



Appendix J2

Master Water Study

Water System Analysis for: The Vineyard, Curci, Costco, & Candee Properties

The following is a water system analysis for four commercial projects located on the north side of Clinton Keith Road just east of I-215 in Murrieta California. Proposed water facilities for the four developments consist of a 12" public line located in Warm Springs Parkway. Warm Springs Parkway is a public road proposed as an offsite improvement conditioned for three of the projects listed in the title line above. Additional fire and domestic services are also taken from the existing 18" public water line in Clinton Keith Road and an existing 24" line running north and south parallel to and adjacent east of I-215. This analysis consists of water demand calculations and a hydraulics analysis of proposed public facilities. Water demand calculations were completed in accordance with Eastern Municipal Water District, 2015 WFMP. Figure 1- Water Systems Analysis for The Vineyards, Curci, Costco & Candee Projects, included with this analysis, show existing and proposed water facilities for the four developments. Fire flow simulations were conducted by Eastern Municipal Water District, (EMWD). For The Vineyard, Curci and Candee projects, EMWD model assumed simultaneous flows of 1500 GPM at two locations or a total fire flow of 3000 GPM. The model shows that the existing public water system can deliver 3000 GPM at a residual pressure of 61.56 GPM. For the Costco site, a separate fire flow simulation was conducted based on a required fire flow of 4000 GPM. Both simulation summaries are attached. From calculations below it is found that the greatest demand occurs when maximum daily demand and fire flows are combined. Four separate scenarios are examined. Each scenario is described below.

Scenario 1: Referring to Figure 1, this scenario assumes domestic use by The Vineyard, Curci, Costco and Candee and a fire in The Vineyard, requiring 3000 GPM fire flow plus domestic demand. A hydraulic analysis is performed at Point F on the new 12" pipe and the fire service at Point A. Fire flow is provided at 2 points, Point A and B for the west side and Points D and E on the east side

Scenario 2: Referring to Figure 1, this scenario assumes domestic use by The Vineyard, Curci, Costco, and Candee, and a fire in property Candee, requiring 3000 GPM fire flow plus domestic demand. The analysis is again performed at Points F and I.

Scenario 3: Referring to Figure 1, this scenario assumes domestic use by Curci, and a fire in Curci, requiring 3000 GPM fire flow. The improvements are the two 8" fire services connected to the existing 24" waterline, identified as Points G & H. Both the fire services and domestic services are fed from an existing 24" public line. Only the fire service is analyzed.

Scenario 4: Referring to Figure 1, this scenario assumes a fire at the Costco property. Two 10" fire services are proposed for the development. One fire service is proposed at the northwest corner of the project with the second service proposed on the east side at Warm Springs Parkway. The west side connection, identified as point J in Figure 1, ties an existing 24" waterline described above. The east side fire service, identified as point K in Figure 1, connects to a proposed 12 water line in Warm Springs Parkway. Scenario 4 assumes a fire flow of 2000 GPM at point J, 2000 GPM at point K, and domestic flows for all four developments.

Water Demand Calculations

Average Day Demand, ADD	Commercial: 2,200 GPD/ GR. AC.					
The Vineyard	11.75 AC	x	2,200	GPD/GR. AC.	=	25,850 GPD
Costco	16.42 AC	x	2,200	GPD/GR. AC.	=	36,124 GPD
Candee	9.58 AC	x	2,200	GPD/GR. AC.	=	21,076 GPD
TOTAL	37.75 AC	x	2,200	GPD/GR. AC.	=	83,050 GPD

Water Demand Calculations (Continued)

Average Day Demand, ADD Commercial: 2,200 GPD/ GR. AC.

Curci	6.65 AC	x	2,200	GPD/GR. AC.	=	14,630	GPD
The Vineyard West	4.40 AC	x	2,200	GPD/GR. AC.	=	9,680	GPD
The Vineyard East	7.25 AC	x	2,200	GPD/GR. AC.	=	15,950	GPD

Maximum Day Demand, MDD Commercial: 2.0 x ADD

The Vineyard	2.0	x	25,850	GPD	=	51,700	GPD
Costco	2.0	x	36,124	GPD	=	72,248	GPD
Candee	2.0	x	21,076	GPD	=	42,152	GPD

TOTAL	2.0	x	83,050	GPD	=	166,100	GPD
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Curci	2.0	x	14,630	GPD	=	29,260	GPD
The Vineyard West	2.0	x	9,680	GPD	=	19,360	GPD
The Vineyard East	2.0	x	15,950	GPD	=	31,900	GPD

Peak Hour Demand, PHD Commercial: 2.0 x MDD

The Vineyard	2.0	x	51,700	GPD	=	103,400	GPD
Costco	2.0	x	72,248	GPD	=	144,496	GPD
Candee	2.0	x	42,152	GPD	=	84,304	GPD

TOTAL	2.0	x	166,100	GPD	=	332,200	GPD
					=	230.69	GPM

Curci	2.0	x	29,260	GPD	=	58,520	GPD
					=	40.64	GPM

The Vineyard West	2.0	x	19,360	GPD	=	38,720	GPD
					=	26.89	GPM

The Vineyard East	2.0	x	31,900	GPD	=	63,800	GPD
					=	44.31	GPM

Peak Hour Demand + Fire Flow Commercial: PHD + FF

The Vineyard	103,400	GPD	÷	1,440	Min/Day	=	72
Costco	144,496	GPD	÷	1,440	Min/Day	=	100
Candee	84,304	GPD	÷	1,440	Min/Day	=	59

TOTAL	332,200	GPD	÷	1,440	Min/Day	=	230.69
			+	3000	GPM		3,230.69
							GPM

Hydraulic Calculations

Velocities and pressure loss in water pipes were calculated by Hazen-Williams Formula. The Hazen Williams formula is shown below. All three scenarios were analyzed and detailed below.

$$V=1.318C(D/4)^{0.000549}S^{0.549}, \text{ Where } S=h_f/L \text{ and } Q=V \pi^2 D^2/4$$

V=Flow Velocity (FPS)

C=Hazen Williams Coefficient, Use C=150

D=Diameter of Pipe

Q=Rate of Flow (GPM)

Maximum Flow	Pipe Diameter	Flow Velocity (FPS)	Unit Pressure Loss (psi)	Total Pressure Loss (psi)
Scenario 1:				
Points A & B or D & E Fire flow only, 3000 GPM fire flow is delivered to the site, distributed at two locations.				
3000/2 = 1500 GPM	8"	9.57	0.0128	0.77 (L=60')
At Point F: Total Demand = Fire flow of 1500 GPM plus domestic demand for The Vineyard, Costco, & Candee. Fire at the Vineyard.				
1500 GPM + 230.69 GPM = 1,730.69 GPM	12"	4.91	0.0025	2.96 (L=1,250')
Scenario 2:				
At Point F: Total Demand = Fire flow of 1500 GPM plus domestic demand for The Vineyard, Costco, & Candee. Fire at Candee.				
3000 GPM + 230.69 GPM = 3,230.69 GPM				
3,289.54 GPM	12"	9.16	0.0074	9.19 (L=1,250')
Scenario 3:				
Points G & H: Total demand = a fire flow of 3000 GPM divided by 2				
3000 /2 = 1500 GPM	8"	9.57	0.0128	0.77 (L=60')
Scenario 4:				
Points J & K: Total demand = a fire flow of 4000 GPM divided by 2				
4000 /2 = 2000 GPM	10"	8.17	0.0074	0.48 (L=66')
Point F: Total demand = a fire flow of 4000 GPM divided by 2 plus domestic for The Vineyard East & West, Candee and Costco				
2000 GPM + 230.69 GPM = 2,230.69 GPM	12"	6.33	0.0037	4.63(L=1250')

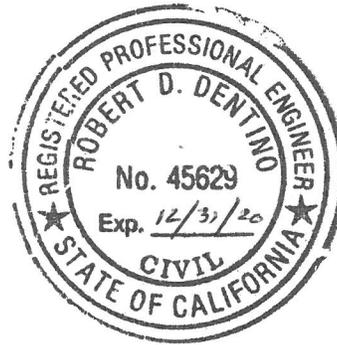
Summary

Calculations were performed under 4 scenarios assumed to be points where maximum flow would occur. Referring to Figure 1 and calculations on previous pages, Scenario 2, flow at Point F was found to be the greatest. With a fire flow of 3000 GPM and domestic demand of 230.69 gpm, or a total flow of 3,230.69 GPM, maximum velocities we found to be 9.33 FPS. Calculations indicate a pressure drop at point I to be 9.19 psi. From fire flow tests, assuming a residual pressure of 60 psi at point F and a pressure drop of 9.19 psi residual pressure at the very north end of the proposed 12" water line is calculated to be 50.8 psi. Scenarios 1, 3, & 4 examined fire flows only. With 8" laterals proposed, maximum flows of 1500 GPM yielded velocities of 9.57 FPS. While maximum velocities at relatively high, 9.57 FPS is well within acceptable levels for materials proposed. Scenario 4 analyzed flows in 10" laterals. Resulting calculations showed that with fire flows of 2000 GPM per service velocities of 8.17 FPS are anticipated. With a minimum requirement of 20 psi residual, the proposed 12" water main and 8" and 10" fire services will convey maximum day demand combined with fire flows.

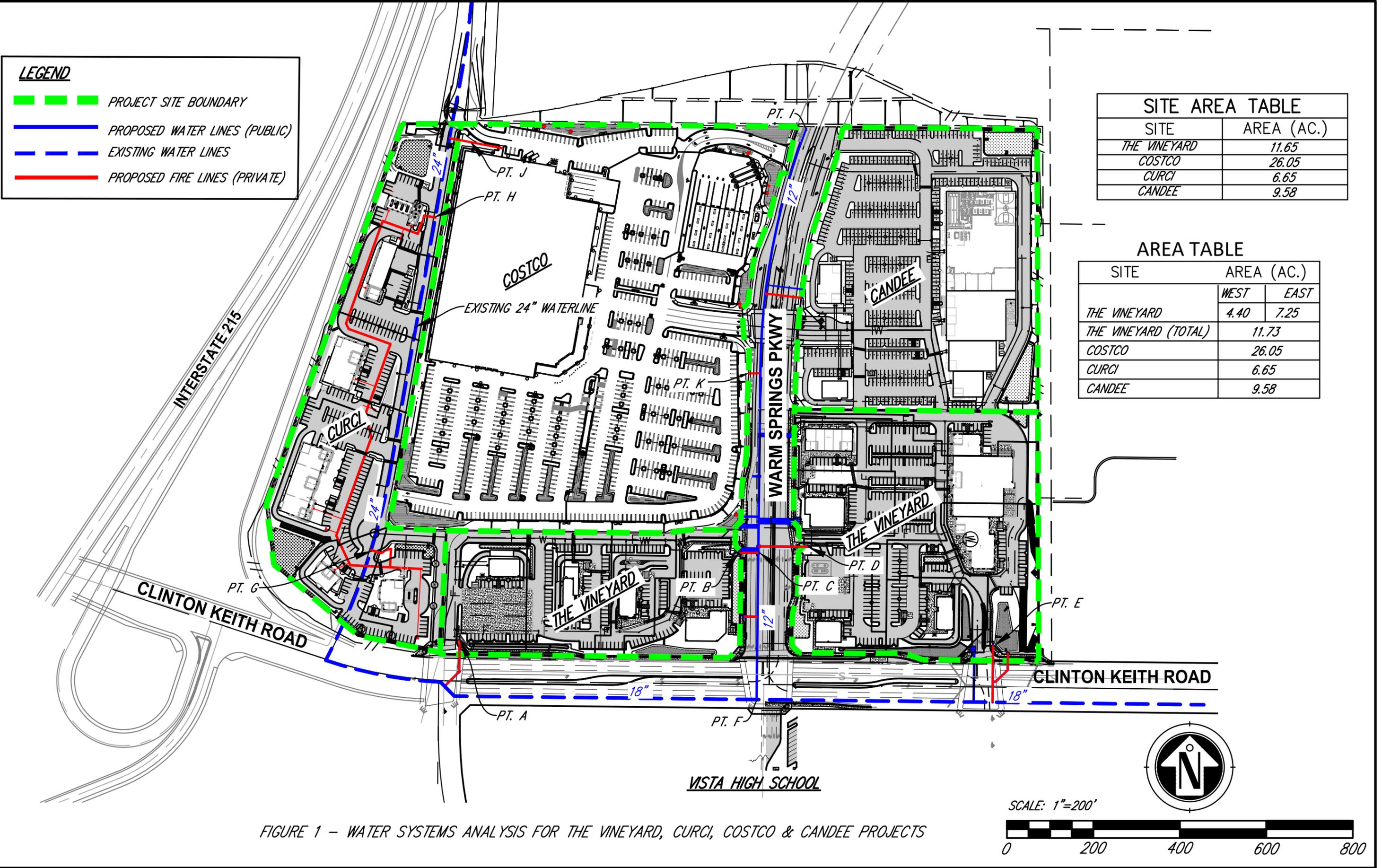
Prepared Under My Supervision


Robert D. Dentino RCE

4/03/20
Date



V:\16\16063\Documents\EMWD Plan of Service\Sewer Study\Costco, Curci, Candee\Current Sewer Water Study-8-9-2019\16-063-Water-Study-Exhibit.dwg 9/4/2019 5:06 PM ORIGINAL PLOT SIZE: PDF 11X17



SITE AREA TABLE	
SITE	AREA (AC.)
THE VINEYARD	11.65
COSTCO	26.05
CURCI	6.65
CANDEE	9.58

AREA TABLE		
SITE	AREA (AC.)	
	WEST	EAST
THE VINEYARD	4.40	7.25
THE VINEYARD (TOTAL)	11.73	
COSTCO	26.05	
CURCI	6.65	
CANDEE	9.58	

FIGURE 1 - WATER SYSTEMS ANALYSIS FOR THE VINEYARD, CURCI, COSTCO & CANDEE PROJECTS

SCALE: 1"=200'



COMPUTER MODEL TEST

Grid Number:	13A	Date:	12-6-2017
Customer Name:	CK 17 The Vineyards	Address:	41623 Margarita Road # 100
City, State Zip:	Temecula, CA 92591		
Contact Name:	Allan Davis		
Phone:	(951) 491-6309	Cell:	(760) 518-0660
Fax:		Email:	ADAVIS@RETAILDEVELOPMENTADVISORS.COM
Project Record Number:	WS20170001142	WO/CO:	WO 15777
Project Name:	The Vineyards	APN:	392-290-051
(Approximate) Test & Hydrant Location:	(1) 49 feet East of the intersection of Whitewood Rd. & Clinton Keith Rd. (2) 782 feet East of the intersection of Whitewood Rd. & Clinton Keith Rd.		

MODEL	NBD_EMWD_POTABLE_20170321_POS FF Diurnal_v1			
POC Test Location:	EMWD RESULTS		Requested	Flow Availability for Fire Department
	Fire Flow POC 1	Fire Flow POC 2	Requested	
Elevation (Ft):	1,520	1,516		
Steady State, Dynamic (psi):	72.50	74.29		
Residual Pressure (psi):	60	61.56		
Tested FF(gpm):	1,500	1,500		
Combined Total (gpm):	Fire Flow 3,000 / MDD 23 at POC 1 & 2		3,000	
Number of Hydrants:	Used 2 Test Nodes		2	
Duration Tested @:	3 Hour		3	
Demand Conditions:	Max Day			
Pressure Zone/Tank Name(s)/Level(s):	PZ 1698K Keller Tank I - Base Elevation 1660 Feet			
Pump Operating Status:	ON	Computer Model Setting	EPS	

Number of Points of connections (POC):	POC (Circle One)		Reason (Circle what Applies)				
	One	Two or More	Plan of Service	Limited Capacity (Existing Systems)	Supply Redundancy	Conditions of Approval	Fire Sprinkler Connection(s)

Comments: The water system is capable of providing 3,023 GPM for 3 hours at a minimum of 20 psi, as shown in the attached map. These Fire Flow test results may need to be complemented by a Plan of Service and do not include all facility conditioning that may be required for this project. Fire Flow Requirements or COA's were not provided, if any Fire Flow changes occur in the COA, you may need to resubmit another Fire Flow test at the requester's expense.

The above results are not a guarantee the District's system will supply water to the project at any specific flows or pressures. These results were determined from a computer simulation of the District's water system and/or from hydraulic calculations pertaining to distribution pipelines: The capacity of the service laterals, meters, backflow assemblies, on-site fire system, and other appurtenances were not considered in these results. The design and sizing of service laterals and downstream facilities shall be the responsibility of the Project Sponsor.

EMWD's Fire Flow test results are valid for 12 months from the date of testing.
RUDY ESPARZA

Completed By: _____

Should you have any questions or need additional information, please contact me at (951) 928-3777, ext. 4478.

Sincerely, RE

Rudy Esparza
Sr. Engineering Technician
New Business Development

Date: 12-6-2017

Reviewed By: EC

Date: 12/6/17

The Vineyard
TR 36493
APN 392-290-051
WS2017-1142

POC 1 Fire Flow Test Node Location
Existing 18" Waterline

POC 2 Fire Flow Test Node Location
Existing 18" Waterline

POC 3 Test Node Location
Existing 18" Waterline

PIQ

Existing Standard Hydrant

Existing Super Hydrant

Existing Standard Hydrant



Created Date: 9/3/2010

EMWD New Business and Development

Hydraulic Boundary Conditions, In The Main Water Pipeline⁽⁶⁾⁽⁷⁾, Based on Hydraulic Model Results



Project Name: THE VINYARD WS2017-1142
Pressure Zone: 1698K
Model Version (12)POS 20170321 POS FF Diurnal v1

ADD (GPM): 11
FFD (GPM): 1,500
Duration (Hours): 3

POC Location: POC-1 Elevation (ft): 1,520.0 APN / TR: / WO 392-290-051 TR 36493 WO 15777 (See Attached Exhibit)			Project Demands ⁽²⁾⁽³⁾⁽¹¹⁾ (gpm)		Existing system (With No Improvements)		Existing system (With Improvements) ⁽¹⁾	
Operational Demand	Modeling Scenario (12)	Operational Conditions:	Project's Domestic Water Demands ⁽²⁾⁽³⁾⁽¹¹⁾ (gpm)	Fire Flow Demand ⁽⁴⁾ (gpm)	HGL (ft)	Pressure (psi)	HGL (ft)	Pressure (psi)
		EPS, MDD, Pumps On (8)	MDD	23		1,687	73	
	EPS, MDD, Pumps On (8)	PHD	45		1,659	60		
	EPS, ADD, Pumps On (8)	MHD						
Fire Flow Demand		FFD + MDD						
	EPS, MDD, Pumps On (8)	FFD + MDD	23	1,500	1,659	60		

Footnotes (see page 2 for additional footnotes):
 (1) If improvements are required, please describe the improvements here:

Minimum Pressure Criteria:	
50 PSI	...under PHD, MDD, and MHD
20 PSI	...under MDD + FFD

Minimum Criteria, Velocities in Pipelines:
 Equal to or less than 5 fps: ...for MDD
 Equal to or less than 10 fps: ...for PHD
 Equal to or less than 15 fps: ...for FF + MDD

	Adequate?	Comments:
Available Firm Pumping Capacity:	YES	
Available Firm Pumping Capacity, w/ Electrical Outage :	YES	
Available Storage Capacity:	YES	

Additional Comments:

Prepared by: Rudy Esparza
 Date: 12/6/2017

Reviewed by: *GC*
 Date: 12/6/17

Hydraulic Boundary Conditions, In The Main Water Pipeline⁽⁶⁾⁽⁷⁾, Based on Hydraulic Model Results

Project Name: THE VINYARD WS2017-1142	ADD (GPM): 11	
Pressure Zone: 1698K	FFD (GPM): 1,500	
Model Version (12)POS 20170321 POS FF Diurnal v1	Duration (Hours): 3	

Acronyms:

ADD: Average Day Demand, in GPM	GPM: Gallons Per Minute	PHD: Peak-Hour Demand, in GPM
EPS: Extended Period Simulation	HGL: Hydraulic Grade-Line, in feet	POC: Point Of Connection
FFD⁽³⁾: Fire Flow Demand, in GPM	MDD: Maximum Day Demand, in GPM	PSI: Pounds Per Inch
FPS: Feet per second	MHD: Minimum Hour Demand, in GPM	SSS: Steady State Simulation

Footnotes (Ct'd):

- (2) Project Demands include ADD of the proposed project, peaked for each test scenario, in accordance with the latest EMWD Water Master Plan Design Criteria
- (3) Domestic water demands from existing services are already included in the Model
- (4) This is NOT a Fire Flow Test Report: The customer shall verify with the Fire Marshall if a separate Fire Flow Test Report/Letter is required for Jurisdictional Project approval.
- (5) All required storage and pumping shall be evaluated in a POS report, per the latest EMWD Master Plan Design Criteria
- (6) Applicants, or their designees, shall design service laterals, commencing from the point of connection(s) in EMWD's main pipeline(s), including main extension(s), lateral(s), meter(s), and all post-meter appurtenances, taking into consideration resulting head losses, pad elevations, and building height, such that the pressure delivered to each floor level and service is adequate to meet jurisdictional requirements.
- (7) In addition to design requirements, operational minimum and maximum pressures are used to identify and record Service Agreements for Low and High pressure conditions in Residential use. Commercial, Institutional, and Industrial uses do not require low and high pressure recordation.
- (8) Storage tanks: Initial levels set at 75% full in EPS
- (9) Storage tanks: Initial levels set at 50% full in SSS, Pumps Off
- (10) Storage tanks: Initial levels set at 50% full in SSS, Pumps On
- (11) Existing demands are based on COINS data, calendar-year 2013
- (12) For EPS modeling, use file name: *NBD_EPS_EMWD_POTABLE_2308_WYA20151019.mxd*

Hydraulic Boundary Conditions, In The Main Water Pipeline⁽⁶⁾⁽⁷⁾, Based on Hydraulic Model Results

Project Name: THE VINYARD WS2017-1142	ADD (GPM): 11
Pressure Zone: 1698K	FFD (GPM): 1,500
Model Version (12)POS 20170321 POS FF Diurnal v1	Duration (Hours): 3



Acronyms:

ADD: Average Day Demand, in GPM	GPM: Gallons Per Minute	PHD: Peak-Hour Demand, in GPM
EPS: Extended Period Simulation	HGL: Hydraulic Grade-Line, in feet	POC: Point Of Connection
FFD⁽³⁾: Fire Flow Demand, in GPM	MDD: Maximum Day Demand, in GPM	PSI: Pounds Per Inch
FPS: Feet per second	MHD: Minimum Hour Demand, in GPM	SSS: Steady State Simulation

Footnotes (Ct'd):

- (2) Project Demands include ADD of the proposed project, peaked for each test scenario, in accordance with the latest EMWD Water Master Plan Design Criteria
- (3) Domestic water demands from existing services are already included in the Model
- (4) This is NOT a Fire Flow Test Report: The customer shall verify with the Fire Marshall if a separate Fire Flow Test Report/Letter is required for Jurisdictional Project approval.
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- (10) Storage tanks: Initial levels set at 50% full in SSS, Pumps On
- (11) Existing demands are based on COINS data, calendar-year 2013
- (12) For EPS modeling, use file name: *NBD_EPS_EMWD_POTABLE_2308_WYA20151019.mxd*

Hydraulic Boundary Conditions, In The Main Water Pipeline⁽⁶⁾⁽⁷⁾, Based on Hydraulic Model Results

Project Name: THE VINYARD WS2017-1142	ADD (GPM): 11
Pressure Zone: 1698K	FFD (GPM): 1,500
Model Version (12)POS 20170321 POS FF Diurnal v1	Duration (Hours): 3



Acronyms:

ADD: Average Day Demand, in GPM	GPM: Gallons Per Minute	PHD: Peak-Hour Demand, in GPM
EPS: Extended Period Simulation	HGL: Hydraulic Grade-Line, in feet	POC: Point Of Connection
FFD⁽³⁾: Fire Flow Demand, in GPM	MDD: Maximum Day Demand, in GPM	PSI: Pounds Per Inch
FPS: Feet per second	MHD: Minimum Hour Demand, in GPM	SSS: Steady State Simulation

Footnotes (Ct'd):

- (2) Project Demands include ADD of the proposed project, peaked for each test scenario, in accordance with the latest EMWD Water Master Plan Design Criteria
- (3) Domestic water demands from existing services are already included in the Model
- (4) This is NOT a Fire Flow Test Report: The customer shall verify with the Fire Marshall if a separate Fire Flow Test Report/Letter is required for Jurisdictional Project approval.
- (5) All required storage and pumping shall be evaluated in a POS report, per the latest EMWD Master Plan Design Criteria
- (6) Applicants, or their designees, shall design service laterals, commencing from the point of connection(s) in EMWD's main pipeline(s), including main extension(s), lateral(s), meter(s), and all post-meter appurtenances, taking into consideration resulting head losses, pad elevations, and building height, such that the pressure delivered to each floor level and service is adequate to meet jurisdictional requirements.
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- (8) Storage tanks: Initial levels set at 75% full in EPS
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- (10) Storage tanks: Initial levels set at 50% full in SSS, Pumps On
- (11) Existing demands are based on COINS data, calendar-year 2013
- (12) For EPS modeling, use file name: *NBD_EPS_EMWD_POTABLE_2308_WYA20151019.mxd*



COMPUTER MODEL TEST

Grid Number:	13A	Date:	June 19, 2019			
Customer Name:	Jim Madden	Address:	11770 Bernardo Plaza Ct; #116			
City, State Zip:	San Diego, CA 92128					
Contact Name:						
Phone:	619-488-9810	Cell:	858-735-1086			
Fax:		Email:	jmadden@jensenhughes.com			
Project Record Number:	WS 2019-625	WO/CO:	WO N/A			
Project Name:	Costco Wholesale	APN:	392-290-028			
(Approximate) Test & Hydrant Location:	POC1 - located at the northwest corner of PIQ POC2 - about 425 ft north of Clinton Keith and Antelope Road intersection Fire Hydrant - about 100 ft south of PIQ's south parcel line; PIQ: Murrieta, CA					
MODEL	NBD_EMWD_POTABLE_20170321_POS FF Diurnal_v2					
POC Test Location:	EMWD RESULTS			Requested	Flow Availability for Fire Department	
	POC1	POC2	Fire Hydrant	Requested		
Elevation*:	1544.0	1550.0	1519.0			
Steady State, Dynamic (psi):	64.9	69.1	75.7			
Residual Pressure (psi):	54.3	58.4	63.7			
Tested FF (gpm):	2000.0	2000.0	4000.0			
Combined Total (gpm):	MDD 12 gpm** plus 4000 gpm fire flow			4012		
Number of Hydrants:	POC1 & POC2 tested simult., FH tested independently			2 POC's, 1 FH		
Duration Tested @:	4 hours			4		
Demand Conditions:	Max Day					
Pressure Zone/Tank Name(s)/Level(s):	1698K	/	Keller Tank I	/	Base Elevation 1660.0 ft	
Pump Operating Status:	ON		Computer Model Setting:	EPS		
Number of Points of connections (POC):	POC (Circle One)		Reason (Circle what Applies)			
	One	Two or More	Plan of Service	Limited Capacity (Existing System)	Supply Redundancy	Conditions of Approval
Comments:	The water system is capable of providing 4012 GPM for 4 hours at a minimum of 20 psi, as shown in the attached map. These Fire Flow test results may need to be complemented by a Plan of Service and do not include all facility conditioning that may be required for this project. Fire Agency Conditions were provided (dated 05/24/19), if any Fire Flow changes occur in the Fire Agency Conditions, you may need to resubmit another Fire Flow test at the requester's expense.					

The above results are not a guarantee the District's system will supply water to the project at any specific flows or pressures. These results were determined from a computer simulation of the District's water system and/or from hydraulic calculations pertaining to distribution pipelines: The capacity of the service laterals, meters, backflow assemblies, on-site fire system, and other appurtenances were not considered in these results. The design and sizing of service laterals and downstream facilities shall be the responsibility of the Project Sponsor.

EMWD's Fire Flow test results are valid for twelve months from the date of testing.

Completed By: Kris Danielson

Should you have any questions or need additional information, please contact me at (951) 928-3777, ext. 4478.

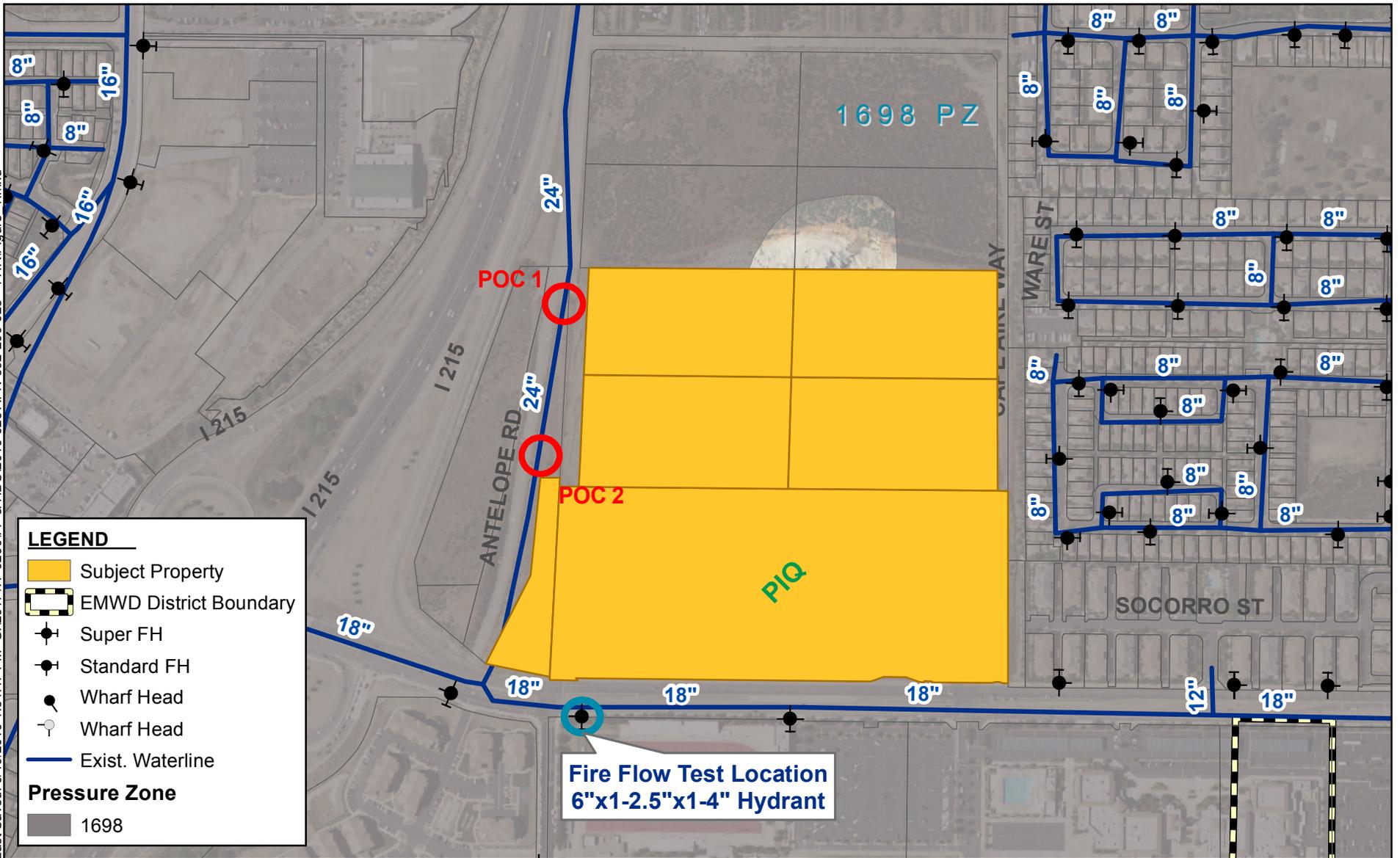
Sincerely, *Kristy Danielson* Date: 6/19/2019

Rudy Esparza
Sr. Engineering Technician
New Business Development

Reviewed By: *RE* Date: 6-25-2019

* Elevation based on Riverside County Flood Control digital data.
 ** Assumed 3.8 ac (average day demand = 2200 gpd/ac, Max Day Demand (MDD) is 2 times average day).

Last Saved: 6/19/2019 1:51:47 PM G:\2017\17-0299\FF & HBC\2019-625\APN 392-290-028 4 HR\Figure 1.mxd



Sources: EMWD, 2017; Riverside Co. GIS, 2018; USDA NAIP, 2016.



0 500 1,000 Feet



FIGURE 1
COSTCO WHOLESALE
FIRE FLOW TEST

