30	445.00	84.63
9	.00	651.59	449.00	87.79
12	.00	651.59	452.00	86.49
14	160.00	654.73	451.00	88.28
15	.00	655.57	453.00	87.78
18	.00	650.68	449.00	87.40
21	.00	659.18	428.00	100.18
24	750.00	647.26	447.00	86.78
26	.00	647.37	446.00	87.26
27	.00	647.54	445.00	87.77
100	.00	659.07	458.00	87.13
103	.00	658.11	440.00	94.51
106	.00	657.01	439.00	94.47
108	907.00	656.86	446.00	91.37
109	.00	657.47	405.00	109.41
110	200.00	657.83	375.00	122.56
112	.00	659.46	355.00	131.93
115	.00	662.79	273.00	168.91
118	.00	663.58	293.00	160.59
121	662.00	656.89	441.00	93.55
	MAXIMUM PRESSURES			
115	.00	662.79	273.00	168.91
118	.00	663.58	293.00	160.59
112	.00	659.46	355.00	131.93
110	200.00	657.83	375.00	122.56
	MINIMUM PRESSURES			
6	1634.00	640.30	445.00	84.63
12	.00	651.59	452.00	86.49
24	750.00	647.26	447.00	86.78
100	.00	659.07	458.00	87.13

THE NET SYSTEM DEMAND = 4313.00

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
101	903.05
134	3409.95

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 4313.00
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
6	884.00
24	1500.00

THE RESULTS ARE OBTAINED AFTER 3 TRIALS WITH AN ACCURACY = .00030

Sharp Medical Center Chula Vista - New Open Parking Garage **505124P**
2250 gpm Fire Flow Split Between Nodes 6 and 24

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	106	3	838.98	8.17	.00	.00	5.35	15.31
4	3	6	884.00	2.36	.00	.00	5.64	16.86
7	3	9	-788.25	-3.11	.00	.00	-5.03	-13.64
8	9	14	-788.25	-2.50	.00	.00	-5.03	-13.64
10	9	12	.00	.00	.00	.00	.00	.00
11	14	15	-948.25	-.69	.00	.00	-3.09	-3.73
13	15	18	756.78	7.77	.00	.00	5.24	15.43
16	15	21	-1705.02	-3.87	.00	.00	-5.55	-11.06
19	18	24	756.78	5.45	.00	.00	5.24	15.43
22	26	24	743.22	1.94	.00	.00	5.15	14.92
23	27	26	743.22	2.89	.00	.00	5.15	14.92
25	3	27	743.22	2.09	.00	.00	5.15	14.92
101	0	100	910.09	.03	.00	.00	1.45	.61
104	100	21	-291.28	-.08	.00	.00	-.46	-.07
107	100	103	1201.37	.90	.00	.00	1.92	1.02
110	103	106	1201.37	1.02	.00	.00	1.92	1.02
113	118	21	1996.30	4.43	.00	.00	3.19	2.61
116	121	106	-362.39	-.13	.00	.00	-1.03	-.45
118	108	121	-157.67	-.03	.00	.00	-.45	-.10
119	108	109	-749.33	-.60	.00	.00	-2.13	-1.72
120	110	109	749.33	.34	.00	.00	2.13	1.72
122	112	110	949.33	1.60	.00	.00	2.69	2.67
125	112	121	457.28	2.52	.00	.00	1.87	1.68

128	115	112	1406.61	3.27	.00	.00	2.24	1.36
131	118	115	1406.61	.77	.00	.00	1.44	.46
134	0	118	3402.91	.12	.00	.00	3.47	2.36

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
3	.00	648.98	444.00	88.83
6	884.00	646.62	445.00	87.37
9	.00	652.09	449.00	88.01
12	.00	652.09	452.00	86.71
14	160.00	654.59	451.00	88.22
15	.00	655.28	453.00	87.66
18	.00	647.51	449.00	86.02
21	.00	659.15	428.00	100.17
24	1500.00	642.06	447.00	84.53
26	.00	644.00	446.00	85.80
27	.00	646.89	445.00	87.49
100	.00	659.07	458.00	87.13
103	.00	658.17	440.00	94.54
106	.00	657.16	439.00	94.53
108	907.00	656.99	446.00	91.43
109	.00	657.59	405.00	109.46
110	200.00	657.94	375.00	122.61
112	.00	659.54	355.00	131.97
115	.00	662.81	273.00	168.92
118	.00	663.58	293.00	160.59
121	662.00	657.02	441.00	93.61
	MAXIMUM PRESSURES			
115	.00	662.81	273.00	168.92
118	.00	663.58	293.00	160.59
112	.00	659.54	355.00	131.97
110	200.00	657.94	375.00	122.61
	MINIMUM PRESSURES			
24	1500.00	642.06	447.00	84.53
26	.00	644.00	446.00	85.80
18	.00	647.51	449.00	86.02
12	.00	652.09	452.00	86.71

THE NET SYSTEM DEMAND = 4313.00

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
101	910.09
134	3402.91

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 4313.00
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00

A SUMMARY OF CONDITIONS SPECIFIED FOR THE NEXT SIMULATION FOLLOWS

THE FOLLOWING SPECIFIC DEMAND CHANGES ARE MADE :

JUNCTION NUMBER	DEMAND
6	1259.00
24	1125.00

THE RESULTS ARE OBTAINED AFTER 2 TRIALS WITH AN ACCURACY = .00379

Sharp Medical Center Chula Vista - New Open Parking Garage 505124P
2250 gpm Fire Flow Split Between Nodes 6 and 24

PIPE NO.	NODE NOS.		FLOWRATE	HEAD LOSS	PUMP HEAD	MINOR LOSS	VELOCITY	HL/1000
1	106	3	876.09	8.86	.00	.00	5.59	16.58
4	3	6	1259.00	4.54	.00	.00	8.04	32.46
7	3	9	-850.85	-3.58	.00	.00	-5.43	-15.71
8	9	14	-850.85	-2.87	.00	.00	-5.43	-15.71
10	9	12	.00	.00	.00	.00	.00	.00
11	14	15	-1010.85	-.78	.00	.00	-3.29	-4.20
13	15	18	657.06	5.98	.00	.00	4.55	11.87
16	15	21	-1667.91	-3.72	.00	.00	-5.43	-10.61
19	18	24	657.06	4.19	.00	.00	4.55	11.87
22	26	24	467.94	.82	.00	.00	3.24	6.33
23	27	26	467.94	1.23	.00	.00	3.24	6.33
25	3	27	467.94	.89	.00	.00	3.24	6.33
101	0	100	905.88	.03	.00	.00	1.45	.60
104	100	21	-323.96	-.10	.00	.00	-.52	-.09
107	100	103	1229.84	.94	.00	.00	1.96	1.06
110	103	106	1229.84	1.06	.00	.00	1.96	1.06
113	118	21	1991.87	4.41	.00	.00	3.18	2.60
116	121	106	-353.75	-.13	.00	.00	-1.00	-.43
118	108	121	-152.18	-.03	.00	.00	-.43	-.09
119	108	109	-754.82	-.61	.00	.00	-2.14	-1.75
120	110	109	754.82	.35	.00	.00	2.14	1.75
122	112	110	954.82	1.62	.00	.00	2.71	2.70
125	112	121	460.43	2.55	.00	.00	1.88	1.70
128	115	112	1415.25	3.31	.00	.00	2.26	1.38
131	118	115	1415.25	.78	.00	.00	1.45	.46
134	0	118	3407.12	.12	.00	.00	3.48	2.37

JUNCTION NUMBER	DEMAND	GRADE LINE	ELEVATION	PRESSURE
3	.00	648.22	444.00	88.49
6	1259.00	643.67	445.00	86.09
9	.00	651.80	449.00	87.88
12	.00	651.80	452.00	86.58
14	160.00	654.67	451.00	88.26
15	.00	655.45	453.00	87.73

18	.00	649.47	449.00	86.87
21	.00	659.17	428.00	100.17
24	1125.00	645.28	447.00	85.92
26	.00	646.10	446.00	86.71
27	.00	647.33	445.00	87.68
100	.00	659.07	458.00	87.13
103	.00	658.13	440.00	94.52
106	.00	657.07	439.00	94.50
108	907.00	656.91	446.00	91.39
109	.00	657.52	405.00	109.43
110	200.00	657.87	375.00	122.58
112	.00	659.49	355.00	131.95
115	.00	662.80	273.00	168.91
118	.00	663.58	293.00	160.59
121	662.00	656.94	441.00	93.58

MAXIMUM PRESSURES

115	.00	662.80	273.00	168.91
118	.00	663.58	293.00	160.59
112	.00	659.49	355.00	131.95
110	200.00	657.87	375.00	122.58

MINIMUM PRESSURES

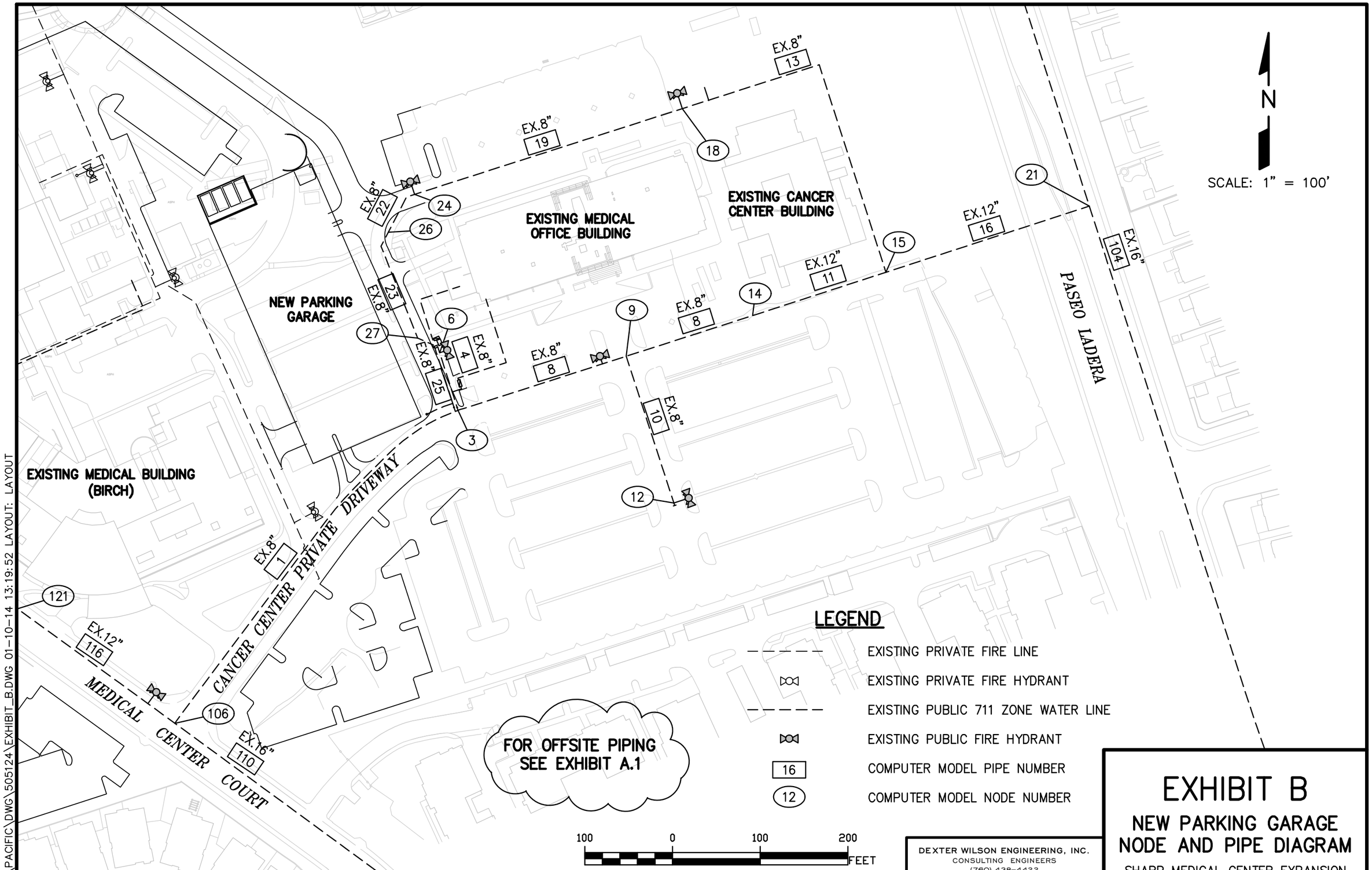
24	1125.00	645.28	447.00	85.92
6	1259.00	643.67	445.00	86.09
12	.00	651.80	452.00	86.58
26	.00	646.10	446.00	86.71

THE NET SYSTEM DEMAND = 4313.00

SUMMARY OF INFLOWS(+) AND OUTFLOWS(-) FROM FIXED GRADE NODES

PIPE NUMBER	FLOWRATE
101	905.88
134	3407.12

THE NET FLOW INTO THE SYSTEM FROM FIXED GRADE NODES = 4313.00
THE NET FLOW OUT OF THE SYSTEM INTO FIXED GRADE NODES = .00



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

EXHIBIT B

NEW PARKING GARAGE NODE AND PIPE DIAGRAM

SHARP MEDICAL CENTER EXPANSION

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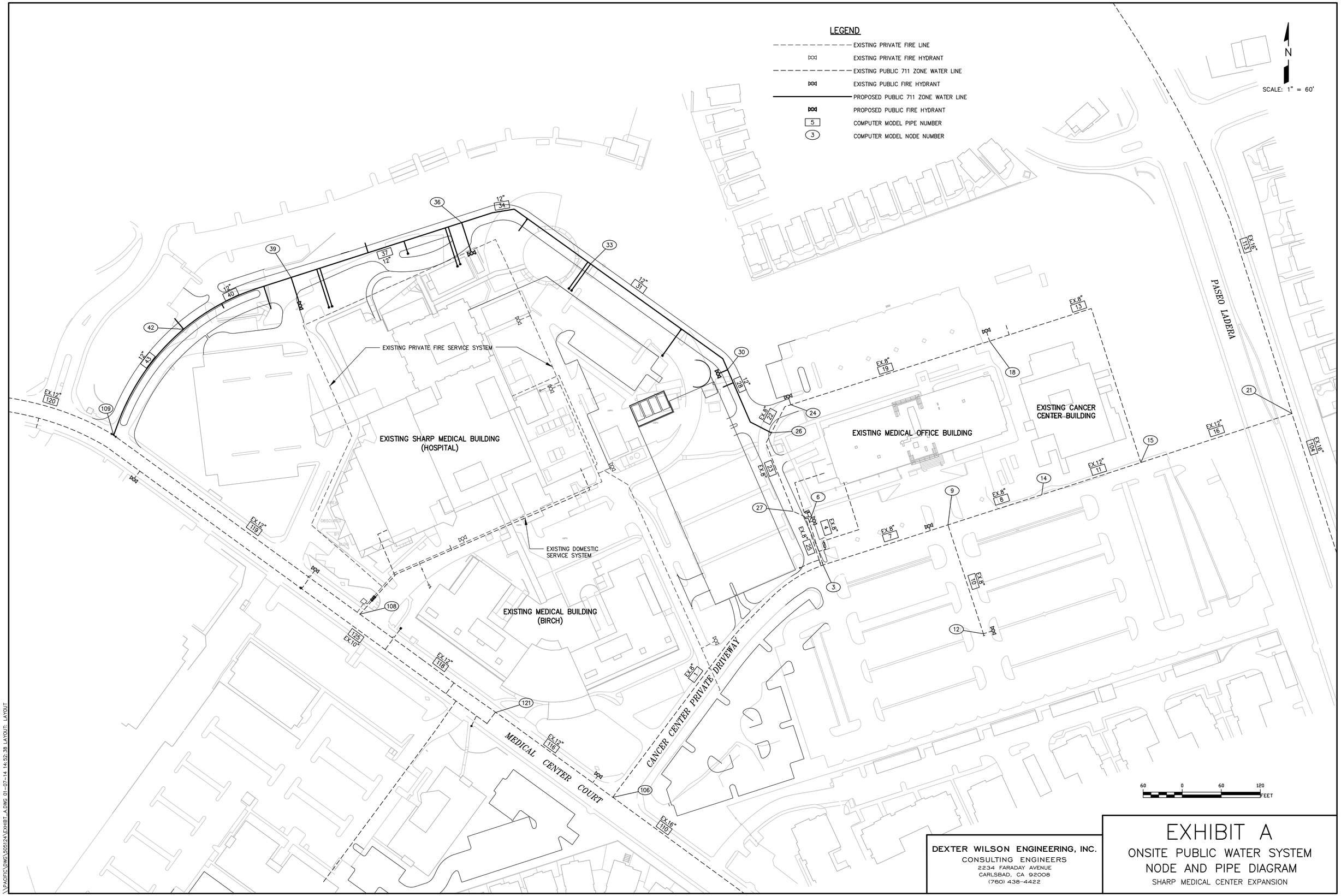

DEXTER WILSON ENGINEERING, INC.
CONSULTING ENGINEERS
2234 FARADAY AVENUE
CARLSBAD, CA 92008
(760) 438-4422

EXHIBIT A

ONSITE PUBLIC WATER SYSTEM NODE AND PIPE DIAGRAM

SHARP MEDICAL CENTER EXPANSION

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