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WATER SYSTEM ANALYSIS
FOR THE GARRISON PROJECT
IN THE CITY OF OCEANSIDE

April 28, 2025

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4-28-2025

Prepared by:

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Job No. 509-153

TABLE OF CONTENTS

PAGE NO.

Introduction and Purpose....1
Water System Design Criteria....2
Potable Water Demands....4
Fire Flows....5
Available Water System Pressure....5
Existing Water System....6
Proposed Offsite Water Facilities....6
Private Water System....8
- Domestic Meter and Service....8
- Private Fire Protection System....8

Computer Model for System Analysis....10
- Available Hydraulic Grade Line....10
- Water System Computer Model....10
- Fitting and Valve Losses....10

Computer Model Analysis....10
Conclusions and Recommendations....11

APPENDICES

APPENDIX A PRELIMINARY SITE PLAN

APPENDIX B CITY OF OCEANSIDE DESIGN CRITERIA

APPENDIX C PRIVATE WATER REFERENCE

APPENDIX D HYDRAULIC COMPUTER MODEL OUTPUT

LIST OF TABLES

PAGE NO.

TABLE 1 GARRISON PROJECT AVERAGE DAILY WATER DEMAND FACTORS 2

TABLE 2 RESIDENTIAL DENSITY FOR THE GARRISON PROJECT 4

TABLE 3 WATER DEMAND FOR THE GARRISON PROJECT 5

LIST OF FIGURES

PAGE NO.

FIGURE 1 VICINITY MAP 3

FIGURE 2 EXISTING WATER FACILITIES 7

FIGURE 3 PROPOSED WATER FACILITIES 9

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April 28, 2025 509-153

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Attention: Ryan Martin, Vice President

Subject: Water System Analysis for the Garrison Project in the City of Oceanside

Introduction and Purpose

The Garrison project is located in the City of Oceanside west of Garrison Street between Oceanside Boulevard and Mesa Drive. Access to the project is from Garrison Street. Water service for the Garrison project will be provided by the City of Oceanside.

The proposed Garrison project is a residential development on an approximately 8.3-acre parcel. It is situated within a previous elementary school site. The proposed project would develop 140 townhome residential units. Finished floor elevations within the project range from a low of 104 feet to a high of 117 feet in elevation.

The purpose of this letter-report is to analyze the existing and proposed public and private water systems for the Garrison project and determine if there are any hydraulic deficiencies created by the proposed development of this property.

A Vicinity Map for the project is shown on Figure 1 and a preliminary site plan for the project is included in Appendix A.

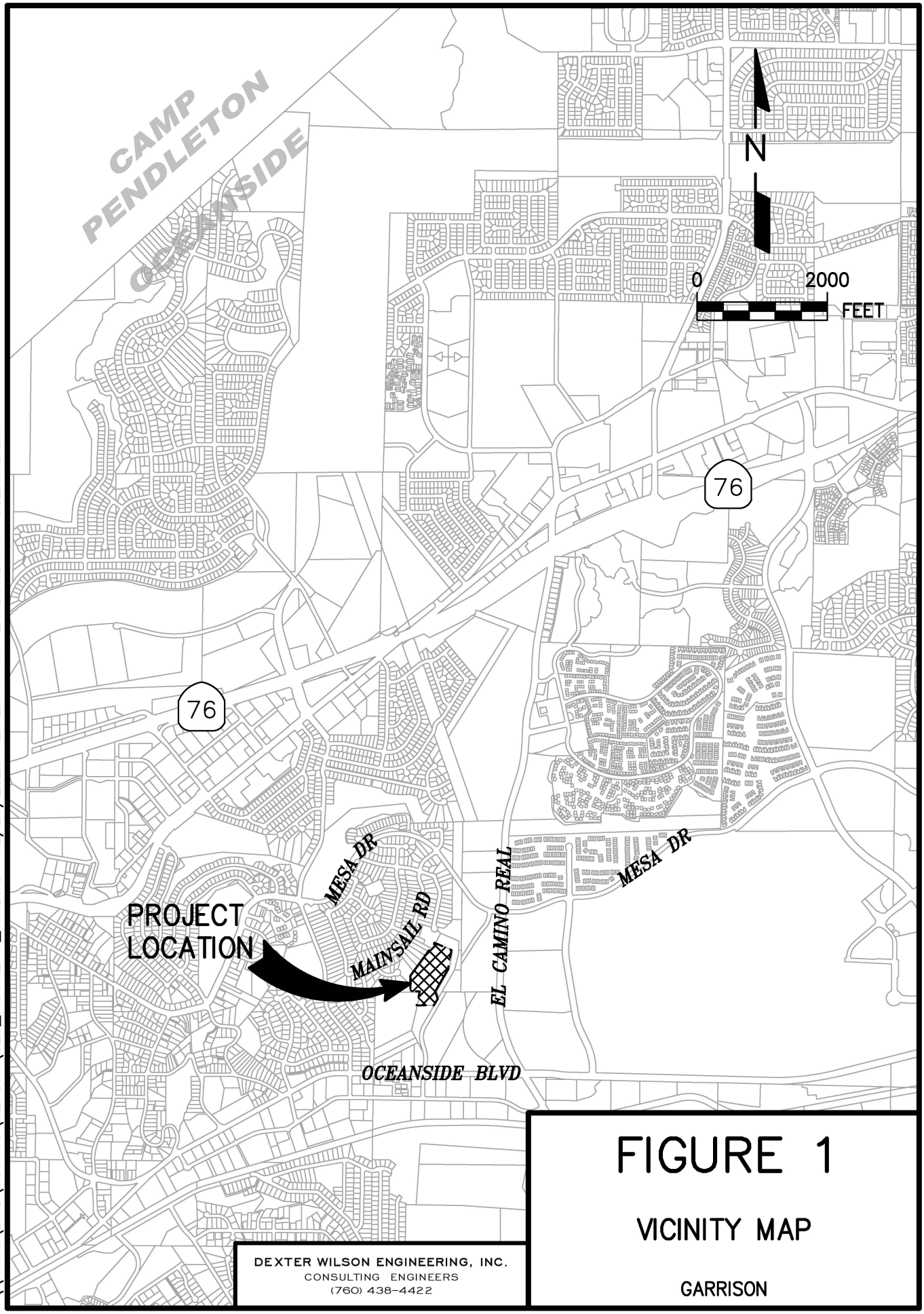
Water System Design Criteria

Water system design criteria such as estimating potable water demands and evaluating the capacity of transmission and distribution pipes are based on the City of Oceanside Water Utilities Department, Water, Sewer, and Reclaimed Water Design & Construction Manual, August 2017, Section 2, Potable Water Systems Design Guidelines (Design & Construction Manual). Based on the design manual, domestic average day water demands are determined using land use acreage and an associated water demand factor. A copy of the pertinent sections in the City's Manual where the design criteria is located is attached as Appendix B.

The water demand rates are presented in Table 1.

TABLE 1
GARRISON PROJECT
AVERAGE DAILY WATER DEMAND FACTORS

Land Use	Gallons Per Day Per Acre
Residential (1-2 DU/ac)	1,200
Residential. (2-4 DU/ac)	2,100
Residential (4-8 DU/ac)	2,400
Residential (8-12 DU/ac)	2,500
Residential (12-15 DU/ac)	2,800
Residential (15-20 DU/ac)	3,200
Residential (20-30 DU/ac)	4,100
Agricultural	1,750
Industrial	2,000
Open Space	1,300
Commercial	1,850
Institutional	1,675



\\ARTIC\DWG\509153\REPORT\GES_FIGURE-1_VM.DWG 12/29/2023 12:12:16 PM LAYOUT:8x11 USER:Karam

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FIGURE 1

VICINITY MAP

GARRISON

During maximum day demands, the public water system must maintain a minimum residual pressure of 45 psi. During peak hour demands, the public water system must maintain a minimum residual pressure of 35 psi. Residual pressure under maximum day demands plus fire flow must be greater than 20 psi.

Pipeline velocity must not exceed 7.5 feet per second (fps) under maximum domestic demands (no fire flow). For fire flow conditions, velocities shall not exceed 15 fps for less than 12-inch diameter existing mains, and velocities shall not exceed 10 fps for 12-inch diameter existing mains and above.

Potable Water Demands

The estimated water demand for the project is calculated using the water use factors based on density presented in the City's Design and Construction Manual. The density is calculated based on the City's definition of Gross Developable Area which equates to 8.3 acres for the Garrison site resulting in a density of 16.6 du/ac. The dwelling unit density for the Garrison project is shown below in Table 2.

TABLE 2
RESIDENTIAL DENSITY FOR THE GARRISON PROJECT

Dwelling Units	Gross Developable Area	Density
140	8.3 acres	16.9 DU/acre

The dwelling unit density corresponds to a water demand factor of 3,200 gpd per acre for the Garrison project. The total estimated average water demand for the Garrison project is calculated in Table 3.

TABLE 3
WATER DEMAND FOR THE GARRISON PROJECT

Land Use	Water Demand Factor	Gross Developable Area	Average Water Demand
Residential	3,200 gpd/acre	8.3 acres	26,560 gpd

The maximum day demands are 2 times the average and peak hour demands are 3 times the average according to the City's Design and Construction Manual. This corresponds to 53,120 gpd (37 gpm) and 79,680 gpd (55 gpm) respectively.

Fire Flows

The fire flow requirement for the project site was estimated based on the City's Design & Construction Manual and Master Plan, the water system shall be designed to meet the minimum design fire flow requirement of 3,000 gpm for 2 hours with a minimum residual pressure of 20 psi.

The excerpt from the City's Design & Construction Manual is shown in Appendix B.

Available Water System Pressure

Water service to the project will be from the Talone 320 Pressure Zone of the City's public water system. Finished floor elevations on the Garrison property range between 104 feet and 117 feet. This results in a maximum static water pressure range of 88 psi to 94 psi on the project site. The expected maximum working pressure behind/downstream of the meter and backflow preventer will be approximately between 65 to 70 psi.

Existing Water System

The Garrison project is located in an area of the City of Oceanside that is well developed. Existing water facilities in the vicinity of the project include a 10-inch diameter water line in Garrison Street. These lines are served by the City's Talone 320 Pressure Zone. There are also larger transmission water lines that are served by the City's Guajome 511 Zone. A pressure reducing station (PRS) located at the El Camino Real and Oceanside Boulevard connects the 511 to 320 Zone. Figure 2 shows the existing water facilities in the vicinity of the Garrison project.

Proposed Offsite Water Facilities

The water service in the area of the Garrison project is being supplied by the 320 Zone water system. From a service pressure standpoint, connecting the Garrison project to this system will provide adequate service. As described in a previous section, the range of pad elevations on the project results in a minimum static water pressure of 88 psi.

The proposed water system for the Garrison project consists of making connections for its proposed private water system at two locations. A domestic water meter and fire protection system connection will be made at two locations.

The Garrison project's proposed onsite water system will consist of private water lines via a private domestic and fire protection system.

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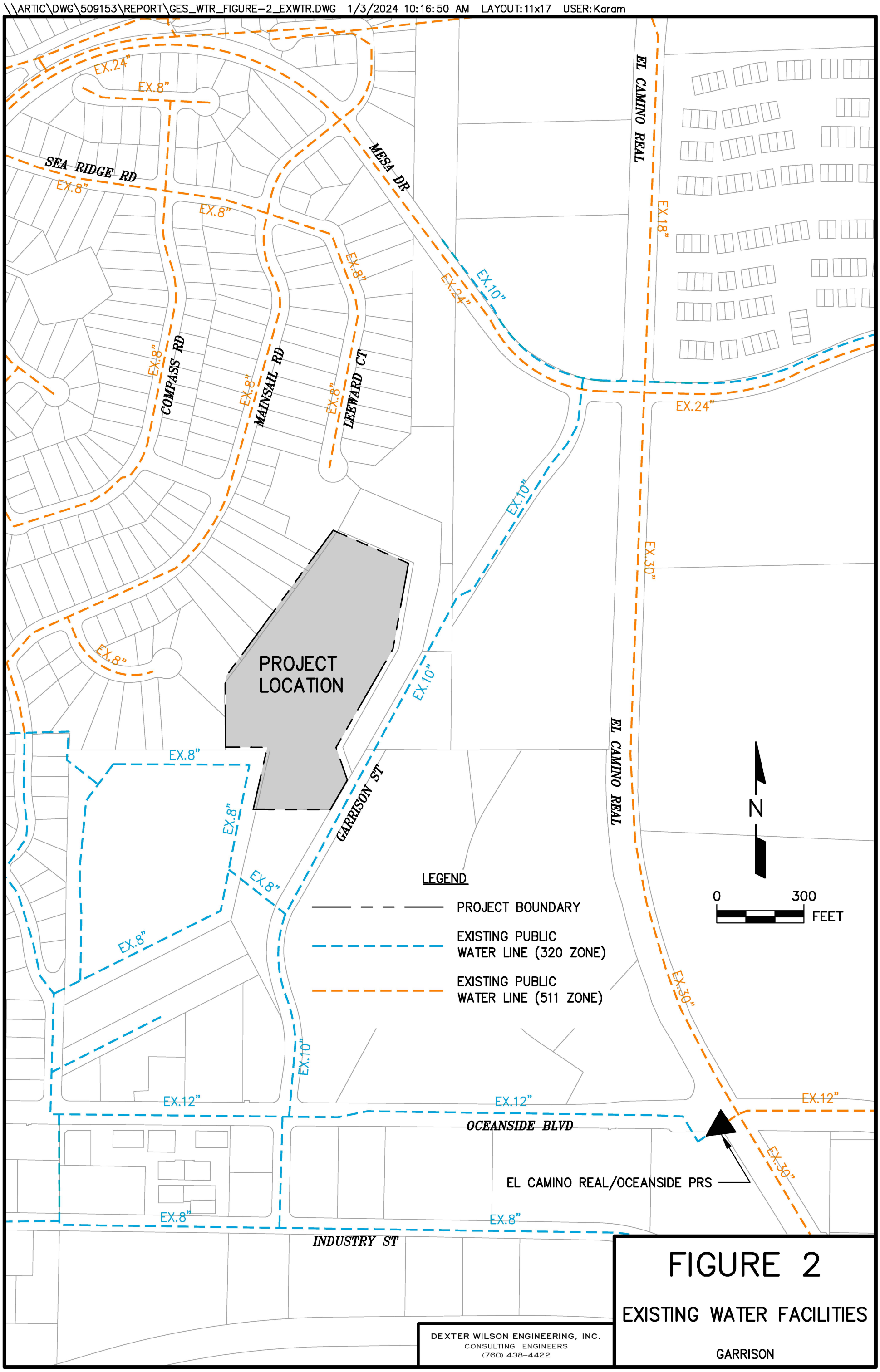

FIGURE 2

EXISTING WATER FACILITIES

GARRISON

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Private Water System

Per the City's requirement, the onsite water system for Garrison will be private. Two connections will be made for both domestic service and fire protection service to the project site. Domestic and fire connections will be made along the existing 10-inch water line in Garrison Street at the southern end of the project and domestic and fire connections will be made along the proposed 12-inch water line (by others) at the northern end of the project. Both the project's private domestic water system and private fire protection system will be connected at each location.

Figure 3 shows the proposed water system for the Garrison project. Reference information surrounding the proposed private water systems for Garrison are included in Appendix C.

Domestic Meter and Service. The preliminary water fixture count (WFU) for the proposed townhome units are estimated to be 30 to 35 WFUs per unit. Based on a WFU count of between 30 and 35 fixture units per home, the design demand for water meter sizing is estimated to be between 530 and 590 gpm for the entire project.

Based on the meter capacities established in AWWA C700-20 and listed by City's Water Utilities Department, the Garrison project will require two 3-inch meters, with a 700 gpm total capacity, that shall be constructed per City of Oceanside Standard Drawing W-4. The final sizing of the service laterals and meters will need to be confirmed once the fixture units for each home are finalized.

Private Fire Protection Service. The private fire protection system will consist of two double check detector assembly (DCDA) backflow preventers at each connection point and 10-inch diameter water lines throughout the project. The 10-inch diameter private fire protection system will sufficiently convey the projected 3,000 gpm fire flow requirement. This was confirmed by a hydraulic computer model that is presented in the next section of this water study.

LEGEND

- PROJECT BOUNDARY
- EXISTING PUBLIC WATER LINE
- PROPOSED PUBLIC WATER LINE
- PROPOSED PUBLIC WATER LINE (BY OTHERS)
- PROPOSED PRIVATE DOMESTIC WATER SYSTEM
- PROPOSED PRIVATE FIRE PROTECTION SYSTEM
- EXISTING PUBLIC FIRE HYDRANT
- PROPOSED PUBLIC FIRE HYDRANT
- PROPOSED BACKFLOW PREVENTER
- PROPOSED WATER METER

NOTE: ALL EXISTING AND PROPOSED WATER SHOWN ON THIS FIGURE ARE 320 PRESSURE ZONE

N

0 80 FEET

FUTURE EL CORAZON SEWER LIFT STATION (BY OTHERS)

PVT DRIVE "A"
PVT DRIVE "B"
PVT DRIVE "C"
PVT DRIVE "D"
PVT DRIVE "E"
PVT DRIVE "F"
PVT DRIVE "G"
PVT DRIVE "H"
PVT DRIVE "I"
PVT DRIVE "J"
PVT DRIVE "K"
PVT DRIVE "L"
PVT DRIVE "M"

BLDG 1 BLDG 2 BLDG 3 BLDG 4 BLDG 5 BLDG 6 BLDG 7 BLDG 8 BLDG 9 BLDG 10 BLDG 11 BLDG 12 BLDG 13 BLDG 14 BLDG 15 BLDG 16 BLDG 17 BLDG 18 BLDG 19 BLDG 20 BLDG 21 BLDG 22

PROPOSED 3" METER AND BACKFLOW PREVENTER

PROPOSED 8" DCDA BACKFLOW PREVENTER

PROPOSED 8" DCDA BACKFLOW PREVENTER

PROPOSED 3" METER AND BACKFLOW PREVENTER

PROPOSED POINT OF CONNECTION

TO BE RELOCATED (BY OTHERS)

PROPOSED POINT OF CONNECTION

GARRISON ST

EX.10"

FIGURE 3

PROPOSED WATER FACILITIES

GARRISON

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Computer Model for System Analysis

To analyze the existing and proposed water systems for the Garrison project, a hydraulic computer model was generated for the piping in the vicinity of the project. This hydraulic computer model included the public water system piping adjacent to the Garrison project as well as the proposed onsite public water system. Several water demand scenarios were modeled which provided data upon which the recommended pipe sizing is based.

Available Hydraulic Grade Line. As mentioned earlier in this report, the source of water in the vicinity of the Garrison project is the 320 Zone with the Talone and Pilgrim Creek Reservoirs being nearest to the project site. According to the City's Water Master Plan and atlas maps the 320 foot hydraulic grade line (HGL) is the high water line of the reservoir. There are 18-inch and 24-inch diameter transmission lines that carry the water from these reservoirs to the Garrison Street and Mesa Drive intersection; hence the source node for the hydraulic computer model was modeled near this intersection. The available HGL was conservatively estimated to be approximately 282 feet (low set point of El Camino Real/Oceanside PRS) during domestic and fire flow scenarios for the proposed project.

Water System Computer Model. Analysis using the KYPIPE computer software program 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 pipe sizes in the analysis is 120.

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

Computer Model Analysis

Computer modeling of the proposed onsite water system and existing offsite water system for the Garrison project was performed to confirm the pipe sizes necessary to provide adequate fire protection and domestic service. The water system was analyzed under three maximum day demand plus 3,000 gpm fire flow scenarios.

Appendix D provides the results of the computer modeling for the analyzed water system. Exhibit A and Exhibit B at the back of Appendix D provides the Node and Pipe Diagrams for the computer model.

The results in Appendix D show that the proposed water system for the Garrison project is adequate for fire protection. The results of the computer model show that a 3,000 gpm fire flow can be provided onsite with minimum residual pressures all above 20 psi.

The results of the computer model in Appendix D show that a peak hour demand can be achieved at the project connection with a minimum residual pressure of 70 psi. The working pressure onsite for the individual buildings is expected to be approximately 55 to 65 psi.

Conclusions and Recommendations

The following recommendations and conclusions are made based on the water system analyses performed for the Garrison project.

1. The Garrison project will be supplied from the Talone 320 Pressure Zone system. Maximum static water pressure will be 94 psi.

2. Figure 2 in this report presents the existing water system surrounding the Garrison project.

3. Water system connections for the Garrison project will be made to the existing 10-inch diameter water line in Garrison Street and proposed 12-inch water line (by others).

4. The proposed Garrison development will be served by onsite private water systems stemming off the existing 10-inch diameter water line and proposed 12-inch diameter water line (by others).

5. The Garrison project will require two 3-inch meters that shall be constructed per City of Oceanside Standard Drawing W-4.

6. No offsite water improvements are necessary for the Garrison project.

7. The fire flow requirement is estimated based on the City's Design & Construction Manual and Master Plan which states a 3,000 gpm fire flow requirement for multi family residential development.

8. Figure 3 in this report presents the proposed water system for the Garrison project.

9. Individual pressure regulators for all building services within the Garrison project are required to limit building service pressures to 80 psi in accordance with the Uniform Plumbing Code and City of Oceanside standards.

10. For PVC pipe to be used for public water lines within the project, we recommend the piping specification to be AWWA C900 DR-18 Class 235.

Thank you for the opportunity to prepare this report. If you have any questions on the enclosed information, please do not hesitate to call.

Dexter Wilson Engineering, Inc.

Steven Henderson, P.E.

SH:ah

Attachments

APPENDIX A

PRELIMINARY SITE PLAN

Site Summary

Gross Site Area:	±8.3 Acres
Dwelling Units:	140 Units
Density:	17 du/ac
Lot Coverage:	30.3%

3 Story Townhomes A:

Plan	Type	Area	Quantity
P1	2 Bed/ 2.5 Bath	1364 sf Net	10 du
P2	2 Bed/ 2.5 Bath	1378 sf Net	20 du
P3	3 Bed/ 2.5 Bath	1561 sf Net	10 du
P4	3 Bed/ 3.5 Bath	1747 sf Net	20 du
P5	3 Bed/ 3.5 Bath	1788 sf Net	41 du
P6	4 Bed/ 3.5 Bath	1948 sf Net	17 du
P7	4 Bed/ 3.5 Bath	2093 sf Net	22 du
Total:			140 du

3 Story Townhomes Building Summary:

Bldg Type	Description	Quantity
Bldg A	4-Plex	1
Bldg B	7-Plex	3
Bldg C	8-Plex	7
Bldg D	4-Plex	2
Bldg E	5-Plex	3
Bldg F	6-Plex	6

Parking Required:

2+ Bed: 140 x 2/du	280 Spaces	
Guest: 140 x 0.2 + 1	29 Spaces	
Total Required:	309 Spaces	

Parking Provided:

Garages:	280 Spaces	
Open parking:	38 Spaces	
Total Provided:	318 Spaces	(2.27/Unit)

Open Space Required:

140 du x 300 sf:	42,000 sf

Open Space Provided:

Private Townhome Balconies:	11,692 sf
Common Usable Open Space:	33,300 + sf
Total:	44,992 sf
	314 sf / du

04-23-25

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TM DESIGN BASE

GARRISON ELEMENTARY SCHOOL

CITY OF OCEANSIDE, CALIFORNIA

W.O. NO. 3214-0002

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APPENDIX B

CITY OF OCEANSIDE DESIGN CRITERIA

2. Pressure Regulating Stations
3. Pressure Relief Stations
4. Reservoirs
5. Wells

H. Demands:

1. Average daily water demands shall be:

LAND USE CATEGORY	GALLONS PER DAY/PER ACRE
Single Family Res. (1-2 DU/ac)	1,200
Single Family Res. (2-4 DU/ac)	2,100
Single Family Res. (4-8 DU/ac)	2,400
Single Family Res. (8-12 DU/ac)	2,500
Single Family Res. (12-15 DU/ac)	2,800
Single Family Res. (15-20 DU/ac)	3,200
Single Family Res. (20-30 DU/ac)	4,100
Agricultural Acres	1,750
Industrial Acres	2,000
Open Space Acres	1,300
Commercial Acres	1,850
Institutional Acres	1,675

DU – Dwelling Unit

2. Peak Factors:

a. Average Daily Demand ADD = 1.00
b. Maximum Daily Demand MDD = 2.0*ADD
c. Peak Hourly Demand PHD = 3.0*ADD

2.2 FIRE FLOWS

The City of Oceanside currently utilizes the latest edition California Fire Code (CFC) requirements for determining fire flow requirements for buildings. The latest edition CFC incorporates many factors in determining fire flows, such as building construction type, building square footage, and fire protection systems. Several factors are combined to determine the minimum required fire flow requirements.

Although General Guidelines contained in Table 2.1 represent typical fire flows for various land use categories, minimum fire flow calculations are governed by the latest edition CFC, Section 507, for each specific building type and construction.

The typical fire flow for the different land use categories are shown in the following Table. All fire flows are measured with a 20-PSI Residual Pressure.

TABLE 2.1: General Fire Flow Guidelines

Land Use Classifications	Design Fire Flow (GPM)	Duration (HOURS)	Residual Pressure (PSI)
Residential - Single Family	1500	2	20
Residential - Multi-Family	3000	2	20
Commercial	4000	4	20
Industrial	4000	4	20
Governmental - Institutional	4000	4	20

All new developments that are required to have a fire suppression system shall have the system approved by the Fire Marshall. Sprinkler calculations shall be provided to the Fire Department for review and to verify the fire service connection and backflow assembly is properly sized.

2.3 PRESSURES

A. Minimum residual pressure shall be 20 PSI at design fire flow plus maximum day domestic demand.

B. Minimum residual pressure shall be 35 PSI at peak hour domestic demand.

C. Minimum residual pressure shall be 45 PSI at peak day.

D. When static pressures exceed 80 PSI at property line, pressure-reducing valves will be required at the building. The pressure regulator shall be Class 150 or greater.

E. All new single-family residential water service in each pressure zone shall be provided with a minimum static pressure of 50 PSI at the water meter.

2.4 MAINS

A. Minimum diameter shall be 8 inches.

B. All mains not meeting the minimum main diameter and material requirements shall be replaced to meet current design standards. This is applicable for all new commercial, industrial, institutional, and residential developments of four (4) units or more. Where the full replacement length along the frontage property is deemed in excess of the overall project cost, the developer may pay an in-lieu fee upon the approval of the Water Utilities Director.

C. All lines are to be looped.

D. Minimum depth of cover required:

1. 36 inches for 12-inch mains and smaller.

2. Mains over 12 inches require special design.

E. Design shall be based on maximum day requirements plus fire flow. Maximum velocity shall be 7.5 FPS not including fire flow.

F. For fire flow conditions, velocities shall not exceed 15 FPS for less than 12-inch existing mains, and velocities shall not exceed 10 FPS for 12-inch existing mains and above. For new mains, velocities shall not exceed 10 FPS with the fire flow demand flowing through one hydrant.

G. Thrust blocks shall be installed in accordance with Standard Drawing W-27. When water pressures exceed 200 PSI and/or soil-bearing pressures are less than 2000 PSF a special design shall be required by a Registered Civil/Structural Engineer.

H. All mains shall be shown in profile on the improvement plans.

I. All water mains not located within the Public right-of-way shall be provided with a minimum 20-foot wide water easement. In some cases, a wider easement may be required, as determined by the Water Utilities Director.

J. Where water and sewer mains are located within the same easement, the minimum easement size shall be 30 feet wide.

K. Easements shall be easily accessible to City maintenance equipment. Access shall be unobstructed with all-weather driveways and capable of withstanding a 40 ton load.

L. No trees, plantings, fences, structures, or building overhang shall be located within City easements.

M. Homeowners who purchase property containing a City easement will be responsible for the maintenance of that easement property.

N. No building foundations will be allowed within 10 feet of the outside edge of a City easement.

O. The shortest pipe length shall be no less than 6 linear feet.

2.5 VALVES

A. Maximum valve spacing:

1. 500 feet in residential areas and high-point areas.

2. 1,000 feet on arteries and secondary feeders, supply lines and combination arteries and supply lines.

B. Valve locations: as required by the Water Utilities Director.

C. Butterfly Valves shall conform to the “Standard for Rubber Seated Butterfly Valves”, per AWWA C-504, as last revised and shall be tested and certified with the valve actuator installed on the valve.

D. Gate Valves sizes 3 inches through 12 inches shall conform to the “Standard for Resilient Wedge Gate Valves for Water and Sewerage Systems”, per AWWA C-509, and C-550 for Interior Epoxy coating, and C-110 for Ductile Iron 250 PSI, latest revision. Gate valves shall be as described in Section 2.12.

Table 4.13 Pressure Regulating Stations
Water Master Plan
City of Oceanside

Name	Location	Valve Size (in)	Standby[2]	Regulating Type	Elevation (ft-msl)	Upstream Zone	Downstream Zone	Pressure Setting (psi)
Airport	Airport Road / Bennett Hill Road	4, 8	N	PRV	60	511	320[5]	155, 148
Buddy Todd Bypass	Buddy Todd Pump Station Site	3, 8	Y	PRV	210	480	320	55, 50
Buena Hills	Buena Hills Drive / North Way	3, 6	Y	PRV	272	511	409	55, 50
College and Adams East	College Boulevard / Adams Street	3, 8	Y	PRV	85	511	320	
College and Adams West	College Boulevard / Adams Street	3, 10	Y	PRV	85	511	320	
Darwin	Darwin Drive / Santa Fe Avenue	3, 6	Y	PRV	200	511	450	75, 70
Darwin / Crestview	Darwin Drive / Crestview Drive	4, 10	Y	PRV	398	626	511	88, 80
Darwin e/o Whispering Palms	Darwin Drive / Whispering Palms	3, 8	N	PRV	256	511	450	75
Del Rio Elementary	Parker Street / North River Road	2, 4	N	PRV MS	98	420	420	100, 95
El Camino Country Club	Palmer Drive / Valley Glen Drive	3, 8	N	PRV	48	409	340	125
El Camino Real & Vista Oceana PRS	El Camino Real / Vista Oceana		N		222	511	511	
El Camino Real & Oceanside PRS	Oceanside Boulevard / El Camino Real	4, 10	Y	PRV	120	511	320	80, 70

APPENDIX C

PRIVATE WATER REFERENCE

APPENDIX A

RECOMMENDED RULES FOR SIZING THE WATER SUPPLY SYSTEM

The provisions contained in this appendix are not mandatory unless specifically adopted by a state agency, or referenced in the adopting ordinance.

A 101.0 General.

A 101.1 Applicability. This appendix provides a general procedure for sizing a water supply system. Because of the variable conditions encountered, it is impractical to lay down definite detailed rules of procedure for determining the sizes of water supply pipes in an appendix, which shall necessarily be limited in length. For an adequate understanding of the problems involved, refer to Water-Distributing Systems for Buildings, Report BMS 79 of the National Bureau of Standards; and Plumbing Manual, Report BMS 66, also published by the National Bureau of Standards.

A 102.0 Preliminary Information.

A 102.1 Daily Service Pressure. Obtain the necessary information regarding the minimum daily service pressure in the area where the building is to be located.

A 102.2 Water Meter. Where the building supply is to be metered, obtain information regarding friction loss relative to the rate of flow of meters in the range of sizes likely to be used. Friction-loss data is capable of being obtained from most manufacturers of water meters. Friction losses for disk-type meters shall be permitted to be obtained from Chart A 102.2.

A 102.3 Local Information. Obtain available local information regarding the use of different kinds of pipe with respect both to durability and to decrease in capacity with the length of service in the particular water supply.

A 103.0 Demand Load.

A 103.1 Supply Demand. Estimate the supply demand for the building main, the principal branches and risers of the system by totaling the fixture units on each, Table A 103.1, and then by reading the corresponding ordinate from Chart A 103.1(1) or Chart A 103.1(2), whichever is applicable.

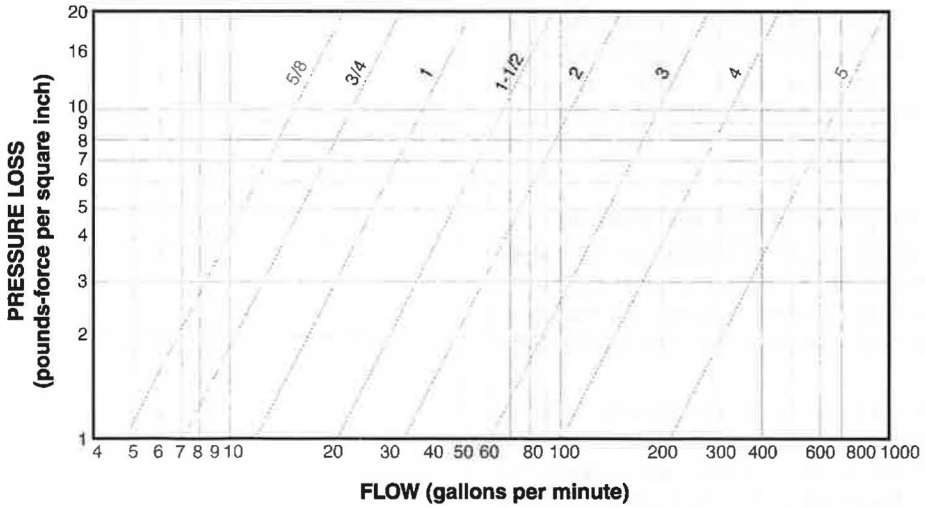
A 103.2 Continuous Supply Demand. Estimate continuous supply demands in gallons per minute (gpm) (L/s) for lawn sprinklers, air conditioners, etc., and add the sum to the total demand for fixtures. The result is the estimated supply demand of the building supply.

A 104.0 Permissible Friction Loss.

A 104.1 Residual Pressure. Decide what is the desirable minimum residual pressure that shall be maintained at the highest fixture in the supply system. Where the highest group of fixtures contains flushometer valves, the residual pressure for the group shall be not less than 15 pounds-force per square inch (psi) (103 kPa). For flush tank supplies, the available residual pressure shall be not less than 8 psi (55 kPa).

A 104.2 Elevation. Determine the elevation of the highest fixture or group of fixtures above the water (street) main. Multiply this difference in elevation by 0.43. The result is the loss of static pressure in psi (kPa).

CHART A 102.2
FRICTION LOSSES FOR DISK-TYPE WATER METERS



For SI units: 1 inch = 25 mm, 1 pound-force per square inch = 6.8947 kPa, 1 gallon per minute = 0.06 L/s

A 104.3 Available Pressure. Subtract the sum of loss in static pressure and the residual pressure to be maintained at the highest fixture from the average minimum daily service pressure. The result will be the pressure available for friction loss in the supply pipes, where no water meter is used. Where a meter is to be installed, the friction loss in the meter for the estimated maximum demand should also be subtracted from the service pressure to determine the pressure loss available for friction loss in the supply pipes.

A 104.4 Developed Length. Determine the developed length of pipe from the water (street) main to the highest fixture. Where close estimates are desired, compute with the aid of Table A 104.4(1), Table A 104.4(2), or Table A 104.4(3), whichever is applicable, the equivalent length of pipe for fittings in the line from the water (street) main to the highest fixture and add the sum to the developed length. The pressure available for friction loss in psi (kPa), divided by the developed lengths of pipe from the water (street) main to the highest fixture, times 100, will be the average permissible friction loss per 100 feet (30 480 mm) length of pipe.

A 105.0 Size of Building Supply.

A 105.1 Diameter. Knowing the permissible friction loss per 100 feet (30 480 mm) of pipe and the total demand, the diameter of the building supply pipe shall be permitted to be obtained from Chart A 105.1(1), Chart A 105.1(2), Chart A 105.1(3), Chart A 105.1(4) Chart A 105.1(5), Chart A 105.1(6), or Chart A 105.1(7), whichever is applicable. The diameter of pipe on or next above the coordinate point corresponding to the estimated total demand and the permissible friction loss will be the size needed up to the first branch from the building supply pipe.

A 105.2 Copper and Copper Alloy Piping. Where copper tubing or copper alloy pipe is to be used for the supply piping and where the character of the water is such that slight changes in the hydraulic characteristics are expected, Chart A 105.1(1) shall be permitted to be used.

A 105.3 Hard Water. Chart A 105.1(2) shall be used for ferrous pipe with the most favorable water supply in regards to corrosion and caking. Where the water is hard or corrosive, Chart A 105.1(3) or Chart A 105.1(4) will be applicable. For extremely hard water, it will be advisable to make additional allowances for the reduction of the capacity of hot-water lines in service.

A 106.0 Size of Principal Branches and Risers.

A 106.1 Size. The required size of branches and risers shall be permitted to be obtained in the same manner as the building supply, by obtaining the demand load on each branch or riser and using the permissible friction loss computed in Section A 104.0.

A 106.2 Branches. Where fixture branches to the building supply are sized for the same permissible friction loss per 100 feet (30 480 mm) of pipe as the branches and risers to the highest level in the building and lead to the inadequate water supply to the upper floor of a building, one of the following shall be provided:

(1) Selecting the sizes of pipe for the different branches so that the total friction loss in each lower branch is approximately equal to the total loss in the riser, including both friction loss and loss in static pressure.

(2) Throttling each such branch using a valve until the preceding balance is obtained.

(3) Increasing the size of the building supply and risers above the minimum required to meet the maximum permissible friction loss.

A 106.3 Water Closets. The size of branches and mains serving flushometer tanks shall be consistent with sizing procedures for flush tank water closets.

A 107.0 General.

A 107.1 Velocities. Velocities shall not exceed 10 feet per second (ft/s) (3 m/s), except as otherwise approved by the Authority Having Jurisdiction.

A 107.2 Pressure-Reducing Valves. Where a pressure-reducing valve is used in the building supply, the developed length of supply piping and the permissible friction loss shall be computed from the building side of the valve.

A 107.3 Fittings. The allowances in Table A 104.4(1) for fittings are based on non-recessed threaded fittings. For recessed threaded fittings and streamlined soldered fittings, one-half of the allowances given in the table will be ample.

TABLE A 103.1
WATER SUPPLY FIXTURE UNITS (WSFU) AND MINIMUM FIXTURE BRANCH PIPE SIZES[3]

APPLIANCES, APPURTENANCES, OR FIXTURES[2]	MINIMUM FIXTURE BRANCH PIPE SIZE[1,4] (inches)	PRIVATE	PUBLIC	ASSEMBLY[6]
Bathtub or Combination Bath/Shower (fill)	½	4.0	4.0	–
¾ inch Bathtub Fill Valve	¾	10.0	10.0	–
Bidet	½	1.0	–	–
Clothes Washer	½	4.0	4.0	–
Dental Unit, cuspidor	½	–	1.0	–
Dishwasher, domestic	½	1.5	1.5	–
Drinking Fountain or Water Cooler	½	0.5	0.5	0.75
Hose Bibb	½	2.5	2.5	–
Hose Bibb, each additional[7]	½	1.0	1.0	–
Lavatory	½	1.0	1.0	1.0
Lawn Sprinkler, each head[5]	–	1.0	1.0	–
Mobile Home, each (minimum)	–	12.0	–	–
Sinks	–	–	–	–
Bar	½	1.0	2.0	–
Clinical Faucet	½	–	3.0	–
Clinical Flushometer Valve with or without faucet	1	–	8.0	–
Kitchen, domestic	½	1.5	1.5	–
Laundry	½	1.5	1.5	–
Service or Mop Basin	½	1.5	3.0	–
Washup, each set of faucets	½	–	2.0	–
Shower per head	½	2.0	2.0	–
Urinal, 1.0 GPF Flushometer Valve	¾	3.0	4.0	5.0
Urinal, greater than 1.0 GPF Flushometer Valve	¾	4.0	5.0	6.0
Urinal, flush tank	½	2.0	2.0	3.0
Wash Fountain, circular spray	¾	–	4.0	–
Water Closet, 1.6 GPF Gravity Tank	½	2.5	2.5	3.5
Water Closet, 1.6 GPF Flushometer Tank	½	2.5	2.5	3.5
Water Closet, 1.6 GPF Flushometer Valve	1	5.0	5.0	8.0
Water Closet, greater than 1.6 GPF Gravity Tank	½	3.0	5.5	7.0
Water Closet, greater than 1.6 GPF Flushometer Valve	1	7.0	8.0	10.0

For SI units: 1 inch = 25 mm

Notes:

1 Size of the cold branch pipe, or both the hot and cold branch pipes.

2 Appliances, appurtenances, or fixtures not included in this table shall be permitted to be sized by reference to fixtures having a similar flow rate and frequency of use.

3 The listed fixture unit values represent their total load on the cold water building supply. The separate cold water and hot water fixture unit value for fixtures having both cold and hot water connections shall be permitted to be three-quarters of the listed total value of the fixture.

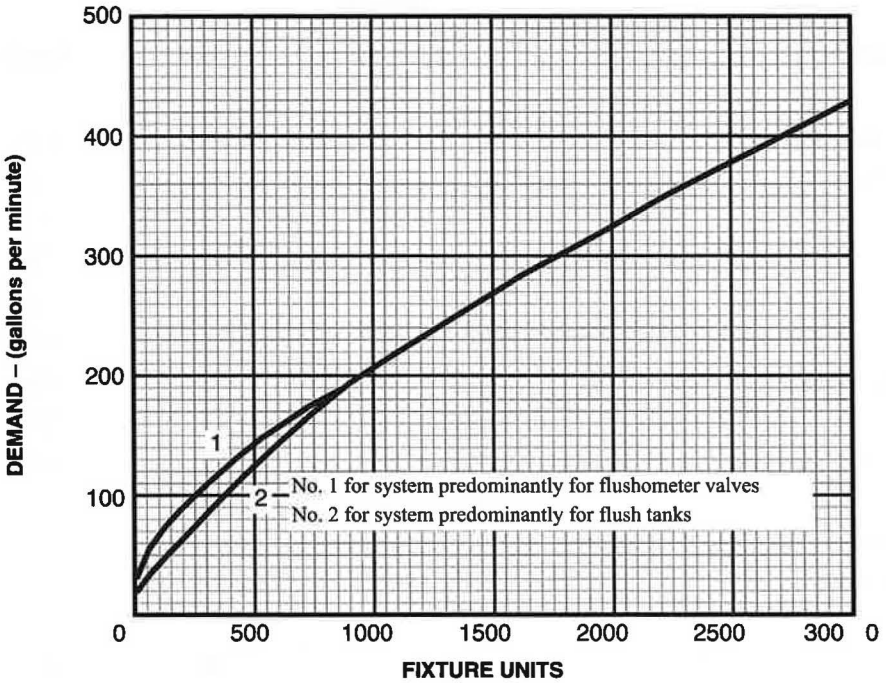
4 The listed minimum supply branch pipe sizes for individual fixtures are the nominal (I.D.) pipe size.

5 For fixtures or supply connections likely to impose continuous flow demands, determine the required flow in gallons per minute (gpm) (L/s) and add it separately to the demand in gpm (L/s) for the distribution system or portions thereof.

6 Assembly [Public Use (see Table 422.1)].

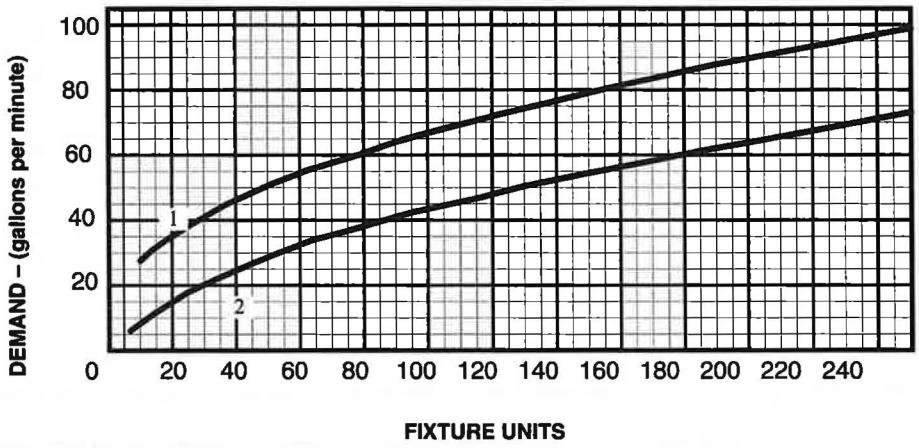
7 Reduced fixture unit loading for additional hose bibbs is to be used where sizing total building demand and for pipe sizing where more than one hose bibb is supplied by a segment of water distribution pipe. The fixture branch to each hose bibb shall be sized by 2.5 fixture units.

CHART A 103.1(1)
ESTIMATE CURVES FOR DEMAND LOAD



For SI units: 1 gallon per minute = 0.06 L/s

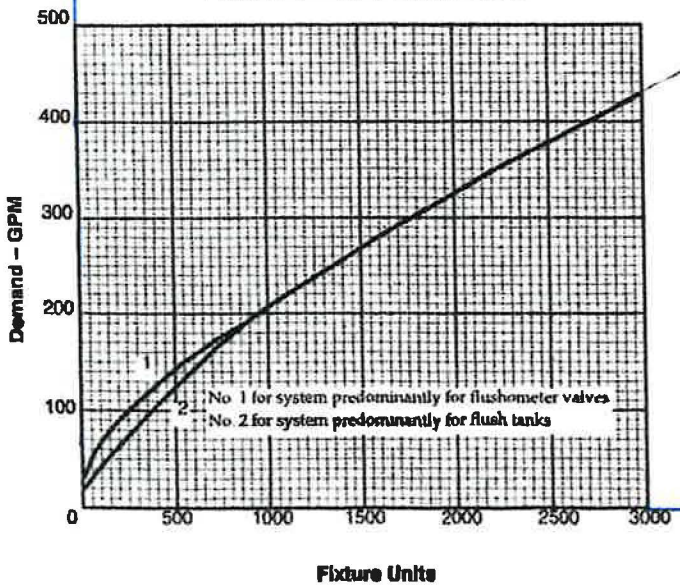
CHART A 103.1(2)
ENLARGED SCALE DEMAND LOAD



For SI units: 1 gallon per minute = 0.06 L/s

Chart A-2

Estimate Curves for Demand Load



1,100
1,000
900
800
4,000
5,000
10,000

CITY OF OCEANSIDE
WATER UTILITIES DEPARTMENT

WATER SYSTEM CAPACITY BUY-IN FEES Based on Meter Size									WASTEWATER SYSTEM BUY-IN FEES		TOTAL BUY-IN FEES	
Use Type	Meter Size	Meter Only	Water System Capacity Buy-In Fees	SDCWA Capacity Charge	SDCWA Water Treatment Cap. Charge	AWWA Operating Capacity (gpm)	Max Fixture Units	Total	Meter Size	Wastewater System Capacity Buy-In Fees	Meter Size	Total
Single Family Residential	5/8"	$ 590	$ 5,680	$ 5,328	$ 149	20	30	$ 11,747	5/8"	$ 7,794	5/8"	$ 19,541
	3/4"	$ 618	$ 8,520	$ 5,328	$ 149	30	53	$ 14,615	3/4"	$ 7,794	3/4"	$ 22,409
	1"	$ 742	$ 14,200	$ 8,525	$ 238	50	130	$ 23,705	1"	$ 7,794	1"	$ 31,499
	1-1/2"	$ 2,214	$ 28,400	$ 15,984	$ 447	100	375	$ 47,045	1-1/2"	$ 7,794	1-1/2"	$ 54,839
	2"	$ 2,546	$ 45,440	$ 27,706	$ 775	160	700	$ 76,467	2"	$ 7,794	2"	$ 84,261
Multi-family & Non-residential	5/8"	$ 590	$ 5,680	$ 5,328	$ 149	20	30	$ 11,747	5/8"	$ 7,794	5/8"	$ 19,541
	3/4"	$ 618	$ 8,520	$ 5,328	$ 149	30	53	$ 14,615	3/4"	$ 11,691	3/4"	$ 26,306
	1"	$ 742	$ 14,200	$ 8,525	$ 238	50	130	$ 23,705	1"	$ 19,486	1"	$ 43,191
	1-1/2"	$ 2,214	$ 28,400	$ 15,984	$ 447	100	375	$ 47,045	1-1/2"	$ 38,971	1-1/2"	$ 86,016
	2"	$ 2,546	$ 45,440	$ 27,706	$ 775	160	700	$ 76,467	2"	$ 62,354	2"	$ 138,821
	3"	$ 2,639	$ 85,200	$ 51,149	$ 1,430	350	*	$ 140,418	3"	$ 116,914	3"	$ 257,332
	4"	$ 4,357	$ 142,000	$ 87,379	$ 2,443	600	*	$ 236,179	4"	$ 194,856	4"	$ 431,035
	6"	$ 7,283	$ 284,000	$ 159,840	$ 4,470	1350	*	$ 455,593	6"	$ 389,712	6"	$ 845,305
	8"	$ 11,725	$ 454,400	$ 277,056	$ 7,748	1600	*	$ 750,929	8"	$ 623,539	8"	$ 1,374,468

Operating Capacity: AWWA C700 Cold-Water Meters – Displacement Type, Table 1
Max fixture units per California Plumbing Code Apendix A, Table A 103.1
Max fixture units for meters over 2" shall be determined by the Water Utilities Department
Dedicated irrigation meter required for non-residential and multi-family projects with 3 or more dwelling units

CITY CODES & ORDINANCES FOR FEES

Water System Capacity Buy-In Fees:	Oceanside City Code, Chapter 37, Sec. 37.56.1, Ord. No. 15-OR0480-1
Wastewater System Capacity Buy-In Fees:	Oceanside City Code, Chapter 29, Sec. 29.11.1, Ord. No. 15-OR0479-1
Imposition, Calculation & Collection of Impact Fees	Oceanside City Code, Chapter 32, Sec. 32B.7, Ord. No. 02-OR331-1
SDCWA Capacity Charge:	San Diego County Water Authority effective January 1, 2022
New Water Meter Equipment & Install Fee:	Oceanside City Resolution No. 17-R0121-1

Rev 01/01/2022

Fees effective January 1, 2022

APPENDIX D

HYDRAULIC COMPUTER MODEL OUTPUT

Reference:

- Exhibit A for offsite Node and Pipe Diagram
- Exhibit B for onsite Node and Pipe Diagram

The following conditions were modeled for the Garrison Project:

0. Average Day Demand
1. Maximum Demand plus 3,000 gpm Fire Flow split between Node 4 and Node 5
2. Maximum Demand plus 3,000 gpm Fire Flow split between Node 1 and Node 8
3. Maximum Demand plus 3,000 gpm Fire Flow split between Node 10 and Node 11
4. Peak Hour Demand
5. Peak Demand – WFU CA Plumbing Code Based

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* * * * * * * * * * * * K Y P I P E * * * * * * * * * * * *
*                                                           *
*  Pipe Network Modeling Software                           *
*                                                           *
*  CopyRighted by KYPIPE LLC (www.kypipe.com)               *
*  Version: 12.009b  03-25-2024                             *
*  Company:  DEXWIL        Serial #:  580753                *
*  Interface:  Classic                                      *
*   Licensed for Pipe2018                                   *
*                                                           *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Date & Time: Mon Apr 28 13:51:33 2025

Master File : k:\509153\garrison ky pipe apr 2 2025.KYP\garrison ky pipe apr 2 2025.P2K

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

U N I T S S P E C I F I E D

FLOWRATE ..... = gallons/minute
HEAD (HGL) ..... = feet
PRESSURE ..... = psig

P I P E L I N E D A T A

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NAMES #1	#2	LENGTH (ft)	DIAMETER (in)	ROUGHNESS COEFF.	MINOR LOSS COEFF.
P-1	J-7	J-8	100.00	10.00	120.0000	1.00
P-2	J-3	J-12	650.00	10.00	120.0000	0.00
P-3	J-3	I-DCDA-1	60.00	8.00	120.0000	0.00
P-4	J-5	J-4	140.00	10.00	120.0000	1.50
P-5	J-7	J-10	170.00	10.00	120.0000	4.00
P-6	J-6	J-3	160.00	10.00	120.0000	0.00
P-7	J-6	J-9	500.00	12.00	120.0000	2.50
P-8	J-2	J-5	115.00	10.00	120.0000	2.95
P-9	J-9	I-DCDA-2	30.00	8.00	120.0000	0.00
P-10	J-11	J-7	110.00	10.00	120.0000	1.50
P-11	J-1	J-4	180.00	10.00	120.0000	2.40
P-12	J-8	J-1	230.00	10.00	120.0000	1.70
P-13	J-12	ECR/O PRS	1450.00	12.00	120.0000	0.00
P-14	J-6	J-13	2100.00	10.00	120.0000	0.00
P-15	J-13	J-14	250.00	10.00	120.0000	0.00
P-16	O-DCDA-2	J-11	30.00	10.00	120.0000	0.00
P-17	O-DCDA-1	J-2	60.00	10.00	120.0000	0.00

P U M P/L O S S E L E M E N T D A T A

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

HEAD (ft)	FLOWRATE (gpm)	EFFICIENCY (%)
-6.92	0.00	75.00 (Default)
-9.23	900.00	75.00 (Default)
-11.54	1500.00	75.00 (Default)
-12.69	1700.00	75.00 (Default)
-13.85	2000.00	75.00 (Default)

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

N O D E D A T A

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	EXTERNAL GRADE (ft)
ECR/O PRS		----	0.00	282.00
I-DCDA-1		0.00	94.00	
I-DCDA-2		0.00	94.00	
J-1		0.00	112.00	
J-2		0.00	94.00	
J-3		9.20	94.00	
J-4		0.00	101.00	
J-5		0.00	99.00	
J-6		0.00	94.00	
J-7		0.00	118.00	
J-8		0.00	114.00	
J-9		9.20	94.00	
J-10		10.00	120.00	
J-11		0.00	114.00	
J-12		0.00	70.00	
J-13		0.00	95.00	
J-14		0.00	100.00	
O-DCDA-1		0.00	94.00	
O-DCDA-2		0.00	94.00	

O U T P U T O P T I O N D A T A

OUTPUT SELECTION: ALL RESULTS ARE INCLUDED IN THE TABULATED OUTPUT
MAXIMUM AND MINIMUM PRESSURES = 3
MAXIMUM AND MINIMUM VELOCITIES = 3

S Y S T E M C O N F I G U R A T I O N

NUMBER OF PIPES .....(P) = 17
NUMBER OF END NODES .....(J) = 16
NUMBER OF PRIMARY LOOPS .....(L) = 1
NUMBER OF SUPPLY NODES .....(F) = 1
NUMBER OF SUPPLY ZONES .....(Z) = 1

==========

Case: 0

RESULTS OBTAINED AFTER 7 TRIALS: ACCURACY = 0.11855E-04

S I M U L A T I O N D E S C R I P T I O N (L A B E L)

AVERAGE DAY DEMAND

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

P I P E N A M E	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	J-7	J-8	-5.48	0.00	0.00	0.02	0.00	0.00
P-2	J-3	J-12	-28.40	0.01	0.00	0.12	0.01	0.01
P-3	J-3	I-DCDA-1	5.48	0.00	0.00	0.04	0.00	0.00
P-4	J-5	J-4	5.48	0.00	0.00	0.02	0.00	0.00
P-5	J-7	J-10	10.00	0.00	0.00	0.04	0.00	0.00
P-6	J-6	J-3	-13.72	0.00	0.00	0.06	0.00	0.00
P-7	J-6	J-9	13.72	0.00	0.00	0.04	0.00	0.00
P-8	J-2	J-5	5.48	0.00	0.00	0.02	0.00	0.00
P-9	J-9	I-DCDA-2	4.52	0.00	0.00	0.03	0.00	0.00
P-10	J-11	J-7	4.52	0.00	0.00	0.02	0.00	0.00
P-11	J-1	J-4	-5.48	0.00	0.00	0.02	0.00	0.00
P-12	J-8	J-1	-5.48	0.00	0.00	0.02	0.00	0.00
P-13	J-12	ECR/O PRS	-28.40	0.01	0.00	0.08	0.00	0.00
P-14	J-6	J-13	0.00	0.00	0.00	0.00	0.00	0.00
P-15	J-13	J-14	0.00	0.00	0.00	0.00	0.00	0.00
P-16	O-DCDA-2	J-11	4.52	0.00	0.00	0.02	0.00	0.00
P-17	O-DCDA-1	J-2	5.48	0.00	0.00	0.02	0.00	0.00

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

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft	EFFIC- ENCY %	USEFUL POWER Hp	INCREMTL COST $	TOTAL COST $	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. ft	Case
DCDA-1	5.48	187.99	181.06	-6.9	75.00	0.	0.0	0.0	**	**	221.2	0.0000
DCDA-2	4.52	187.99	181.06	-6.9	75.00	0.	0.0	0.0	**	**	221.2	0.0000

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
ECR/O PRS		----	282.00			
I-DCDA-1		0.00	281.99	94.00	187.99	81.46
I-DCDA-2		0.00	281.99	94.00	187.99	81.46
J-1		0.00	275.06	112.00	163.06	70.66
J-2		0.00	275.06	94.00	181.06	78.46
J-3		9.20	281.99	94.00	187.99	81.46
J-4		0.00	275.06	101.00	174.06	75.43
J-5		0.00	275.06	99.00	176.06	76.29
J-6		0.00	281.99	94.00	187.99	81.46
J-7		0.00	275.06	118.00	157.06	68.06
J-8		0.00	275.06	114.00	161.06	69.79
J-9		9.20	281.99	94.00	187.99	81.46
J-10		10.00	275.06	120.00	155.06	67.19
J-11		0.00	275.06	114.00	161.06	69.79
J-12		0.00	281.99	70.00	211.99	91.86
J-13		0.00	281.99	95.00	186.99	81.03
J-14		0.00	281.99	100.00	181.99	78.86
O-DCDA-1		0.00	275.06	94.00	181.06	78.46
O-DCDA-2		0.00	275.06	94.00	181.06	78.46

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

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
J-12	91.86	J-10	67.19
J-3	81.46	J-7	68.06
I-DCDA-1	81.46	J-8	69.79

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-2	0.12	P-10	0.02
P-13	0.08	P-16	0.02
P-6	0.06	P-1	0.02

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

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

NODE NAME	FLOWRATE gpm	NODE TITLE
ECR/O PRS	28.40	

NET SYSTEM INFLOW = 28.40
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 28.40

==========

Case: 1

C H A N G E S F O R N E X T S I M U L A T I O N (Change Number = 1)

Maximum Day Demand plus 3,000 gpm Fire Flow split between Node 4 and Node 5

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 5 TRIALS: ACCURACY = 0.83050E-06

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	J-7	J-8	1167.63	0.95	0.35	4.77	13.05	9.52
P-2	J-3	J-12	-3068.80	37.06	0.00	12.54	57.01	57.01
P-3	J-3	I-DCDA-1	1844.37	3.95	0.00	11.77	65.83	65.83
P-4	J-5	J-4	338.37	0.13	0.04	1.38	1.28	0.96
P-5	J-7	J-10	20.00	0.00	0.00	0.08	0.01	0.01
P-6	J-6	J-3	-1206.03	1.62	0.00	4.93	10.11	10.11
P-7	J-6	J-9	1206.03	2.08	0.45	3.42	5.07	4.16
P-8	J-2	J-5	1844.37	2.55	2.60	7.53	44.81	22.21
P-9	J-9	I-DCDA-2	1187.63	0.87	0.00	7.58	29.13	29.13
P-10	J-11	J-7	1187.63	1.08	0.55	4.85	14.81	9.83
P-11	J-1	J-4	1167.63	1.71	0.85	4.77	14.23	9.52
P-12	J-8	J-1	1167.63	2.19	0.60	4.77	12.13	9.52
P-13	J-12	ECR/O PRS	-3068.80	34.02	0.00	8.70	23.46	23.46
P-14	J-6	J-13	0.00	0.00	0.00	0.00	0.00	0.00
P-15	J-13	J-14	0.00	0.00	0.00	0.00	0.00	0.00
P-16	O-DCDA-2	J-11	1187.63	0.29	0.00	4.85	9.83	9.83
P-17	O-DCDA-1	J-2	1844.37	1.33	0.00	7.53	22.21	22.21

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

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft	EFFIC- ENCY %	USEFUL POWER Hp	INCREMTL COST $	TOTAL COST $	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. ft	Case
DCDA-1	1844.37	112.97	99.69	-13.3	75.00	-6.	0.0	0.0	**	**	144.0	1.0000
DCDA-2	1187.63	111.89	101.61	-10.3	75.00	-3.	0.0	0.0	**	**	144.2	1.0000

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
ECR/O PRS		----	282.00			
I-DCDA-1		0.00	206.97	94.00	112.97	48.95
I-DCDA-2		0.00	205.89	94.00	111.89	48.49
J-1		0.00	189.59	112.00	77.59	33.62
J-2		0.00	192.36	94.00	98.36	42.62
J-3		18.40(2.00)	210.92	94.00	116.92	50.67
J-4		1506.00	187.03	101.00	86.03	37.28
J-5		1506.00	187.21	99.00	88.21	38.22
J-6		0.00	209.30	94.00	115.30	49.96
J-7		0.00	193.68	118.00	75.68	32.80
J-8		0.00	192.38	114.00	78.38	33.96
J-9		18.40(2.00)	206.77	94.00	112.77	48.87
J-10		20.00(2.00)	193.68	120.00	73.68	31.93
J-11		0.00	195.31	114.00	81.31	35.24
J-12		0.00	247.98	70.00	177.98	77.12
J-13		0.00	209.30	95.00	114.30	49.53
J-14		0.00	209.30	100.00	109.30	47.36
O-DCDA-1		0.00	193.69	94.00	99.69	43.20
O-DCDA-2		0.00	195.61	94.00	101.61	44.03

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

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
J-12	77.12	J-10	31.93
J-3	50.67	J-7	32.80
J-6	49.96	J-1	33.62

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-2	12.54	P-5	0.08
P-3	11.77	P-4	1.38
P-13	8.70	P-7	3.42

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

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

NODE NAME	FLOWRATE gpm	NODE TITLE
ECR/O PRS	3068.80	

NET SYSTEM INFLOW = 3068.80
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 3068.80

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Case: 2

C H A N G E S F O R N E X T S I M U L A T I O N (Change Number = 2)

Maximum Day Demand plus 3,000 gpm Fire Flow split between Node 1 and Node 8

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 5 TRIALS: ACCURACY = 0.14020E-06

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	J-7	J-8	1527.97	1.57	0.60	6.24	21.72	15.67
P-2	J-3	J-12	-3068.80	37.06	0.00	12.54	57.01	57.01
P-3	J-3	I-DCDA-1	1484.03	2.64	0.00	9.47	44.01	44.01
P-4	J-5	J-4	1484.03	2.08	0.86	6.06	20.96	14.85
P-5	J-7	J-10	20.00	0.00	0.00	0.08	0.01	0.01
P-6	J-6	J-3	-1566.37	2.63	0.00	6.40	16.41	16.41
P-7	J-6	J-9	1566.37	3.38	0.77	4.44	8.28	6.75
P-8	J-2	J-5	1484.03	1.71	1.68	6.06	29.48	14.85
P-9	J-9	I-DCDA-2	1547.97	1.43	0.00	9.88	47.59	47.59
P-10	J-11	J-7	1547.97	1.77	0.93	6.32	24.52	16.05
P-11	J-1	J-4	-1484.03	2.67	1.37	6.06	22.45	14.85
P-12	J-8	J-1	21.97	0.00	0.00	0.09	0.01	0.01
P-13	J-12	ECR/O PRS	-3068.80	34.02	0.00	8.70	23.46	23.46
P-14	J-6	J-13	0.00	0.00	0.00	0.00	0.00	0.00
P-15	J-13	J-14	0.00	0.00	0.00	0.00	0.00	0.00
P-16	O-DCDA-2	J-11	1547.97	0.48	0.00	6.32	16.05	16.05
P-17	O-DCDA-1	J-2	1484.03	0.89	0.00	6.06	14.85	14.85

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

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft	EFFIC- ENCY %	USEFUL POWER Hp	INCREMTL COST $	TOTAL COST $	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. ft	Case
DCDA-1	1484.03	114.28	102.83	-11.5	75.00	-4.	-0.3	-0.3	**	**	146.1	2.0000
DCDA-2	1547.97	108.72	96.92	-11.8	75.00	-5.	-0.2	-0.2	**	**	140.4	2.0000

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
ECR/O PRS		----	282.00			
I-DCDA-1		0.00	208.28	94.00	114.28	49.52
I-DCDA-2		0.00	202.72	94.00	108.72	47.11
J-1		1506.00	185.57	112.00	73.57	31.88
J-2		0.00	195.94	94.00	101.94	44.17
J-3		18.40(2.00)	210.92	94.00	116.92	50.67
J-4		0.00	189.61	101.00	88.61	38.40
J-5		0.00	192.55	99.00	93.55	40.54
J-6		0.00	208.29	94.00	114.29	49.53
J-7		0.00	187.74	118.00	69.74	30.22
J-8		1506.00	185.57	114.00	71.57	31.01
J-9		18.40(2.00)	204.15	94.00	110.15	47.73
J-10		20.00(2.00)	187.74	120.00	67.74	29.35
J-11		0.00	190.44	114.00	76.44	33.12
J-12		0.00	247.98	70.00	177.98	77.12
J-13		0.00	208.29	95.00	113.29	49.09
J-14		0.00	208.29	100.00	108.29	46.93
O-DCDA-1		0.00	196.83	94.00	102.83	44.56
O-DCDA-2		0.00	190.92	94.00	96.92	42.00

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

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
J-12	77.12	J-10	29.35
J-3	50.67	J-7	30.22
J-6	49.53	J-8	31.01

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-2	12.54	P-5	0.08
P-9	9.88	P-12	0.09
P-3	9.47	P-7	4.44

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

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

NODE NAME	FLOWRATE gpm	NODE TITLE
ECR/O PRS	3068.80	

NET SYSTEM INFLOW = 3068.80
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 3068.80

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Case: 3

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

Maximum Day Demand plus 3,000 gpm Fire Flow split between Node 10 and Node 11

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 4 TRIALS: ACCURACY = 0.82052E-05

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	J-7	J-8	-1227.90	1.05	0.39	5.02	14.36	10.45
P-2	J-3	J-12	-3048.80	36.61	0.00	12.45	56.33	56.33
P-3	J-3	I-DCDA-1	1227.90	1.86	0.00	7.84	30.99	30.99
P-4	J-5	J-4	1227.90	1.46	0.59	5.02	14.64	10.45
P-5	J-7	J-10	1506.00	2.59	2.35	6.15	29.08	15.26
P-6	J-6	J-3	-1802.50	3.41	0.00	7.36	21.28	21.28
P-7	J-6	J-9	1802.50	4.38	1.01	5.11	10.79	8.76
P-8	J-2	J-5	1227.90	1.20	1.15	5.02	20.47	10.45
P-9	J-9	I-DCDA-2	1784.10	1.86	0.00	11.39	61.90	61.90
P-10	J-11	J-7	278.10	0.07	0.03	1.14	0.94	0.67
P-11	J-1	J-4	-1227.90	1.88	0.94	5.02	15.66	10.45
P-12	J-8	J-1	-1227.90	2.40	0.66	5.02	13.34	10.45
P-13	J-12	ECR/O PRS	-3048.80	33.61	0.00	8.65	23.18	23.18
P-14	J-6	J-13	0.00	0.00	0.00	0.00	0.00	0.00
P-15	J-13	J-14	0.00	0.00	0.00	0.00	0.00	0.00
P-16	O-DCDA-2	J-11	1784.10	0.63	0.00	7.29	20.88	20.88
P-17	O-DCDA-1	J-2	1227.90	0.63	0.00	5.02	10.45	10.45

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

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft	EFFIC- ENCY %	USEFUL POWER Hp	INCREMTL COST $	TOTAL COST $	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. ft	Case
DCDA-1	1227.90	115.92	105.70	-10.2	75.00	-3.	-0.2	-0.5	**	**	148.2	3.0000
DCDA-2	1784.10	107.12	94.08	-13.0	75.00	-6.	-0.2	-0.4	**	**	138.3	3.0000

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
ECR/O PRS		----	282.00			
I-DCDA-1		0.00	209.92	94.00	115.92	50.23
I-DCDA-2		0.00	201.12	94.00	107.12	46.42
J-1		0.00	191.85	112.00	79.85	34.60
J-2		0.00	199.07	94.00	105.07	45.53
J-3		18.40(2.00)	211.78	94.00	117.78	51.04
J-4		0.00	194.67	101.00	93.67	40.59
J-5		0.00	196.72	99.00	97.72	42.34
J-6		0.00	208.37	94.00	114.37	49.56
J-7		0.00	187.35	118.00	69.35	30.05
J-8		0.00	188.78	114.00	74.78	32.41
J-9		18.40(2.00)	202.98	94.00	108.98	47.22
J-10		1506.00(**)	182.40	120.00	62.40	27.04
J-11		1506.00	187.45	114.00	73.45	31.83
J-12		0.00	248.39	70.00	178.39	77.30
J-13		0.00	208.37	95.00	113.37	49.13
J-14		0.00	208.37	100.00	108.37	46.96
O-DCDA-1		0.00	199.70	94.00	105.70	45.80
O-DCDA-2		0.00	188.08	94.00	94.08	40.77

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

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
J-12	77.30	J-10	27.04
J-3	51.04	J-7	30.05
I-DCDA-1	50.23	J-11	31.83

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-2	12.45	P-10	1.14
P-9	11.39	P-1	5.02
P-13	8.65	P-4	5.02

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

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

NODE NAME	FLOWRATE gpm	NODE TITLE
ECR/O PRS	3048.80	

NET SYSTEM INFLOW = 3048.80
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 3048.80

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Case: 4

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

Peak Hour Demand

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 6 TRIALS: ACCURACY = 0.20787E-06

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	J-7	J-8	-17.12	0.00	0.00	0.07	0.00	0.00
P-2	J-3	J-12	-85.20	0.05	0.00	0.35	0.07	0.07
P-3	J-3	I-DCDA-1	17.12	0.00	0.00	0.11	0.01	0.01
P-4	J-5	J-4	17.12	0.00	0.00	0.07	0.00	0.00
P-5	J-7	J-10	30.00	0.00	0.00	0.12	0.02	0.01
P-6	J-6	J-3	-40.48	0.00	0.00	0.17	0.02	0.02
P-7	J-6	J-9	40.48	0.00	0.00	0.11	0.01	0.01
P-8	J-2	J-5	17.12	0.00	0.00	0.07	0.01	0.00
P-9	J-9	I-DCDA-2	12.88	0.00	0.00	0.08	0.01	0.01
P-10	J-11	J-7	12.88	0.00	0.00	0.05	0.00	0.00
P-11	J-1	J-4	-17.12	0.00	0.00	0.07	0.00	0.00
P-12	J-8	J-1	-17.12	0.00	0.00	0.07	0.00	0.00
P-13	J-12	ECR/O PRS	-85.20	0.04	0.00	0.24	0.03	0.03
P-14	J-6	J-13	0.00	0.00	0.00	0.00	0.00	0.00
P-15	J-13	J-14	0.00	0.00	0.00	0.00	0.00	0.00
P-16	O-DCDA-2	J-11	12.88	0.00	0.00	0.05	0.00	0.00
P-17	O-DCDA-1	J-2	17.12	0.00	0.00	0.07	0.00	0.00

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

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft	EFFIC- ENCY %	USEFUL POWER Hp	INCREMTL COST $	TOTAL COST $	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. ft	Case
DCDA-1	17.12	187.91	180.97	-6.9	75.00	0.	-0.2	-0.7	**	**	221.1	4.0000
DCDA-2	12.88	187.90	180.97	-6.9	75.00	0.	-0.3	-0.7	**	**	221.1	4.0000

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
ECR/O PRS		----	282.00			
I-DCDA-1		0.00	281.91	94.00	187.91	81.43
I-DCDA-2		0.00	281.90	94.00	187.90	81.42
J-1		0.00	274.97	112.00	162.97	70.62
J-2		0.00	274.97	94.00	180.97	78.42
J-3		27.60(3.00)	281.91	94.00	187.91	81.43
J-4		0.00	274.97	101.00	173.97	75.39
J-5		0.00	274.97	99.00	175.97	76.25
J-6		0.00	281.90	94.00	187.90	81.43
J-7		0.00	274.97	118.00	156.97	68.02
J-8		0.00	274.97	114.00	160.97	69.75
J-9		27.60(3.00)	281.90	94.00	187.90	81.42
J-10		30.00(3.00)	274.97	120.00	154.97	67.15
J-11		0.00	274.97	114.00	160.97	69.75
J-12		0.00	281.96	70.00	211.96	91.85
J-13		0.00	281.90	95.00	186.90	80.99
J-14		0.00	281.90	100.00	181.90	78.83
O-DCDA-1		0.00	274.97	94.00	180.97	78.42
O-DCDA-2		0.00	274.97	94.00	180.97	78.42

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

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
J-12	91.85	J-10	67.15
J-3	81.43	J-7	68.02
I-DCDA-1	81.43	J-11	69.75

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-2	0.35	P-10	0.05
P-13	0.24	P-16	0.05
P-6	0.17	P-1	0.07

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

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

NODE NAME	FLOWRATE gpm	NODE TITLE
ECR/O PRS	85.20	

NET SYSTEM INFLOW = 85.20
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 85.20

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Case: 5

C H A N G E S F O R N E X T S I M U L A T I O N (Change Number = 5)

Peak Demand - WFU CA Plumbing Code Based

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 4 TRIALS: ACCURACY = 0.11280E-05

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

STATUS CODE: XX -CLOSED PIPE CV -CHECK VALVE

PIPE NAME	NODE NUMBERS #1	#2	FLOWRATE gpm	HEAD LOSS ft	MINOR LOSS ft	LINE VELO. ft/s	HL+ML/ 1000 ft/f	HL/ 1000 ft/f
P-1	J-7	J-8	-199.13	0.04	0.01	0.81	0.46	0.36
P-2	J-3	J-12	-908.80	3.89	0.00	3.71	5.99	5.99
P-3	J-3	I-DCDA-1	199.13	0.06	0.00	1.27	1.07	1.07
P-4	J-5	J-4	199.13	0.05	0.02	0.81	0.47	0.36
P-5	J-7	J-10	320.00	0.15	0.11	1.31	1.49	0.87
P-6	J-6	J-3	-415.27	0.22	0.00	1.70	1.40	1.40
P-7	J-6	J-9	415.27	0.29	0.05	1.18	0.69	0.58
P-8	J-2	J-5	199.13	0.04	0.03	0.81	0.62	0.36
P-9	J-9	I-DCDA-2	120.87	0.01	0.00	0.77	0.42	0.42
P-10	J-11	J-7	120.87	0.02	0.01	0.49	0.19	0.14
P-11	J-1	J-4	-199.13	0.06	0.02	0.81	0.50	0.36
P-12	J-8	J-1	-199.13	0.08	0.02	0.81	0.44	0.36
P-13	J-12	ECR/O PRS	-908.80	3.57	0.00	2.58	2.46	2.46
P-14	J-6	J-13	0.00	0.00	0.00	0.00	0.00	0.00
P-15	J-13	J-14	0.00	0.00	0.00	0.00	0.00	0.00
P-16	O-DCDA-2	J-11	120.87	0.00	0.00	0.49	0.14	0.14
P-17	O-DCDA-1	J-2	199.13	0.02	0.00	0.81	0.36	0.36

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

NAME	FLOWRATE gpm	INLET HEAD ft	OUTLET HEAD ft	PUMP HEAD ft	EFFIC- ENCY %	USEFUL POWER Hp	INCREMTL COST $	TOTAL COST $	#PUMPS PARALLEL	#PUMPS SERIES	NPSH Avail. ft	Case
DCDA-1	199.13	180.47	173.25	-7.2	75.00	0.	0.0	-0.7	**	**	213.6	5.0000
DCDA-2	120.87	179.96	172.88	-7.1	75.00	0.	0.0	-0.7	**	**	213.1	5.0000

N O D E R E S U L T S

NODE NAME	NODE TITLE	EXTERNAL DEMAND gpm	HYDRAULIC GRADE ft	NODE ELEVATION ft	PRESSURE HEAD ft	NODE PRESSURE psi
ECR/O PRS		----	282.00			
I-DCDA-1		0.00	274.47	94.00	180.47	78.20
I-DCDA-2		0.00	273.96	94.00	179.96	77.98
J-1		0.00	267.00	112.00	155.00	67.17
J-2		0.00	267.23	94.00	173.23	75.07
J-3		294.40(**)	274.54	94.00	180.54	78.23
J-4		0.00	267.09	101.00	166.09	71.97
J-5		0.00	267.16	99.00	168.16	72.87
J-6		0.00	274.31	94.00	180.31	78.13
J-7		0.00	266.86	118.00	148.86	64.50
J-8		0.00	266.90	114.00	152.90	66.26
J-9		294.40(**)	273.97	94.00	179.97	77.99
J-10		320.00(**)	266.60	120.00	146.60	63.53
J-11		0.00	266.88	114.00	152.88	66.25
J-12		0.00	278.43	70.00	208.43	90.32
J-13		0.00	274.31	95.00	179.31	77.70
J-14		0.00	274.31	100.00	174.31	75.53
O-DCDA-1		0.00	267.25	94.00	173.25	75.08
O-DCDA-2		0.00	266.88	94.00	172.88	74.92

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

P R E S S U R E S

JUNCTION NUMBER	MAXIMUM PRESSURES psi	JUNCTION NUMBER	MINIMUM PRESSURES psi
J-12	90.32	J-10	63.53
J-3	78.23	J-7	64.50
I-DCDA-1	78.20	J-11	66.25

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
P-2	3.71	P-10	0.49
P-13	2.58	P-16	0.49
P-6	1.70	P-9	0.77

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

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

NODE NAME	FLOWRATE gpm	NODE TITLE
ECR/O PRS	908.80	

NET SYSTEM INFLOW = 908.80
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 908.80

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

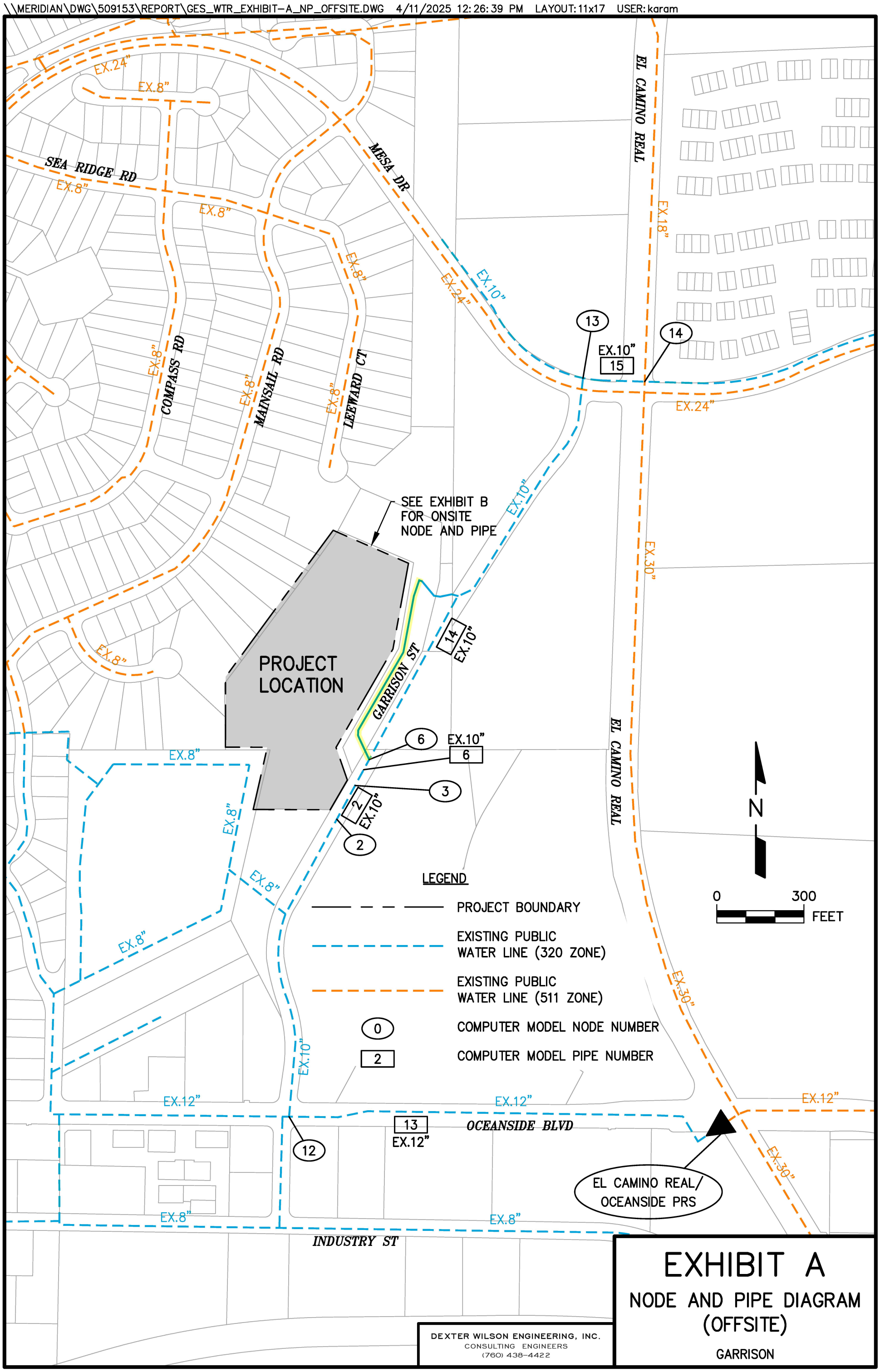

EXHIBIT A

NODE AND PIPE DIAGRAM (OFFSITE)

GARRISON

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CONSULTING ENGINEERS
(760) 438-4422

LEGEND

- PROJECT BOUNDARY
- EXISTING PUBLIC WATER LINE
- PROPOSED PUBLIC WATER LINE
- PROPOSED PUBLIC WATER LINE (BY OTHERS)
- PROPOSED PRIVATE FIRE PROTECTION SYSTEM
- EXISTING PUBLIC FIRE HYDRANT
- PROPOSED PUBLIC FIRE HYDRANT
- PROPOSED BACKFLOW PREVENTER
- (0) COMPUTER MODEL NODE NUMBER
- [1] COMPUTER MODEL PIPE NUMBER

NOTE: ALL EXISTING AND PROPOSED WATER SHOWN ON THIS FIGURE ARE 320 PRESSURE ZONE

N

0 80 FEET

FUTURE EL CORAZON SEWER LIFT STATION (BY OTHERS)

PVT DRIVE "H"
PVT DRIVE "I"
PVT DRIVE "G"
PVT DRIVE "A"
PVT DRIVE "F"
PVT DRIVE "J"
PVT DRIVE "E"
PVT DRIVE "K"
PVT DRIVE "D"
PVT DRIVE "L"
PVT DRIVE "C"
PVT DRIVE "M"
PVT DRIVE "B"

10" [5] (10)
10" [1] (7)
10" [10] (11)
10" [16]
10" [9] (9)
8" [12] (8)
12" [7]
10" [11] (1)
10" [4] (4)
10" [8] (5)
10" [17] (2)
8" [3] (DCDA-1)
10" [2] EX.10"
12" [14] EX.10"
12" [6] EX.10"
EX.10"

DCDA-2

PROPOSED POINT OF CONNECTION

TO BE RELOCATED (BY OTHERS)

PROPOSED POINT OF CONNECTION

GARRISON ST

EXHIBIT B

NODE AND PIPE DIAGRAM (ONSITE)

GARRISON

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