

TECHNICAL MEMORANDUM

Water Service Exploration
Redwood Valley School
Redwood Valley, California
APN 163-060-15

Date: January 17, 2019
Project No.: 7097.24

Prepared For: Ukiah Unified School District

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Attachments: Appendix 1: Figure 1
Appendix 2: Uniform Plumbing Code Tables

1.0 INTRODUCTION

This report presents the analysis of a water service exploration performed by LACO Associates (LACO), to support the feasibility of a residential development on former Redwood Valley School in Redwood Valley, California. The site is on an approximately 8.97-acre parcel property west of the intersection of East School Way and East Road, within the County of Mendocino. The site is located on APN 180-080-28; its location in relation to adjacent streets and landmarks is shown on Figure 1 – Site Map as presented in Appendix 1.

LACO's scope of services was limited to Receiving flow and pressure tests from Redwood Valley County Water District on the existing water service, and performing the necessary engineering and geologic evaluations to develop an analysis regarding the following:

- Existing water supply
- Estimates of water supply fixture units (WSFU);
- Estimates of residential units
- Review and estimate of Existing Well Production

The results are summarized in this report.

2.0 EXPLORATION

LACO explored existing water service conditions and found two public water main lines (domestic and irrigation) and an existing Well, approximately shown in Figure 1 of Appendix 1. The irrigation main is 10-inches, and the domestic main is 8-inches. The 8-inch domestic main serves a 2-inch water meter for domestic supply at the Redwood Valley School site. While the 10-inch irrigation main serves a 2-inch water meter for irrigation supply. There were no records available for the existing well, therefore we have excluded the well from this evaluation until further testing can be performed.

Analysis was performed on the 2-inch domestic water meter including the feasibility of the meter supplying domestic water to residential units at the Redwood Valley School site. As a result of Redwood Valley County Water District being currently under moratorium on new residential connections, we evaluated the feasibility of service to the site from the existing 2" water connection.

The uniform plumbing code was used to estimate the approximate number units by estimating the number of fixtures in a typical unit.

2.1 Water Supply Fixture Units (WSFU) and Residential Units

Using Table 6-4 from the Uniform Plumbing Code "Water Supply Fixture Units (WSFU) and Minimum Fixture Pipe Sizes", a WSFU was calculated (see Appendix 2). Three apartment sizes were analyzed using a list of appliances, appurtenances and fixtures expected to be in each unit, see Table 1 below:

Table 1. Summary of WSFU Calculations per Apartment

Appliances, Appurtenances or Fixtures	Minimum Fixture Branch Pipe Size	1 bd, 1 ba (WSFU)	2 bd, 1 ba (WSFU)	3 bd, 2 ba (WSFU)
Bathtub or Combination Bath/Shower (fill)	½"	4.0	4.0	8.0
Clothes Washer	½"	4.0	4.0	4.0
Dishwasher, domestic	½"	1.5	1.5	1.5
Lavatory	½"	1.0	1.0	2.0
Kitchen, domestic	½"	1.5	1.5	1.5
Water Closet, 1.6 GPF Gravity Tank	½"	2.5	2.5	5.0
Total WSFU		14.5	14.5	22.0

The number of Water Supply Fixture Units lead to the number residential units using Table 6-5 Fixture Unit Table for Determining Water Pipe and Meter Sizes from the Uniform Plumbing Code (see Appendix 2). Assuming a meter and street service of 2 inches and a building supply and branches of 2 ½ inches at a maximum allowable length of 600 feet, the number of residential units was calculated and tabulated below in Table 2:

Table 2. Summary of Residential Units Calculations based on Pressure Range

Apartment Type	Fixture Units	WSFU	Residential Units (Fixture Units/WSFU)
Pressure Range: 30 to 45 psi			
1 bedroom, 1 bath	198	14.5	13 units
2 bedroom, 1 bath	198	14.5	13 units
3 bedroom, 2 bath	198	22.0	9 units
Pressure Range: 46 to 60 psi			
1 bedroom, 1 bath	335	14.5	23 units
2 bedroom, 1 bath	335	14.5	23 units
3 bedroom, 2 bath	335	22.0	15 units
Pressure Range: Over 60 psi			
1 bedroom, 1 bath	430	14.5	29 units
2 bedroom, 1 bath	430	14.5	29 units
3 bedroom, 2 bath	430	22.0	19 units




3.0 CONCLUSION

As presented in Table 2, the maximum and minimum number of possible units assuming all to be 1 or 2-bedroom, 1-bath is 29 and 13 respectively. The maximum and minimum number of units assuming all to be 3-bedroom, 2-baths is 19 and 9 respectively. Results are based on system pressure ranges as presented in Table 6-5 Fixture Unit Table for Determining Water Pipe and Meter Sizes (Appendix 2). All units will be served by the existing 2" water service. A new fire service line will also be proposed, however this will connect to the 10" irrigation line and will not require a new water meter.

APPENDIX 1

Figure 1: Site Map

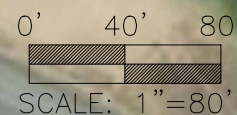
LEGEND

-  1% ANNUAL CHANCE FLOOD HAZARD
-  0.2% ANNUAL CHANCE FLOOD HAZARD
-  REGULATORY FLOODWAY



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APPENDIX 2

Uniform Plumbing Code

(Tables 6-4 and 6-5)

2 bdr 1 ba
Apartment

TABLE 6-4

Water Supply Fixture Units (WSFU) and Minimum Fixture Branch Pipe Sizes¹

Inch	mm
1/2	15
3/4	20
1	25

Appliances, Appurtenances or Fixtures ²	Minimum Fixture Branch Pipe Size ^{3,4}	Private	Public	Assembly ⁶
Bathtub or Combination Bath/Shower (fill)	1/2"	4.0	4.0	
3/4" Bathtub Fill Valve	3/4"	10.0	10.0	
Bidet	1/2"	1.0		
Clothes washer	1/2"	4.0	4.0	
Dental Unit, cuspidor	1/2"		1.0	
Dishwasher, domestic	1/2"	1.5	1.5	
Drinking Fountain or Watercooler	1/2"	0.5	0.5	0.75
Hose Bibb	1/2"	2.5	2.5	
Hose Bibb, each additional ⁸	1/2"	1.0	1.0	
Lavatory	1/2"	1.0	1.0	1.0
Lawn Sprinkler, each head ⁵		1.0	1.0	
Mobile Home, each (minimum)		12.0		
Sinks				
Bar	1/2"	1.0	2.0	
Clinic Faucet	1/2"		3.0	
Clinic Flushometer Valve				
with or without faucet	1"		8.0	
Kitchen, domestic	1/2"	1.5	1.5	
Laundry	1/2"	1.5	1.5	
Service or Mop Basin	1/2"	1.5	3.0	
Washup, each set of faucets	1/2"		2.0	
Shower, per head	1/2"	2.0	2.0	
Urinal, 1.0 GPF Flushometer Valve	3/4"	See Footnote 7		
Urinal, greater than 1.0 GPF Flushometer Valve	3/4"	See Footnote 7		
Urinal, flush tank	1/2"	2.0	2.0	3.0
Washfountain, circular spray	3/4"		4.0	
Water Closet, 1.6 GPF Gravity Tank	1/2"	2.5	2.5	3.5
Water Closet, 1.6 GPF Flushometer Tank	1/2"	2.5	2.5	3.5
Water Closet, 1.6 GPF Flushometer Valve	1"	See Footnote 7		
Water Closet, greater than 1.6 GPF Gravity Tank	1/2"	3.0	5.5	7.0
Water Closet, greater than 1.6 GPF Flushometer Valve	1"	See Footnote 7		

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 may be sized by reference to fixtures having a similar flow rate and frequency of use.
- ³ The listed fixture unit values represent their load on their cold water service. The separate cold water and hot water fixture unit value for fixtures having both hot and cold water connections may each be taken as three-quarter (3/4) 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) and add it separately to the demand (in GPM) for the distribution system or portions thereof.
- ⁶ Assembly [Public Use (See Table 4-1)].
- ⁷ When sizing flushometer systems see Section 610.10.
- ⁸ Reduced fixture unit loading for additional hose bibbs as used is to be used only when sizing total building demand and for pipe sizing when more than one hose bibb is supplied by a segment of water distributing pipe. The fixture branch to each hose bibb shall be sized on the basis of 2.5 fixture units.

14.5 WSFU

TABLE 6-5
Fixture Unit Table for Determining Water Pipe and Meter Sizes

Inch	mm
1/2	15
3/4	20
1	25
1-1/4	32
1-1/2	40
2	50
2-1/2	65

Pressure Range – 30 to 45 psi (207 to 310 kPa)**

Meter and Street Service, Inches	Building Supply and Branches, Inches	Maximum Allowable Length in Feet (meters)														
		40 (12)	60 (18)	80 (24)	100 (30)	150 (46)	200 (61)	250 (76)	300 (91)	400 (122)	500 (152)	600 (183)	700 (213)	800 (244)	900 (274)	1000 (305)
3/4	1/2***	6	5	4	3	2	1	1	1	0	0	0	0	0	0	0
3/4	3/4	16	16	14	12	9	6	5	5	4	4	3	2	2	2	1
3/4	1	29	25	23	21	17	15	13	12	10	8	6	6	6	6	6
1	1	36	31	27	25	20	17	15	13	12	10	8	6	6	6	6
3/4	1-1/4	36	33	31	28	24	23	21	19	17	16	13	12	12	11	11
1	1-1/4	54	47	42	38	32	28	25	23	19	17	14	12	12	11	11
1-1/2	1-1/4	78	68	57	48	38	32	28	25	21	18	15	12	12	11	11
1	1-1/2	85	84	79	65	56	48	43	38	32	28	26	22	21	20	20
1-1/2	1-1/2	150	124	105	91	70	57	49	45	36	31	26	23	21	20	20
2	1-1/2	151	129	129	110	80	64	53	46	38	32	27	23	21	20	20
1	2	85	85	85	85	85	85	82	80	66	61	57	52	49	46	43
1-1/2	2	220	205	190	176	155	138	127	120	104	85	70	61	57	54	51
2	2	370	327	292	265	217	185	164	147	124	96	70	61	57	54	51
2	2-1/2	445	418	390	370	330	300	280	265	240	220	198	175	158	143	133

Pressure Range – 46 to 60 psi (317 to 414 kPa)**

3/4	1/2***	7	7	6	5	4	3	2	2	1	1	1	0	0	0	0
3/4	3/4	20	20	19	17	14	11	9	8	6	5	4	4	3	3	3
3/4	1	39	39	36	33	28	23	21	19	17	14	12	10	9	8	8
1	1	39	39	39	36	30	25	23	20	18	15	12	10	9	8	8
3/4	1-1/4	39	39	39	39	39	39	34	32	27	25	22	19	19	17	16
1	1-1/4	78	78	76	67	52	44	39	36	30	27	24	20	19	17	16
1-1/2	1-1/4	78	78	78	78	66	52	44	39	33	29	24	20	19	17	16
1	1-1/2	85	85	85	85	85	85	80	67	55	49	41	37	34	32	30
1-1/2	1-1/2	151	151	151	151	128	105	90	78	62	52	42	38	35	32	30
2	1-1/2	151	151	151	151	150	117	98	84	67	55	42	38	35	32	30
1	2	85	85	85	85	85	85	85	85	85	85	85	85	85	83	80
1-1/2	2	370	370	340	318	272	240	220	198	170	150	135	123	110	102	94
2	2	370	370	370	370	368	318	280	250	205	165	142	123	110	102	94
2	2-1/2	654	640	610	580	535	500	470	440	400	365	335	315	285	267	250

250 / 14.5 = 17.24 17 UNITS

Pressure Range – Over 60 psi (414 kPa)**

3/4	1/2***	7	7	7	6	5	4	3	3	2	1	1	1	1	1	0
3/4	3/4	20	20	20	20	17	13	11	10	8	7	6	6	5	4	4
3/4	1	39	39	39	39	35	30	27	24	21	17	14	13	12	12	11
1	1	39	39	39	39	38	32	29	26	22	18	14	13	12	12	11
3/4	1-1/4	39	39	39	39	39	39	39	39	34	28	26	25	23	22	21
1	1-1/4	78	78	78	78	74	62	53	47	39	31	26	25	23	22	21
1-1/2	1-1/4	78	78	78	78	78	74	65	54	43	34	26	25	23	22	21
1	1-1/2	85	85	85	85	85	85	85	85	81	64	51	48	46	43	40
1-1/2	1-1/2	151	151	151	151	151	151	130	113	88	73	51	51	46	43	40
2	1-1/2	151	151	151	151	151	151	142	122	98	82	64	51	46	43	40
1	2	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
1-1/2	2	370	370	370	370	360	335	305	282	244	212	187	172	153	141	129
2	2	370	370	370	370	370	370	370	340	288	245	204	172	153	141	129
2	2-1/2	654	654	654	654	654	650	610	570	510	460	430	404	380	356	329

**Available static pressure after head loss.

***Building supply, three-quarter (3/4) inch (20 mm) nominal size minimum.