WATER SYSTEM ANALYSIS FOR THE SAN DIEGO STATE UNIVERSITY (SDSU) MISSION VALLEY PROJECT IN THE CITY OF SAN DIEGO

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Subject: Water System Analysis for the SDSU Mission Valley Project in the City of San Diego

Introduction

This report provides a water system analysis for the SDSU Mission Valley project in the City of San Diego. The project is located at the San Diego County Credit Union (SDCCU) Stadium site along Friars Road. The project is west of the 15 Freeway, north of Camino Del Rio and the 8 Freeway, and south of Friars Road. Figure 1 provides a location map for the project and a preliminary site plan is attached as Appendix A. The project is planned to be constructed in two phases.

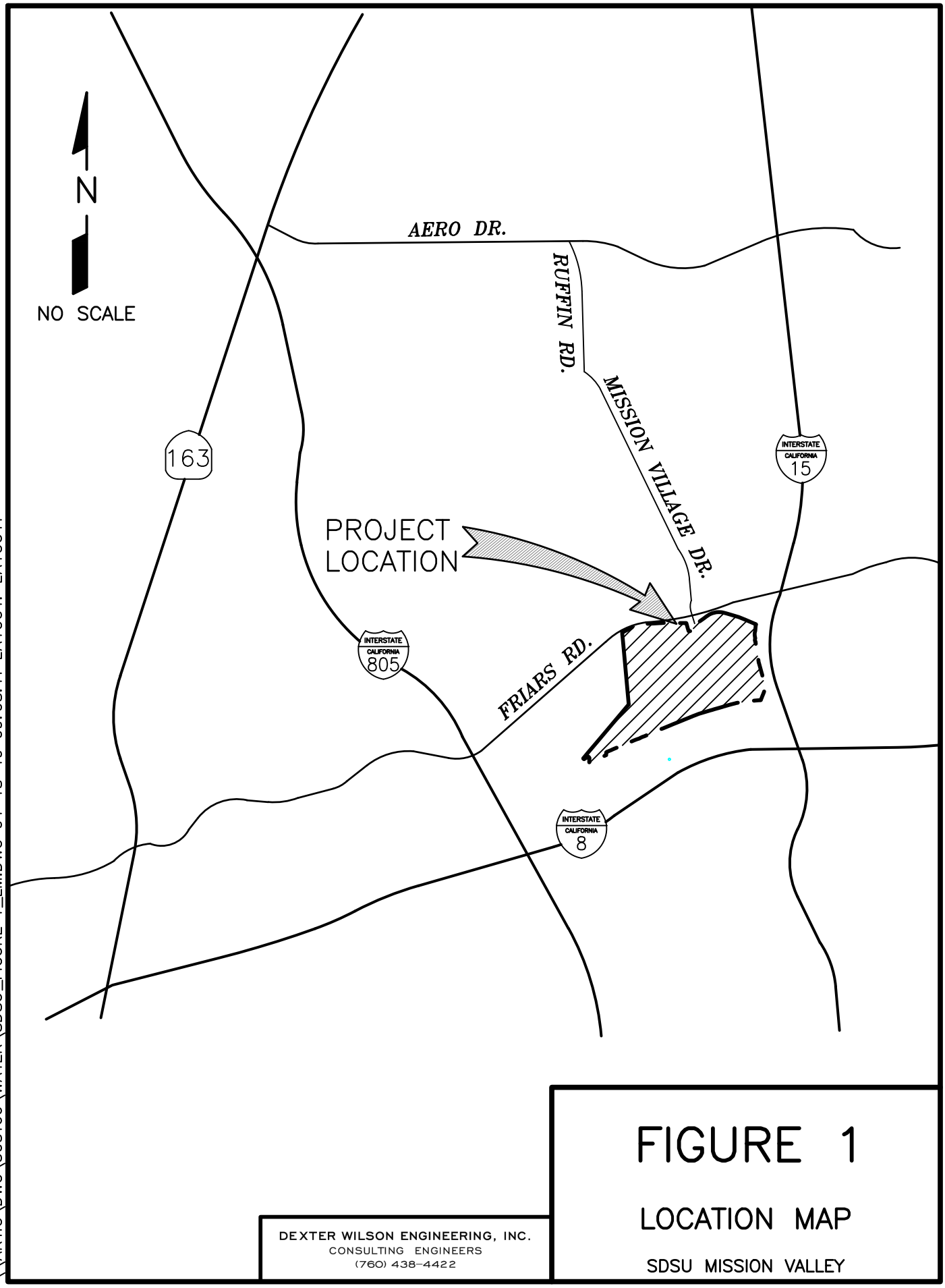

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FIGURE 1

LOCATION MAP

SDSU MISSION VALLEY

The project encompasses approximately 166 acres and the existing land is currently composed of a 70,000-seat stadium, a trolley station, and parking. The project proposes to remove the existing stadium and redevelop the site with a 35,000-seat stadium, 1,600,000 million square feet of campus academic buildings, a 400-room hotel, 95,000 square feet of retail, 4,600 high density residential units and a River Park with active and passive recreational facilities.

Purpose of Study

The primary purpose of this study is to determine if there is any need to provide public water system improvements to support the SDSU Mission Valley project. Some necessary improvements will include removal and relocation of existing onsite public water infrastructure to facilitate the proposed development plan. Other public water system improvements may be needed to provide adequate domestic and fire protection service to the SDSU Mission Valley project. This report will verify that the recommended public water system improvements enable the public water system to comply with the City of San Diego Water Department water system design standards and criteria.

A secondary purpose of this study is to show and size the private onsite water distribution system for the SDSU Mission Valley project.

Study Area

The study area for this report is the boundary of the SDSU Mission Valley project. The existing water system which was incorporated into the analysis of the project site is based on the existing University Heights 390 Zone distribution system that serves the area. Adjacent water mains were included in the computer model to ensure that the dynamics of the existing water system were analyzed as closely as possible without modeling the entire pressure zone.

SDSU Mission Valley Project Water Demands

The water demands and corresponding proposed public water facilities were developed in accordance with the City of San Diego Design Guidelines and Standards. Residential water demand is estimated based on persons per dwelling unit and a water demand of 150 gpd/person. Retail, campus, hotel, and landscape water demand is estimated based on acreage.

The stadium water demand is estimated using a demand factor based on stadium capacity. To be conservative, it was assumed that an average attendee will use approximately four gallons of water during a typical event. This demand scenario was used for the stadium even though a stadium event does not occur on a daily basis.

Table 1 presents the projected average potable water demand for the project. A breakdown of the average potable water demand for each type of land use for the project is provided in Appendix B.

TABLE 1
SDSU MISSION VALLEY PROJECT
AVERAGE POTABLE WATER DEMAND

Land Use	Quantity	Demand Factor	Average Water Demand, gpd
Residential[1]	7,451 people	150 gpd/person	1,117,650
Retail	2.2 net-acres	5,000 gpd/acre	11,000
Campus[2]	35.9 net-acres	4,680 gpd/acre	168,012
Hotel	5.5 net-acres	6,555 gpd/acre	36,053
Stadium	35,000 seats	4 gpd/seat	140,000
Park	31 net-acres	4,000 gpd/acre	124,000
TOTAL			**1,596,715 (1,109 gpm)**

[1]Detailed residential density breakdowns by planning area are included in Appendix B.

[2]Buildings with multiple stories are accounted for in the net-acreage total.

From the City of San Diego Guidelines and Standards, Figure 2-2, the maximum day demand to average annual demand ratio is approximately 1.9 based on the Inland Central peaking curve, resulting in an estimated maximum day demand of 3,033,759 gpd (2,107 gpm).

From the City of San Diego Guidelines and Standards, Figure 2-1, the peak hour demand to average annual demand ratio is approximately 4.4 based on the Inland Central peaking curve, resulting in an estimated peak hour demand of 7,025,546 gpd (4,879 gpm). Appendix C of this report presents the backup data for determining these peaking factors.

City of San Diego Design Criteria

Book 2 of the City of San Diego Guidelines and Standards was used to analyze the proposed water system. A summary of the design criteria from Book 2 is presented as Table 2.

TABLE 2
SDSU MISSION VALLEY PROJECT
WATER SYSTEM DESIGN CRITERIA

Criteria	Design Requirement
Commercial Fire Flow	4,000 gpm
Minimum Static Pressure	65 psi
Maximum Static Pressure	120 psi
Maximum Pressure Drop – Reservoir Out of Service	40 psi
Maximum Pressure Drop – Peak Hour & Max Day plus Fire	25 psi
Minimum Pressure – Peak Hour	40 psi
Minimum Pressure – Max Day plus Fire	20 psi
Maximum Pipeline Velocity (Fire Flow)[1]	15 fps
Maximum Pipeline Velocity (Normal Operating Conditions)[2]	5 fps

[1] Section 3.3.1 E
[2] Section 3.10.1

Existing Water System

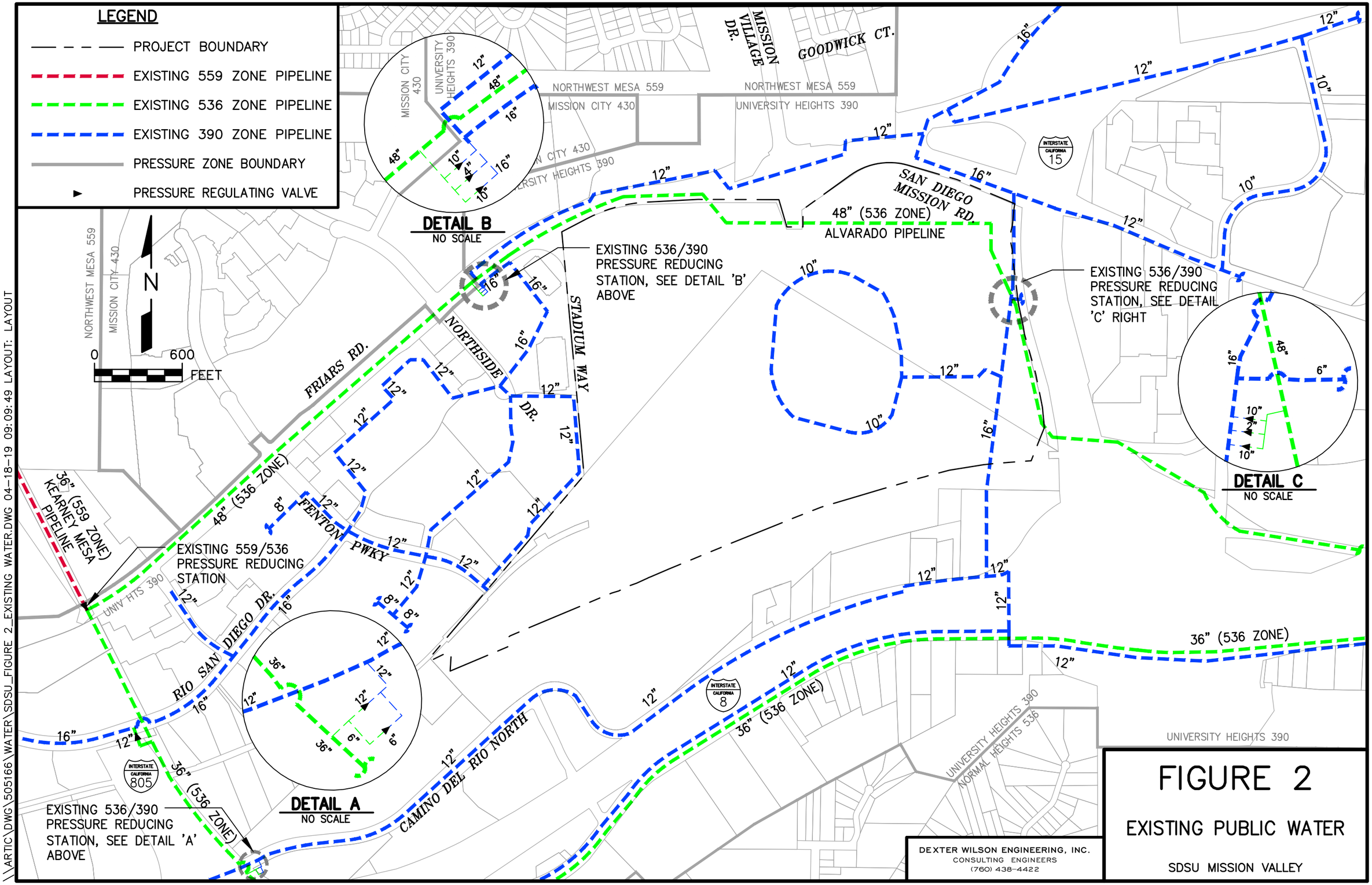
There are existing public water facilities within and directly adjacent to the project site. The existing facilities are part of the University Heights 390 Pressure Zone and Normal Heights 536 Pressure Zone. There are existing 12-inch lines in Friars Road, San Diego Mission Road, and Camino del Rio North. There is a 16-inch line water line in San Diego Mission Road east of Mission Village Drive. This 16" water line extends from the south side of the San Diego River and traverses the existing stadium property. An existing 48-inch 536 Pressure Zone transmission pipeline runs through the existing stadium site as well. This transmission main runs from the southeast area of the site to the northwest area.

There is an existing pressure reducing station within the existing stadium site (Onsite PRS). The Onsite PRS feeds the 390 Pressure Zone from the 536 Pressure Zone via a 16-inch line from the aforementioned onsite 48-inch pipeline.

Another 536/390 Pressure Zone pressure reducing station is located near the intersection of Friars Road and Stadium Way west of the project site (Friars Road PRS). This PR Station is supplied from the 48-inch 536 Pressure Zone transmission main. This PR Station feeds the existing 12-inch 390 Pressure Zone water line in Friars Road.

There are other pressure regulating stations which supply the 390 Pressure Zone; however, the other stations are further from the stadium property and do not influence service to the stadium site to the extent of the Onsite PRS and the Friars Road PRS.

The existing public water facilities in the vicinity of the project are shown on Figure 2 and a Hydraulic Control Map is shown on Figure 3.



\\ARTIC\DWG\505166\WATER\SDSU_FIGURE 2_EXISTING WATER.DWG 04-18-19 09:09:49 LAYOUT: LAYOUT

FIGURE 2

EXISTING PUBLIC WATER

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\\ARTIC\DWG\505166\WATER\SDSU_FIGURE 3_HYDRAULIC CONTROL MAP.DWG 04-18-19 09:10:54 LAYOUT: LAYOUT

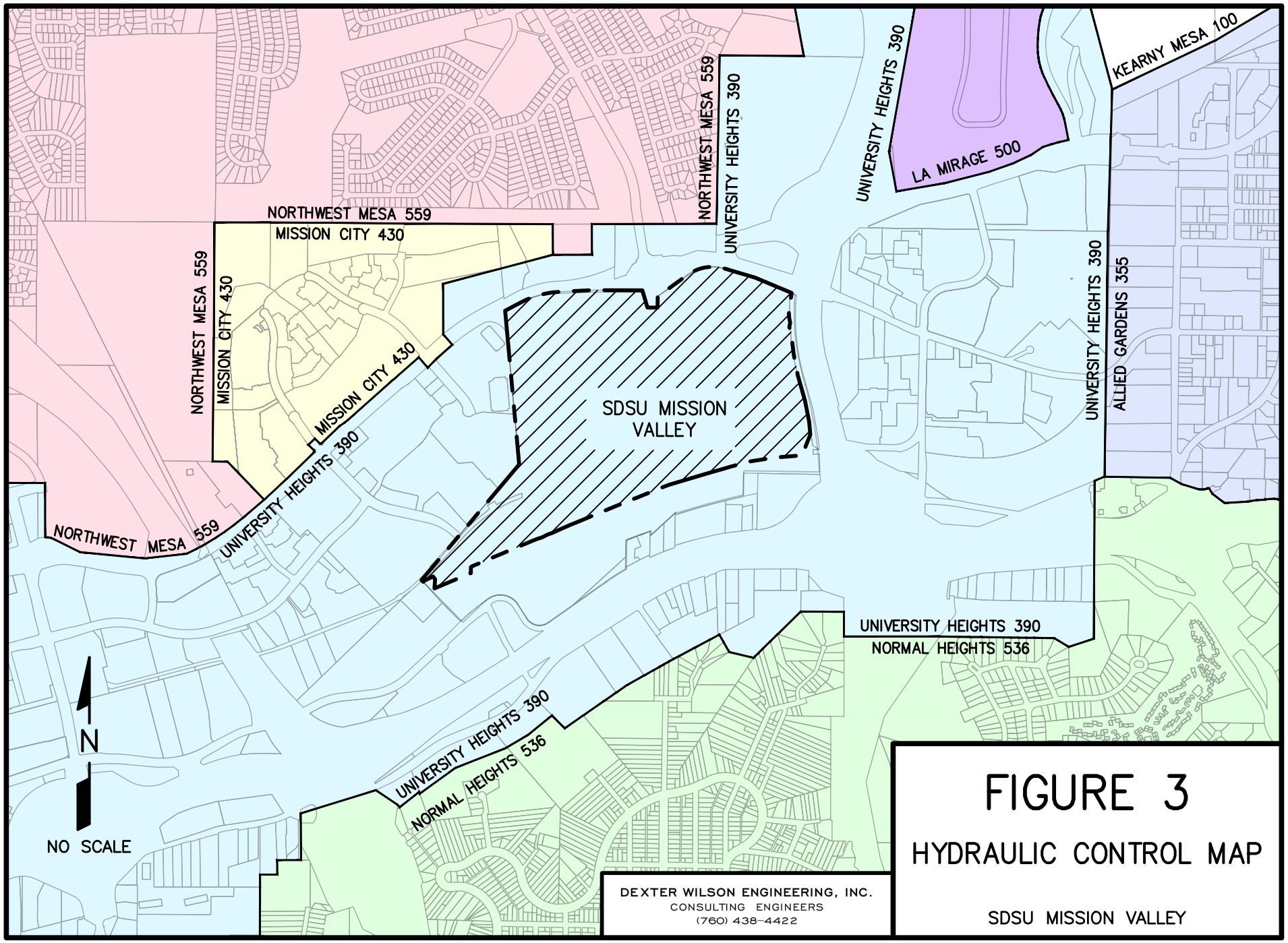

FIGURE 3

HYDRAULIC CONTROL MAP

SDSU MISSION VALLEY

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Proposed Public Water System

Water service to the SDSU Mission Valley development site will be provided from the City of San Diego University Heights 390 Pressure Zone. Elevations within the site will range from 55 feet to 86 feet which results in a maximum static pressure range of 131 psi to 145 psi. This pressure range is above the City of San Diego desirable pressure criterion. Individual pressure regulators will need to be installed for services on all buildings in order to comply with the California Plumbing Code which limits building supply pressures to a maximum of 80 psi.

Water service to the SDSU Mission Valley site will be provided from the City of San Diego 390 Pressure Zone public water system through several master water meters. The number and location of the master water meters for the SDSU Mission Valley site is based on the ability of the City public water system to supply the needed water demand within the established City design criteria.

Proposed Private Onsite Water System. The proposed private onsite water system for the SDSU Mission Valley project will be a combined private water system, meaning domestic water service and fire protection service will be provided by the same system. The private water system will have four separate connections to the existing public water system. In addition, the four proposed service connections to the public water system will be located to make use of the existing Onsite PRS.

Private Water System Meter Sizing

The sizing of the water meters for service to the SDSU Mission Valley site is being presented here because the meter sizes will influence the hydraulic analyses that will be discussed in a later section of this report. The hydraulic analyses were performed in order to confirm that the public water system meets City design criteria under interim and build-out conditions for SDSU Mission Valley.

Per City of San Diego staff, Badger Recordall Fire Series Assembly meters (fire-service type meters) would be supplied for the project in the case that a combined private water system is approved. Therefore, 8-inch Badger Recordall Fire Series Assembly meters will be used and each meter will be followed by an 8-inch reduced pressure principle assembly per City of San Diego standards. Appendix D presents email correspondence that demonstrates that Badger Recordall Fire Series Assembly meters are allowed. Also included in Appendix D is manufacturer literature for Badger Recordall Fire Series Assembly meters which state that an 8-inch meter has a maximum continuous capacity of 3,500 gpm.

Although an 8-inch Badger Recordall Fire Series Assembly meter has a maximum continuous capacity of 3,500 gpm, the City of San Diego criteria for domestic service allows the maximum capacity of a water meter to be less than or equal to 80 percent of a meter's applicable AWWA safe maximum operating capacity flowrate. Per Table 1 of AWWA C703 Cold Water Meters – Fire-Service Type an 8-inch fire-service type meter has a safe maximum operating capacity of 2,800 gpm. At 80 percent, the City of San Diego allowable capacity of an 8-inch fire-service type meter is 2,240 gpm.

Build-Out Condition Water Meter Requirements. Average potable water demand for project build-out is presented in Table 1. The project's water demands are summarized below:

Average Day Demand = 1,109 gpm
Maximum Day Demand = 2,107 gpm
Peak Hour Demand = 4,879 gpm
Maximum Day + 4,000 gpm Fire Flow Demand = 6,107 gpm

The required combined meter capacity for the site is 6,107 gpm. Although the project's build-out demand can be supplied through three 8-inch meters (combined capacity of 6,720 gpm), four meters are proposed to provide redundancy to the private water system.

Phase 1 Water Meter Requirements. Phase 1 of the project will include the proposed stadium and four residential buildings (Buildings R5, R6, R10, and R11). Potable water demands for this phase are as follows:

Average Day Demand = 352 gpm
Maximum Day Demand = 808 gpm
Peak Hour Demand = 1,863 gpm
Maximum Day + 4,000 gpm Fire Flow Demand = 4,808 gpm

In order to provide adequate capacity for Phase 1 of the project, three 8-inch meters are required since the combined maximum capacity of two meters is less than the maximum day plus fire flow demand of 4,808 gpm. One of the three meters will be located south of the Onsite PRS to provide redundancy to the public water system.

Public Water Service Overview

The basic public water system configuration which will provide water service to the SDSU Mission Valley project site includes the existing Friar Road PRS, the existing 12-inch 390 Zone water line in Friars Road adjacent to and along the north side of the project site, the Onsite PRS, and the 16-inch 390 Zone water line along the east side of the project site.

Existing Pressure Reducing Stations. The existing Onsite PRS is composed of one 2-inch pressure reducing valve and two 10-inch pressure reducing valves. The Friars Road PRS is composed of one 4-inch pressure reducing valve and two 10-inch pressure reducing valves. These pressure reducing stations will be the primary sources of water service to the SDSU Mission Valley project site.

Each pressure reducing station has two 10-inch pressure regulating valves; this configuration ensures redundancy within each pressure reducing station even with one large valve out of service. The maximum continuous flowrate for a 10-inch pressure reducing valve is 4,900 gpm.

Having two similarly sized pressure reducing stations in the near vicinity of the SDSU Mission Valley project site provides supply redundancy as well. If an entire pressure reducing station was to be out of service, the second station can provide sufficient flow. This will also apply to pipeline breaks which could isolate one pressure reducing station from the other.

The Onsite PRS is proposed to be set to provide the same hydraulic grade line as the Friars Road PRS. Per the City of San Diego Water Department's Water Field Book Map, the Friars Road PRS is set to provide a downstream pressure of 125 psi at an elevation of 100.8 ft which results in a hydraulic grade line of 389 feet.

Existing 48-inch 536 Zone Transmission Main. As shown in Figure 2, there is an existing 48-inch 536 Pressure Zone transmission main which enters the SDSU Mission Valley project site on the southeast end and exits the property in the north-central to northwest end. A section of this existing 48-inch transmission line will be relocated due to conflicts with proposed improvements within the project development. The relocation will shift the 48-inch pipeline toward the east property boundary and extend the pipeline north to Friars Road, then west in Friars Road until it connects back to the existing pipeline. This proposed alignment is shown in Figure 4.

The 48-inch transmission pipeline relocation will commence north of the existing Onsite PRS. Therefore, the existing Onsite PRS will remain in place.

Existing 16-inch 390 Zone Pipeline. To the extent feasible, the existing 16-inch 390 Zone pipeline on the east side of the project site will remain in place. There are sections of this pipeline which will need to be relocated in order to accommodate improvements within the project site. The new sections of 16-inch water main are shown schematically in Figure 4.

PROPOSED 48" 536 ZONE REALIGNMENT

END RELOCATION OF 48" PIPE

EX. 48" (536 ZONE) ALVARADO PIPELINE

12"

16"

SAN DIEGO MISSION RD.

12"

BEGIN RELOCATION OF 48" PIPE

N

0 200 FEET

INTERSTATE CALIFORNIA 15

EXISTING 536/390 PRESSURE REDUCING STATION PROTECT IN PLACE

PROPOSED 16" 390 ZONE REALIGNMENT

16"

48"

16"

H2 R1 R2 R3 R4 R5 R6 R7 R8 R9 R11 R12 R14

LEGEND

- PROJECT BOUNDARY
- PROPOSED 536 PIPELINE REALIGNMENT
- PROPOSED 390 PIPELINE REALIGNMENT
- EXISTING 536 ZONE PIPELINE
- EXISTING 390 ZONE PIPELINE
- PRESSURE REDUCING STATION

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FIGURE 4

ALVARADO PIPELINE REALIGNMENT

SDSU MISSION VALLEY

Water Service to the SDSU Mission Valley Site. Water service to the SDSU Mission Valley project site will be provided by a series of master water meters connected to the City's public water system. The master meters will be connected to an onsite private water distribution system within the SDSU Mission Valley site.

The private distribution system will be a combined system meaning that a single water distribution system will provide domestic, fire flow, and irrigation service within the project site. The master water meters are sized to provide the full range of domestic demands. The master water meter sizes are large enough to provide fire flow capacity.

Water System Computer Model

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

The model for this analysis includes proposed and existing public water lines in the near vicinity of the project site. The computer model has one source node ("0" Node) for the 536 Zone. The model also includes two existing 536 Zone/390 Zone pressure reducing stations that supply the 390 Zone from the 536 Zone transmission pipeline. These are the Onsite PRS and the Friars Road PRS as described earlier in this report.

LEGEND

- PROJECT BOUNDARY
- EXISTING PUBLIC 536 ZONE PIPELINE
- EXISTING PUBLIC 390 ZONE PIPELINE
- PROPOSED PUBLIC 536 ZONE PIPELINE
- PROPOSED PUBLIC 390 ZONE PIPELINE
- PROPOSED PRIVATE PIPELINE
- PRESSURE REDUCING STATION

MISSION VILLAGE DR.

GOODWICK CT.

PROPOSED RELOCATION OF THE EXISTING 48" 536 ZONE ALVARADO PIPELINE

FRIARS RD.

METER A
8" WATER METER
AND 10" BACKFLOW
PREVENTER

EXISTING 536/390
PRESSURE REDUCING
STATION

EX.48" (536 ZONE)

METER B
8" WATER METER
AND 10" BACKFLOW
PREVENTER

SAN DIEGO MISSION RD.

METER C
8" WATER METER
AND 10" BACKFLOW
PREVENTER

EXISTING 536/390
PRESSURE REDUCING
STATION

NORTHSIDE DR.

STADIUM WAY

INTERSTATE CALIFORNIA 15

EX.48" (536 ZONE)

METER D
8" WATER METER
AND 10" BACKFLOW
PREVENTER

DIG DIG

N

0 400 FEET

FIGURE 5

PROPOSED BUILD-OUT WATER SYSTEM

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Each of these existing pressure reducing stations has multiple pressure regulating valves that feed the 390 Zone. In the computer model each pressure reducing station is modeled as a single pressure reducing valve. This enables the pressure reducing valve to be assigned a flow coefficient value "C_v" of the appropriate magnitude to result in the valve never exceeding the maximum continuous capacity of the corresponding pressure reducing valve or combination of pressure reducing valves. This provides assurance that the computer model will not simulate a condition which cannot be achieved in the field.

To simulate minor losses through pipe fittings and valves, minor loss coefficients or "k" values for all fittings associated with the piping were included in the hydraulic model.

Meters and reduced pressure zone backflow preventer assembly devices were modeled as loss element nodes. A loss element node uses a flow-versus-pressure-loss curve to determine the pressure loss at a given flow.

Appendix E presents a candidate reduced pressure zone backflow preventer assembly. The manufacturer's literature for this device includes charts which show pressure loss as a function of flow. These charts were used to develop the flow-versus-pressure-loss curves for the loss element nodes. The pressure losses are reflected in the computer modeling and show up as losses calculated in feet.

Water System Analysis and Results – Build-Out Scenario

Water system hydraulic modeling was performed to evaluate the ability of the public water system to deliver adequate flow and pressure to the SDSU Mission Valley project connection points. The hydraulic modeling also calculated the expected flow delivered to the project site at all of the proposed connection points. These results are used to confirm whether City water design criteria are satisfied under various demand conditions.

Average day demand, maximum day plus fire flow demand, and peak hour demand were modeled for the SDSU Mission Valley project. A commercial fire flow requirement of 4,000 gpm was modeled at two adjacent computer model nodes within the project simulating two adjacent fire hydrants.

Maximum day plus fire flow demand scenarios were modeled under normal operating conditions (all pipes open) and pipe-out-of-service conditions (one pipe closed).

Appendix F presents the computer modeling results for the SDSU Mission Valley project's build-out condition. Exhibit A presents the model's corresponding Node and Pipe Diagram.

The results in Appendix F include summary tables that demonstrate the public water system's compliance with the City of San Diego's maximum velocity criterion and tables that demonstrate compliance with the City of San Diego's maximum pressure drop criterion. A summary of the computer model results for the build-out condition demand scenarios is presented in Table 3.

TABLE 3
BUILD-OUT WATER SYSTEM
COMPUTER MODEL RESULTS SUMMARY

Scenario	Condition	Fire Flow Nodes	Minimum Residual Pressure, psi	Maximum Public Pipeline Velocity, fps	Maximum Pressure Drop in Public System, psi
4,000	Normal	808, 820	107	8.3	2.9
4,000	Normal	794, 796	110	8.4	2.5
4,000	Normal	784, 788	112	8.4	2.4
4,000	Normal	780, 800	112	8.3	2.5
4,000	Normal	720, 724	101	8.0	1.9
4,000	Pipe 143 Closed	808, 820	105	10.4	7.8
4,000	Pipe 129 Closed	720, 724	98	9.4	7.2
4,000	Pipe 125 Closed	720, 724	87	12.6	21.5

As shown on Table 3, each maximum day plus fire flow scenario is being satisfied at greater than 20 psi residual pressure. For normal operating conditions (all pipes open), there is less than a 25 psi drop in pressure within the public water system for all scenarios. For pipe-out-of-service conditions (pipe break), there is less than a 40 psi drop in pressure within the public water system for all scenarios.

The maximum velocity through a pipeline under any fire flow scenario is 12.6 fps. This maximum velocity occurs through Computer Model Pipe 135 (proposed lateral to the project), which is an 8-inch pipeline, when a 4,000 gpm fire flow is split between Computer Model Nodes 720 and 724, and Pipe 125 is out of service (closed).

Public Water System Redundancy. In order to maintain public water system redundancy to the four service connections for the SDSU Mission Valley project, at least one of the proposed water supply connections must be made south of the Onsite PRS. This is to prevent the situation where all four connections would be supplied by the Friars Road PRS. The Friars Road PRS has the hydraulic capacity to deliver the necessary flow; however, there is not sufficient pipeline capacity in Friars Road to meet the 40 psi pressure drop requirement. In addition, providing a connection south of the Onsite PRS is feasible.

SDSU Mission Valley Project Phasing

The SDSU Mission Valley project is proposed to be constructed in several phases over a span of 10 years or more. The first phase will include the proposed stadium and four residential buildings (Buildings R5, R6, R10, and R11). After the first phase, construction of the remaining residential buildings and the academic buildings will continue. At this time, it is not known exactly how quickly the build-out will or what the sequence of construction will be. Figure 6 shows the Phase 1 water system configuration which includes three master meters, Meter A, Meter B, and Meter C.

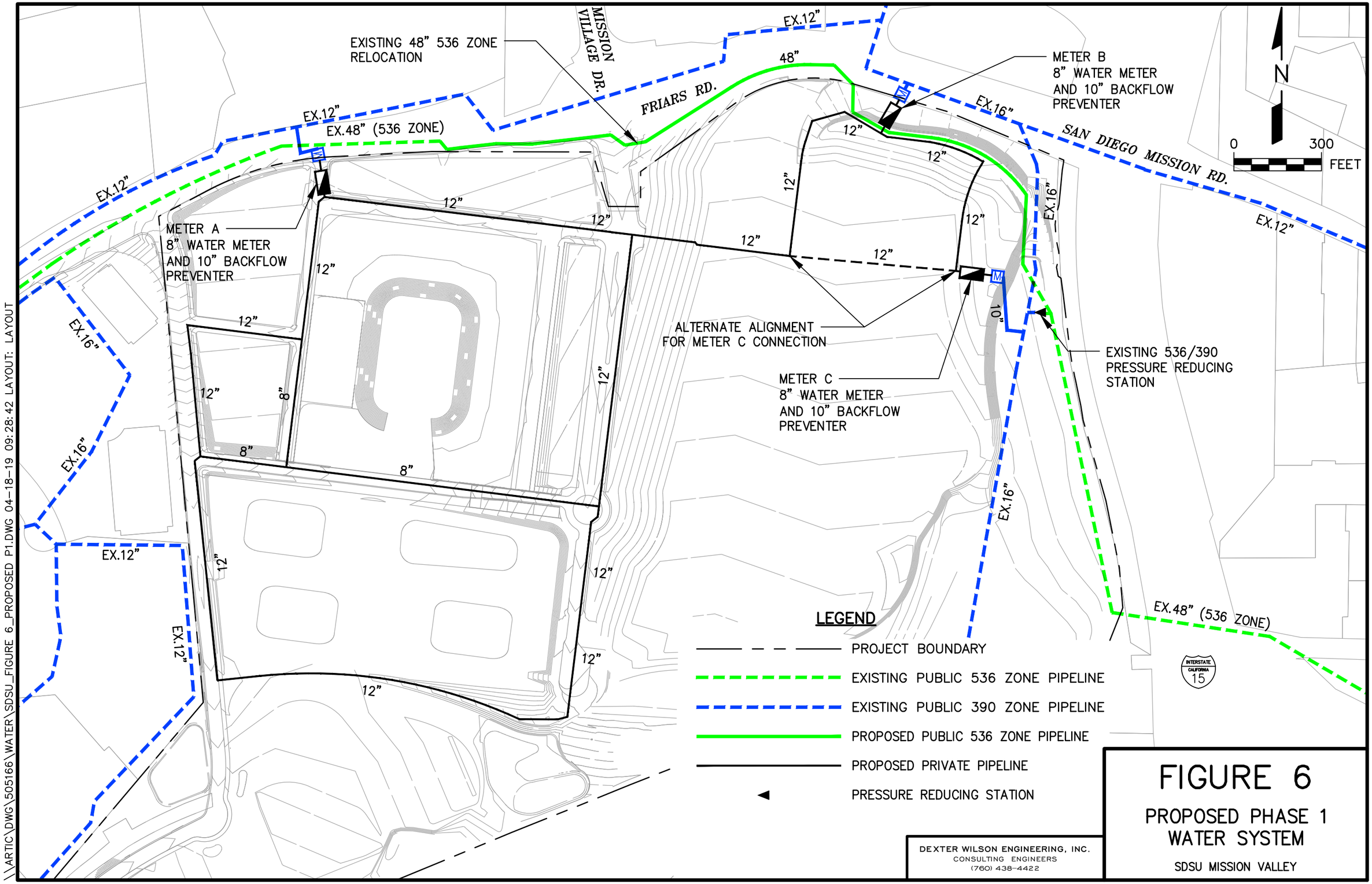

FIGURE 6

PROPOSED PHASE 1 WATER SYSTEM

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The timing of adding the fourth 8-inch master meter is dependent upon the pace of building within the SDSU Mission Valley site. It is recommended that the fourth meter, Meter D, be added to the private water system when the peak hour demand exceeds 4,480 gpm. At this point in the project development, it may be prudent to review the actual water use of the SDSU Mission Valley site to determine if a fourth meter is needed.

Phase 1 Hydraulic Analysis

Appendix G presents the results of the computer model analyses for the Phase 1 of the SDSU Mission Valley project and Exhibit B presents the computer model Node and Pipe Diagram. With three connections providing service, all demand scenarios are satisfied with all pipes open as well as with pipe breaks. The analyses include pipe breaks such that one of the two pressure reducing stations is out of service.

Figure 6 shows the public water system configuration needed for Phase 1 service; as well, this figure shows the minimum SDSU Mission Valley project onsite water distribution pipe configuration and pipe sizes to provide service to Phase 1. A summary of the computer model results for the Phase 1 water system analyses is presented in Table 4.

TABLE 4
PHASE 1 WATER SYSTEM
COMPUTER MODEL RESULTS SUMMARY

Scenario	Condition	Fire Flow Nodes	Minimum Residual Pressure, psi	Maximum Public Pipeline Velocity, fps	Maximum Pressure Drop in Public System, psi
4,000	Normal	808, 820	97	10.0	4.4
4,000	Normal	788, 798	74	9.1	3.8
4,000	Normal	728, 772	110	7.9	3.4
4,000	Pipe 143 Closed	808, 820	90	8.4	15.3
4,000	Pipe 125 Closed	788, 798	71	9.9	10.7

As shown on Table 4, each maximum day plus fire flow scenario is being met with more than 20 psi of residual pressure. For normal operating conditions, there is less than a 25 psi drop in pressure throughout the public water system for each scenario. For pipe-out-of-service conditions, there is less than a 40 psi drop in pressure throughout the public water system for each scenario.

The maximum velocity through a pipeline under any fire flow scenario is 10.0 fps. This maximum velocity occurs through Computer Model Pipe 141 (proposed lateral to the project), which is a 10-inch pipeline, when a 4,000 gpm fire flow is split between Computer Model Nodes 808 and 820 under normal operating conditions.

Conclusions and Recommendations

The following conclusions and recommendations are summarized based on the public water system analysis prepared for the SDSU Mission Valley project.

1. The SDSU Mission Valley project will be supplied from the University Heights 390 Zone system.

2. Maximum static pressures onsite are expected to range from 131 psi to 145 psi.

3. The public water system adjacent to the SDSU Mission Valley project site has adequate capacity to provide service to the project.

4. Portions of the existing 48-inch 536 Zone transmission main and the existing 16-inch 390 Zone distribution main within the project site will be relocated to accommodate proposed improvements.

5. Four new water service connections are proposed to be made to the existing 390 Zone public water system to provide service to the SDSU Mission Valley site.

6. Connections to the existing 390 Zone will be made in Friars Road and San Diego Mission Road as well as to the relocated 390 Zone 16-inch pipeline in the eastern portion of the project.

7. The onsite water distribution system for the SDSU Mission Valley project site will be a private system.

8. The onsite private distribution system will function as a combined system to deliver both domestic service and fire flow.

9. Four 8-inch master water meters are recommended to provide domestic and fire protection capacity for the build-out of the SDSU Mission Valley site.

10. Phase 1 of the project will require three of the four 8-inch master meters to be installed.

11. Individual pressure regulators will need to be installed for services on all pads in order to comply with the California Plumbing Code which limits building supply pressures to a maximum of 80 psi.

12. New piping to be installed as part of the public water system outlined in this report shall conform to AWWA C900 DR18 Class 235 for pipe sizes 16" diameter and smaller. For the relocation of the 48-inch transmission main, pipe material is recommended to be welded steel, cement mortar lined, tape wrapped, and mortar overcoated.

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

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

Dexter Wilson Engineering, Inc.

Andrew Oven, P.E.

AO:FF:ps

Attachments