PRELIMINARY
UTILITY DEMAND STUDY
FOR

Cotati Village Community

APN: 046-286-021
Cotati, CA 94931

Prepared For:
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Introduction

The purpose of the attached analysis is to determine the proposed sewer and water demands for the project. The project is located on a 7.54 acre vacant lot in the City of Cotati, CA. The project is bound by Gravenstein Highway 116 to the south, Alder Avenue to the west, residential properties (Cotati Cottages) to the north and vacant lots to the east. The project is in a commercial zone and will consist of the development of 3 multifamily residential buildings, 3 residential/retail buildings, and a recreation building with a pool.

For an analysis and discussion of the proposed Storm Drain System, see the separate Hydrology and Hydraulics Study for this project.

Existing Conditions

There is an existing 8” sewer main located in the private Ford Lane to the north of the project. There is also an existing 10” sewer main located adjacent to the Gravenstein Highway 116 Right of Way within a sewer easement.

There are existing water mains located within Ford Lane (12”) to the north, Alder Ave (10”) to the west, and Gravenstein Highway 116 (10”) to the south. There are three existing fire hydrants located within Ford Lane, two hydrants within Alder Avenue, and two hydrants along Gravenstein Highway 116.

Project Description

The project proposes the construction of 10” water mains within Batchelor Lane and the private drive aisle along the easterly property line. These mains will connect to the existing mains within Alder and Ford. Another 10” connection from Batchelor Lane to the water main in Gravenstein Hwy 116 will provide 3 points of connection to supply the project. Each building will be served with a domestic and fire service. Nine (9) fire hydrants are proposed adequately spaced throughout the site to provide cover for the proposed buildings.

The project also proposes to construct sewer laterals connecting to the existing 8” main in Ford Lane for the northern buildings, and a connection to the existing 10” main along Gravenstein Hwy 116 for the three southern buildings.

Analysis

The water system was analyzed using the program EPAnet. The existing mains were modeled as a reservoir and pump to replicate the hydrant flow test results. A scenario for the furthest hydrant of the project was run where there was an individual demand of 1,500 gpm per 2019 California Fire Code. A fire sprinkler/hose demand of 150 gpm was applied to the adjacent building.

The sewer system was analyzed using a pipe flow calculator. The calculation was run on each connecting pipe to the existing system to determine the depth of flow. See Appendix for the results.

Conclusion

Water

The proposed water system is not in conformance with the City of Cotati's 2011 Water Distribution Master Plan (Master Plan). Per the Master Plan, this project was not identified specifically but the anticipated demand for the project area was 8,294 gpd (based on parcel size), therefore this project is adding 22,168 gpd to the water distribution system.

Per the previously submitted Cotati Village project, the proposed water demand for the residential units was 19,350 gpd, the commercial space was 23,038 gpd, and the total demand was 42,388 gpd. This report proposes reduces demand by 11,926 gpd compared to the previous project. Assuming the City reviewed the previous project plans for this site, it is expected that this project will be deemed in compliance with the Master Plan based on the information contained within this report and available documents.

Per the Master Plan, a future municipal well (W-4) is proposed for the SW corner of the site. City staff should review the projected future of this well location as it relates to the proposed project usage. The Master Plan also shows a proposed 10" interconnect from Ford Lane to Helman Lane. This parallels an existing sewer main, and should be reviewed for constructability and alternative alignments. There is an easement for water purposes in our files which does not follow this alignment, instead extends easterly to the future extension of Batchelor Lane. It is unclear from review of available documents whether this water main has been constructed at this time or if it was intended to be constructed with the previous Cotati Village project.

Sewer

Per the 2011 Sewer Master Plan (and Addendum), the anticipated future connection points of the Cotati Village project were not identified though according to Figure 5.2 the area is tributary to the 10" sewer main in Gravenstein Hwy 116. The Master Plan Addendum #1 identifies the Cotati Village project and the proposed number of Residential units and Commercial space correctly, but Figure #5 (of Addendum #1) still shows the entire project being tributary to Gravenstein Hwy 116. Per the previously submitted and reviewed plans for Cotati Village, the residential units north of Batchelor Lane were connected to the 8" sewer in Ford Lane. The commercial buildings south of Batchelor Lane were connected to the 10" sewer in Gravenstein Hwy 116. This matches the connection points currently proposed for this revised project. It is unclear if the Master Plan attributed the demands from this project according to the previously

reviewed plans; for the purposes of this analysis we will assume the previous plans met the criteria of the Master Plan including the locations of the connection points since the plans were reviewed by the City in 2017.

The Master Plan anticipated demand for the northern portion of this project was 9,149 gpd, therefore the northern half of this project is adding 4,178 gpd to the 8" sewer main located in Ford Lane. The estimated per capital flow rate used in the Master Plan (60.8 gpcd) is 2/3 the required flow rate used for this report (90 gpcd). Adjusting for this, the northern half is decreasing the flow by about 115 gpd.

The Master Plan identified that the Cotati Village project contained 35% commercial space, and its sewer effluent contributing 1,583 gpd to the sewer main along Gravenstein Hwy116 . Therefore, we are adding 10,343 gpd to this sewer main. If we were to use the Master Plan per capital flow rate (60.8 gpcd), then the southern half is increasing the flow by about 6,786 gpd.

Overall, we are adding 14,521 gpd to the existing system over the anticipated 2011 Sewer Master Plan (and Addendum) demand totals. Adjusting for the difference in Master Plan Residential demand (60.8 gpcd vs 90 gpcd), this project increases the flow by 6,671 gpd.

Fire

Fire hydrant flow results show good pressure and flow supplied by the public water system. The interconnection of the water lines within the property support the proposed project by providing adequate opportunity to locate hydrants to protect the buildings. The analysis results show 1,500 gpm provided at the center of the project with a residual pressure of 52 psi, well above the minimum 20 psi required.

SEWER/DOMESTIC/FIRE WATER DEMANDS

Sanitary Sewer Demands

Unit Types	Count	Capacity (persons)[1] or (sf)	Avg Flow (gpcd)[2] or (gpd/acre)	Total Avg Flow (gpd)	Peak Factor (K)[3]	Peak Flow (gpd)	Design Flow (gpm)	Design Flow (cfs)
1-Bed	48	1.3	90	5616	3.6	20217.6	14.04	0.03
2-Beds	27	2.2	90	5346	3.6	19245.6	13.36	0.03
Commercial	1	30000	1400	964.19	1	964.19	0.67	0
Total South:				**11926.19**		**40427.39**	**28.07**	**0.06**
1-Bed	42	1.3	90	4914	3.6	17690.4	12.28	0.03
2-Beds	42	2.2	90	8316	3.6	29937.6	20.79	0.05
Rec Center	1	3000	1400	96.42	1	96.42	0.07	0
Total North:				**13326.42**		**47724.42**	**33.14**	**0.07**
Residential:	**159 units**	**268.8**		**24192**		**87091.2**		
Com/Rec:		**33000**		**1060.61**		**1060.61**		
Project Total:				**25252.61**		**88151.81**		
Equivalent Flow Rate:	**Area (ac):**	**7.54**	**Residential Flow (gal/day):**	**25252.61**	**Gal/day/acre:**	**3349.15**		

Per the 2011 Sewer Master Plan and Addendum, the estimated demand for the project was ((43 units x 3.5 person/unit x 60.8 gpcd residential) + (7.54 ac x 600 gpd/ac x 35% commercial)) = 10,734 gpd.

1 Residential Capacity determined per conversation with Craig Scott (Cotati DPW)
2 Gallons per Capital per Day Average Flow per 2011 Sewer Master Plan and Addendum
3 Peak Factor per 2011 Sewer Master Plan and Addendum

Domestic Water Demands

Unit Types	Count	Capacity (people)[4] or (sf)	Avg Flow (gpcd)[5] or (gpd/1000sf)	Avg Day Demand ADD (gpd)	Peak Hour Factor (M)[6]	Peak Hour Demand (gpd)	Max Day Demand (gpm)	Max Daily Flow (cfs)
1-Bed	90	1.3	90	10530	3.6	37908	26.32	0.06
2-Beds	69	2.2	90	13662	3.6	49183.2	34.15	0.08
Commercial	1	30000	190	5700	3.6	20520	3.96	0.01
Rec Center	1	3000	190	570	3.6	2052	0.4	0
Residential:	**159**	**268.8**		**24192**		**87091.2**		
Com/Rec:		**33000**		**6270**		**22572**		
Project Total:				**30462**		**109663.2**	**76.15**	**0.17**
Equivalent Flow Rate:	**Area (ac):**	**7.54**	**Flow (gal/day):**	**30462**	**Gal/day/acre:**	**4040.05**		

Per the 2011 Water Master Plan Table 4.2, the estimated demand for the project was (7.54 ac x 1,100 gpd/ac) = 8,294 gpd.

Fire Flow Demands

This project does not fall within a “High Severity Fire Zone” (per CalFire Fire Hazard Severity Zone Map).

Required Fire Flow = 1,500 gal/min
Provided System Flow[7] = 2,619 gal/min
Provided Fire Hydrant Flow = 1,500 gal/min @ 52 psi (Junction 6 of the results)

4 Residential Capacity determined per conversation with Craig Scott (Cotati DPW)
5 Gallons per Capital per Day Average Flow per 2011 Water Distribution System Master Plan
6 Peak Hour Factor per 2011 Water Distribution System Master Plan
7 Per Fire Hydrant Flow Test, see Appendix

Fire Flow Demands

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7 Per Fire Hydrant Flow Test, see Appendix

Sanitary Sewer Analysis

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Apr 22 2022

Cotati Village North Sewer

Circular

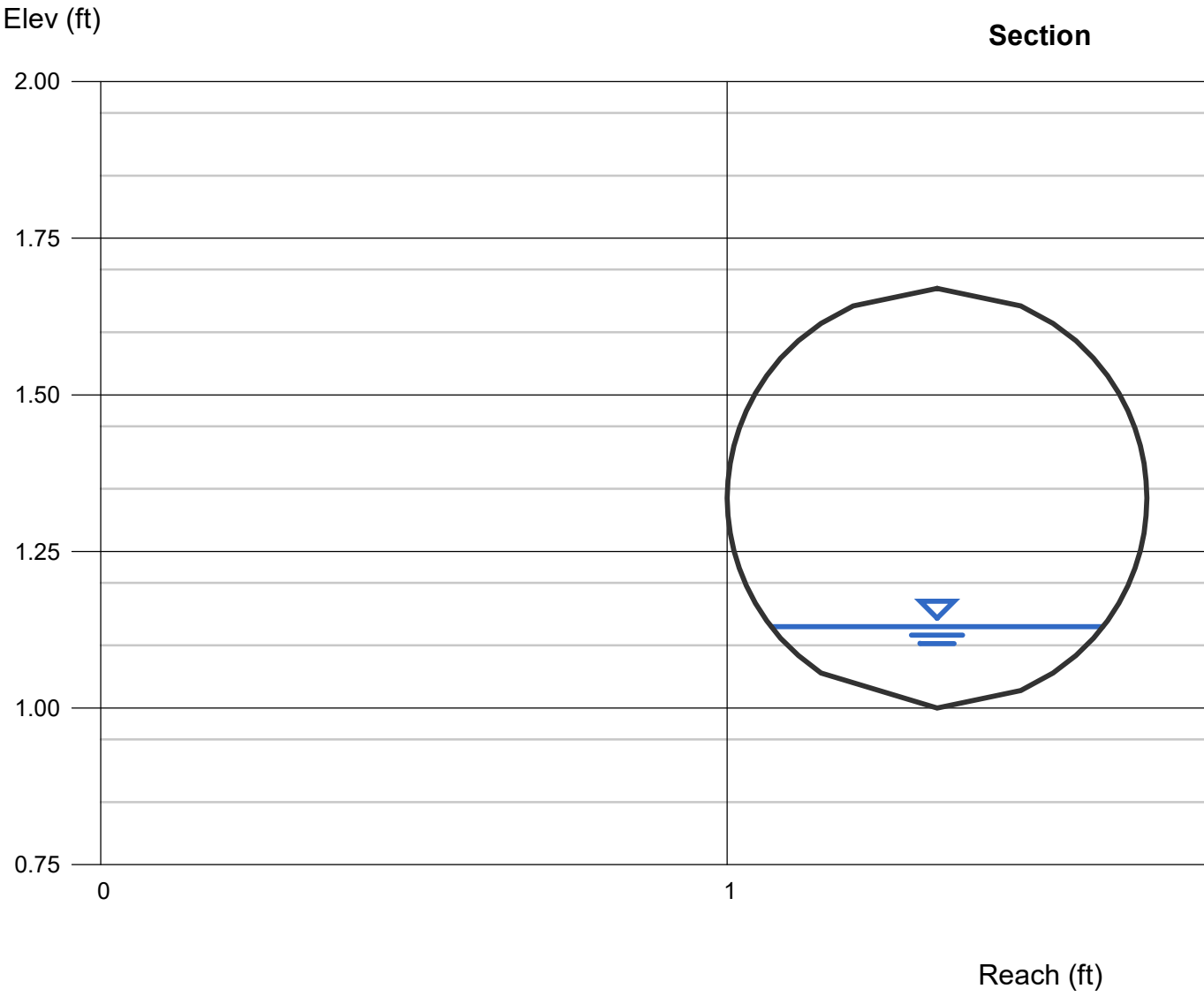
Diameter (ft)	= 0.67
Invert Elev (ft)	= 1.00
Slope (%)	= 0.50
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.07

Highlighted

Depth (ft)	= 0.13
Q (cfs)	= 0.070
Area (sqft)	= 0.05
Velocity (ft/s)	= 1.44
Wetted Perim (ft)	= 0.61
Crit Depth, Yc (ft)	= 0.12
Top Width (ft)	= 0.53
EGL (ft)	= 0.16



Channel Report

Cotati Village South Sewer

Circular

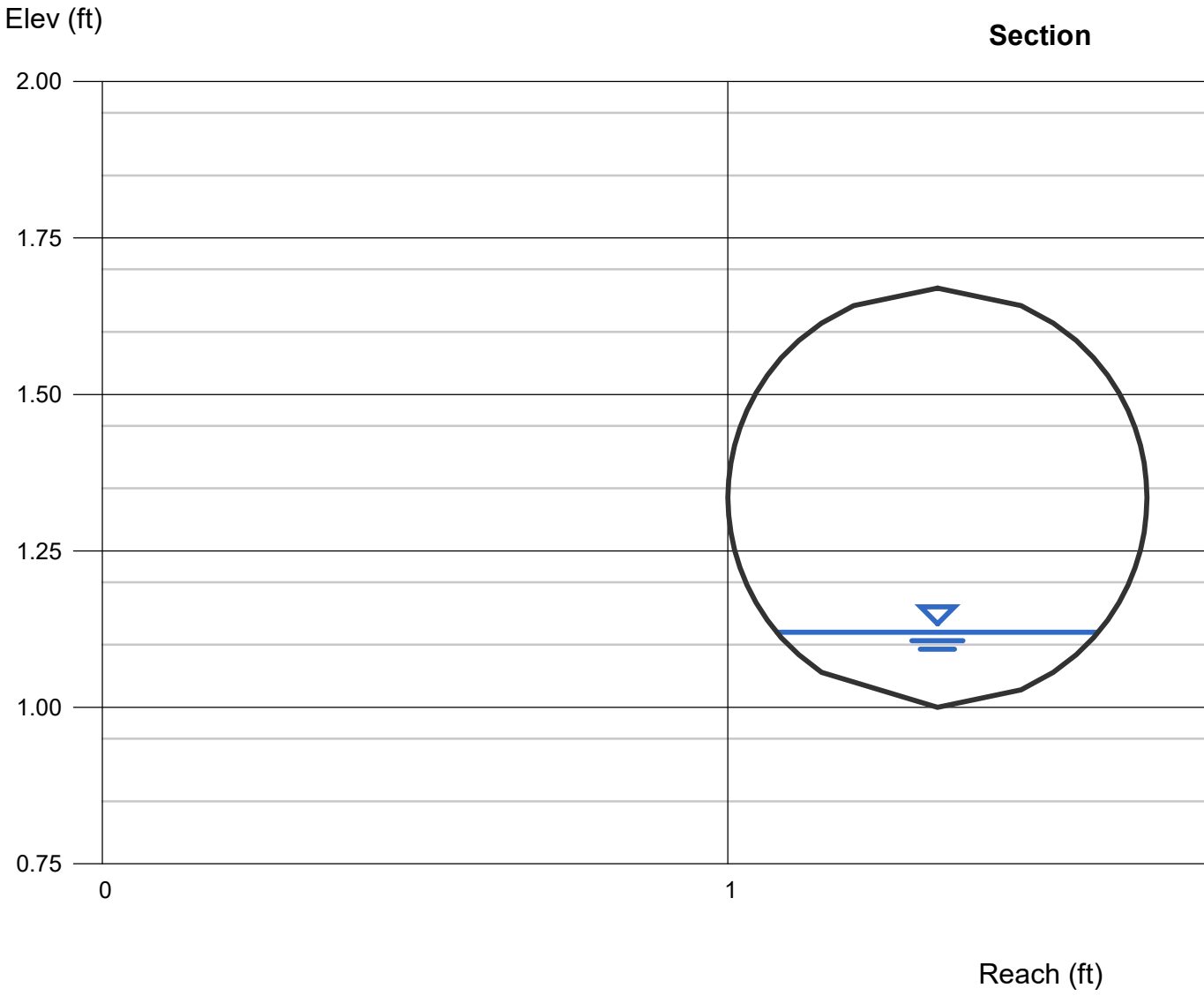
Diameter (ft)	= 0.67
Invert Elev (ft)	= 1.00
Slope (%)	= 0.50
N-Value	= 0.012

Calculations

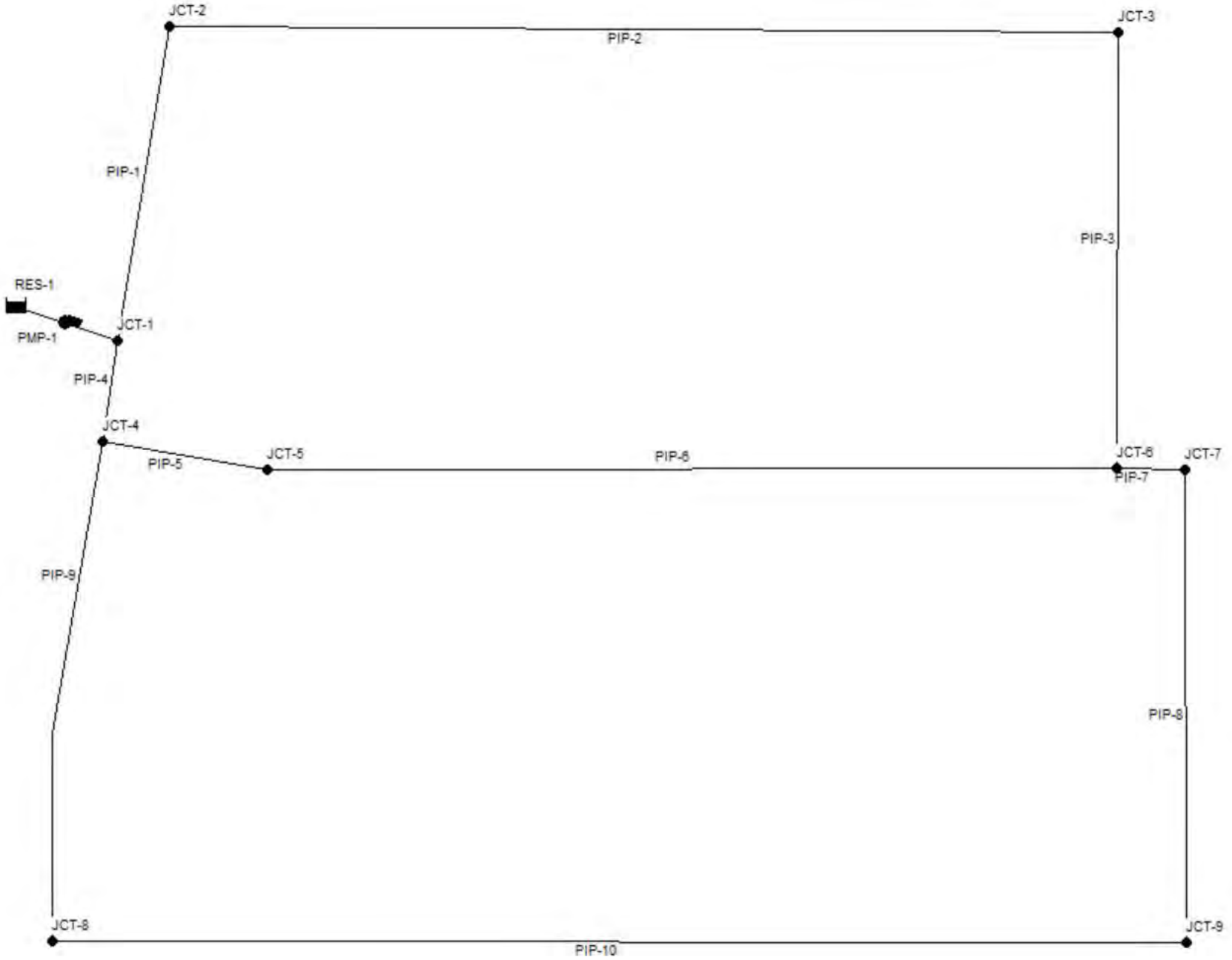
Compute by:	Known Q
Known Q (cfs)	= 0.06

Highlighted

Depth (ft)	= 0.12
Q (cfs)	= 0.060
Area (sqft)	= 0.04
Velocity (ft/s)	= 1.40
Wetted Perim (ft)	= 0.59
Crit Depth, Yc (ft)	= 0.12
Top Width (ft)	= 0.51
EGL (ft)	= 0.15



FIRE FLOW ANALYSIS OF HYDRANTS


JCT-2
JCT-3
PIP-2
PIP-1
PIP-3
RES-1
PMP-1
JCT-1
PIP-4
JCT-4
PIP-5
JCT-5
PIP-6
JCT-6
JCT-7
PIP-7
PIP-9
PIP-8
JCT-8
JCT-9
PIP-10

```
*************************************************************************
*                            E P A N E T                                *
*                     Hydraulic and Water Quality                       *
*                     Analysis for Pipe Networks                        *
*                          Version 2.2                                  *
*************************************************************************
```

Input File: 230-006 fire.net

Link - Node Table:

Link ID	Start Node	End Node	Length ft	Diameter in	
PIP-1	JCT-1	JCT-2	193	10	
PIP-2	JCT-2	JCT-3	574	12	
PIP-3	JCT-3	JCT-6	265	10	
PIP-4	JCT-1	JCT-4	62	10	
PIP-5	JCT-4	JCT-5	102	10	
PIP-6	JCT-5	JCT-6	515	10	
PIP-7	JCT-6	JCT-7	42	10	
PIP-8	JCT-7	JCT-9	287	10	
PIP-9	JCT-4	JCT-8	306	10	
PIP-10	JCT-8	JCT-9	688	10	
PMP-1	RES-1	JCT-1	#N/A	#N/A	Pump

Energy Usage:

Pump	Usage Factor	Avg. Effic.	Kw-hr /Mgal	Avg. Kw	Peak Kw	Cost /day
PMP-1	100.00	75.00	517.34	46.56	46.56	0.00
				Demand Charge:		0.00
				Total Cost:		0.00

Node Results:

Node ID	Demand GPM	Head ft	Pressure psi	Quality	
JCT-1	0.00	223.00	53.51	0.00	
JCT-2	0.00	222.49	53.68	0.00	
JCT-3	0.00	221.87	53.93	0.00	
JCT-4	0.00	222.63	53.26	0.00	
JCT-5	0.00	222.39	53.25	0.00	
JCT-6	1500.00	221.17	52.22	0.00	
JCT-7	0.00	221.21	52.00	0.00	
JCT-8	0.00	222.29	51.69	0.00	
JCT-9	0.00	221.53	51.45	0.00	
RES-1	-1500.00	99.50	0.00	0.00	Reservoir

Link Results:

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
PIP-1	584.70	2.39	2.64	Open
PIP-2	584.70	1.66	1.09	Open
PIP-3	584.70	2.39	2.64	Open
PIP-4	915.30	3.74	6.06	Open
PIP-5	550.59	2.25	2.37	Open
PIP-6	550.59	2.25	2.37	Open
PIP-7	-364.71	1.49	1.10	Open
PIP-8	-364.71	1.49	1.10	Open

PIP-9	364.71	1.49	1.10	Open	
PIP-10	364.71	1.49	1.10	Open	
PMP-1	1500.00	0.00	-123.50	Open	Pump

FireHydrant.org

BETA Version

Fire Hydrant Flow Calculator

- Use the tab key to navigate.
- Tab between each box to update the calculation.
- Be sure to tab past your final entry for a correct calculation.

CoTaTi Hydrant
CoT-321
Flowed 6/27/17
7515 Alder

Static:	072	psi before flowing
Residual:	060	psi while flowing
Pitot:	050	pitot gage reading
Diameter:	02.5	size of opening tested
This hydrant is flowing:	1186	GPM from the test outlet
Projected available hydrant flow:	2619	GPM Note 1
2nd Static:	0	secondary psi before flowing
2nd Residual:	0	secondary psi while flowing
The main can be expected to flow about:	NaN	GPM

Notes:

1. Projected available flows calculated at 20 psi residual, or ½ the static pressure for low pressure hydrants having static pressures of less than 40 psi.
2. This calculator is based on established Hazen-Williams formulas and is provided for convenience and estimation purposes only. The author and FireHydrant.org express no warranty for its suitability for any particular purpose.

Click for Legal Disclaimer

Site Design: FireHydrant.Org Volunteers - webmaster@firehydrant.org

Pump Curve Calculation

FH Location: 7515 Alder Avenue
Test Date: 6/27/2017

Given: Information obtained from the Rancho Adobe Fire Department for City Fire Hydrant at 7515 Alder Avenue.

Static Pressure (P_S) =	72 psi	=>	**166.3** ft
Residual Pressure (P_R) =	60 psi	=>	**138.6** ft
Flow During Test (Q_F) =	1186 gpm		

Equation:

$$Q_R = Q_F \left[\frac{H_R}{H_F} \right]^{0.54}$$

Where:

H_R = Pressure drop to desired residual pressure (static pressure minus the design residual pressure)

H_F = Pressure drop during test (static pressure minus residual pressure)

Calculations:

Point # 1 (Shut off)

$Q_R(1)$ = **0** gpm
$P_R(1)$ = **166.3** ft

Point # 2 (Design)

Pick H = 30 psi

$Q_R(2)$ = **2332.8** gpm
$P_R(2)$ = **69.3** ft

Point # 3 (Maximum Operating)

H = 20 psi

$Q_R(3)$ = **2618.0** gpm
$P_R(2)$ = **46.2** ft