APPENDIX L

Storm Water Quality Management Plan and Drainage Report

DEXTER WILSON ENGINEERING, INC.

WATER • WASTEWATER • RECYCLED WATER

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WATER SYSTEM ANALYSIS
FOR THE
CYPRESS POINT PROJECT
IN THE CITY OF OCEANSIDE

March 19, 2021

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March 19, 2021

750-006

Concordia Homes
380 Stevens Avenue, Suite 307
Solana Beach, CA 92075

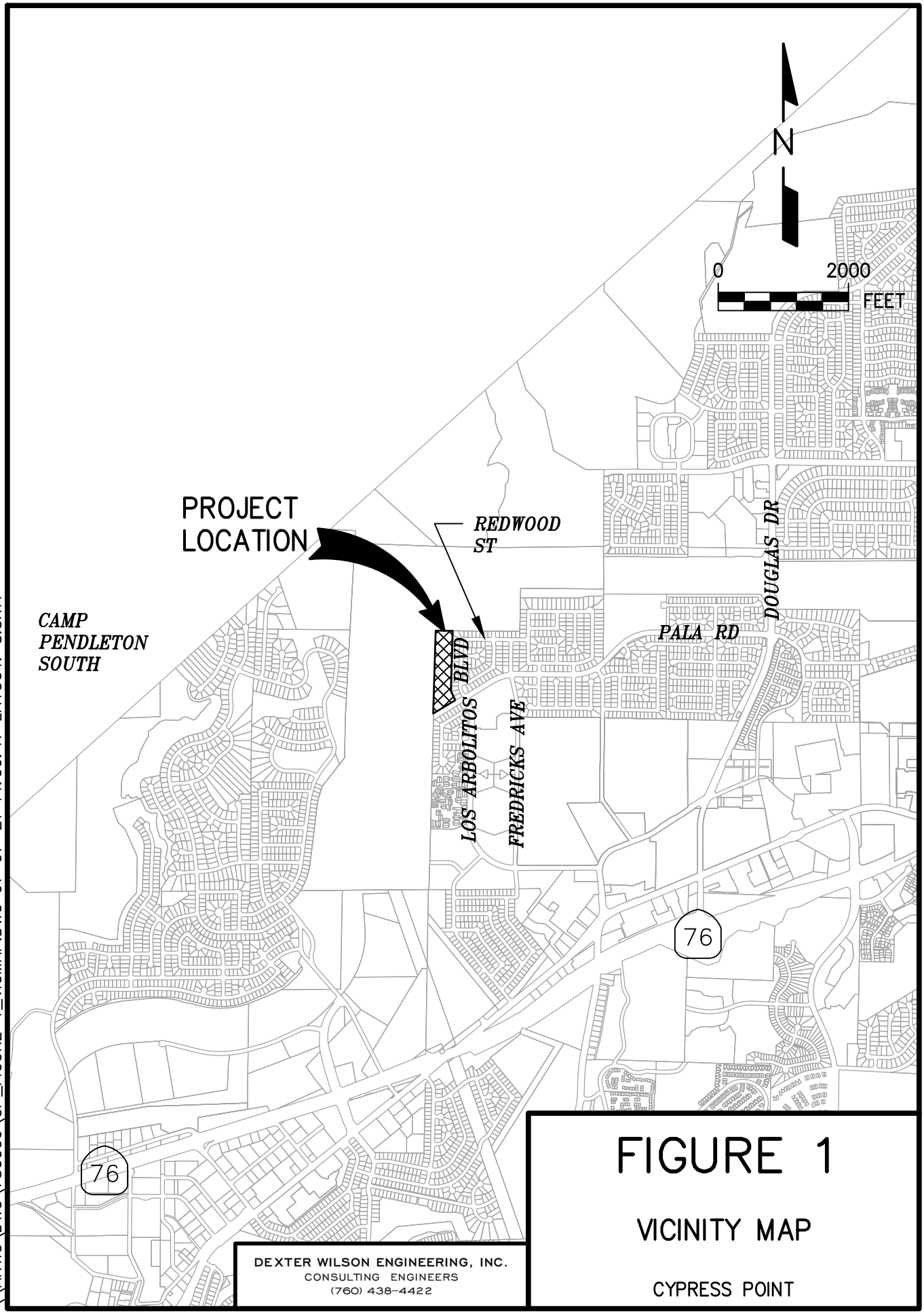
Attention: Jeb Hall, Principal

Subject: Public Water System Analysis for the Cypress Point Project in the City of Oceanside

Introduction

This letter-report provides a public water system analysis for the Cypress Point project in the City of Oceanside (City). This letter-report will present the recommended onsite sizing of new public potable water infrastructure, as well as the sizing of extensions of the existing system to the project site. We will also present recommendations of potable water services.

The Cypress Point project is located on the north side of Pala Road, just west of Los Arbolitos Boulevard. The project is proposing a residential development that includes 54 single-family units on a 7.38 acre site. A vicinity map for the project is provided in Figure 1.



\\ARTIC\DWG\750006\CP_FIGURE-1_VICMAP.DWG 01-07-21 14:00:47 LAYOUT: 8.5X11

FIGURE 1

VICINITY MAP

CYPRESS POINT

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Water System Design Criteria

Water system planning and design criteria for the Cypress Point project are based on Section 2 of the City of Oceanside Design and Construction Manual, revised August 1, 2017 and City design requirements established for the project. The average day demand for the project is 2,400 gallons per day per acre (gpd/ac) based on the land use category which is "Single Family Res. (4-8 DU/ac)". The maximum day and peak hourly demand factors are 2.0 and 3.0, respectively. During maximum demands, residual pressures must be greater than 45 psi and during peak hour demand residual pressure must be greater than 35 psi.

The fire flow requirement for the project is anticipated to be 1,500 gpm for single-family residential land use. During fire flow demands, residual pressure must be greater than 20 psi in the water system. Appendix A presents the planning and design requirements for the project.

Estimated Water Demand for the Cypress Point Project

Based on the water demand factors from the City's Design and Construction Manual the estimated water demand for the project is calculated in Table 1.

TABLE 1
CYPRESS POINT
ESTIMATED AVERAGE WATER DEMAND

Land Use Category	Average Demand Factor[1]	Acreage	Average Water Demand, gpd
Single Family Res. (4-8 DU/ac)	2,400 gpd/ac	7.38	17,712
Average Day Demand			**17,712 gpd 12.3 gpm**
Maximum Day Demand			**35,424 gpd 24.6 gpm**
Peak Hour Demand			**53,136 gpd 36.9 gpm**

1. City of Oceanside Design and Construction Manual, revised August 1, 2017.

As previously mentioned, the maximum day demand factor of 2.0 and the peak hourly factor is 3.0. Thus, the maximum day demand and peak hour demand for the Cypress Point project are 35,424 gpd (24.6 gpm) and 53,136 gpd (36.9 gpm) respectively.

Existing Water System

Water service for the Cypress Point project will be provided by the City of Oceanside. The project is situated in the central northern portion of the City in an area served by the Talone 320 Pressure Zone. The nearest existing 320 Pressure Zone public water lines in the vicinity of the project are a 12-inch water line in Pala Road south east of the project and an 8-inch water line in Los Arbolitos Boulevard to the east. The existing water system within the vicinity of the project is shown in Figure 2.

The water supply to this area comes mainly from three reservoirs and several pressure reducing valves (PRV) in the Talone 320 Pressure Zone. The three reservoirs are the 5 million gallon Wire Mountain Reservoir, the 3 million gallon Fire Mountain Reservoir, and the 3 million gallon John Paul Steiger Reservoir. These reservoirs provide gravity service to the Talone 320 Pressure Zone.

Water Service Overview

Water service to the project will be from the City of Oceanside Talone 320 Pressure Zone**.** Pad elevations for the Cypress Point project range between 51 feet and 57 feet. This results in a maximum static water pressure range of 114 psi to 117 psi within the project boundary.

The proposed public water system for the Cypress Point project will make two connections to the existing public water system. One connection will be made to the existing 12-inch public water main in Pala Road and a second connection will be made to the existing 8-inch public water main in Los Arbolitos Boulevard. Offsite, the project will extend the 12-inch public water main in Pala Road to the project site. All onsite water mains will be 8-inches in diameter and will provide looping between the two existing system connections.

N

0 150 FEET

SAN LUIS REY RIVER

EX.8" REDWOOD ST

LOS ARBOLITOS BLVD

EX.8"

EX.8"

EX.8"

PONDEROSA DR

EX.8"

PALA RD

EX.12"

EX.8"

EX.12"

EX.10"

LOS ARBOLITOS BLVD

LEGEND

PROJECT BOUNDARY

EXISTING PUBLIC WATER LINE

FIGURE 2

EXISTING WATER FACILITIES

CYPRESS POINT

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Meter and Service. Per the City of Oceanside Design and Construction Manual, the minimum lateral size for new homes is 1-inch. The maximum capacity of a 1-inch service lateral per the 2019 California Plumbing Code (CPC) is 39 fixture units. Each home within the project has an estimated fixture unit count of 27 FUs per the CPC, so a 1-inch lateral is sufficient for each home within the Cypress Point project.

A fixture unit count of 27 translates to a demand of 19 gpm for each home within Cypress Point. Per the American Water Works Association C700-20, a ¾-inch meter has a maximum capacity of 30 gpm, therefore each home is proposed to have a ¾-inch meter installed. Appendix B provides the calculations supporting the service lateral and meter sizing.

Each residence shall also have a fire sprinkler system with a Residential Dual Check Valve provided after the residential meter per City of Oceanside Standard Drawing W-30. When static pressures exceed 80 psi, the California Plumbing Code requires pressure regulating valves at each building supply. All building supplies within the Cypress Point project will be required to have individual pressure regulating valves.

Available Hydraulic Grade Line

The available hydraulic grade line (HGL) in the vicinity of the Cypress Point project was estimated based on a fire hydrant flow test provided by CJ. Suppression, Inc. The fire hydrant flow test identifies a flow and pressure at an existing fire hydrant fronting the project on Los Arbolitos Boulevard. Appendix B includes a copy of the fire hydrant flow test for reference.

Also included in Appendix B is a calculation spreadsheet used to estimate the available hydraulic grade line (HGL) at the test hydrant under various flow rates, including a fire flow of 1,500 gpm, as the physical test presents only one flow condition. From the calculation spreadsheet in Appendix B, the available hydraulic grade line at 1,500 gpm is 300.6 feet.

It was assumed that the majority of the flow for the project will be supplied from the 12-inch water line in Pala Road. The fire hydrant just east of the project on the north side of Pala Road was used as the source node ("0" Node) for the modeling presented in subsequent sections of this report. It was assumed that this hydrant had the same hydraulic gradeline as the nearby hydrant in Los Arbolitos Boulevard. This was done to make the modeling presented in this report more straightforward.

Water System Analysis

In order to analyze the water system, a computer model was prepared. Average day, maximum day, peak hour, and maximum day plus fire flow scenarios were modeled which provided data upon which the recommended pipe sizing for the onsite water system is based. The recommended public onsite water system sizing and configuration is presented on Figure 3. Figure 3 also presents the location of eight proposed public fire hydrants within the project site.

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 all pipe sizes is 120. To simulate minor losses through pipe fittings and valves, all pipe lengths included in the hydraulic model were increased by 10 percent.

Results of Computer Modeling for the Cypress Point Project

Appendix D presents the computer modeling results for the water system analyses. Exhibit A presents the corresponding Node and Pipe Diagram for the computer model.

Four hydraulic model runs were analyzed for various demand scenarios. The first run analyzes the proposed public onsite system under average day demands. The second run analyzes the proposed system under maximum day demands. The third run analyzes the proposed system under peak hour demands. The fourth run analyzes the proposed system

under maximum day demands plus a 1,500 gpm fire flow at the hydrant farthest from the main supply line in Pala Road which is the critical node within the system.

The results of the computer modeling analyses are summarized in Table 2.

TABLE 2
CYPRESS POINT PROJECT
WATER SYSTEM ANALYSIS RESULTS

Demand Scenario	Minimum Residual Pressure, psi	Required Minimum Residual Pressure, psi
Average Day Demand	112	--
Maximum Day Demand	112	45
Peak Hour Demand	112	35
Maximum Day Demand Plus Fire Flow	96	20

As shown in Table 2, under each scenario, the minimum pressures are well above the requirements. As such, the proposed water distribution system presented in Figure 3 is adequate to serve the needs of the Cypress Point project.

As shown on Figure 3, the proposed public potable water system will make two connections to the existing public water system. One connection will be made to the existing 12-inch public water main in Pala Road. A second connection will be made to the existing 8-inch public water main in Los Arbolitos Boulevard. A looped 8-inch system will be provided onsite.

N

0 150 FEET

SAN LUIS REY RIVER

REDWOOD ST

EX.8"

LOS ARBOLITOS BLVD

PONDEROSA DR

PALA RD

EX.12"

EX.10"

8"

LEGEND

PROJECT BOUNDARY

EXISTING PUBLIC WATER LINE

PROPOSED PUBLIC WATER LINE

PROPOSED FIRE HYDRANT

FIGURE 3

PROPOSED WATER FACILITIES

CYPRESS POINT

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Conclusions and Recommendations

The following conclusions and recommendations are summarized based on the water system analysis prepared for the Cypress Point project.

1. Water service to the project will be provided by the City of Oceanside Talone 320 Pressure Zone public water system.

2. Pad elevations within the project range from approximately 51 to 57 feet resulting in a range of maximum static water pressures of 114 to 117 psi.

3. The fire flow available to the project site exceeds a 1,500 gpm fire flow requirement at a minimum of 20 psi residual pressure when connected to the existing public water system adjacent to the project.

4. The existing public water system needs to be extended on Pala Road and from Los Arbolitos Boulevard as 8-inch water mains to serve the Cypress Point project. No other offsite water system improvements are needed to provide service to the project.

5. The public water system within the Cypress Point project site will be connected to the existing system at two locations: Pala Road and Los Arbolitos Boulevard. Internal to the project, the water system will consist of 8-inch looping between the connections.

6. Figure 3 provides a layout of the Cypress Point project showing the recommended public onsite water system pipeline sizes and configuration.

7. Each home will have its own 1-inch water service with a ¾-inch meter in accordance with Section 2 of the City of Oceanside Design and Construction Manual and the City of Oceanside Standard Drawing No. W-4. All building supplies within the Cypress Point project will be required to have individual pressure regulating valves.

8. The proposed public water system shall be designed and constructed in accordance with the guidelines, standards, and approved materials of the City of Oceanside or as otherwise specified in Appendix A.

Thank you for the opportunity to provide water system planning services for the Cypress Point project. Please feel free to contact us to further discuss any aspect of the information presented in this letter-report.

Dexter Wilson Engineering, Inc.

Natalie Fraschetti, P.E.

NF:KH:ah

Attachments

APPENDIX A

CYPRESS POINT WATER SYSTEM PLANNING AND DESIGN CRITERIA

CONTENTS:

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.

APPENDIX A1

WATER DESIGN REQUIREMENT EXCERPTS FROM SECTION 2 OF THE CITY OF OCEANSIDE DESIGN AND CONSTRUCTION MANUAL REVISED AUGUST 1, 2017

APPENDIX A2

EMAIL CORRESPONDENCE FROM CITY STAFF REGARDING WATER LINE DESIGN

Oceanside Water Utilities Department
Comments are in "Red"
-M. Uyeda 12/8/20

Cypress Point - Sewer/Water Design Summary

DESIGN GUIDELINE		ISSUE	DESCRIPTION of REQUEST
DESIGN EXCEPTIONS REQUESTED - OUTSTANDING ITEMS			
3.2.I	Where 2 FPS is not attainable, a minimum slope of 1.6% shall be used.	Due to the flatness of existing grades on the site and depth of the existing sewer point of connection, the site cannot be graded to meet the 1.6% slope requirement. Also, in order to get the sewer across the existing 42" Sewer Force Main, the sewer in Pala Road needs to be 0.35% as well. The 2 FPS cannot be accomplished in this portion of the sewer main extension to the site.	**Requesting the sewer main slope be 0.35%**. Without this reduced slope, the site would need to be raised on average about 7 feet, with the upstream portion of the site needing to be raised by about 13 feet. This would put the pads 13 feet above the existing grades of homes along the project's easterly property line. The second point of access from Aspen Street would not be achievable as the street is not long enough to make up the required grade change. The project would lose about 30% of the units proposed. City will accept provided it is a private sewer system.
3.2 I	Where velocities are 2.0 FPS or greater the following design criteria will govern: Pipe Diameter - 8 inches Minimum Slope - 0.50%	Due to the flatness of existing grades on the site and depth of the existing sewer point of connection, the 0.5% grade cannot be met.	**Requesting a slope of 0.35% on all sewer mains.** The only available point of connection for the sewer that has a path to the site around the existing 42" Sewer Force Main is the manhole at the intersection of Los Arbolitos and Pala Road. The sewer then continues west on Pala Road to the proposed project driveway, the only location where a gravity main can cross the exsting 42" Sewer Force Main and serve the site. The sewer is proposed to be at a slope of 0.35% instead of the 0.5% to keep the sewer invert as low as possible to maintain the maximum amount of cover over the pipe. The neighboring subdivision has a sewer grade of 0.32% in Los Arbolitos and Spruce Court, a cul-de-sac serving 10 detached homes. Again the finish grades on Pala Road cannot be rasied from those proposed as the current design allows for emergency surface flow if the proposed storm drain system was to fail. City will accept provided it is a private sewer system.

DESIGN GUIDELINE		ISSUE	DESCRIPTION of REQUEST
3.2.H.4	Minimum cover for sewer main shall be 6 feet below finish grade, unless otherwise approved by the Water Utilities Director.	Due to the flatness of existing grades on the site and depth of the existing sewer point of connection, the 6-foot of required cover cannot be met for portions of the project. Note: Pala Road cannot be raised any further as the current grades are set to allow for emergency overflow of storm water runoff in the event the underground storm water facility fails.	**Requesting the cover of over the sewer main to be 4.5 feet.** The cover that is achievable is about 5.0 feet in Pala Road and 4.5 feet for the on-site mains. The sewer in Pala Road is bucking grade because the only available spot to cross the existing 42" Sewer Force Main is near the west end of Pala Road, at which point the sewer enters the project. City will accept provided it is a private sewer system.
3.6.B.d.	PVC pipes shall not have slopes less than 2%. The maximum diameter shall be 24 inches. A PVC application may be allowed for a slope of less than 2% provided that the length of each section does not exceed 14 feet, a minimum 2 FPS velocity is maintained, or as approved by the Water Utilities Director.	Due to the flatness of existing grades on the site and depth of the existing sewer point of connection, the site cannot be graded to meet the slope requirement.	Project proposes to use PVC pipe. **Please clarify** whether the proposed grade of 0.35% is affected by this Guideline. City will accept provided it is a private sewer system.
Std Dwg S-3	House Connection depth 5' Min. cover to top of curb measured at PL.	Due to the flatness of existing grades on the site and depth of the existing sewer point of connection, the depth of 5' Min cannot be met at all locations.	**Requesting the sewer lateral cover to top of curb be reduced to approximately 4.5 feet.** City will accept provided it is a private sewer system. Based on discussions, development should be able to meet sewer lateral slope requirement.
3.4	Drop of sewer lateral to main.	Cannot determine what the City minimum standard is for drop to the main.	Requesting clarification of the required drop to the main. **Project is requesting no more than 0.5 feet drop to the main.** Refer to OSD S-3 on City's website. If you are referring to drop at connection to main, it shows lateral dropping at 45 degrees into main. Based on SDR-35 4" fitting, the drop is about 0.75 ft (9in).

DESIGN GUIDELINE		ISSUE	DESCRIPTION of REQUEST
2.4 - D	Minimum depth of cover required: 36 inches for 12-inch mains and smaller.	Due to the flatness of the existing site and the sewer constraints the 36 inch cover cannot be met at all locations.	**Requesting minimum depth of cover of 30 inches (2.5 ft) for water mains.** This may be possible for an 8" main where top of gate valve nut, but would probably present a problem for mains 10" or larger. Provide detail showing cover above nut for proposed water main size prior to acceptance of 2.5 ft of cover above public water main.
2.7 - F	All services for water meters, fire protection, fire hydrants, air vacuum and release valve assemblies, and blow off assemblies shall have a minimum of 3-feet of cover.	Due to the flatness of existing grades on the site and depth of the existing sewer point of connection, the 3-foot of required cover cannot be met for portions of the project.	**Requesting the cover over the proposed on-site water main be reduced to minimum of 2.5-feet in portions of the project area.** City will accept this modification. Where service line is in landscaped or unpaved are, the public service line shall be sleeved with PVC pipe 2x diameter of carrier pipe.
DESIGN EXCEPTIONS RESOLVED IN STAFF DISCUSSIONS - TO BE CONFIRMED			
3.2.H.2.	Street: Sewer main locations shall be located in the center of the street.	Due to the inclusion of various City Sewer Mains the project's public sewer main within easterly on-site street cannot be at the centerline of the street.	**Requesting the sewer main be located off of centerline on the easterly on-site street** to accomodated other City-proposed Utilities. City will accept provided it is a private sewer system.
		On the westerly on-site street the sewer cannot be on the centerline and keep the proposed water 5 feet from face of curb. Water line needs to be in this location to keep the proposed valves out of the gutter area. Adequate clearance from f/c to avoid removal of curb & gutter should water main need repair or replacement.	**Requesting the sewer main be located off centerline on the westerly on-site street** to allow 5-foot width from the water main to the edge of gutter for valves. City will accept provided it is a private sewer system.
3.2.L and 2.4.J	Where water and sewer mains are located within the same easement, the miniumum easement size shall be 30 feet wide.	The on-site street width from curb to curb is 28 feet.	**Requesting a 28 foot wide easement** (curb face to curb face) and pop out easments for water meters, blow-offs, Fire Hydrants and other misc appurtances. Assuming only water main will be public and sewer is private, the min public water easement width is 20-ft wide. Extend beyond curb face to include all public services/appurtenances to avoid easement pop outs that would provide less flexibility with location changes in design.

DESIGN GUIDELINE		ISSUE	DESCRIPTION of REQUEST
3.3.C.8	Prohibited location of Manholes: Within any area subject to Flooding.	The project is shown in the FEMA flood zone. The flood elevations in Pala Road indicate that the sewer manholes in the Pala Road will be lower than the flood elevations.	The site and the neighboring sites have been protected from flooding with the construction of the levy; however the Agencies have not completed the LOMR and therefore the site technically remains in a flood area. The project lots will be graded to raise homes out of the flood zone, but not the sewer manholes in Pala Road. Unless the manholes are in unpaved area and outside of access road, sewer manhole will not need to be raised but shall have water proofing.
2.4 - N	No Building foundations will be allowed within 10 feet of the outside edge of a City easement	The project proposes houses pushed to the front of the lot (10 ft behind curb face). The water easement pop outs will be closer than 10 feet to the building foundations.	**Requesting that the water pop out easements be allowed within the 10 foot setback of building foundations.** These popouts contain water meters and fire hydrants only - no mains. The mains will meet the required 10 feet clear of building footings. Provide a min clearance of 10' from outside of water main to building foundation. Provide a minimum 5' clearance from water meter and FH services.
2.6 - C	All fire hydrant lines shall be provided with a shut off valve at the main, and shall conform in all aspects to the Oceanside Standard Drawing.	Due to the inclusion of various City Sewer Mains and the proposed public sewer main within easterly on-site street, the water main was forced to be 1.85 feet from the edge of gutter. This condition would put the valve in the gutter area.	**Requesting the valve for the hydrants on the easterly on-site street be placed in the sidewalk area.** Per last meeting, the outside of the FH valve can may infringe on the edge of gutter by 1" to 1.5". This is preferred over placement of shutoff valve in sidewalk. Valve can shall not be located near in flow line of gutter.
2.10	Waterlines shall be offset 10 feet to the south or 10 feet to the east of the centerline of the street.	Due to the inclusion of various City sewer mains and the project's public sewer main within easterly on-site street the water main cannot be in the desired location. The water main was forced to be 1.85 feet from the edge of gutter. On the westerly on-site street the water cannot be located on the easterly side of the street due to the configuration of the numerous utilites at Pala Road.	**Requesting the water main be located west of the centerline:** **- I**n the easterly on-site street and at 1.85 feet off of the edge of gutter (3.35 feet from face of curb). - In the westerly on-site street. Submit a more detailed cross section showing all existing, proposed, and future utilities for City to review. City would provide some allowance here, but additional information is needed for specific dimension.

DESIGN GUIDELINE		ISSUE	DESCRIPTION of REQUEST
	Clearance Requirements between utilities	The storm drain invert elevations are set by the elevation at the discharge point. This was set as low as possible, with the pipes coming back at 0.35% and could not get under the existing 42" SWR FM at the proposed cul-de-sac. This means the storm drain needs to go over the FM, raising the pipe significantly. The street grade in Pala Road is bucking grade as the existing street was left so low and was left as surface flow runoff and sump was required just west of Pala Road and Los Arbolitos. If the surface flow was carried to the proposed cul-de-sac there would not be enough cover over the existing 42" SWR FM to get water and sewer over.	**Requesting Clearance Exceptions between Utilities**: 1. Need 0.5 ft clearance between the existing 42" Sewer FM and the proposed storm drain. Storm drain will be over the sewer main. 2. Need to have the water main dip under the storm drain west of the intersection of Pala Road and Los Arbolitos. 3. Need 0.5 ft clearance between the proposed 8" sewer and the 8" water at the intersection of Aspen Street and easterly on-site street. 1. Special design will be required to show ex 42" FM is properly protected and supported where SD will cross over 42" FM with just 0.5 ft of clearance OD to OD. Provision for City to be able to repair or rehab 42" FM should also be taken into consideration in design. 2. Submit detail of crossing in design showing proposed depth of water main for review. City may allow crossing depending upon overall depth of water main. This would require additional air vac/release valve at high point(s), and preferably a FH instead of blow off assembly at local low point.

3. This vertical clearance of 0.5 ft between water and sewer would be acceptable provided design ensures proper support and fill between the two pipes, adequate cover over each pipe, and the design meets State Water Resources Control Board separation requirements. This can be addressed in more detail during design phase.

1, 2, and 3. This may require submittal of design to State Water Resources Control Board, Division of Drinking Water for a waiver to design requirements.

APPENDIX B

WATER SERVICE LATERAL AND METER SIZING

Project Name Cypress Point

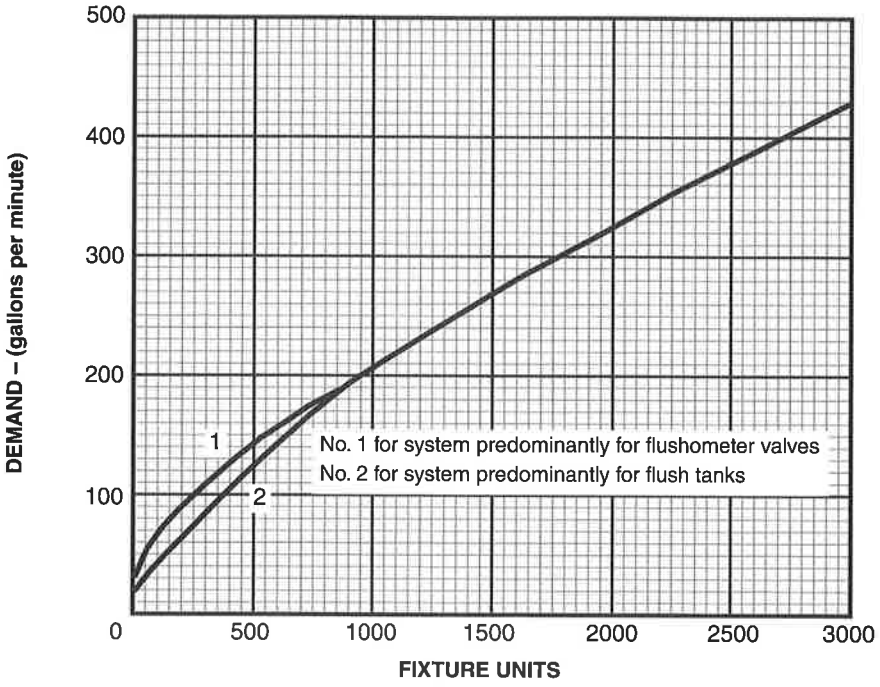
Job Number 750-006
Date 3/17/2021

Water Fixture Units

The basis for the Water Fixture Units is "Private" per the 2019 California Plumbing Code.

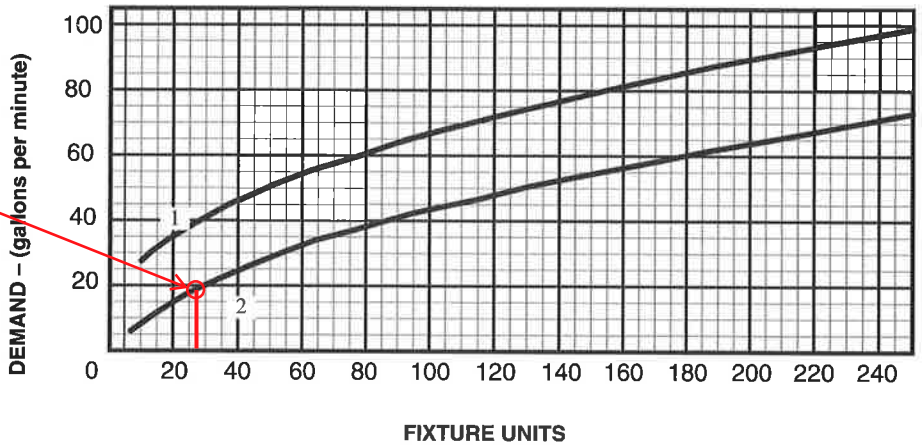
	All Plans		
DESCRIPTION	QUANTITY	FIXTURE UNITS EACH	TOTAL FIXTURE UNITS
CLOTHES WASHER	1	4	4
LAUNDRY SINK		1.5	0
TUB/SHOWER	1	4	4
SHOWER	1	2	2
KITCHEN SINK	1	1.5	1.5
DISHWASHER	1	1.5	1.5
LAVATORY	4	1	4
WATER CLOSET (1.6 GPF)	3	2.5	7.5
HOSE BIBB	1	2.5	2.5
EACH ADDTL HB		1	0
OTHER		1	0
TOTAL			27

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



27 FU ~ 19 gpm

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

APPENDIX C

FIRE HYDRANT FLOW TEST
AND
CALCULATION SPREADSHEET

FLOW TEST SUMMARY REPORT page1

Fire Hydrant Flow Test From
CJS Suppression, Inc.

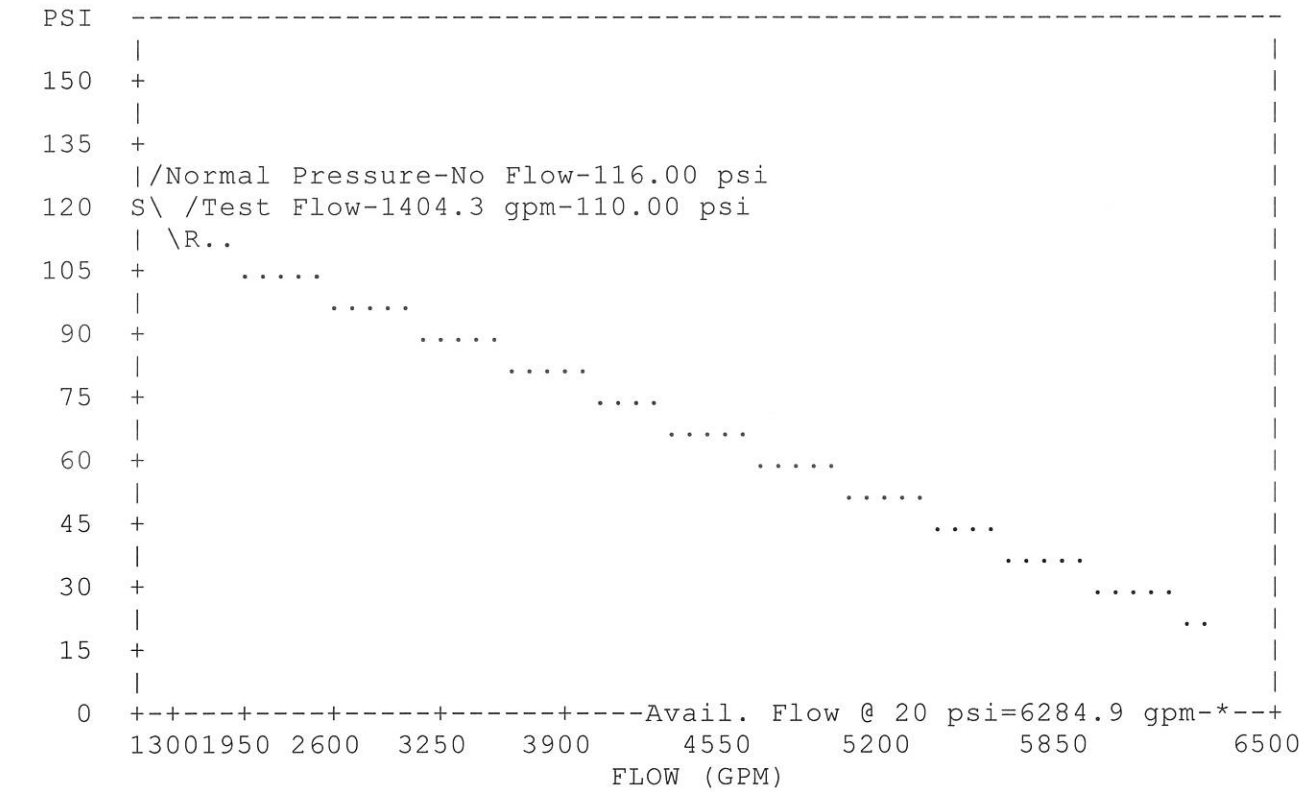
LOCATION:corner of Los Arbolitos Blvd. and Aspen Str
Oceanside

DATE: 11-16-2020
TIME: 12:20 pm

Static Hydrant Number:	1	Flowing Hydrant Number:	2
Elevation:	0	Elevation:	0
Dist. Between Hydrants:	300		
Diameter of Main:	8		
Outlet Diameter:	2.50 in	Number flowing: 1 Coeff.:	0.90
Static pressure:	116.00 psi	Residual pressure:	110.00 psi
Pitot Reading:	70.00 psi	Flow:	1404.3 gpm

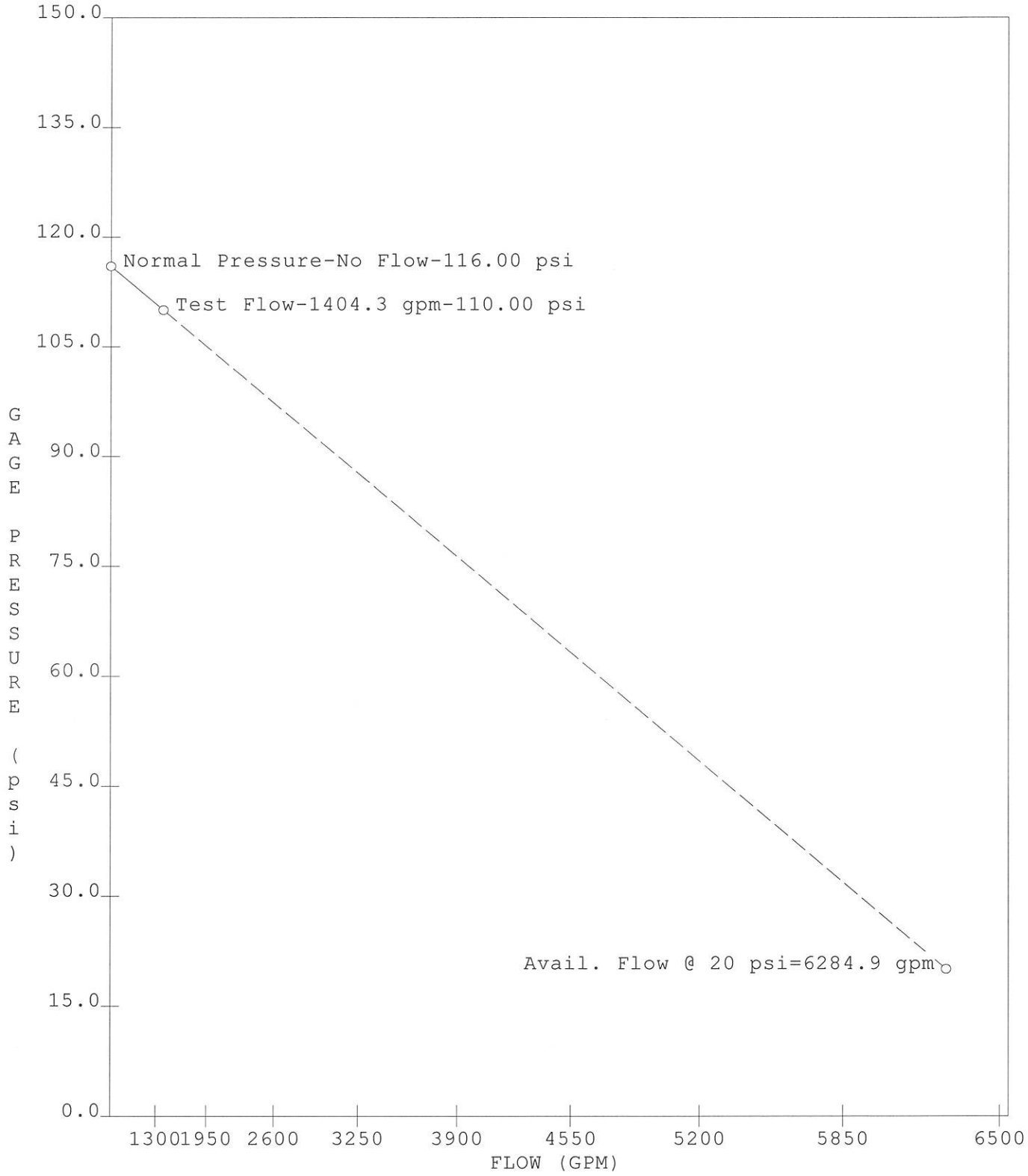
Flow at 20 psi: 6284.9 gpm

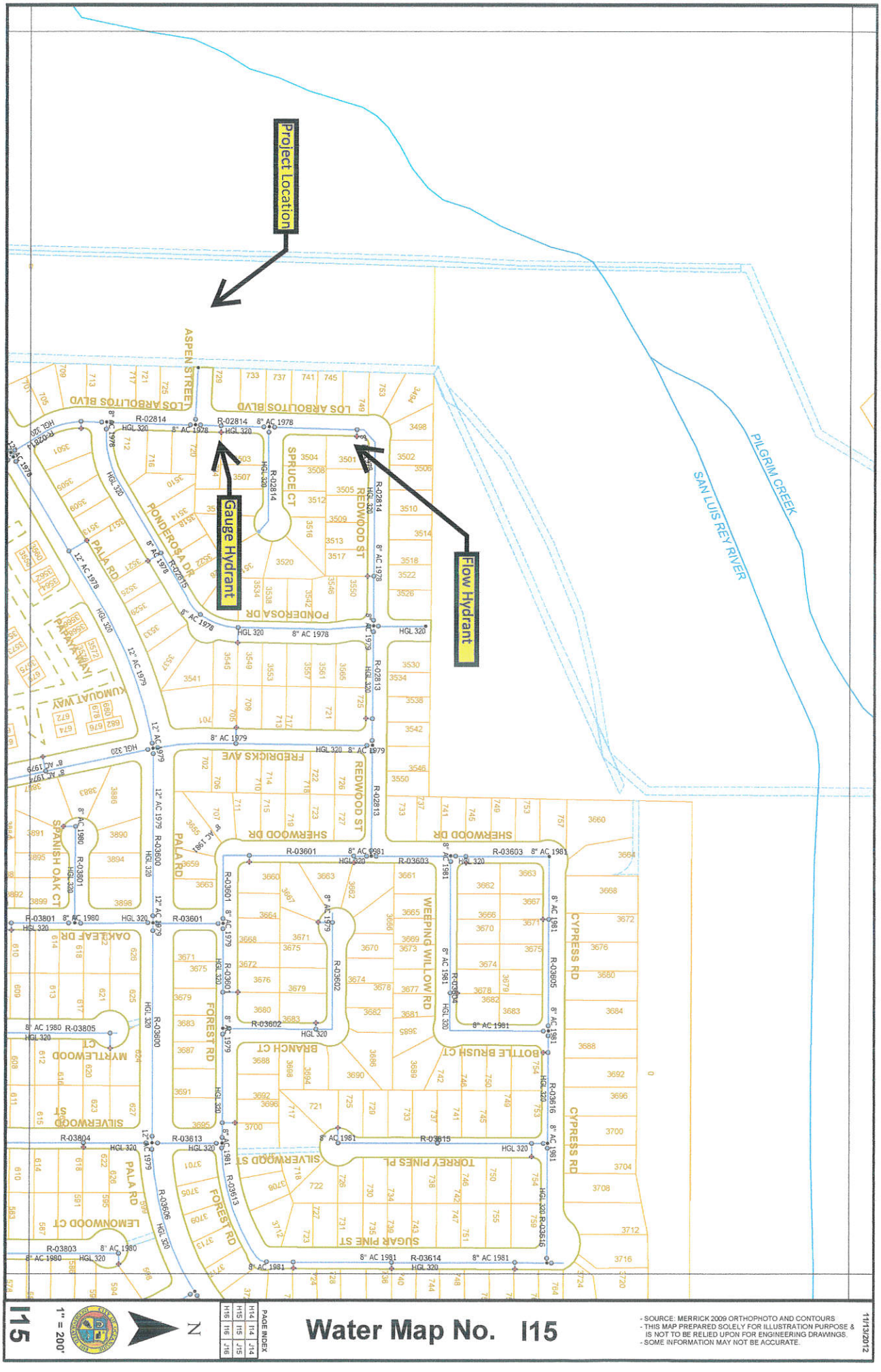
GRAPH:



NOTES:

(1) Flowing hydrant is assumed to be on a circulating main or downstream of the pressure test hydrant on a dead-end system.
(2) Flow analysis assumes a gravity flow system with no distribution pumps and having no demand, other than the test flow.
(3) Distance between hydrants, elevations & main diameter are for information only.


150.0
135.0
120.0
105.0
90.0
75.0
60.0
45.0
30.0
15.0
0.0
GAGE PRESSURE (psi)
Normal Pressure-No Flow-116.00 psi
Test Flow-1404.3 gpm-110.00 psi
Avail. Flow @ 20 psi=6284.9 gpm
1300
1950
2600
3250
3900
4550
5200
5850
6500
FLOW (GPM)


Project Location
Gauge Hydrant
Flow Hydrant
ASPEN STREET
LOS ARBOLITOS BLVD
SPRUCE CT
REDWOOD ST
PONDEROSA DR
PALA RD
KUMQUAT WAY
FREDRICKS AVE
SHERWOOD DR
SPANISH OAK CT
OAKLEAF DR
MYRTLEWOOD CT
SILVERWOOD ST
LEMONWOOD CT
FOREST RD
BRANCH CT
WEEPING WILLOW RD
BOTTLE BRUSH CT
TORREY PINES PL
SUGAR PINE ST
CYPRESS RD
PILGRIM CREEK
SAN LUIS REY RIVER
N
1" = 200'
I15
PAGE INDEX
H14 I14 J14
H15 I15 J15
H16 I16 J16
Water Map No. I15
- SOURCE: MERRICK 2009 ORTHOPHOTO AND CONTOURS
- THIS MAP PREPARED SOLELY FOR ILLUSTRATION PURPOSE & IS NOT TO BE RELIED UPON FOR ENGINEERING DRAWINGS.
- SOME INFORMATION MAY NOT BE ACCURATE.
11/13/2012

Fire Hydrant Flow Test Date November 16, 2020

Input Flow Test Results

Static Pressure	116	PSI		
Residual Pressure	110	PSI		
Hydrant Flow	1404.3	GPM		
Estimated Hydrant Elevation	48.5	Feet	HGL	316.2 Feet

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

k = 2.08251E-05

Extrapolated Calculations

Q, gpm	Residual Pressure	Available HGL
12.30	116.0 psi	316.2 ft
24.6	116.0 psi	316.2 ft
36.9	116.0 psi	316.2 ft
100	116.0 psi	316.1 ft
500	115.1 psi	314.2 ft
1000	112.8 psi	308.8 ft
1500	109.2 psi	300.6 ft
1524.60	109.0 psi	300.1 ft
2000	104.5 psi	289.6 ft
6285	20.0 psi	94.7 ft

APPENDIX D

COMPUTER RUNS

WATER SYSTEM ANALYSIS
FOR
FIRE HYDRANT FLOW

NODE AND PIPE DIAGRAM REFERENCE:

Exhibit A

CONDITIONS MODELED:

1. Average Day Demand
2. Maximum Day Demand
3. Peak Hour Demand
4. Maximum Day Demand plus Fire Flow of 1,500 gpm at Node 18

```
* * * * * * * * * * * * K Y P I P E * * * * * * * * * * * *
*                                                           *
*  Pipe Network Modeling Software                           *
*                                                           *
*  CopyRighted by KYPIPE LLC (www.kypipe.com)               *
*  Version: 10.009  10/01/2019                              *
*  Company:  Dexter Wilson Eng. Inc.   Serial #:  592169    *
*  Interface:  Classic                                      *
*  Licensed for Pipe2018                                    *
*                                                           *
* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *
```

Date & Time: Fri Dec 11 15:55:58 2020

Master File : \\artic\eng\750006\ky\750006.KYP\750006.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.
1	0	2	315.00	12.00	120.0000	0.00
3	4	2	75.00	12.00	120.0000	0.00
5	6	4	405.00	8.00	120.0000	0.00
7	8	6	195.00	8.00	120.0000	0.00
9	8	10	40.00	8.00	120.0000	0.00
11	10	12	290.00	8.00	120.0000	0.00
13	12	14	285.00	8.00	120.0000	0.00
15	14	16	350.00	8.00	120.0000	0.00
17	16	18	200.00	8.00	120.0000	0.00
19	18	20	340.00	8.00	120.0000	0.00
21	22	20	240.00	8.00	120.0000	0.00
23	24	22	315.00	8.00	120.0000	0.00
25	26	24	355.00	8.00	120.0000	0.00
27	8	26	90.00	8.00	120.0000	0.00
29	22	28	205.00	8.00	120.0000	0.00
31	2	28	560.00	8.00	120.0000	0.00

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

THERE IS A DEVICE AT NODE 0 DESCRIBED BY THE FOLLOWING DATA:

HEAD (ft)	FLOWRATE (gpm)	EFFICIENCY (%)
267.70	0.00	75.00 (Default)
267.60	100.00	75.00 (Default)
265.70	500.00	75.00 (Default)
260.30	1000.00	75.00 (Default)
252.10	1500.00	75.00 (Default)
251.60	1524.60	75.00 (Default)
241.10	2000.00	75.00 (Default)

N O D E D A T A

NODE NAME	NODE TITLE	EXTERNAL DEMAND (gpm)	JUNCTION ELEVATION (ft)	EXTERNAL GRADE (ft)
2		0.00	48.50	
4		0.00	48.50	
6		0.00	49.88	
8		0.23	51.92	
10		1.14	52.52	
12		2.28	53.79	
14		2.28	55.08	
16		1.59	56.37	
18		1.14	57.05	
20		0.91	55.54	
22		0.68	51.05	
24		1.14	53.02	
26		0.91	52.30	
28		0.00	49.60	
0		----	48.50	48.50

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
MAXIMUM AND MINIMUM HEAD LOSS/1000 = 3

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

NUMBER OF PIPES .....(P) = 16
NUMBER OF END NODES .....(J) = 14
NUMBER OF PRIMARY LOOPS .....(L) = 2
NUMBER OF SUPPLY NODES .....(F) = 1
NUMBER OF SUPPLY ZONES .....(Z) = 1

==========

Case: 0

RESULTS OBTAINED AFTER 9 TRIALS: ACCURACY = 0.11117E-06

Cypress Point Project
Fire Hydrant Flow Analysis
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

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
1	0	2	12.30	0.00	0.00	0.03	0.00	0.00
3	4	2	-6.55	0.00	0.00	0.02	0.00	0.00
5	6	4	-6.55	0.00	0.00	0.04	0.00	0.00
7	8	6	-6.55	0.00	0.00	0.04	0.00	0.00
9	8	10	5.39	0.00	0.00	0.03	0.00	0.00
11	10	12	4.25	0.00	0.00	0.03	0.00	0.00
13	12	14	1.97	0.00	0.00	0.01	0.00	0.00
15	14	16	-0.31	0.00	0.00	0.00	0.00	0.00
17	16	18	-1.90	0.00	0.00	0.01	0.00	0.00
19	18	20	-3.04	0.00	0.00	0.02	0.00	0.00
21	22	20	3.95	0.00	0.00	0.03	0.00	0.00
23	24	22	-1.12	0.00	0.00	0.01	0.00	0.00
25	26	24	0.02	0.00	0.00	0.00	0.00	0.00
27	8	26	0.93	0.00	0.00	0.01	0.00	0.00
29	22	28	-5.75	0.00	0.00	0.04	0.00	0.00
31	2	28	5.75	0.00	0.00	0.04	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
0	12.30	0.00	267.70

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
2		0.00	316.20	48.50	267.70	116.00
4		0.00	316.20	48.50	267.70	116.00
6		0.00	316.20	49.88	266.32	115.40
8		0.23	316.20	51.92	264.28	114.52
10		1.14	316.20	52.52	263.68	114.26
12		2.28	316.20	53.79	262.41	113.71
14		2.28	316.20	55.08	261.12	113.15
16		1.59	316.20	56.37	259.83	112.59
18		1.14	316.20	57.05	259.15	112.30
20		0.91	316.20	55.54	260.66	112.95
22		0.68	316.20	51.05	265.15	114.90
24		1.14	316.20	53.02	263.18	114.04
26		0.91	316.20	52.30	263.90	114.36
28		0.00	316.20	49.60	266.60	115.53
0		----	316.20	48.50	267.70	116.00

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
0	116.00	18	112.30
2	116.00	16	112.59
4	116.00	20	112.95

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
5	0.04	25	0.00
7	0.04	15	0.00
29	0.04	27	0.01

H L + M L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)
5	0.00	25	0.00
7	0.00	15	0.00
29	0.00	27	0.00

H L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)
5	0.00	25	0.00
7	0.00	15	0.00
29	0.00	27	0.00

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
0	12.30

NET SYSTEM INFLOW = 12.30
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 12.30

==========

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)

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 3 TRIALS: ACCURACY = 0.72988E-08

Cypress Point Project
Fire Hydrant Flow Analysis
Maximum 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

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
1	0	2	24.60	0.00	0.00	0.07	0.00	0.00
3	4	2	-13.10	0.00	0.00	0.04	0.00	0.00
5	6	4	-13.10	0.00	0.00	0.08	0.01	0.01
7	8	6	-13.10	0.00	0.00	0.08	0.01	0.01
9	8	10	10.77	0.00	0.00	0.07	0.00	0.00
11	10	12	8.49	0.00	0.00	0.05	0.00	0.00
13	12	14	3.93	0.00	0.00	0.03	0.00	0.00
15	14	16	-0.63	0.00	0.00	0.00	0.00	0.00
17	16	18	-3.81	0.00	0.00	0.02	0.00	0.00
19	18	20	-6.09	0.00	0.00	0.04	0.00	0.00
21	22	20	7.91	0.00	0.00	0.05	0.00	0.00
23	24	22	-2.23	0.00	0.00	0.01	0.00	0.00
25	26	24	0.05	0.00	0.00	0.00	0.00	0.00
27	8	26	1.87	0.00	0.00	0.01	0.00	0.00
29	22	28	-11.50	0.00	0.00	0.07	0.01	0.01
31	2	28	11.50	0.00	0.00	0.07	0.01	0.01

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
0	24.60	0.00	267.69

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
2		0.00	316.19	48.50	267.69	116.00
4		0.00	316.19	48.50	267.69	116.00
6		0.00	316.19	49.88	266.31	115.40
8		0.46(2.00)	316.19	51.92	264.27	114.52
10		2.28(2.00)	316.19	52.52	263.67	114.26
12		4.56(2.00)	316.19	53.79	262.40	113.71
14		4.56(2.00)	316.19	55.08	261.11	113.15
16		3.18(2.00)	316.19	56.37	259.82	112.59
18		2.28(2.00)	316.19	57.05	259.14	112.29
20		1.82(2.00)	316.19	55.54	260.65	112.95
22		1.36(2.00)	316.19	51.05	265.14	114.89
24		2.28(2.00)	316.19	53.02	263.17	114.04
26		1.82(2.00)	316.19	52.30	263.89	114.35
28		0.00	316.19	49.60	266.59	115.52
0		----	316.19	48.50	267.69	116.00

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
0	116.00	18	112.29
2	116.00	16	112.59
4	116.00	20	112.95

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
5	0.08	25	0.00
7	0.08	15	0.00
31	0.07	27	0.01

H L + M L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)
5	0.01	25	0.00
7	0.01	15	0.00
29	0.00	27	0.00

H L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)
5	0.01	25	0.00
7	0.01	15	0.00
29	0.00	27	0.00

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
0	24.60

NET SYSTEM INFLOW = 24.60
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 24.60

==========

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)

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 3 TRIALS: ACCURACY = 0.10449E-06

Cypress Point Project
Fire Hydrant Flow Analysis
Peak Hour Demand

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
1	0	2	36.90	0.00	0.00	0.10	0.01	0.01
3	4	2	-19.65	0.00	0.00	0.06	0.00	0.00
5	6	4	-19.65	0.01	0.00	0.13	0.01	0.01
7	8	6	-19.65	0.00	0.00	0.13	0.01	0.01
9	8	10	16.16	0.00	0.00	0.10	0.01	0.01
11	10	12	12.74	0.00	0.00	0.08	0.01	0.01
13	12	14	5.90	0.00	0.00	0.04	0.00	0.00
15	14	16	-0.94	0.00	0.00	0.01	0.00	0.00
17	16	18	-5.71	0.00	0.00	0.04	0.00	0.00
19	18	20	-9.13	0.00	0.00	0.06	0.00	0.00
21	22	20	11.86	0.00	0.00	0.08	0.01	0.01
23	24	22	-3.35	0.00	0.00	0.02	0.00	0.00
25	26	24	0.07	0.00	0.00	0.00	0.00	0.00
27	8	26	2.80	0.00	0.00	0.02	0.00	0.00
29	22	28	-17.25	0.00	0.00	0.11	0.01	0.01
31	2	28	17.25	0.01	0.00	0.11	0.01	0.01

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
0	36.90	0.00	267.68

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
2		0.00	316.18	48.50	267.68	116.00
4		0.00	316.18	48.50	267.68	116.00
6		0.00	316.18	49.88	266.30	115.40
8		0.69(3.00)	316.17	51.92	264.25	114.51
10		3.42(3.00)	316.17	52.52	263.65	114.25
12		6.84(3.00)	316.17	53.79	262.38	113.70
14		6.84(3.00)	316.17	55.08	261.09	113.14
16		4.77(3.00)	316.17	56.37	259.80	112.58
18		3.42(3.00)	316.17	57.05	259.12	112.29
20		2.73(3.00)	316.17	55.54	260.63	112.94
22		2.04(3.00)	316.17	51.05	265.12	114.89
24		3.42(3.00)	316.17	53.02	263.15	114.03
26		2.73(3.00)	316.17	52.30	263.87	114.35
28		0.00	316.18	49.60	266.58	115.52
0		----	316.18	48.50	267.68	116.00

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
0	116.00	18	112.28
2	116.00	16	112.58
4	116.00	20	112.94

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
5	0.13	25	0.00
7	0.13	15	0.01
29	0.11	27	0.02

H L + M L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)
5	0.01	25	0.00
7	0.01	15	0.00
31	0.01	27	0.00

H L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)
5	0.01	23	0.00
7	0.01	15	0.00
31	0.01	25	0.00

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
0	36.90	

NET SYSTEM INFLOW = 36.90
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 36.90

==========

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)

JUNCTION DEMANDS CHANGED - PLEASE SEE RESULTS TABLE

RESULTS OBTAINED AFTER 4 TRIALS: ACCURACY = 0.14254E-06

Cypress Point Project
Fire Hydrant Flow Analysis
Maximum Day Demand Plus 1,500 gpm Fire Flow Demand at Node 18

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
1	0	2	1524.60	2.02	0.00	4.32	6.42	6.42
3	4	2	-796.01	0.14	0.00	2.26	1.93	1.93
5	6	4	-796.01	5.62	0.00	5.08	13.89	13.89
7	8	6	-796.01	2.71	0.00	5.08	13.89	13.89
9	8	10	633.02	0.36	0.00	4.04	9.08	9.08
11	10	12	630.74	2.62	0.00	4.03	9.02	9.02
13	12	14	626.18	2.54	0.00	4.00	8.90	8.90
15	14	16	621.62	3.07	0.00	3.97	8.78	8.78
17	16	18	618.45	1.74	0.00	3.95	8.70	8.70
19	18	20	-883.84	5.73	0.00	5.64	16.86	16.86
21	22	20	885.66	4.06	0.00	5.65	16.92	16.92
23	24	22	158.43	0.22	0.00	1.01	0.70	0.70
25	26	24	160.71	0.25	0.00	1.03	0.72	0.72
27	8	26	162.53	0.07	0.00	1.04	0.73	0.73
29	22	28	-728.59	2.42	0.00	4.65	11.79	11.79
31	2	28	728.59	6.60	0.00	4.65	11.79	11.79

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
0	1524.60	0.00	251.60

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
2		0.00	298.08	48.50	249.58	108.15
4		0.00	297.93	48.50	249.43	108.09
6		0.00	292.31	49.88	242.43	105.05
8		0.46(2.00)	289.60	51.92	237.68	102.99
10		2.28(2.00)	289.24	52.52	236.72	102.58
12		4.56(2.00)	286.62	53.79	232.83	100.89
14		4.56(2.00)	284.08	55.08	229.00	99.23
16		3.18(2.00)	281.01	56.37	224.64	97.34
18		1502.28(**)	279.27	57.05	222.22	96.29
20		1.82(2.00)	285.00	55.54	229.46	99.43
22		1.36(2.00)	289.06	51.05	238.01	103.14
24		2.28(2.00)	289.28	53.02	236.26	102.38
26		1.82(2.00)	289.53	52.30	237.23	102.80
28		0.00	291.48	49.60	241.88	104.81
0		----	300.10	48.50	251.60	109.03

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
0	109.03	18	96.29
2	108.15	16	97.34
4	108.09	14	99.23

V E L O C I T I E S

PIPE NUMBER	MAXIMUM VELOCITY (ft/s)	PIPE NUMBER	MINIMUM VELOCITY (ft/s)
21	5.65	23	1.01
19	5.64	25	1.03
5	5.08	27	1.04

H L + M L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL+ML/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL+ML/1000 (ft/ft)
21	16.92	23	0.70
19	16.86	25	0.72
7	13.89	27	0.73

H L / 1 0 0 0

PIPE NUMBER	MAXIMUM HL/1000 (ft/ft)	PIPE NUMBER	MINIMUM HL/1000 (ft/ft)
21	16.92	23	0.70
19	16.86	25	0.72
7	13.89	27	0.73

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
0	1524.60	

NET SYSTEM INFLOW = 1524.60
NET SYSTEM OUTFLOW = 0.00
NET SYSTEM DEMAND = 1524.60

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

EXHIBIT A

NODE AND PIPE DIAGRAM

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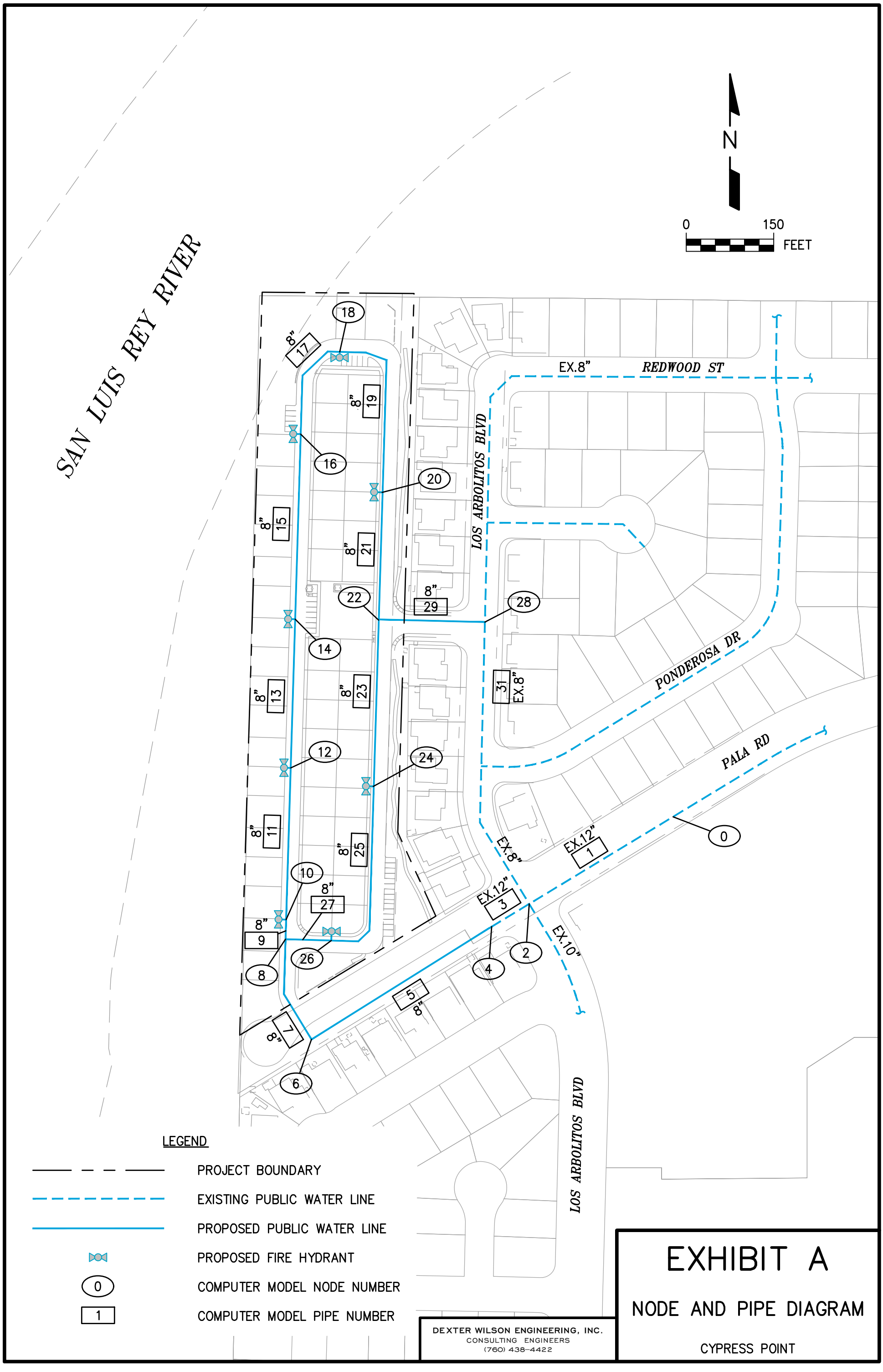

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EXHIBIT A

NODE AND PIPE DIAGRAM

CYPRESS POINT