PRELIMINARY WATER STUDY
FOR
RANCHO MURIETA NORTH

Ranch Murieta, California

July 2018

Prepared by:

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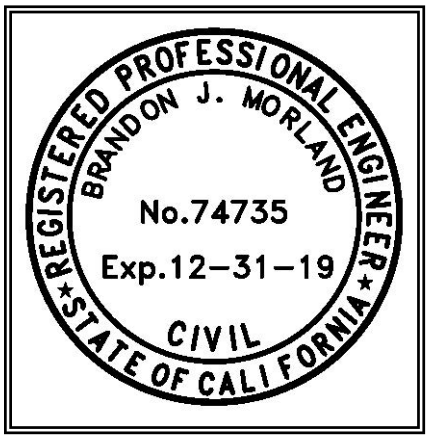

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I. Background/Purpose

The Rancho Murieta North development encompasses multiple tentative maps located within the rural community of Rancho Murieta, which is in the eastern portion of Sacramento County on Highway 16. Figure 1 below gives a general overview of the existing developments and show the locations of two water storage tanks and the water treatment plant. The water supply facilities for Rancho Murieta include three reservoirs: Calero Reservoir (2,572 acre-feet), Chesbro Reservoir (1,194 acre-feet) are the main water supply reservoirs and Clementia Reservoir (957 acre-feet) which may be used in severe drought conditions. Raw water is brought through an intake system located at the Granlees Dam and diversion structure located on the Cosumnes River. The water is conveyed to Calero Reservoir and then diverted to Chesbro Reservoir and if needed, Clementia Reservoirs via a pipe system. The existing water treatment plant (3.5 Mgd capacity) is located between Chesbro and Clementia Reservoirs, as shown in Figure 1. The water treatment plant has undergone its phase three expansion to increase capacity in December of 2015.

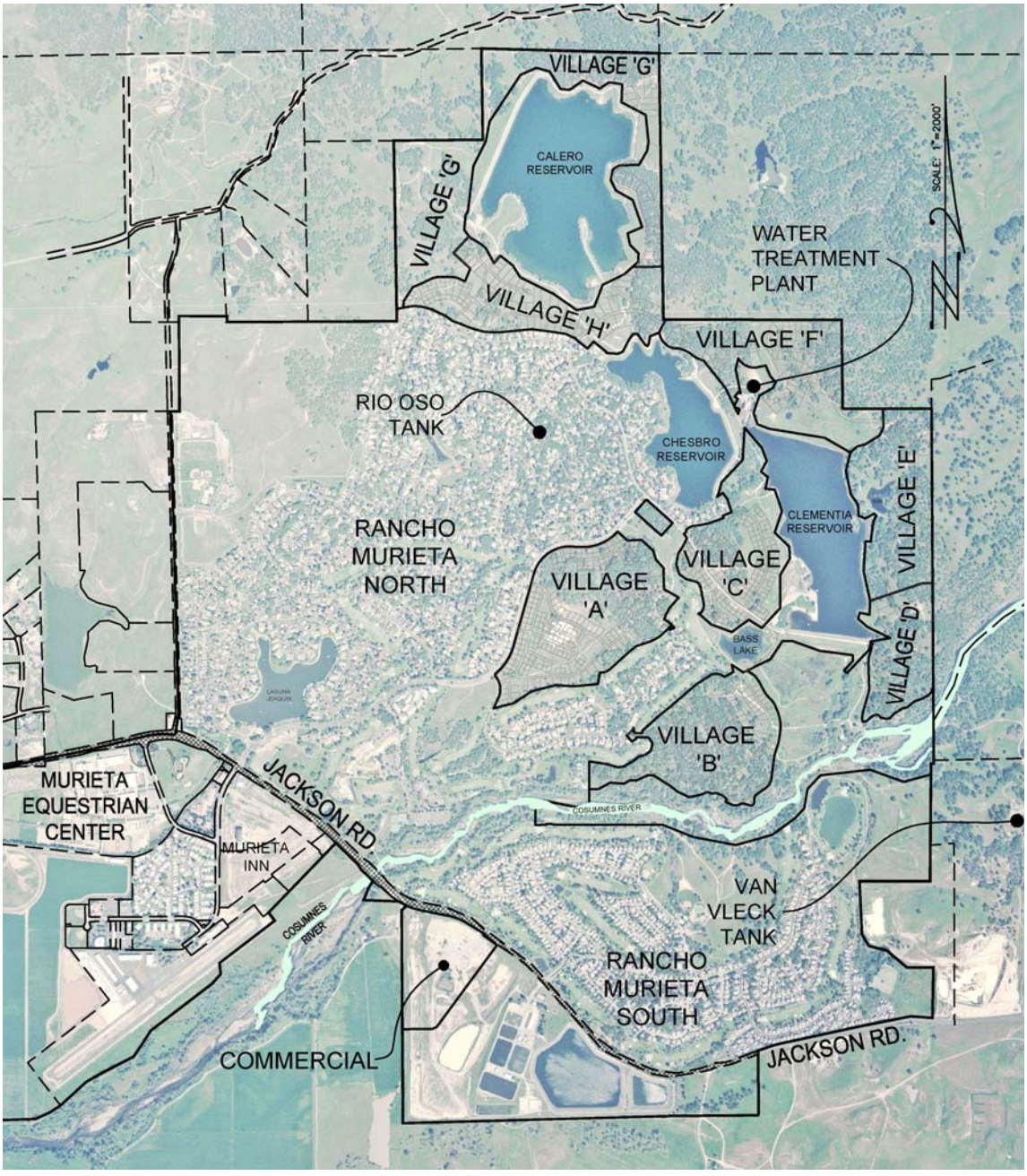

Figure 1 - Project Location

The purpose of this report is to analyze the existing and proposed water system infrastructure for the ultimate build out condition within the RMCSD service area and to provide recommendations in order to construct the various Rancho Murieta North Villages. The existing and proposed water systems will be analyzed to ensure there is sufficient water system capacity to serve the existing and proposed developments and meet the design criteria specified by Rancho Murieta Community Service District (RMCSD) and the Rancho Murieta North Infrastructure Master Plan (Master Plan) performed by MacKay & Somps, dated August 2003. This report will not focus on the current or future capacities of the reservoirs or tanks, Water Augmentation or the current and future capacity of the water treatment plant. A Water Supply Assessment for the Rancho Murieta North project has been completed by Maddaus Water Management, Inc.

II. Existing\Proposed Development

The existing metered services in the RMCSD service area is 2,615 (2,319 residential services and 296 commercial services) according to the Murieta Gardens I & II Environmental Impact Report (MG-EIR). These existing services encompass the following existing developments:

- Rancho Murieta South unit 1-9 (South)
- Crest (South)
- Greens (South)
- Rancho Murieta North Unit 1
- Rancho Murieta North Unit 2
- Rancho Murieta North Unit 3
- Rancho Murieta North Unit 4
- Rancho Murieta North Unit 6
- Murieta Village Mobile Home Park
- Rancho Murieta Business Center
- Rancho Murieta Equestrian Center

The currently entitled residential and commercial developments that account for approximately 1,020 Equivalent dwelling units (EDUs) are as follows

- Riverview (South) (140 Lots)
- Lakeview (South) (99 Lots)
- Murieta Gardens I (50 EDUs)
- Murieta Inn & Extended Stay (30 EDUs)
- Murieta Gardens II (78 EDUs)
- Murieta Self Storage (1 EDU)
- The Residences at Murieta Hills East & West (198 EDUs)
- The Retreats West, East & North (84 EDUs)
- Murieta Apartments (Proposed 340 EDUs)

See the Rancho Murieta Development Map in Appendix A.

The proposed Rancho Murieta North development consists of eight residential villages (Villages A through H) and a 39-acre commercial development will add 795 lots plus 50 commercial EDUs' totaling 845 EDU's. The 1,020 entitled lots plus the Rancho Murieta North 845 lots/EDU's totals 1,865 EDU's. Added to the existing 2,615 EDU's brings the total EDU count for modeling purposes to 4,480 EDU's.

III. Analysis of Water System Under Static Conditions

Rancho Murieta Community Service District (RMCSD) is the water purveyor for this community. The water supply system is derived from three local reservoirs, Calero, Chesbro and Clementia. These reservoirs have a combined usable normal storage of about 4,300 acre-feet. The water treatment plant (WTP) is located just north of Clementia Reservoir and serves two

water storage tanks: the southeasterly Van Vleck Tank (3.0 million gallon capacity) and the north Rio Oso Tank (1.2 million gallon capacity) (refer to Figure 1). The Van Vleck Tank operates as a gravity source for the developments on both the north and south side of the Cosumnes River . The Rio Oso tank serves mostly as a source for the pressurized hydroneumatic water system at the northerly limits of the community, yet also serves as a supplemental source to the gravity system as needed if the gravity system drops below a designated pressure. (refer to 2015 Water Master Plan in Appendix E). For the purposes of this report, the gravity system and the hydroneumatic system are modeled separately.

To analyze each system we estimated proposed pipe sizes and had to create a model by collecting data on the water system from various plans and records provided by RMCSD and overlaying that information on Sacramento County's LIDAR (NAVD 88 datum) topographic maps (refer to the Gravity System Map in Appendix B and the Hydroneumatic System Map in Appendix I). The data was then entered into Civil CAD's hydraulic analysis program, which utilizes Hazen-Williams formulas for water distribution systems.

In the RMCSD 2020 Compliance Plan performed by Brown and Caldwell, the demand of each lot is adjusted by conversion factor based on lot size and type. Table 1 below shows the EDU conversions.

Lot Size/Class	EDU Conversion Factor
Estate > 12,000 sf	1.0
Estate < 12,000 sf	0.9
Circle	0.7
Cottage	0.7
Halfplex	0.5
Townhouse	0.5
Murieta Mobile Village	0.3

Table 1: EDU Conversions

For the purpose of this report and modeling both existing and proposed lots shall have a 1.0 EDU designation for simplicity and added conservative design.

RMCSD Design Criteria

The average demand for a dwelling unit is 750 gallons per day (gpd), which translates to approximately 0.52 gallons per minute (gpm). The system is required to handle the maximum day demand, which is the average demand multiplied by a peaking factor of 2.1 (0.52gpm*2.1=1.09gpm) without falling under a pressure of 30 pounds per square inch (psi) anywhere in the system. The State of California has adopted a mandate that requires all water purveyors to reduce their water uses 20% by the year 2020. For the purpose of this report the maximum day demand for all dwelling units (existing and proposed) will reflect this reduction (1.09gpm*0.80=0.87gpm). For the purpose of this report and simplicity of modeling 1 gpm will be used.

Gravity System Assumptions

The hydraulic grade line (HGL) for the gravity system at the Van Vleck Tank is set at an elevation of 330.0 feet (NAVD 88 datum) according to the Rancho Murieta South Water Improvement Plans provided by RMCSD. The Rio Oso Tank being a hybrid source does not have a set HGL that could be reliable for the gravity system. In order to simplify the model we have conservatively assumed that the HGL for the Rio Oso Tank is at an elevation of 305.0 feet which would be approximately five feet above tank bottom. These two gravity sources interconnect at the intersection of Murieta Parkway and Alameda Drive. The system static map can be viewed in Appendix B.

The gravity system will be analyzed under three different scenarios:

1. Existing Development
2. Existing Development along with all entitled future development
3. Ultimate Build Out Condition

Hydroneumatic System Assumptions

The Master Plan by MacKay & Somps shows that the Rio Oso Tank is the only source for the hydroneumatic system. The system is pressurized by a pump system that supplies 60psi to 80psi. For the purpose of this report the lower limit of 60psi will be used as the conservative limit in establishing the HGL starting point. With the tank bottom elevation of 300 feet and the 60psi boundary pressure yields a starting HGL elevation of 438.6 feet, which matches the Master Plan. The hydroneumatic system map can be viewed in Appendix I.

The hydroneumatic system will be analyzed under three different scenarios

1. Existing Development
2. Existing Development along with all entitled future development
3. Existing and entitled development with Village A as a stand alone
4. Existing and entitled development with Village B as a stand alone
5. Existing and entitled development with Village C as a stand alone
6. Existing and entitled development with Village H as a stand alone
7. Ultimate Build Out Condition

Village B is proposed to be served with the hydroneumatic system yet those lots below the 222 elevation (NAVD 88 datum) would require individual pressure reducers.

IV. Divergence for the 2003 Master Plan

There are portions of Unit 6 that have historically experience water pressure complaints. The 2003 Master Plan called out for the disconnection of the existing 14 & 16 inch lines in Unit 6 which currently act as a hybrid gravity and hydroneumatic system and split them into two independent systems. The 2003 Mater Plan recommends adding a 10 inch hydroneumatic line through Village 'B' that would connect to the 14 & 16 inch lines to the hydroneumatic system above the boundary elevation of 222.0 (Hydroneumatic Nodes 41 to 46). The 2003 Master Plan then called for a parallel 16 inch gravity line be constructed through Village 'B' to the existing connection to the 16 inch line that feeds the Van Vleck Tank from the Treatment Plant (at gravity Node 78). For the purpose of this report only the a 12 inch hydroneumatic line is to be connected through Village B and connection to the 16 inch line from Unit 6 while abandoning the connection to the supply line to the Van Vleck Tank. The disconnection will take place with Villages A, B or C, whichever goes to construction first. This will supply the necessary additional pressure to easterly portion of Unit 6. The westerly portion of unit 6 is below elevation 222 on the gravity system yet we recommend installing a one way pressure switch interconnect at De La Cruz Drive and the entrance to Village B, for the hydroneumatic system provide redundancy and pressure relief for fire flows.

V. Analysis of Water System with Proposed Fire Flow Demand

With the water system model established as outlined above, the fire flow demand for the proposed development can be input into the model to verify the adequacy of the system. The fire flow demand is based on a Type V-A construction for commercial and Type II-B for residential per Table BB105.2 the 2013 California Fire Code. All buildings are to have automated sprinkler devices, thus allowing for a 50 percent reduction in the fire flow, not to be less than 1,000gpm. The following were the fire flow modeling assumptions for each scenario:

- **Gravity System**: All three scenarios described in the Gravity System Assumptions section had a 2,000gpm demand placed at the lowest static pressure node in the system Node 51 (intersection of Murieta Parkway and Guadalupe Drive) would cover building areas up to 52,500 square feet in the most remote part of the system. See Appendices D, F & H for fire flow model results.
- **Hydroneumatic System**: A conservative demand of 2,000gpm demand were places at the lowest static pressure nodes for the worst case scenario. Please refer to Appendices K,M, O, Q, S, U, and W for fire flow model results.

VI. Findings

Gravity Models (Appendixes B-H)
The existing and entitled conditions both meet the minimum pressure and maximum velocity requirements for the static and fire flow conditions. No extra work is required for the current conditions or the build out of the entitled development. While the modeling works, we suggest that two one-way pressure switch interconnects be installed near Node 51 (Murieta Parkway and Guadalupe Drive) and Node 78 (De La Cruz Drive) as redundancy measures for these lower pressure areas.

Hydroneumatic Models (Appendices J-W)
The existing and entitled conditions both meets the minimum pressure and maximum velocity requirements for the static and fire flow conditions. No extra work is required for the current conditions or the build out of the entitled development.

In the Village A stand-alone model the project meets the minimum pressure requirement for the static and fire flow conditions, but exceeds the 10 ft/s velocity requirements between nodes 37 to 39. These nodes correspond to the existing 8 inch main in De La Cruz Drive in Rancho Murieta North Unit 6. This can be resolved by upsizing approximately 550 lineal feet of existing 8 inch main to 12 inch main.

In the Village B stand-alone model also exceeds the 10 ft/s velocity requirements between nodes 37 to 39. These nodes correspond to the existing 8 inch main in De La Cruz Drive in Rancho Murieta North Unit 6. This can be resolved by upsizing approximately 550 lineal feet of existing 8 inch main to 12 inch main.

In the Village C stand-alone model does not the minimum pressure requirements between Nodes 62 and 27. This is due to the elevation change for the lots on the top of the hill. This can be resolved by adding a booster pump for the main in this area. RMCSD may also be considering Lot F for a future tank site, which would also boost the pressure in the line at the top of the hill if it was installed. The existing 8” main between Nodes 26 and 27 (near Camino De Lago and Clementia Circle) is nearing the maximum velocity of 10 ft/s. Upgrading roughly 220 lineal feet of 8 inch pipe to 12 inch would lower the velocity in the pipe, but is not necessary.

The Village H stand-alone model both meets the minimum pressure and maximum velocity requirements for the static and fire flow conditions. No extra work is required for the current conditions or the build out of this development.

Both the gravity and hydroneumatic systems meet the minimum pressure and maximum velocity requirements for the static and fire flow conditions at the ultimate build out of development with villages D, E, and F backbone infrastructure being built as one project. Village G would be a stand-alone project yet would require a wat main loop around Calero Reservoir.

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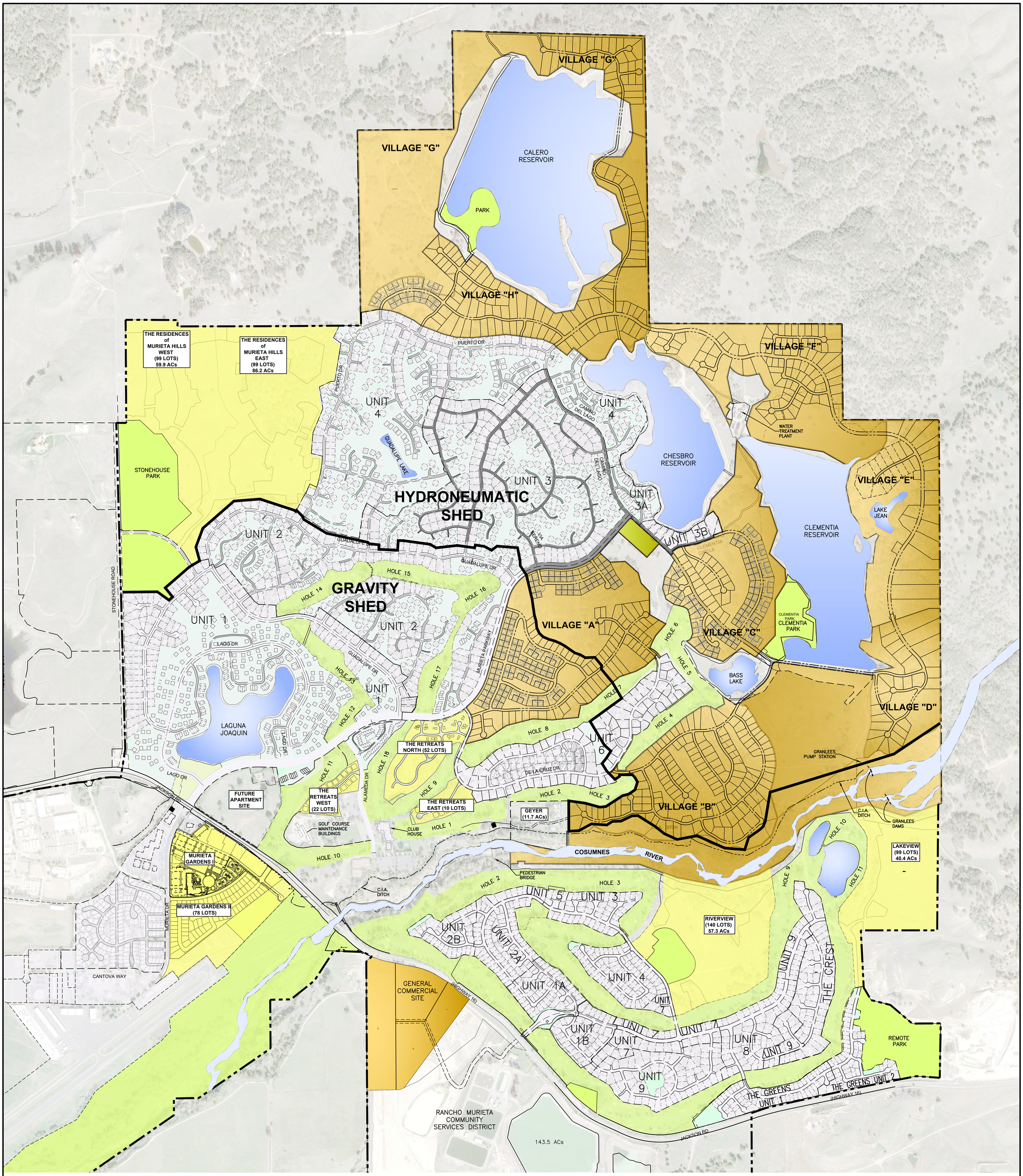
APPENDIX A

RANCHO MURIETA DEVELOPMENT PLAN



LEGEND

- PROPOSED RANCHO MURIETA NORTH
- EXISTING DEVELOPED AREAS
- EXISTING PARKS/RMA AND GOLF COURSE/CLUB HOUSE
- RIVER/LAKES
- APPROVED ENTITLED PROJECTS

SCALE: 1"=400'

400' 0' 400' 800' 1200'

GRAPHIC SCALE: 1"=400'

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APPENDIX B

RANCHO MURIETA GRAVITY WATER SYSTEM DIAGRAM

RANCHO MURIETA GRAVITY WATER PLAN

JUNE, 2018

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APPENDIX C

GRAVITY SYSTEM STATIC MODEL FOR EXISTING DEVELOPMENT

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June 29, 2018

RANCHO MURIETA EXISTING GRAVITY WATER STATIC MODEL
(11-01-001)

Number of pipes: 90 Flow unit of measure: GPM
Number of junction nodes: 79 File name: RMNGEX

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	16.0	1300.0	130.0	0.0	-	310.00
2	1	2	16.0	750.0	130.0	0.0	-	-
3	2	3	16.0	500.0	130.0	0.0	-	-
4	3	4	14.0	1900.0	130.0	0.0	-	-
5	4	5	14.0	500.0	130.0	0.0	-	-
6	5	6	14.0	180.0	130.0	0.0	-	-
7	6	7	14.0	650.0	130.0	0.0	-	-
8	7	8	14.0	890.0	130.0	0.0	-	-
9	8	9	14.0	350.0	130.0	0.0	-	-
10	9	10	14.0	620.0	130.0	0.0	-	-
11	10	11	14.0	920.0	130.0	0.0	-	-
12	11	12	14.0	290.0	130.0	0.0	-	-
13	12	13	14.0	280.0	130.0	0.0	-	-
14	13	14	14.0	550.0	130.0	0.0	-	-
15	14	15	14.0	450.0	130.0	0.0	-	-
16	15	16	14.0	1100.0	130.0	0.0	-	-
17	16	17	14.0	250.0	130.0	0.0	-	-
18	17	18	14.0	420.0	130.0	0.0	-	-
19	18	19	14.0	440.0	130.0	0.0	-	-
20	19	20	12.0	480.0	130.0	0.0	-	-
21	20	13	8.0	3810.0	130.0	0.0	-	-
22	20	21	12.0	770.0	130.0	0.0	-	-
23	21	22	12.0	340.0	130.0	0.0	-	-
24	22	23	8.0	410.0	130.0	0.0	-	-
25	23	24	8.0	210.0	130.0	0.0	-	-
26	24	25	8.0	270.0	130.0	0.0	-	-
27	25	26	8.0	420.0	130.0	0.0	-	-
28	26	27	8.0	1080.0	130.0	0.0	-	-
29	27	28	8.0	230.0	130.0	0.0	-	-
30	28	29	8.0	270.0	130.0	0.0	-	-
31	29	30	10.0	1730.0	130.0	0.0	-	-
32	30	31	10.0	1820.0	130.0	0.0	-	-
33	31	29	8.0	550.0	130.0	0.0	-	-
34	31	32	10.0	350.0	130.0	0.0	-	-
35	32	33	10.0	570.0	130.0	0.0	-	-
36	33	34	10.0	530.0	130.0	0.0	-	-
37	34	35	10.0	620.0	130.0	0.0	-	-
38	35	36	10.0	100.0	130.0	0.0	-	-
39	36	37	8.0	640.0	130.0	0.0	-	-
40	37	35	8.0	410.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	37	38	12.0	670.0	130.0	0.0	-	-
42	38	39	8.0	1170.0	130.0	0.0	-	-
43	39	40	8.0	1430.0	130.0	0.0	-	-
44	40	41	8.0	430.0	130.0	0.0	-	-
45	41	42	8.0	400.0	130.0	0.0	-	-
46	42	43	8.0	260.0	130.0	0.0	-	-
47	43	44	8.0	250.0	130.0	0.0	-	-
48	44	67	8.0	600.0	130.0	0.0	-	-
49	44	45	8.0	630.0	130.0	0.0	-	-
50	45	46	8.0	880.0	130.0	0.0	-	-
51	46	47	8.0	350.0	130.0	0.0	-	-
52	47	48	10.0	550.0	130.0	0.0	-	-
53	48	67	10.0	1480.0	130.0	0.0	-	-
54	48	49	10.0	490.0	130.0	0.0	-	-
55	49	50	10.0	1320.0	130.0	0.0	-	-
56	50	51	12.0	750.0	130.0	0.0	-	-
57	50	0	14.0	1300.0	130.0	0.0	-	305.00
58	51	52	12.0	400.0	130.0	0.0	-	-
59	52	53	12.0	710.0	130.0	0.0	-	-
60	53	54	12.0	750.0	130.0	0.0	-	-
61	54	55	12.0	590.0	130.0	0.0	-	-
62	55	56	12.0	350.0	130.0	0.0	-	-
63	56	57	12.0	840.0	130.0	0.0	-	-
64	57	58	8.0	600.0	130.0	0.0	-	-
65	58	59	8.0	550.0	130.0	0.0	-	-
66	59	60	8.0	170.0	130.0	0.0	-	-
67	60	21	12.0	1080.0	130.0	0.0	-	-
68	57	61	12.0	850.0	130.0	0.0	-	-
69	61	62	8.0	500.0	130.0	0.0	-	-
70	62	63	8.0	630.0	130.0	0.0	-	-
71	63	64	8.0	650.0	130.0	0.0	-	-
72	64	65	8.0	790.0	130.0	0.0	-	-
73	65	66	8.0	520.0	130.0	0.0	-	-
74	66	39	6.0	1020.0	130.0	0.0	-	-
75	67	68	8.0	1210.0	130.0	0.0	-	-
76	68	69	8.0	850.0	130.0	0.0	-	-
77	69	49	8.0	520.0	130.0	0.0	-	-
78	69	70	6.0	350.0	130.0	0.0	-	-
79	70	71	6.0	1100.0	130.0	0.0	-	-
80	71	72	6.0	850.0	130.0	0.0	-	-
81	72	73	8.0	800.0	130.0	0.0	-	-
82	73	70	6.0	860.0	130.0	0.0	-	-
83	73	68	6.0	600.0	130.0	0.0	-	-
84	74	54	12.0	170.0	130.0	0.0	-	-
85	74	75	12.0	340.0	130.0	0.0	-	-
86	75	76	12.0	720.0	130.0	0.0	-	-
87	76	77	12.0	380.0	130.0	0.0	-	-
88	77	78	14.0	1350.0	130.0	0.0	-	-
89	78	79	8.0	860.0	130.0	0.0	-	-
90	79	77	8.0	1300.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	0.00	224.00	1, 2
2	0.00	193.00	2, 3
3	0.00	164.00	3, 4
4	0.00	176.00	4, 5
5	7.00	197.00	5, 6
6	47.98	203.00	6, 7
7	20.02	215.00	7, 8
8	54.99	198.00	8, 9
9	140.99	183.00	9, 10
10	158.99	192.00	10, 11
11	47.98	183.00	11, 12
12	15.98	173.00	12, 13
13	24.01	170.00	13, 14, 21
14	61.99	170.00	14, 15
15	21.99	173.00	15, 16
16	97.00	156.00	16, 17
17	15.98	164.00	17, 18
18	21.99	171.00	18, 19
19	4.98	172.00	19, 20
20	0.00	160.00	20, 21, 22
21	0.00	174.00	22, 23, 67
22	0.00	177.00	23, 24
23	0.00	154.00	24, 25
24	9.02	148.00	25, 26
25	0.99	148.00	26, 27
26	0.00	144.00	27, 28
27	0.00	142.00	28, 29
28	0.00	140.00	29, 30
29	0.00	140.00	30, 31, 33
30	9.02	140.00	31, 32
31	75.00	142.00	32, 33, 34
32	24.01	140.00	34, 35
33	93.99	140.00	35, 36
34	0.00	143.00	36, 37
35	0.00	141.00	37, 38, 40
36	0.00	141.00	38, 39
37	0.00	141.00	39, 40, 41
38	15.98	154.00	41, 42
39	82.01	162.00	42, 43, 74
40	27.02	204.00	43, 44
41	15.98	196.00	44, 45
42	7.99	179.00	45, 46
43	3.99	173.00	46, 47
44	35.01	173.00	47, 48, 49
45	13.02	182.00	49, 50
46	20.02	210.00	50, 51
47	11.98	216.00	51, 52
48	29.00	200.00	52, 53, 54
49	36.00	192.00	54, 55, 77
50	22.98	230.00	55, 56, 57
51	3.99	230.00	56, 58
52	21.01	220.00	58, 59
53	27.02	208.00	59, 60
54	11.00	192.00	60, 61, 84
55	14.00	195.00	61, 62
56	25.00	192.00	62, 63
57	24.01	170.00	63, 64, 68
58	7.00	178.00	64, 65
59	4.98	190.00	65, 66
60	0.00	193.00	66, 67

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
61	25.00	156.00	68, 69
62	33.98	156.00	69, 70
63	25.99	154.00	70, 71
64	42.01	160.00	71, 72
65	40.98	172.00	72, 73
66	28.01	166.00	73, 74
67	38.02	193.00	48, 53, 75
68	36.99	170.00	75, 76, 83
69	10.01	206.00	76, 77, 78
70	14.99	197.00	78, 79, 82
71	32.99	198.00	79, 80
72	25.00	187.00	80, 81
73	21.99	172.00	81, 82, 83
74	7.99	182.00	84, 85
75	6.01	180.00	85, 86
76	11.00	162.00	86, 87
77	27.02	160.00	87, 88, 90
78	21.01	202.00	88, 89
79	20.02	180.00	89, 90

Simulation Results

Number of trials: 9
Convergence : 0.0026

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	16.0	1300.0	971.21	1.55	0.77	0.00	-	0.59
2	1	2	16.0	750.0	971.21	1.55	0.44	0.00	-	0.59
3	2	3	16.0	500.0	971.21	1.55	0.30	0.00	-	0.59
4	3	4	14.0	1900.0	971.21	2.02	2.15	0.00	-	1.13
5	4	5	14.0	500.0	971.21	2.02	0.57	0.00	-	1.13
6	5	6	14.0	180.0	964.21	2.01	0.20	0.00	-	1.12
7	6	7	14.0	650.0	916.23	1.91	0.66	0.00	-	1.02
8	7	8	14.0	890.0	896.21	1.87	0.87	0.00	-	0.98
9	8	9	14.0	350.0	841.22	1.75	0.30	0.00	-	0.87
10	9	10	14.0	620.0	700.23	1.46	0.38	0.00	-	0.62
11	10	11	14.0	920.0	541.25	1.13	0.35	0.00	-	0.38
12	11	12	14.0	290.0	493.26	1.03	0.09	0.00	-	0.32
13	12	13	14.0	280.0	477.29	0.99	0.09	0.00	-	0.30
14	13	14	14.0	550.0	388.80	0.81	0.11	0.00	-	0.21
15	14	15	14.0	450.0	326.81	0.68	0.07	0.00	-	0.15
16	15	16	14.0	1100.0	304.81	0.64	0.15	0.00	-	0.13
17	16	17	14.0	250.0	207.82	0.43	0.02	0.00	-	0.07
18	17	18	14.0	420.0	191.84	0.40	0.02	0.00	-	0.06
19	18	19	14.0	440.0	169.84	0.35	0.02	0.00	-	0.04
20	19	20	12.0	480.0	164.86	0.47	0.04	0.00	-	0.09
21	13	20	8.0	3810.0	64.48	0.41	0.43	0.00	-	0.11
22	20	21	12.0	770.0	229.33	0.65	0.13	0.00	-	0.17
23	21	22	12.0	340.0	178.66	0.51	0.04	0.00	-	0.10
24	22	23	8.0	410.0	178.66	1.14	0.31	0.00	-	0.75
25	23	24	8.0	210.0	178.66	1.14	0.16	0.00	-	0.75
26	24	25	8.0	270.0	169.64	1.08	0.18	0.00	-	0.68
27	25	26	8.0	420.0	168.66	1.08	0.28	0.00	-	0.68
28	26	27	8.0	1080.0	168.66	1.08	0.73	0.00	-	0.68
29	27	28	8.0	230.0	168.66	1.08	0.16	0.00	-	0.68
30	28	29	8.0	270.0	168.66	1.08	0.18	0.00	-	0.68
31	29	30	10.0	1730.0	69.58	0.28	0.08	0.00	-	0.04
32	30	31	10.0	1820.0	60.56	0.25	0.06	0.00	-	0.03
33	29	31	8.0	550.0	99.07	0.63	0.14	0.00	-	0.25

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
34	31	32	10.0	350.0	84.63	0.35	0.02	0.00	-	0.06
35	32	33	10.0	570.0	60.61	0.25	0.02	0.00	-	0.03
36	34	33	10.0	530.0	33.38	0.14	0.01	0.00	-	0.01
37	35	34	10.0	620.0	33.38	0.14	0.01	0.00	-	0.01
38	36	35	10.0	100.0	14.46	0.06	0.00	0.00	-	0.00
39	37	36	8.0	640.0	14.46	0.09	0.00	0.00	-	0.01
40	37	35	8.0	410.0	18.91	0.12	0.00	0.00	-	0.01
41	38	37	12.0	670.0	33.38	0.09	0.00	0.00	-	0.00
42	39	38	8.0	1170.0	49.36	0.32	0.08	0.00	-	0.07
43	40	39	8.0	1430.0	89.64	0.57	0.30	0.00	-	0.21
44	41	40	8.0	430.0	116.66	0.74	0.15	0.00	-	0.34
45	42	41	8.0	400.0	132.64	0.85	0.17	0.00	-	0.43
46	43	42	8.0	260.0	140.63	0.90	0.13	0.00	-	0.48
47	44	43	8.0	250.0	144.62	0.92	0.13	0.00	-	0.51
48	67	44	8.0	600.0	110.18	0.70	0.18	0.00	-	0.31
49	45	44	8.0	630.0	69.46	0.44	0.08	0.00	-	0.13
50	46	45	8.0	880.0	82.47	0.53	0.16	0.00	-	0.18
51	47	46	8.0	350.0	102.49	0.65	0.09	0.00	-	0.27
52	48	47	10.0	550.0	114.48	0.47	0.06	0.00	-	0.11
53	48	67	10.0	1480.0	131.01	0.54	0.21	0.00	-	0.14
54	49	48	10.0	490.0	274.48	1.12	0.28	0.00	-	0.56
55	50	49	10.0	1320.0	469.64	1.92	2.01	0.00	-	1.52
56	50	51	12.0	750.0	418.10	1.19	0.38	0.00	-	0.50
57	0	50	14.0	1300.0	910.72	1.90	1.31	0.00	-	1.01
58	51	52	12.0	400.0	414.10	1.17	0.20	0.00	-	0.50
59	52	53	12.0	710.0	393.10	1.12	0.32	0.00	-	0.45
60	53	54	12.0	750.0	366.08	1.04	0.30	0.00	-	0.39
61	54	55	12.0	590.0	262.03	0.74	0.13	0.00	-	0.21
62	55	56	12.0	350.0	248.03	0.70	0.07	0.00	-	0.19
63	56	57	12.0	840.0	223.02	0.63	0.13	0.00	-	0.16
64	58	57	8.0	600.0	38.69	0.25	0.03	0.00	-	0.04
65	59	58	8.0	550.0	45.69	0.29	0.03	0.00	-	0.06
66	60	59	8.0	170.0	50.67	0.32	0.01	0.00	-	0.07
67	21	60	12.0	1080.0	50.67	0.14	0.01	0.00	-	0.01
68	57	61	12.0	850.0	237.70	0.67	0.15	0.00	-	0.18
69	61	62	8.0	500.0	212.69	1.36	0.52	0.00	-	1.04
70	62	63	8.0	630.0	178.72	1.14	0.47	0.00	-	0.75
71	63	64	8.0	650.0	152.73	0.97	0.37	0.00	-	0.56
72	64	65	8.0	790.0	110.71	0.71	0.25	0.00	-	0.31
73	65	66	8.0	520.0	69.73	0.45	0.07	0.00	-	0.13
74	66	39	6.0	1020.0	41.72	0.47	0.21	0.00	-	0.21
75	68	67	8.0	1210.0	17.19	0.11	0.01	0.00	-	0.01
76	69	68	8.0	850.0	84.30	0.54	0.16	0.00	-	0.19
77	49	69	8.0	520.0	159.17	1.02	0.32	0.00	-	0.61
78	69	70	6.0	350.0	64.86	0.74	0.16	0.00	-	0.47
79	70	71	6.0	1100.0	25.99	0.29	0.09	0.00	-	0.09
80	72	71	6.0	850.0	7.00	0.08	0.01	0.00	-	0.01
81	73	72	8.0	800.0	32.00	0.20	0.02	0.00	-	0.03
82	70	73	6.0	860.0	23.88	0.27	0.06	0.00	-	0.07
83	68	73	6.0	600.0	30.12	0.34	0.07	0.00	-	0.11
84	54	74	12.0	170.0	93.05	0.26	0.01	0.00	-	0.03
85	74	75	12.0	340.0	85.06	0.24	0.01	0.00	-	0.03
86	75	76	12.0	720.0	79.04	0.22	0.02	0.00	-	0.02
87	76	77	12.0	380.0	68.05	0.19	0.01	0.00	-	0.02
88	77	78	14.0	1350.0	30.39	0.06	0.00	0.00	-	0.00
89	78	79	8.0	860.0	9.38	0.06	0.00	0.00	-	0.00
90	77	79	8.0	1300.0	10.64	0.07	0.01	0.00	-	0.00

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	971.21+
57	910.72+

Net system demand: 1882 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
4	2.02	55	1.52	28	69.51
5	2.02	4	1.13	29	69.43
6	2.01	5	1.13	30	69.39
55	1.92	6	1.12	32	69.36
7	1.91	69	1.04	33	69.35
57	1.90	7	1.02	37	68.92
8	1.87	57	1.01	36	68.92
9	1.75	8	0.98	35	68.92
1	1.55	9	0.87	27	68.71
2	1.55	70	0.75	31	68.50
36	0.14	36	0.01	40	41.79
40	0.12	67	0.01	69	41.33
75	0.11	75	0.01	53	41.08
41	0.09	80	0.01	46	39.54
39	0.09	39	0.01	7	38.96
80	0.08	41	0.00	47	36.98
90	0.07	90	0.00	1	36.93
88	0.06	89	0.00	52	36.02
89	0.06	38	0.00	50	31.93
38	0.06	88	0.00	51	31.77

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

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APPENDIX D

GRAVITY SYSTEM FIRE FLOW MODEL FOR EXISTING DEVELOPMENT
WITH 2,000 GPM DEMAND AT NODE #51

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June 29, 2018

RANCHO MURIETA EXISTING GRAVITY WATER FIRE FLOW MODEL @ NODE 51
(11-01-001)

Number of pipes: 90 Flow unit of measure: GPM
Number of junction nodes: 79 File name: RMNGEX

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	16.0	1300.0	130.0	0.0	-	310.00
2	1	2	16.0	750.0	130.0	0.0	-	-
3	2	3	16.0	500.0	130.0	0.0	-	-
4	3	4	14.0	1900.0	130.0	0.0	-	-
5	4	5	14.0	500.0	130.0	0.0	-	-
6	5	6	14.0	180.0	130.0	0.0	-	-
7	6	7	14.0	650.0	130.0	0.0	-	-
8	7	8	14.0	890.0	130.0	0.0	-	-
9	8	9	14.0	350.0	130.0	0.0	-	-
10	9	10	14.0	620.0	130.0	0.0	-	-
11	10	11	14.0	920.0	130.0	0.0	-	-
12	11	12	14.0	290.0	130.0	0.0	-	-
13	12	13	14.0	280.0	130.0	0.0	-	-
14	13	14	14.0	550.0	130.0	0.0	-	-
15	14	15	14.0	450.0	130.0	0.0	-	-
16	15	16	14.0	1100.0	130.0	0.0	-	-
17	16	17	14.0	250.0	130.0	0.0	-	-
18	17	18	14.0	420.0	130.0	0.0	-	-
19	18	19	14.0	440.0	130.0	0.0	-	-
20	19	20	12.0	480.0	130.0	0.0	-	-
21	20	13	8.0	3810.0	130.0	0.0	-	-
22	20	21	12.0	770.0	130.0	0.0	-	-
23	21	22	12.0	340.0	130.0	0.0	-	-
24	22	23	8.0	410.0	130.0	0.0	-	-
25	23	24	8.0	210.0	130.0	0.0	-	-
26	24	25	8.0	270.0	130.0	0.0	-	-
27	25	26	8.0	420.0	130.0	0.0	-	-
28	26	27	8.0	1080.0	130.0	0.0	-	-
29	27	28	8.0	230.0	130.0	0.0	-	-
30	28	29	8.0	270.0	130.0	0.0	-	-
31	29	30	10.0	1730.0	130.0	0.0	-	-
32	30	31	10.0	1820.0	130.0	0.0	-	-
33	31	29	8.0	550.0	130.0	0.0	-	-
34	31	32	10.0	350.0	130.0	0.0	-	-
35	32	33	10.0	570.0	130.0	0.0	-	-
36	33	34	10.0	530.0	130.0	0.0	-	-
37	34	35	10.0	620.0	130.0	0.0	-	-
38	35	36	10.0	100.0	130.0	0.0	-	-
39	36	37	8.0	640.0	130.0	0.0	-	-
40	37	35	8.0	410.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	37	38	12.0	670.0	130.0	0.0	-	-
42	38	39	8.0	1170.0	130.0	0.0	-	-
43	39	40	8.0	1430.0	130.0	0.0	-	-
44	40	41	8.0	430.0	130.0	0.0	-	-
45	41	42	8.0	400.0	130.0	0.0	-	-
46	42	43	8.0	260.0	130.0	0.0	-	-
47	43	44	8.0	250.0	130.0	0.0	-	-
48	44	67	8.0	600.0	130.0	0.0	-	-
49	44	45	8.0	630.0	130.0	0.0	-	-
50	45	46	8.0	880.0	130.0	0.0	-	-
51	46	47	8.0	350.0	130.0	0.0	-	-
52	47	48	10.0	550.0	130.0	0.0	-	-
53	48	67	10.0	1480.0	130.0	0.0	-	-
54	48	49	10.0	490.0	130.0	0.0	-	-
55	49	50	10.0	1320.0	130.0	0.0	-	-
56	50	51	12.0	750.0	130.0	0.0	-	-
57	50	0	14.0	1300.0	130.0	0.0	-	305.00
58	51	52	12.0	400.0	130.0	0.0	-	-
59	52	53	12.0	710.0	130.0	0.0	-	-
60	53	54	12.0	750.0	130.0	0.0	-	-
61	54	55	12.0	590.0	130.0	0.0	-	-
62	55	56	12.0	350.0	130.0	0.0	-	-
63	56	57	12.0	840.0	130.0	0.0	-	-
64	57	58	8.0	600.0	130.0	0.0	-	-
65	58	59	8.0	550.0	130.0	0.0	-	-
66	59	60	8.0	170.0	130.0	0.0	-	-
67	60	21	12.0	1080.0	130.0	0.0	-	-
68	57	61	12.0	850.0	130.0	0.0	-	-
69	61	62	8.0	500.0	130.0	0.0	-	-
70	62	63	8.0	630.0	130.0	0.0	-	-
71	63	64	8.0	650.0	130.0	0.0	-	-
72	64	65	8.0	790.0	130.0	0.0	-	-
73	65	66	8.0	520.0	130.0	0.0	-	-
74	66	39	6.0	1020.0	130.0	0.0	-	-
75	67	68	8.0	1210.0	130.0	0.0	-	-
76	68	69	8.0	850.0	130.0	0.0	-	-
77	69	49	8.0	520.0	130.0	0.0	-	-
78	69	70	6.0	350.0	130.0	0.0	-	-
79	70	71	6.0	1100.0	130.0	0.0	-	-
80	71	72	6.0	850.0	130.0	0.0	-	-
81	72	73	8.0	800.0	130.0	0.0	-	-
82	73	70	6.0	860.0	130.0	0.0	-	-
83	73	68	6.0	600.0	130.0	0.0	-	-
84	74	54	12.0	170.0	130.0	0.0	-	-
85	74	75	12.0	340.0	130.0	0.0	-	-
86	75	76	12.0	720.0	130.0	0.0	-	-
87	76	77	12.0	380.0	130.0	0.0	-	-
88	77	78	14.0	1350.0	130.0	0.0	-	-
89	78	79	8.0	860.0	130.0	0.0	-	-
90	79	77	8.0	1300.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	0.00	224.00	1, 2
2	0.00	193.00	2, 3
3	0.00	164.00	3, 4
4	0.00	176.00	4, 5
5	7.00	197.00	5, 6
6	47.98	203.00	6, 7
7	20.02	215.00	7, 8
8	54.99	198.00	8, 9
9	140.99	183.00	9, 10
10	158.99	192.00	10, 11
11	47.98	183.00	11, 12
12	15.98	173.00	12, 13
13	24.01	170.00	13, 14, 21
14	61.99	170.00	14, 15
15	21.99	173.00	15, 16
16	97.00	156.00	16, 17
17	15.98	164.00	17, 18
18	21.99	171.00	18, 19
19	4.98	172.00	19, 20
20	0.00	160.00	20, 21, 22
21	0.00	174.00	22, 23, 67
22	0.00	177.00	23, 24
23	0.00	154.00	24, 25
24	9.02	148.00	25, 26
25	0.99	148.00	26, 27
26	0.00	144.00	27, 28
27	0.00	142.00	28, 29
28	0.00	140.00	29, 30
29	0.00	140.00	30, 31, 33
30	9.02	140.00	31, 32
31	75.00	142.00	32, 33, 34
32	24.01	140.00	34, 35
33	93.99	140.00	35, 36
34	0.00	143.00	36, 37
35	0.00	141.00	37, 38, 40
36	0.00	141.00	38, 39
37	0.00	141.00	39, 40, 41
38	15.98	154.00	41, 42
39	82.01	162.00	42, 43, 74
40	27.02	204.00	43, 44
41	15.98	196.00	44, 45
42	7.99	179.00	45, 46
43	3.99	173.00	46, 47
44	35.01	173.00	47, 48, 49
45	13.02	182.00	49, 50
46	20.02	210.00	50, 51
47	11.98	216.00	51, 52
48	29.00	200.00	52, 53, 54
49	36.00	192.00	54, 55, 77
50	22.98	230.00	55, 56, 57
51	2003.98	230.00	56, 58
52	21.01	220.00	58, 59
53	27.02	208.00	59, 60
54	11.00	192.00	60, 61, 84
55	14.00	195.00	61, 62
56	25.00	192.00	62, 63
57	24.01	170.00	63, 64, 68
58	7.00	178.00	64, 65
59	4.98	190.00	65, 66
60	0.00	193.00	66, 67

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
61	25.00	156.00	68, 69
62	33.98	156.00	69, 70
63	25.99	154.00	70, 71
64	42.01	160.00	71, 72
65	40.98	172.00	72, 73
66	28.01	166.00	73, 74
67	38.02	193.00	48, 53, 75
68	36.99	170.00	75, 76, 83
69	10.01	206.00	76, 77, 78
70	14.99	197.00	78, 79, 82
71	32.99	198.00	79, 80
72	25.00	187.00	80, 81
73	21.99	172.00	81, 82, 83
74	7.99	182.00	84, 85
75	6.01	180.00	85, 86
76	11.00	162.00	86, 87
77	27.02	160.00	87, 88, 90
78	21.01	202.00	88, 89
79	20.02	180.00	89, 90

Simulation Results

Number of trials: 8
Convergence : 0.0009

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	16.0	1300.0	1336.46	2.13	1.39	0.00	-	1.07
2	1	2	16.0	750.0	1336.46	2.13	0.80	0.00	-	1.07
3	2	3	16.0	500.0	1336.46	2.13	0.53	0.00	-	1.07
4	3	4	14.0	1900.0	1336.46	2.79	3.89	0.00	-	2.05
5	4	5	14.0	500.0	1336.46	2.79	1.02	0.00	-	2.05
6	5	6	14.0	180.0	1329.46	2.77	0.37	0.00	-	2.03
7	6	7	14.0	650.0	1281.47	2.67	1.23	0.00	-	1.89
8	7	8	14.0	890.0	1261.46	2.63	1.64	0.00	-	1.84
9	8	9	14.0	350.0	1206.47	2.51	0.59	0.00	-	1.69
10	9	10	14.0	620.0	1065.48	2.22	0.83	0.00	-	1.35
11	10	11	14.0	920.0	906.50	1.89	0.92	0.00	-	1.00
12	11	12	14.0	290.0	858.51	1.79	0.26	0.00	-	0.90
13	12	13	14.0	280.0	842.53	1.76	0.24	0.00	-	0.87
14	13	14	14.0	550.0	684.04	1.43	0.33	0.00	-	0.59
15	14	15	14.0	450.0	622.05	1.30	0.22	0.00	-	0.50
16	15	16	14.0	1100.0	600.06	1.25	0.51	0.00	-	0.46
17	16	17	14.0	250.0	503.06	1.05	0.08	0.00	-	0.34
18	17	18	14.0	420.0	487.08	1.02	0.13	0.00	-	0.32
19	18	19	14.0	440.0	465.09	0.97	0.13	0.00	-	0.29
20	19	20	12.0	480.0	460.10	1.31	0.29	0.00	-	0.60
21	13	20	8.0	3810.0	134.48	0.86	1.69	0.00	-	0.44
22	20	21	12.0	770.0	594.58	1.69	0.75	0.00	-	0.97
23	21	22	12.0	340.0	226.08	0.64	0.05	0.00	-	0.16
24	22	23	8.0	410.0	226.08	1.44	0.48	0.00	-	1.16
25	23	24	8.0	210.0	226.08	1.44	0.24	0.00	-	1.16
26	24	25	8.0	270.0	217.06	1.39	0.29	0.00	-	1.08
27	25	26	8.0	420.0	216.07	1.38	0.45	0.00	-	1.07
28	26	27	8.0	1080.0	216.07	1.38	1.16	0.00	-	1.07
29	27	28	8.0	230.0	216.07	1.38	0.25	0.00	-	1.07
30	28	29	8.0	270.0	216.07	1.38	0.29	0.00	-	1.07
31	29	30	10.0	1730.0	88.40	0.36	0.12	0.00	-	0.07
32	30	31	10.0	1820.0	79.38	0.32	0.10	0.00	-	0.06
33	29	31	8.0	550.0	127.67	0.81	0.22	0.00	-	0.40

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
34	31	32	10.0	350.0	132.04	0.54	0.05	0.00	-	0.14
35	32	33	10.0	570.0	108.03	0.44	0.06	0.00	-	0.10
36	33	34	10.0	530.0	14.04	0.06	0.00	0.00	-	0.00
37	34	35	10.0	620.0	14.04	0.06	0.00	0.00	-	0.00
38	35	36	10.0	100.0	6.23	0.03	0.00	0.00	-	0.00
39	36	37	8.0	640.0	6.23	0.04	0.00	0.00	-	0.00
40	35	37	8.0	410.0	7.81	0.05	0.00	0.00	-	0.00
41	37	38	12.0	670.0	14.04	0.04	0.00	0.00	-	0.00
42	39	38	8.0	1170.0	1.94	0.01	0.00	0.00	-	0.00
43	40	39	8.0	1430.0	164.82	1.05	0.93	0.00	-	0.65
44	41	40	8.0	430.0	191.84	1.22	0.37	0.00	-	0.86
45	42	41	8.0	400.0	207.82	1.33	0.40	0.00	-	1.00
46	43	42	8.0	260.0	215.81	1.38	0.28	0.00	-	1.07
47	44	43	8.0	250.0	219.81	1.40	0.28	0.00	-	1.10
48	67	44	8.0	600.0	158.19	1.01	0.36	0.00	-	0.60
49	45	44	8.0	630.0	96.63	0.62	0.15	0.00	-	0.24
50	46	45	8.0	880.0	109.65	0.70	0.27	0.00	-	0.30
51	47	46	8.0	350.0	129.67	0.83	0.15	0.00	-	0.42
52	48	47	10.0	550.0	141.65	0.58	0.09	0.00	-	0.17
53	48	67	10.0	1480.0	157.06	0.64	0.30	0.00	-	0.20
54	49	48	10.0	490.0	327.71	1.34	0.38	0.00	-	0.78
55	50	49	10.0	1320.0	544.83	2.23	2.64	0.00	-	2.00
56	50	51	12.0	750.0	1977.65	5.61	6.72	0.00	-	8.97
57	0	50	14.0	1300.0	2545.46	5.30	8.78	0.00	-	6.75
58	52	51	12.0	400.0	26.33	0.07	0.00	0.00	-	0.00
59	53	52	12.0	710.0	47.33	0.13	0.01	0.00	-	0.01
60	54	53	12.0	750.0	74.35	0.21	0.02	0.00	-	0.02
61	55	54	12.0	590.0	178.40	0.51	0.06	0.00	-	0.10
62	56	55	12.0	350.0	192.41	0.55	0.04	0.00	-	0.12
63	57	56	12.0	840.0	217.41	0.62	0.13	0.00	-	0.15
64	58	57	8.0	600.0	356.52	2.28	1.62	0.00	-	2.70
65	59	58	8.0	550.0	363.52	2.32	1.54	0.00	-	2.80
66	60	59	8.0	170.0	368.50	2.35	0.49	0.00	-	2.88
67	21	60	12.0	1080.0	368.50	1.05	0.43	0.00	-	0.40
68	57	61	12.0	850.0	115.10	0.33	0.04	0.00	-	0.05
69	61	62	8.0	500.0	90.10	0.58	0.11	0.00	-	0.21
70	62	63	8.0	630.0	56.12	0.36	0.06	0.00	-	0.09
71	63	64	8.0	650.0	30.13	0.19	0.02	0.00	-	0.03
72	65	64	8.0	790.0	11.88	0.08	0.00	0.00	-	0.00
73	66	65	8.0	520.0	52.86	0.34	0.04	0.00	-	0.08
74	39	66	6.0	1020.0	80.87	0.92	0.72	0.00	-	0.70
75	68	67	8.0	1210.0	39.14	0.25	0.05	0.00	-	0.05
76	69	68	8.0	850.0	101.01	0.64	0.22	0.00	-	0.26
77	49	69	8.0	520.0	181.11	1.16	0.40	0.00	-	0.77
78	69	70	6.0	350.0	70.10	0.80	0.19	0.00	-	0.54
79	70	71	6.0	1100.0	27.80	0.32	0.11	0.00	-	0.10
80	72	71	6.0	850.0	5.19	0.06	0.00	0.00	-	0.00
81	73	72	8.0	800.0	30.20	0.19	0.02	0.00	-	0.03
82	70	73	6.0	860.0	27.31	0.31	0.08	0.00	-	0.09
83	68	73	6.0	600.0	24.88	0.28	0.05	0.00	-	0.08
84	54	74	12.0	170.0	93.05	0.26	0.01	0.00	-	0.03
85	74	75	12.0	340.0	85.06	0.24	0.01	0.00	-	0.03
86	75	76	12.0	720.0	79.04	0.22	0.02	0.00	-	0.02
87	76	77	12.0	380.0	68.05	0.19	0.01	0.00	-	0.02
88	77	78	14.0	1350.0	30.39	0.06	0.00	0.00	-	0.00
89	78	79	8.0	860.0	9.38	0.06	0.00	0.00	-	0.00
90	77	79	8.0	1300.0	10.64	0.07	0.01	0.00	-	0.00

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	1336.45+
57	2545.46+

Net system demand: 3882 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
56	5.61	56	8.97	28	65.40
57	5.30	57	6.75	29	65.27
4	2.79	66	2.88	30	65.22
5	2.79	65	2.80	32	65.15
6	2.77	64	2.70	33	65.13
7	2.67	4	2.05	36	64.69
8	2.63	5	2.05	35	64.69
9	2.51	6	2.03	37	64.69
66	2.35	55	2.00	27	64.64
65	2.32	7	1.89	31	64.31
88	0.06	89	0.00	40	37.79
89	0.06	58	0.00	69	37.78
80	0.06	40	0.00	7	37.16
36	0.06	36	0.00	1	36.66
37	0.06	37	0.00	46	35.95
40	0.05	88	0.00	53	35.32
41	0.04	39	0.00	47	33.41
39	0.04	42	0.00	52	30.11
38	0.03	41	0.00	50	28.70
42	0.01	38	0.00	51	25.78

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

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APPENDIX E

GRAVITY SYSTEM STATIC MODEL FOR EXISTING & ENTITLED DEVELOPMENT

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June 29, 2018

RANCHO MURIETA EXITING & ENTITLED GRAVITY WATER STATIC MODEL
(11-01-001)

Number of pipes: 111 Flow unit of measure: GPM
Number of junction nodes: 92 File name: RMNGEN

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	16.0	1300.0	130.0	0.0	-	310.00
2	1	2	16.0	750.0	130.0	0.0	-	-
3	2	3	16.0	500.0	130.0	0.0	-	-
4	3	4	14.0	1900.0	130.0	0.0	-	-
5	4	5	14.0	500.0	130.0	0.0	-	-
6	5	6	14.0	180.0	130.0	0.0	-	-
7	6	7	14.0	650.0	130.0	0.0	-	-
8	7	8	14.0	890.0	130.0	0.0	-	-
9	8	9	14.0	350.0	130.0	0.0	-	-
10	9	10	14.0	620.0	130.0	0.0	-	-
11	10	11	14.0	920.0	130.0	0.0	-	-
12	11	12	14.0	290.0	130.0	0.0	-	-
13	12	13	14.0	280.0	130.0	0.0	-	-
14	13	14	14.0	550.0	130.0	0.0	-	-
15	14	15	14.0	450.0	130.0	0.0	-	-
16	15	16	14.0	1100.0	130.0	0.0	-	-
17	16	17	14.0	250.0	130.0	0.0	-	-
18	17	18	14.0	420.0	130.0	0.0	-	-
19	18	19	14.0	440.0	130.0	0.0	-	-
20	19	20	12.0	480.0	130.0	0.0	-	-
21	20	13	8.0	3810.0	130.0	0.0	-	-
22	20	21	12.0	770.0	130.0	0.0	-	-
23	21	22	12.0	340.0	130.0	0.0	-	-
24	22	23	8.0	410.0	130.0	0.0	-	-
25	23	24	8.0	210.0	130.0	0.0	-	-
26	24	25	8.0	270.0	130.0	0.0	-	-
27	25	26	8.0	420.0	130.0	0.0	-	-
28	26	27	8.0	1080.0	130.0	0.0	-	-
29	27	28	8.0	230.0	130.0	0.0	-	-
30	28	29	8.0	270.0	130.0	0.0	-	-
31	29	30	10.0	1730.0	130.0	0.0	-	-
32	30	31	10.0	1820.0	130.0	0.0	-	-
33	31	29	8.0	550.0	130.0	0.0	-	-
34	31	32	10.0	350.0	130.0	0.0	-	-
35	32	33	10.0	570.0	130.0	0.0	-	-
36	33	34	10.0	530.0	130.0	0.0	-	-
37	34	35	10.0	620.0	130.0	0.0	-	-
38	35	36	10.0	100.0	130.0	0.0	-	-
39	36	37	8.0	640.0	130.0	0.0	-	-
40	37	35	8.0	410.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	37	38	12.0	670.0	130.0	0.0	-	-
42	38	39	8.0	1170.0	130.0	0.0	-	-
43	39	40	8.0	1430.0	130.0	0.0	-	-
44	40	41	8.0	430.0	130.0	0.0	-	-
45	41	42	8.0	400.0	130.0	0.0	-	-
46	42	43	8.0	260.0	130.0	0.0	-	-
47	43	44	8.0	250.0	130.0	0.0	-	-
48	44	67	8.0	600.0	130.0	0.0	-	-
49	44	45	8.0	630.0	130.0	0.0	-	-
50	45	46	8.0	880.0	130.0	0.0	-	-
51	46	47	8.0	350.0	130.0	0.0	-	-
52	47	48	10.0	550.0	130.0	0.0	-	-
53	48	67	10.0	1480.0	130.0	0.0	-	-
54	48	49	10.0	490.0	130.0	0.0	-	-
55	49	50	10.0	1320.0	130.0	0.0	-	-
56	50	51	12.0	750.0	130.0	0.0	-	-
57	50	0	14.0	1300.0	130.0	0.0	-	305.00
58	51	52	12.0	400.0	130.0	0.0	-	-
59	52	53	12.0	710.0	130.0	0.0	-	-
60	53	54	12.0	750.0	130.0	0.0	-	-
61	54	55	12.0	590.0	130.0	0.0	-	-
62	55	56	12.0	350.0	130.0	0.0	-	-
63	56	57	12.0	840.0	130.0	0.0	-	-
64	57	58	8.0	600.0	130.0	0.0	-	-
65	58	59	8.0	550.0	130.0	0.0	-	-
66	59	60	8.0	170.0	130.0	0.0	-	-
67	60	21	12.0	1080.0	130.0	0.0	-	-
68	57	61	12.0	850.0	130.0	0.0	-	-
69	61	62	8.0	500.0	130.0	0.0	-	-
70	62	63	8.0	630.0	130.0	0.0	-	-
71	63	64	8.0	650.0	130.0	0.0	-	-
72	64	65	8.0	790.0	130.0	0.0	-	-
73	65	66	8.0	520.0	130.0	0.0	-	-
74	66	39	8.0	1020.0	130.0	0.0	-	-
75	67	68	8.0	1210.0	130.0	0.0	-	-
76	68	69	8.0	850.0	130.0	0.0	-	-
77	69	49	8.0	520.0	130.0	0.0	-	-
78	69	70	6.0	350.0	130.0	0.0	-	-
79	70	71	6.0	1100.0	130.0	0.0	-	-
80	71	72	6.0	850.0	130.0	0.0	-	-
81	72	73	8.0	800.0	130.0	0.0	-	-
82	73	70	6.0	860.0	130.0	0.0	-	-
83	73	68	6.0	600.0	130.0	0.0	-	-
84	74	54	12.0	170.0	130.0	0.0	-	-
85	74	75	12.0	340.0	130.0	0.0	-	-
86	75	76	12.0	720.0	130.0	0.0	-	-
87	76	77	12.0	380.0	130.0	0.0	-	-
88	77	78	14.0	1350.0	130.0	0.0	-	-
89	78	79	8.0	860.0	130.0	0.0	-	-
90	79	77	8.0	1300.0	130.0	0.0	-	-
91	80	58	8.0	750.0	130.0	0.0	-	-
92	80	59	8.0	750.0	130.0	0.0	-	-
93	81	75	8.0	400.0	130.0	0.0	-	-
94	81	82	8.0	260.0	130.0	0.0	-	-
95	84	76	12.0	850.0	130.0	0.0	-	-
96	82	83	8.0	810.0	130.0	0.0	-	-
97	82	55	8.0	230.0	130.0	0.0	-	-
98	84	60	12.0	660.0	130.0	0.0	-	-
99	83	81	8.0	980.0	130.0	0.0	-	-
100	85	36	8.0	170.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
101	85	86	8.0	170.0	130.0	0.0	-	-
102	86	87	8.0	350.0	130.0	0.0	-	-
103	87	88	8.0	700.0	130.0	0.0	-	-
104	88	89	8.0	230.0	130.0	0.0	-	-
105	89	24	8.0	330.0	130.0	0.0	-	-
106	89	90	8.0	840.0	130.0	0.0	-	-
107	90	87	8.0	240.0	130.0	0.0	-	-
108	90	91	8.0	660.0	130.0	0.0	-	-
109	91	86	8.0	750.0	130.0	0.0	-	-
110	91	92	8.0	270.0	130.0	0.0	-	-
111	92	85	8.0	780.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	0.00	224.00	1, 2
2	0.00	193.00	2, 3
3	99.02	164.00	3, 4
4	0.00	176.00	4, 5
5	7.00	197.00	5, 6
6	118.01	203.00	6, 7
7	20.02	215.00	7, 8
8	54.99	198.00	8, 9
9	140.99	183.00	9, 10
10	229.01	192.00	10, 11
11	47.98	183.00	11, 12
12	65.98	173.00	12, 13
13	24.01	170.00	13, 14, 21
14	61.99	170.00	14, 15
15	21.99	173.00	15, 16
16	97.00	156.00	16, 17
17	15.98	164.00	17, 18
18	21.99	171.00	18, 19
19	4.98	172.00	19, 20
20	0.00	160.00	20, 21, 22
21	0.00	174.00	22, 23, 67
22	29.98	177.00	23, 24
23	0.00	154.00	24, 25
24	9.02	148.00	25, 26, 105
25	50.99	148.00	26, 27
26	340.01	144.00	27, 28
27	0.00	142.00	28, 29
28	0.00	140.00	29, 30
29	0.00	140.00	30, 31, 33
30	9.02	140.00	31, 32
31	75.00	142.00	32, 33, 34
32	24.01	140.00	34, 35
33	93.99	140.00	35, 36
34	0.00	143.00	36, 37
35	0.00	141.00	37, 38, 40
36	0.00	141.00	38, 39, 100
37	0.00	141.00	39, 40, 41
38	15.98	154.00	41, 42
39	104.00	162.00	42, 43, 74
40	27.02	204.00	43, 44
41	15.98	196.00	44, 45
42	7.99	179.00	45, 46
43	3.99	173.00	46, 47

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
44	35.01	173.00	47, 48, 49
45	13.02	182.00	49, 50
46	20.02	210.00	50, 51
47	11.98	216.00	51, 52
48	29.00	200.00	52, 53, 54
49	36.00	192.00	54, 55, 77
50	22.98	230.00	55, 56, 57
51	3.99	230.00	56, 58
52	21.01	220.00	58, 59
53	89.01	208.00	59, 60
54	11.00	192.00	60, 61, 84
55	14.00	195.00	61, 62, 97
56	25.00	192.00	62, 63
57	24.01	170.00	63, 64, 68
58	7.00	178.00	64, 65, 91
59	4.98	190.00	65, 66, 92
60	0.00	193.00	66, 67, 98
61	25.00	156.00	68, 69
62	33.98	156.00	69, 70
63	25.99	154.00	70, 71
64	42.01	160.00	71, 72
65	40.98	172.00	72, 73
66	28.01	166.00	73, 74
67	38.02	193.00	48, 53, 75
68	36.99	170.00	75, 76, 83
69	10.01	206.00	76, 77, 78
70	14.99	197.00	78, 79, 82
71	32.99	198.00	79, 80
72	25.00	187.00	80, 81
73	21.99	172.00	81, 82, 83
74	7.99	182.00	84, 85
75	6.01	180.00	85, 86, 93
76	11.00	162.00	86, 87, 95
77	27.02	160.00	87, 88, 90
78	21.01	202.00	88, 89
79	20.02	180.00	89, 90
80	11.00	180.00	91, 92
81	9.02	187.00	93, 94, 99
82	14.99	185.00	94, 96, 97
83	13.02	180.00	96, 99
84	6.01	182.00	95, 98
85	6.01	140.00	100, 101, 111
86	6.01	140.00	101, 102, 109
87	9.02	142.00	102, 103, 107
88	6.01	144.00	103, 104
89	6.01	144.00	104, 105, 106
90	24.01	142.00	106, 107, 108
91	7.00	140.00	108, 109, 110
92	7.00	140.00	110, 111

Simulation Results

Number of trials: 9
Convergence : 0.0026

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	16.0	1300.0	1368.35	2.18	1.45	0.00	-	1.12
2	1	2	16.0	750.0	1368.35	2.18	0.84	0.00	-	1.12
3	2	3	16.0	500.0	1368.35	2.18	0.56	0.00	-	1.12
4	3	4	14.0	1900.0	1269.33	2.65	3.54	0.00	-	1.86
5	4	5	14.0	500.0	1269.33	2.65	0.93	0.00	-	1.86
6	5	6	14.0	180.0	1262.33	2.63	0.33	0.00	-	1.84
7	6	7	14.0	650.0	1144.32	2.38	1.00	0.00	-	1.54
8	7	8	14.0	890.0	1124.30	2.34	1.32	0.00	-	1.49
9	8	9	14.0	350.0	1069.32	2.23	0.47	0.00	-	1.36
10	9	10	14.0	620.0	928.33	1.93	0.65	0.00	-	1.04
11	10	11	14.0	920.0	699.32	1.46	0.57	0.00	-	0.62
12	11	12	14.0	290.0	651.34	1.36	0.16	0.00	-	0.54
13	12	13	14.0	280.0	585.36	1.22	0.12	0.00	-	0.44
14	13	14	14.0	550.0	476.36	0.99	0.17	0.00	-	0.30
15	14	15	14.0	450.0	414.38	0.86	0.11	0.00	-	0.23
16	15	16	14.0	1100.0	392.38	0.82	0.23	0.00	-	0.21
17	16	17	14.0	250.0	295.38	0.62	0.03	0.00	-	0.13
18	17	18	14.0	420.0	279.40	0.58	0.05	0.00	-	0.11
19	18	19	14.0	440.0	257.41	0.54	0.04	0.00	-	0.10
20	19	20	12.0	480.0	252.43	0.72	0.10	0.00	-	0.20
21	13	20	8.0	3810.0	84.98	0.54	0.72	0.00	-	0.19
22	20	21	12.0	770.0	337.41	0.96	0.26	0.00	-	0.34
23	21	22	12.0	340.0	533.08	1.51	0.27	0.00	-	0.79
24	22	23	8.0	410.0	503.09	3.21	2.10	0.00	-	5.12
25	23	24	8.0	210.0	503.09	3.21	1.07	0.00	-	5.12
26	24	25	8.0	270.0	333.93	2.13	0.65	0.00	-	2.40
27	25	26	8.0	420.0	282.94	1.81	0.74	0.00	-	1.76
28	27	26	8.0	1080.0	57.07	0.36	0.10	0.00	-	0.09
29	28	27	8.0	230.0	57.07	0.36	0.02	0.00	-	0.09
30	29	28	8.0	270.0	57.07	0.36	0.02	0.00	-	0.09
31	30	29	10.0	1730.0	19.62	0.08	0.01	0.00	-	0.00
32	31	30	10.0	1820.0	28.64	0.12	0.02	0.00	-	0.01
33	31	29	8.0	550.0	37.45	0.24	0.02	0.00	-	0.04
34	32	31	10.0	350.0	141.10	0.58	0.06	0.00	-	0.16
35	33	32	10.0	570.0	165.11	0.67	0.13	0.00	-	0.22
36	34	33	10.0	530.0	259.11	1.06	0.27	0.00	-	0.51
37	35	34	10.0	620.0	259.11	1.06	0.31	0.00	-	0.51
38	36	35	10.0	100.0	159.06	0.65	0.02	0.00	-	0.20
39	37	36	8.0	640.0	70.01	0.45	0.08	0.00	-	0.13
40	37	35	8.0	410.0	100.05	0.64	0.11	0.00	-	0.26
41	38	37	12.0	670.0	170.06	0.48	0.06	0.00	-	0.10
42	39	38	8.0	1170.0	186.04	1.19	0.95	0.00	-	0.81
43	40	39	8.0	1430.0	209.09	1.33	1.44	0.00	-	1.01
44	41	40	8.0	430.0	236.11	1.51	0.54	0.00	-	1.26
45	42	41	8.0	400.0	252.09	1.61	0.57	0.00	-	1.42
46	43	42	8.0	260.0	260.08	1.66	0.39	0.00	-	1.51
47	44	43	8.0	250.0	264.08	1.69	0.39	0.00	-	1.55
48	67	44	8.0	600.0	186.26	1.19	0.49	0.00	-	0.81
49	45	44	8.0	630.0	112.83	0.72	0.20	0.00	-	0.32
50	46	45	8.0	880.0	125.85	0.80	0.35	0.00	-	0.39
51	47	46	8.0	350.0	145.87	0.93	0.18	0.00	-	0.52
52	48	47	10.0	550.0	157.85	0.64	0.11	0.00	-	0.20
53	48	67	10.0	1480.0	172.67	0.71	0.35	0.00	-	0.24
54	49	48	10.0	490.0	359.51	1.47	0.45	0.00	-	0.93
55	50	49	10.0	1320.0	589.10	2.41	3.05	0.00	-	2.31
56	50	51	12.0	750.0	819.70	2.33	1.32	0.00	-	1.75

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
57	0	50	14.0	1300.0	1431.77	2.98	3.02	0.00	-	2.33
58	51	52	12.0	400.0	815.70	2.31	0.70	0.00	-	1.74
59	52	53	12.0	710.0	794.69	2.25	1.18	0.00	-	1.66
60	53	54	12.0	750.0	705.69	2.00	1.00	0.00	-	1.33
61	54	55	12.0	590.0	344.70	0.98	0.21	0.00	-	0.35
62	55	56	12.0	350.0	338.29	0.96	0.12	0.00	-	0.34
63	56	57	12.0	840.0	313.29	0.89	0.25	0.00	-	0.30
64	57	58	8.0	600.0	12.35	0.08	0.00	0.00	-	0.01
65	59	58	8.0	550.0	0.21	0.00	0.00	0.00	-	0.00
66	60	59	8.0	170.0	10.63	0.07	0.00	0.00	-	0.00
67	60	21	12.0	1080.0	195.67	0.56	0.13	0.00	-	0.12
68	57	61	12.0	850.0	276.92	0.79	0.20	0.00	-	0.24
69	61	62	8.0	500.0	251.92	1.61	0.71	0.00	-	1.42
70	62	63	8.0	630.0	217.94	1.39	0.68	0.00	-	1.09
71	63	64	8.0	650.0	191.95	1.23	0.56	0.00	-	0.86
72	64	65	8.0	790.0	149.94	0.96	0.43	0.00	-	0.54
73	65	66	8.0	520.0	108.96	0.70	0.16	0.00	-	0.30
74	66	39	8.0	1020.0	80.95	0.52	0.18	0.00	-	0.17
75	68	67	8.0	1210.0	51.61	0.33	0.09	0.00	-	0.08
76	69	68	8.0	850.0	110.23	0.70	0.26	0.00	-	0.31
77	49	69	8.0	520.0	193.58	1.24	0.45	0.00	-	0.87
78	69	70	6.0	350.0	73.34	0.83	0.21	0.00	-	0.59
79	70	71	6.0	1100.0	28.99	0.33	0.12	0.00	-	0.11
80	72	71	6.0	850.0	4.00	0.05	0.00	0.00	-	0.00
81	73	72	8.0	800.0	29.01	0.19	0.02	0.00	-	0.03
82	70	73	6.0	860.0	29.36	0.33	0.09	0.00	-	0.11
83	68	73	6.0	600.0	21.64	0.25	0.04	0.00	-	0.06
84	54	74	12.0	170.0	349.99	0.99	0.06	0.00	-	0.36
85	74	75	12.0	340.0	342.00	0.97	0.12	0.00	-	0.35
86	75	76	12.0	720.0	291.36	0.83	0.19	0.00	-	0.26
87	76	77	12.0	380.0	68.05	0.19	0.01	0.00	-	0.02
88	77	78	14.0	1350.0	30.39	0.06	0.00	0.00	-	0.00
89	78	79	8.0	860.0	9.38	0.06	0.00	0.00	-	0.00
90	77	79	8.0	1300.0	10.64	0.07	0.01	0.00	-	0.00
91	58	80	8.0	750.0	5.56	0.04	0.00	0.00	-	0.00
92	59	80	8.0	750.0	5.43	0.03	0.00	0.00	-	0.00
93	75	81	8.0	400.0	44.63	0.28	0.02	0.00	-	0.06
94	81	82	8.0	260.0	23.87	0.15	0.00	0.00	-	0.02
95	76	84	12.0	850.0	212.31	0.60	0.12	0.00	-	0.14
96	82	83	8.0	810.0	1.28	0.01	0.00	0.00	-	0.00
97	82	55	8.0	230.0	7.60	0.05	0.00	0.00	-	0.00
98	84	60	12.0	660.0	206.30	0.59	0.09	0.00	-	0.14
99	81	83	8.0	980.0	11.73	0.07	0.00	0.00	-	0.00
100	85	36	8.0	170.0	89.04	0.57	0.04	0.00	-	0.21
101	86	85	8.0	170.0	69.79	0.45	0.02	0.00	-	0.13
102	87	86	8.0	350.0	67.82	0.43	0.04	0.00	-	0.13
103	88	87	8.0	700.0	71.28	0.45	0.10	0.00	-	0.14
104	89	88	8.0	230.0	77.30	0.49	0.04	0.00	-	0.16
105	24	89	8.0	330.0	160.14	1.02	0.20	0.00	-	0.61
106	89	90	8.0	840.0	76.83	0.49	0.13	0.00	-	0.16
107	90	87	8.0	240.0	5.56	0.04	0.00	0.00	-	0.00
108	90	91	8.0	660.0	47.26	0.30	0.04	0.00	-	0.06
109	91	86	8.0	750.0	7.98	0.05	0.00	0.00	-	0.00
110	91	92	8.0	270.0	32.27	0.21	0.01	0.00	-	0.03
111	92	85	8.0	780.0	25.27	0.16	0.02	0.00	-	0.02

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	1368.34+
57	1431.77+

Net system demand: 2800 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
25	3.21	25	5.12	91	66.41
24	3.21	24	5.12	86	66.41
57	2.98	26	2.40	92	66.41
4	2.65	57	2.33	85	66.40
5	2.65	55	2.31	33	66.13
6	2.63	4	1.86	32	66.07
55	2.41	5	1.86	30	66.04
7	2.38	6	1.84	29	66.04
8	2.34	27	1.76	28	66.03
56	2.33	56	1.75	37	65.99
88	0.06	89	0.00	69	40.07
89	0.06	80	0.00	40	39.75
109	0.05	109	0.00	53	39.34
97	0.05	97	0.00	46	38.21
80	0.05	88	0.00	7	37.42
91	0.04	91	0.00	1	36.64
107	0.04	107	0.00	47	35.69
92	0.03	92	0.00	52	34.65
96	0.01	96	0.00	50	31.19
65	0.00	65	0.00	51	30.62

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

APPENDIX F

GRAVITY SYSTEM FIRE FLOW MODEL FOR EXISTING & ENTITLED DEVELOPMENT WITH 2,000 GPM DEMAND AT NODE #51

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June 29, 2018

RANCHO MURIETA EXISTING & ENTITLED GRAVITY WATER FIRE FLOW MODEL @ NODE 51
(11-01-001)

Number of pipes: 111 Flow unit of measure: GPM
Number of junction nodes: 92 File name: RMNGEN

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	16.0	1300.0	130.0	0.0	-	310.00
2	1	2	16.0	750.0	130.0	0.0	-	-
3	2	3	16.0	500.0	130.0	0.0	-	-
4	3	4	14.0	1900.0	130.0	0.0	-	-
5	4	5	14.0	500.0	130.0	0.0	-	-
6	5	6	14.0	180.0	130.0	0.0	-	-
7	6	7	14.0	650.0	130.0	0.0	-	-
8	7	8	14.0	890.0	130.0	0.0	-	-
9	8	9	14.0	350.0	130.0	0.0	-	-
10	9	10	14.0	620.0	130.0	0.0	-	-
11	10	11	14.0	920.0	130.0	0.0	-	-
12	11	12	14.0	290.0	130.0	0.0	-	-
13	12	13	14.0	280.0	130.0	0.0	-	-
14	13	14	14.0	550.0	130.0	0.0	-	-
15	14	15	14.0	450.0	130.0	0.0	-	-
16	15	16	14.0	1100.0	130.0	0.0	-	-
17	16	17	14.0	250.0	130.0	0.0	-	-
18	17	18	14.0	420.0	130.0	0.0	-	-
19	18	19	14.0	440.0	130.0	0.0	-	-
20	19	20	12.0	480.0	130.0	0.0	-	-
21	20	13	8.0	3810.0	130.0	0.0	-	-
22	20	21	12.0	770.0	130.0	0.0	-	-
23	21	22	12.0	340.0	130.0	0.0	-	-
24	22	23	8.0	410.0	130.0	0.0	-	-
25	23	24	8.0	210.0	130.0	0.0	-	-
26	24	25	8.0	270.0	130.0	0.0	-	-
27	25	26	8.0	420.0	130.0	0.0	-	-
28	26	27	8.0	1080.0	130.0	0.0	-	-
29	27	28	8.0	230.0	130.0	0.0	-	-
30	28	29	8.0	270.0	130.0	0.0	-	-
31	29	30	10.0	1730.0	130.0	0.0	-	-
32	30	31	10.0	1820.0	130.0	0.0	-	-
33	31	29	8.0	550.0	130.0	0.0	-	-
34	31	32	10.0	350.0	130.0	0.0	-	-
35	32	33	10.0	570.0	130.0	0.0	-	-
36	33	34	10.0	530.0	130.0	0.0	-	-
37	34	35	10.0	620.0	130.0	0.0	-	-
38	35	36	10.0	100.0	130.0	0.0	-	-
39	36	37	8.0	640.0	130.0	0.0	-	-
40	37	35	8.0	410.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	37	38	12.0	670.0	130.0	0.0	-	-
42	38	39	8.0	1170.0	130.0	0.0	-	-
43	39	40	8.0	1430.0	130.0	0.0	-	-
44	40	41	8.0	430.0	130.0	0.0	-	-
45	41	42	8.0	400.0	130.0	0.0	-	-
46	42	43	8.0	260.0	130.0	0.0	-	-
47	43	44	8.0	250.0	130.0	0.0	-	-
48	44	67	8.0	600.0	130.0	0.0	-	-
49	44	45	8.0	630.0	130.0	0.0	-	-
50	45	46	8.0	880.0	130.0	0.0	-	-
51	46	47	8.0	350.0	130.0	0.0	-	-
52	47	48	10.0	550.0	130.0	0.0	-	-
53	48	67	10.0	1480.0	130.0	0.0	-	-
54	48	49	10.0	490.0	130.0	0.0	-	-
55	49	50	10.0	1320.0	130.0	0.0	-	-
56	50	51	12.0	750.0	130.0	0.0	-	-
57	50	0	14.0	1300.0	130.0	0.0	-	305.00
58	51	52	12.0	400.0	130.0	0.0	-	-
59	52	53	12.0	710.0	130.0	0.0	-	-
60	53	54	12.0	750.0	130.0	0.0	-	-
61	54	55	12.0	590.0	130.0	0.0	-	-
62	55	56	12.0	350.0	130.0	0.0	-	-
63	56	57	12.0	840.0	130.0	0.0	-	-
64	57	58	8.0	600.0	130.0	0.0	-	-
65	58	59	8.0	550.0	130.0	0.0	-	-
66	59	60	8.0	170.0	130.0	0.0	-	-
67	60	21	12.0	1080.0	130.0	0.0	-	-
68	57	61	12.0	850.0	130.0	0.0	-	-
69	61	62	8.0	500.0	130.0	0.0	-	-
70	62	63	8.0	630.0	130.0	0.0	-	-
71	63	64	8.0	650.0	130.0	0.0	-	-
72	64	65	8.0	790.0	130.0	0.0	-	-
73	65	66	8.0	520.0	130.0	0.0	-	-
74	66	39	8.0	1020.0	130.0	0.0	-	-
75	67	68	8.0	1210.0	130.0	0.0	-	-
76	68	69	8.0	850.0	130.0	0.0	-	-
77	69	49	8.0	520.0	130.0	0.0	-	-
78	69	70	6.0	350.0	130.0	0.0	-	-
79	70	71	6.0	1100.0	130.0	0.0	-	-
80	71	72	6.0	850.0	130.0	0.0	-	-
81	72	73	8.0	800.0	130.0	0.0	-	-
82	73	70	6.0	860.0	130.0	0.0	-	-
83	73	68	6.0	600.0	130.0	0.0	-	-
84	74	54	12.0	170.0	130.0	0.0	-	-
85	74	75	12.0	340.0	130.0	0.0	-	-
86	75	76	12.0	720.0	130.0	0.0	-	-
87	76	77	12.0	380.0	130.0	0.0	-	-
88	77	78	14.0	1350.0	130.0	0.0	-	-
89	78	79	8.0	860.0	130.0	0.0	-	-
90	79	77	8.0	1300.0	130.0	0.0	-	-
91	80	58	8.0	750.0	130.0	0.0	-	-
92	80	59	8.0	750.0	130.0	0.0	-	-
93	81	75	8.0	400.0	130.0	0.0	-	-
94	81	82	8.0	260.0	130.0	0.0	-	-
95	84	76	12.0	850.0	130.0	0.0	-	-
96	82	83	8.0	810.0	130.0	0.0	-	-
97	82	55	8.0	230.0	130.0	0.0	-	-
98	84	60	12.0	660.0	130.0	0.0	-	-
99	83	81	8.0	980.0	130.0	0.0	-	-
100	85	36	8.0	170.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
101	85	86	8.0	170.0	130.0	0.0	-	-
102	86	87	8.0	350.0	130.0	0.0	-	-
103	87	88	8.0	700.0	130.0	0.0	-	-
104	88	89	8.0	230.0	130.0	0.0	-	-
105	89	24	8.0	330.0	130.0	0.0	-	-
106	89	90	8.0	840.0	130.0	0.0	-	-
107	90	87	8.0	240.0	130.0	0.0	-	-
108	90	91	8.0	660.0	130.0	0.0	-	-
109	91	86	8.0	750.0	130.0	0.0	-	-
110	91	92	8.0	270.0	130.0	0.0	-	-
111	92	85	8.0	780.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	0.00	224.00	1, 2
2	0.00	193.00	2, 3
3	99.02	164.00	3, 4
4	0.00	176.00	4, 5
5	7.00	197.00	5, 6
6	118.01	203.00	6, 7
7	20.02	215.00	7, 8
8	54.99	198.00	8, 9
9	140.99	183.00	9, 10
10	229.01	192.00	10, 11
11	47.98	183.00	11, 12
12	65.98	173.00	12, 13
13	24.01	170.00	13, 14, 21
14	61.99	170.00	14, 15
15	21.99	173.00	15, 16
16	97.00	156.00	16, 17
17	15.98	164.00	17, 18
18	21.99	171.00	18, 19
19	4.98	172.00	19, 20
20	0.00	160.00	20, 21, 22
21	0.00	174.00	22, 23, 67
22	29.98	177.00	23, 24
23	0.00	154.00	24, 25
24	9.02	148.00	25, 26, 105
25	50.99	148.00	26, 27
26	340.01	144.00	27, 28
27	0.00	142.00	28, 29
28	0.00	140.00	29, 30
29	0.00	140.00	30, 31, 33
30	9.02	140.00	31, 32
31	75.00	142.00	32, 33, 34
32	24.01	140.00	34, 35
33	93.99	140.00	35, 36
34	0.00	143.00	36, 37
35	0.00	141.00	37, 38, 40
36	0.00	141.00	38, 39, 100
37	0.00	141.00	39, 40, 41
38	15.98	154.00	41, 42
39	104.00	162.00	42, 43, 74
40	27.02	204.00	43, 44
41	15.98	196.00	44, 45
42	7.99	179.00	45, 46
43	3.99	173.00	46, 47
44	35.01	173.00	47, 48, 49

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
45	13.02	182.00	49, 50
46	20.02	210.00	50, 51
47	11.98	216.00	51, 52
48	29.00	200.00	52, 53, 54
49	36.00	192.00	54, 55, 77
50	22.98	230.00	55, 56, 57
51	2003.98	230.00	56, 58
52	21.01	220.00	58, 59
53	89.01	208.00	59, 60
54	11.00	192.00	60, 61, 84
55	14.00	195.00	61, 62, 97
56	25.00	192.00	62, 63
57	24.01	170.00	63, 64, 68
58	7.00	178.00	64, 65, 91
59	4.98	190.00	65, 66, 92
60	0.00	193.00	66, 67, 98
61	25.00	156.00	68, 69
62	33.98	156.00	69, 70
63	25.99	154.00	70, 71
64	42.01	160.00	71, 72
65	40.98	172.00	72, 73
66	28.01	166.00	73, 74
67	38.02	193.00	48, 53, 75
68	36.99	170.00	75, 76, 83
69	10.01	206.00	76, 77, 78
70	14.99	197.00	78, 79, 82
71	32.99	198.00	79, 80
72	25.00	187.00	80, 81
73	21.99	172.00	81, 82, 83
74	7.99	182.00	84, 85
75	6.01	180.00	85, 86, 93
76	11.00	162.00	86, 87, 95
77	27.02	160.00	87, 88, 90
78	21.01	202.00	88, 89
79	20.02	180.00	89, 90
80	11.00	180.00	91, 92
81	9.02	187.00	93, 94, 99
82	14.99	185.00	94, 96, 97
83	13.02	180.00	96, 99
84	6.01	182.00	95, 98
85	6.01	140.00	100, 101, 111
86	6.01	140.00	101, 102, 109
87	9.02	142.00	102, 103, 107
88	6.01	144.00	103, 104
89	6.01	144.00	104, 105, 106
90	24.01	142.00	106, 107, 108
91	7.00	140.00	108, 109, 110
92	7.00	140.00	110, 111

Simulation Results

Number of trials: 9
Convergence : 0.0007

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Losses (ft) Minor	Pump Head	Hd Loss /1000 ft
1	0	1	16.0	1300.0	1812.44	2.89	2.44	0.00	-	1.88
2	1	2	16.0	750.0	1812.44	2.89	1.41	0.00	-	1.88
3	2	3	16.0	500.0	1812.44	2.89	0.94	0.00	-	1.88
4	3	4	14.0	1900.0	1713.42	3.57	6.17	0.00	-	3.24
5	4	5	14.0	500.0	1713.42	3.57	1.62	0.00	-	3.24
6	5	6	14.0	180.0	1706.42	3.56	0.58	0.00	-	3.22
7	6	7	14.0	650.0	1588.41	3.31	1.83	0.00	-	2.82
8	7	8	14.0	890.0	1568.39	3.27	2.45	0.00	-	2.75
9	8	9	14.0	350.0	1513.41	3.15	0.90	0.00	-	2.58
10	9	10	14.0	620.0	1372.42	2.86	1.33	0.00	-	2.15
11	10	11	14.0	920.0	1143.41	2.38	1.41	0.00	-	1.53
12	11	12	14.0	290.0	1095.43	2.28	0.41	0.00	-	1.42
13	12	13	14.0	280.0	1029.45	2.15	0.35	0.00	-	1.26
14	13	14	14.0	550.0	834.65	1.74	0.47	0.00	-	0.86
15	14	15	14.0	450.0	772.67	1.61	0.33	0.00	-	0.74
16	15	16	14.0	1100.0	750.67	1.56	0.77	0.00	-	0.70
17	16	17	14.0	250.0	653.67	1.36	0.14	0.00	-	0.54
18	17	18	14.0	420.0	637.69	1.33	0.22	0.00	-	0.52
19	18	19	14.0	440.0	615.70	1.28	0.21	0.00	-	0.49
20	19	20	12.0	480.0	610.72	1.73	0.49	0.00	-	1.02
21	13	20	8.0	3810.0	170.78	1.09	2.64	0.00	-	0.69
22	20	21	12.0	770.0	781.50	2.22	1.24	0.00	-	1.61
23	21	22	12.0	340.0	511.02	1.45	0.25	0.00	-	0.73
24	22	23	8.0	410.0	481.04	3.07	1.93	0.00	-	4.71
25	23	24	8.0	210.0	481.04	3.07	0.99	0.00	-	4.71
26	24	25	8.0	270.0	329.14	2.10	0.63	0.00	-	2.33
27	25	26	8.0	420.0	278.15	1.78	0.72	0.00	-	1.71
28	27	26	8.0	1080.0	61.86	0.39	0.11	0.00	-	0.11
29	28	27	8.0	230.0	61.86	0.39	0.02	0.00	-	0.11
30	29	28	8.0	270.0	61.86	0.39	0.03	0.00	-	0.11
31	30	29	10.0	1730.0	21.54	0.09	0.01	0.00	-	0.01
32	31	30	10.0	1820.0	30.56	0.12	0.02	0.00	-	0.01
33	31	29	8.0	550.0	40.32	0.26	0.03	0.00	-	0.05
34	32	31	10.0	350.0	145.89	0.60	0.06	0.00	-	0.17
35	33	32	10.0	570.0	169.90	0.69	0.13	0.00	-	0.23
36	34	33	10.0	530.0	263.89	1.08	0.28	0.00	-	0.52
37	35	34	10.0	620.0	263.89	1.08	0.32	0.00	-	0.52
38	36	35	10.0	100.0	152.32	0.62	0.02	0.00	-	0.19
39	37	36	8.0	640.0	80.54	0.51	0.11	0.00	-	0.17
40	37	35	8.0	410.0	111.57	0.71	0.13	0.00	-	0.31
41	38	37	12.0	670.0	192.11	0.54	0.08	0.00	-	0.12
42	39	38	8.0	1170.0	208.09	1.33	1.17	0.00	-	1.00
43	40	39	8.0	1430.0	281.36	1.80	2.49	0.00	-	1.74
44	41	40	8.0	430.0	308.38	1.97	0.89	0.00	-	2.07
45	42	41	8.0	400.0	324.36	2.07	0.91	0.00	-	2.27
46	43	42	8.0	260.0	332.35	2.12	0.62	0.00	-	2.38
47	44	43	8.0	250.0	336.34	2.15	0.61	0.00	-	2.43
48	67	44	8.0	600.0	231.92	1.48	0.73	0.00	-	1.22
49	45	44	8.0	630.0	139.43	0.89	0.30	0.00	-	0.48
50	46	45	8.0	880.0	152.45	0.97	0.49	0.00	-	0.56
51	47	46	8.0	350.0	172.47	1.10	0.25	0.00	-	0.70
52	48	47	10.0	550.0	184.45	0.75	0.15	0.00	-	0.27
53	48	67	10.0	1480.0	198.36	0.81	0.46	0.00	-	0.31
54	49	48	10.0	490.0	411.81	1.68	0.58	0.00	-	1.19
55	50	49	10.0	1320.0	661.36	2.70	3.78	0.00	-	2.87
56	50	51	12.0	750.0	2303.32	6.53	8.92	0.00	-	11.89

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
57	0	50	14.0	1300.0	2987.67	6.23	11.81	0.00	-	9.09
58	51	52	12.0	400.0	299.34	0.85	0.11	0.00	-	0.27
59	52	53	12.0	710.0	278.34	0.79	0.17	0.00	-	0.24
60	53	54	12.0	750.0	189.33	0.54	0.09	0.00	-	0.12
61	54	55	12.0	590.0	168.41	0.48	0.06	0.00	-	0.09
62	55	56	12.0	350.0	178.57	0.51	0.04	0.00	-	0.10
63	56	57	12.0	840.0	153.57	0.44	0.07	0.00	-	0.08
64	58	57	8.0	600.0	97.15	0.62	0.15	0.00	-	0.24
65	59	58	8.0	550.0	69.53	0.44	0.07	0.00	-	0.13
66	60	59	8.0	170.0	120.13	0.77	0.06	0.00	-	0.36
67	21	60	12.0	1080.0	270.47	0.77	0.24	0.00	-	0.23
68	57	61	12.0	850.0	226.71	0.64	0.14	0.00	-	0.16
69	61	62	8.0	500.0	201.71	1.29	0.47	0.00	-	0.94
70	62	63	8.0	630.0	167.73	1.07	0.42	0.00	-	0.67
71	63	64	8.0	650.0	141.74	0.90	0.32	0.00	-	0.49
72	64	65	8.0	790.0	99.73	0.64	0.20	0.00	-	0.26
73	65	66	8.0	520.0	58.75	0.37	0.05	0.00	-	0.10
74	66	39	8.0	1020.0	30.74	0.20	0.03	0.00	-	0.03
75	68	67	8.0	1210.0	71.58	0.46	0.17	0.00	-	0.14
76	69	68	8.0	850.0	124.60	0.80	0.33	0.00	-	0.39
77	49	69	8.0	520.0	213.55	1.36	0.54	0.00	-	1.05
78	69	70	6.0	350.0	78.94	0.90	0.24	0.00	-	0.67
79	70	71	6.0	1100.0	31.15	0.35	0.13	0.00	-	0.12
80	72	71	6.0	850.0	1.84	0.02	0.00	0.00	-	0.00
81	73	72	8.0	800.0	26.84	0.17	0.02	0.00	-	0.02
82	70	73	6.0	860.0	32.79	0.37	0.11	0.00	-	0.13
83	68	73	6.0	600.0	16.04	0.18	0.02	0.00	-	0.04
84	54	74	12.0	170.0	9.92	0.03	0.00	0.00	-	0.00
85	74	75	12.0	340.0	1.93	0.01	0.00	0.00	-	0.00
86	76	75	12.0	720.0	65.28	0.19	0.01	0.00	-	0.02
87	76	77	12.0	380.0	68.05	0.19	0.01	0.00	-	0.02
88	77	78	14.0	1350.0	30.39	0.06	0.00	0.00	-	0.00
89	78	79	8.0	860.0	9.38	0.06	0.00	0.00	-	0.00
90	77	79	8.0	1300.0	10.64	0.07	0.01	0.00	-	0.00
91	80	58	8.0	750.0	34.63	0.22	0.03	0.00	-	0.04
92	59	80	8.0	750.0	45.62	0.29	0.05	0.00	-	0.06
93	75	81	8.0	400.0	61.19	0.39	0.04	0.00	-	0.10
94	81	82	8.0	260.0	35.34	0.23	0.01	0.00	-	0.04
95	84	76	12.0	850.0	144.32	0.41	0.06	0.00	-	0.07
96	83	82	8.0	810.0	3.82	0.02	0.00	0.00	-	0.00
97	82	55	8.0	230.0	24.16	0.15	0.00	0.00	-	0.02
98	60	84	12.0	660.0	150.34	0.43	0.05	0.00	-	0.08
99	81	83	8.0	980.0	16.83	0.11	0.01	0.00	-	0.01
100	85	36	8.0	170.0	71.78	0.46	0.02	0.00	-	0.14
101	86	85	8.0	170.0	57.50	0.37	0.02	0.00	-	0.09
102	87	86	8.0	350.0	57.56	0.37	0.03	0.00	-	0.09
103	88	87	8.0	700.0	62.86	0.40	0.08	0.00	-	0.11
104	89	88	8.0	230.0	68.88	0.44	0.03	0.00	-	0.13
105	24	89	8.0	330.0	142.88	0.91	0.16	0.00	-	0.50
106	89	90	8.0	840.0	67.98	0.43	0.11	0.00	-	0.13
107	90	87	8.0	240.0	3.72	0.02	0.00	0.00	-	0.00
108	90	91	8.0	660.0	40.25	0.26	0.03	0.00	-	0.05
109	91	86	8.0	750.0	5.95	0.04	0.00	0.00	-	0.00
110	91	92	8.0	270.0	27.29	0.17	0.01	0.00	-	0.02
111	92	85	8.0	780.0	20.29	0.13	0.01	0.00	-	0.01

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	1812.43+
57	2987.66+

Net system demand: 4800 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
56	6.53	56	11.89	3	61.19
57	6.23	57	9.09	91	61.01
4	3.57	24	4.71	86	61.01
5	3.57	25	4.71	92	61.01
6	3.56	4	3.24	85	61.01
7	3.31	5	3.24	33	60.73
8	3.27	6	3.22	32	60.67
9	3.15	55	2.87	30	60.64
24	3.07	7	2.82	29	60.63
25	3.07	8	2.75	28	60.62
31	0.09	31	0.01	69	35.91
90	0.07	90	0.00	78	35.49
88	0.06	89	0.00	40	34.93
89	0.06	88	0.00	7	34.67
109	0.04	109	0.00	46	33.98
84	0.03	107	0.00	53	32.93
96	0.02	96	0.00	47	31.49
107	0.02	85	0.00	52	27.80
80	0.02	84	0.00	50	27.38
85	0.01	80	0.00	51	23.52

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

APPENDIX G

GRAVITY SYSTEM STATIC MODEL FOR ULTIMATE BUILDOUT OF DEVELOPMENT

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June 29, 2018

RANCHO MURIETA ULTIMATE BUILD OUT GRAVITY WATER STATIC MODEL
(11-01-001)

Number of pipes: 122 Flow unit of measure: GPM
Number of junction nodes: 99 File name: RMNGFP

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	16.0	1300.0	130.0	0.0	-	310.00
2	1	2	16.0	750.0	130.0	0.0	-	-
3	2	3	16.0	500.0	130.0	0.0	-	-
4	3	4	14.0	1900.0	130.0	0.0	-	-
5	4	5	14.0	500.0	130.0	0.0	-	-
6	5	6	14.0	180.0	130.0	0.0	-	-
7	6	7	14.0	650.0	130.0	0.0	-	-
8	7	8	14.0	890.0	130.0	0.0	-	-
9	8	9	14.0	350.0	130.0	0.0	-	-
10	9	10	14.0	620.0	130.0	0.0	-	-
11	10	11	14.0	920.0	130.0	0.0	-	-
12	11	12	14.0	290.0	130.0	0.0	-	-
13	12	13	14.0	280.0	130.0	0.0	-	-
14	13	14	14.0	550.0	130.0	0.0	-	-
15	14	15	14.0	450.0	130.0	0.0	-	-
16	15	16	14.0	1100.0	130.0	0.0	-	-
17	16	17	14.0	250.0	130.0	0.0	-	-
18	17	18	14.0	420.0	130.0	0.0	-	-
19	18	19	14.0	440.0	130.0	0.0	-	-
20	19	20	12.0	480.0	130.0	0.0	-	-
21	20	13	8.0	3810.0	130.0	0.0	-	-
22	20	21	12.0	770.0	130.0	0.0	-	-
23	21	22	12.0	340.0	130.0	0.0	-	-
24	22	23	8.0	410.0	130.0	0.0	-	-
25	23	24	8.0	210.0	130.0	0.0	-	-
26	24	25	8.0	270.0	130.0	0.0	-	-
27	25	26	8.0	420.0	130.0	0.0	-	-
28	26	27	8.0	1080.0	130.0	0.0	-	-
29	27	28	8.0	230.0	130.0	0.0	-	-
30	28	29	8.0	270.0	130.0	0.0	-	-
31	29	30	10.0	1730.0	130.0	0.0	-	-
32	30	31	10.0	1820.0	130.0	0.0	-	-
33	31	29	8.0	550.0	130.0	0.0	-	-
34	31	32	10.0	350.0	130.0	0.0	-	-
35	32	33	10.0	570.0	130.0	0.0	-	-
36	33	34	10.0	530.0	130.0	0.0	-	-
37	34	35	10.0	620.0	130.0	0.0	-	-
38	35	36	10.0	100.0	130.0	0.0	-	-
39	36	37	8.0	640.0	130.0	0.0	-	-
40	37	35	8.0	410.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	37	38	12.0	670.0	130.0	0.0	-	-
42	38	39	8.0	1170.0	130.0	0.0	-	-
43	39	40	8.0	1430.0	130.0	0.0	-	-
44	40	41	8.0	430.0	130.0	0.0	-	-
45	41	42	8.0	400.0	130.0	0.0	-	-
46	42	43	8.0	260.0	130.0	0.0	-	-
47	43	44	8.0	250.0	130.0	0.0	-	-
48	44	67	8.0	600.0	130.0	0.0	-	-
49	44	45	8.0	630.0	130.0	0.0	-	-
50	45	46	8.0	880.0	130.0	0.0	-	-
51	46	47	8.0	350.0	130.0	0.0	-	-
52	47	48	10.0	550.0	130.0	0.0	-	-
53	48	67	10.0	1480.0	130.0	0.0	-	-
54	48	49	10.0	490.0	130.0	0.0	-	-
55	49	50	10.0	1320.0	130.0	0.0	-	-
56	50	51	12.0	750.0	130.0	0.0	-	-
57	50	0	14.0	1300.0	130.0	0.0	-	305.00
58	51	52	12.0	400.0	130.0	0.0	-	-
59	52	53	12.0	710.0	130.0	0.0	-	-
60	53	54	12.0	750.0	130.0	0.0	-	-
61	54	55	12.0	590.0	130.0	0.0	-	-
62	55	56	12.0	350.0	130.0	0.0	-	-
63	56	57	12.0	840.0	130.0	0.0	-	-
64	57	58	8.0	600.0	130.0	0.0	-	-
65	58	59	8.0	550.0	130.0	0.0	-	-
66	59	60	8.0	170.0	130.0	0.0	-	-
67	60	21	12.0	1080.0	130.0	0.0	-	-
68	57	61	12.0	850.0	130.0	0.0	-	-
69	61	62	8.0	500.0	130.0	0.0	-	-
70	62	63	8.0	630.0	130.0	0.0	-	-
71	63	64	8.0	650.0	130.0	0.0	-	-
72	64	65	8.0	790.0	130.0	0.0	-	-
73	65	66	8.0	520.0	130.0	0.0	-	-
74	66	39	8.0	1020.0	130.0	0.0	-	-
75	67	68	8.0	1210.0	130.0	0.0	-	-
76	68	69	8.0	850.0	130.0	0.0	-	-
77	69	49	8.0	520.0	130.0	0.0	-	-
78	69	70	6.0	350.0	130.0	0.0	-	-
79	70	71	6.0	1100.0	130.0	0.0	-	-
80	71	72	6.0	850.0	130.0	0.0	-	-
81	72	73	8.0	800.0	130.0	0.0	-	-
82	73	70	6.0	860.0	130.0	0.0	-	-
83	73	68	6.0	600.0	130.0	0.0	-	-
84	74	54	12.0	170.0	130.0	0.0	-	-
85	74	75	12.0	340.0	130.0	0.0	-	-
86	75	76	12.0	720.0	130.0	0.0	-	-
87	76	77	12.0	380.0	130.0	0.0	-	-
88	77	78	14.0	1350.0	130.0	0.0	-	-
89	78	79	8.0	860.0	130.0	0.0	-	-
90	79	77	8.0	1300.0	130.0	0.0	-	-
91	80	58	8.0	750.0	130.0	0.0	-	-
92	80	59	8.0	750.0	130.0	0.0	-	-
93	81	75	8.0	400.0	130.0	0.0	-	-
94	81	82	8.0	260.0	130.0	0.0	-	-
95	84	76	12.0	850.0	130.0	0.0	-	-
96	82	83	8.0	810.0	130.0	0.0	-	-
97	82	55	8.0	230.0	130.0	0.0	-	-
98	84	60	12.0	660.0	130.0	0.0	-	-
99	83	81	8.0	980.0	130.0	0.0	-	-
100	85	36	8.0	170.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
101	85	86	8.0	170.0	130.0	0.0	-	-
102	86	87	8.0	350.0	130.0	0.0	-	-
103	87	88	8.0	700.0	130.0	0.0	-	-
104	88	89	8.0	230.0	130.0	0.0	-	-
105	89	24	8.0	330.0	130.0	0.0	-	-
106	89	90	8.0	840.0	130.0	0.0	-	-
107	90	87	8.0	240.0	130.0	0.0	-	-
108	90	91	8.0	660.0	130.0	0.0	-	-
109	91	86	8.0	750.0	130.0	0.0	-	-
110	91	92	8.0	270.0	130.0	0.0	-	-
111	92	85	8.0	780.0	130.0	0.0	-	-
112	92	28	8.0	180.0	130.0	0.0	-	-
113	93	52	8.0	300.0	130.0	0.0	-	-
114	93	94	8.0	920.0	130.0	0.0	-	-
115	94	95	8.0	400.0	130.0	0.0	-	-
116	95	96	8.0	1470.0	130.0	0.0	-	-
117	96	97	8.0	430.0	130.0	0.0	-	-
118	96	74	8.0	270.0	130.0	0.0	-	-
119	97	98	8.0	270.0	130.0	0.0	-	-
120	98	93	8.0	720.0	130.0	0.0	-	-
121	98	53	8.0	240.0	130.0	0.0	-	-
122	99	98	8.0	730.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	0.00	224.00	1, 2
2	0.00	193.00	2, 3
3	99.02	164.00	3, 4
4	0.00	176.00	4, 5
5	7.00	197.00	5, 6
6	118.01	203.00	6, 7
7	20.02	215.00	7, 8
8	54.99	198.00	8, 9
9	140.99	183.00	9, 10
10	229.01	192.00	10, 11
11	47.98	182.00	11, 12
12	65.98	173.00	12, 13
13	24.01	170.00	13, 14, 21
14	61.99	170.00	14, 15
15	21.99	173.00	15, 16
16	97.00	156.00	16, 17
17	15.98	164.00	17, 18
18	21.99	171.00	18, 19
19	4.98	172.00	19, 20
20	0.00	160.00	20, 21, 22
21	0.00	174.00	22, 23, 67
22	29.98	177.00	23, 24
23	0.00	154.00	24, 25
24	9.02	148.00	25, 26, 105
25	50.99	148.00	26, 27
26	340.01	144.00	27, 28
27	0.00	142.00	28, 29
28	0.00	140.00	29, 30, 112
29	0.00	140.00	30, 31, 33
30	9.02	140.00	31, 32
31	75.00	142.00	32, 33, 34
32	24.01	140.00	34, 35
33	93.99	140.00	35, 36

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
34	0.00	143.00	36, 37
35	0.00	141.00	37, 38, 40
36	0.00	141.00	38, 39, 100
37	0.00	141.00	39, 40, 41
38	15.98	154.00	41, 42
39	104.00	162.00	42, 43, 74
40	27.02	204.00	43, 44
41	15.98	196.00	44, 45
42	7.99	179.00	45, 46
43	3.99	173.00	46, 47
44	35.01	173.00	47, 48, 49
45	13.02	182.00	49, 50
46	20.02	210.00	50, 51
47	11.98	216.00	51, 52
48	29.00	200.00	52, 53, 54
49	36.00	192.00	54, 55, 77
50	22.98	230.00	55, 56, 57
51	3.99	230.00	56, 58
52	21.01	220.00	58, 59, 113
53	89.01	208.00	59, 60, 121
54	11.00	192.00	60, 61, 84
55	14.00	195.00	61, 62, 97
56	25.00	192.00	62, 63
57	24.01	170.00	63, 64, 68
58	7.00	178.00	64, 65, 91
59	4.98	190.00	65, 66, 92
60	0.00	193.00	66, 67, 98
61	25.00	156.00	68, 69
62	33.98	156.00	69, 70
63	25.99	154.00	70, 71
64	42.01	160.00	71, 72
65	40.98	172.00	72, 73
66	28.01	166.00	73, 74
67	38.02	193.00	48, 53, 75
68	36.99	170.00	75, 76, 83
69	10.01	206.00	76, 77, 78
70	14.99	197.00	78, 79, 82
71	32.99	198.00	79, 80
72	25.00	187.00	80, 81
73	21.99	172.00	81, 82, 83
74	7.99	182.00	84, 85, 118
75	6.01	180.00	85, 86, 93
76	11.00	162.00	86, 87, 95
77	27.02	160.00	87, 88, 90
78	21.01	202.00	88, 89
79	20.02	180.00	89, 90
80	11.00	180.00	91, 92
81	9.02	187.00	93, 94, 99
82	14.99	185.00	94, 96, 97
83	13.02	180.00	96, 99
84	6.01	182.00	95, 98
85	6.01	140.00	100, 101, 111
86	6.01	140.00	101, 102, 109
87	6.01	142.00	102, 103, 107
88	9.02	144.00	103, 104
89	6.01	144.00	104, 105, 106
90	6.01	142.00	106, 107, 108
91	24.01	140.00	108, 109, 110
92	7.00	140.00	110, 111, 112
93	3.99	224.00	113, 114, 120
94	13.02	210.00	114, 115

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
95	10.01	208.00	115, 116
96	11.00	180.00	116, 117, 118
97	14.00	190.00	117, 119
98	15.98	204.00	119, 120, 121, 122
99	22.98	194.00	122

Simulation Results

Number of trials: 11
Convergence : 0.0006

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	16.0	1300.0	1367.11	2.18	1.45	0.00	-	1.11
2	1	2	16.0	750.0	1367.11	2.18	0.84	0.00	-	1.11
3	2	3	16.0	500.0	1367.11	2.18	0.56	0.00	-	1.11
4	3	4	14.0	1900.0	1268.09	2.64	3.53	0.00	-	1.86
5	4	5	14.0	500.0	1268.09	2.64	0.93	0.00	-	1.86
6	5	6	14.0	180.0	1261.09	2.63	0.33	0.00	-	1.84
7	6	7	14.0	650.0	1143.08	2.38	1.00	0.00	-	1.53
8	7	8	14.0	890.0	1123.06	2.34	1.32	0.00	-	1.48
9	8	9	14.0	350.0	1068.08	2.23	0.47	0.00	-	1.35
10	9	10	14.0	620.0	927.09	1.93	0.65	0.00	-	1.04
11	10	11	14.0	920.0	698.08	1.45	0.57	0.00	-	0.62
12	11	12	14.0	290.0	650.10	1.35	0.16	0.00	-	0.54
13	12	13	14.0	280.0	584.12	1.22	0.12	0.00	-	0.44
14	13	14	14.0	550.0	475.49	0.99	0.17	0.00	-	0.30
15	14	15	14.0	450.0	413.51	0.86	0.10	0.00	-	0.23
16	15	16	14.0	1100.0	391.51	0.82	0.23	0.00	-	0.21
17	16	17	14.0	250.0	294.51	0.61	0.03	0.00	-	0.12
18	17	18	14.0	420.0	278.53	0.58	0.05	0.00	-	0.11
19	18	19	14.0	440.0	256.54	0.53	0.04	0.00	-	0.10
20	19	20	12.0	480.0	251.56	0.71	0.09	0.00	-	0.20
21	13	20	8.0	3810.0	84.61	0.54	0.72	0.00	-	0.19
22	20	21	12.0	770.0	336.17	0.95	0.26	0.00	-	0.34
23	21	22	12.0	340.0	533.05	1.51	0.27	0.00	-	0.79
24	22	23	8.0	410.0	503.07	3.21	2.10	0.00	-	5.12
25	23	24	8.0	210.0	503.07	3.21	1.07	0.00	-	5.12
26	24	25	8.0	270.0	295.47	1.89	0.52	0.00	-	1.91
27	25	26	8.0	420.0	244.48	1.56	0.56	0.00	-	1.35
28	27	26	8.0	1080.0	95.53	0.61	0.25	0.00	-	0.24
29	28	27	8.0	230.0	95.53	0.61	0.05	0.00	-	0.24
30	28	29	8.0	270.0	54.89	0.35	0.02	0.00	-	0.08
31	29	30	10.0	1730.0	24.29	0.10	0.01	0.00	-	0.01
32	30	31	10.0	1820.0	15.27	0.06	0.00	0.00	-	0.00
33	29	31	8.0	550.0	30.60	0.20	0.02	0.00	-	0.03
34	32	31	10.0	350.0	29.14	0.12	0.00	0.00	-	0.01
35	33	32	10.0	570.0	53.15	0.22	0.02	0.00	-	0.03
36	34	33	10.0	530.0	147.14	0.60	0.09	0.00	-	0.18
37	35	34	10.0	620.0	147.14	0.60	0.11	0.00	-	0.18
38	36	35	10.0	100.0	51.87	0.21	0.00	0.00	-	0.03
39	37	36	8.0	640.0	73.83	0.47	0.09	0.00	-	0.15
40	37	35	8.0	410.0	95.27	0.61	0.10	0.00	-	0.23
41	38	37	12.0	670.0	169.10	0.48	0.06	0.00	-	0.09
42	39	38	8.0	1170.0	185.08	1.18	0.94	0.00	-	0.80
43	40	39	8.0	1430.0	203.23	1.30	1.37	0.00	-	0.96
44	41	40	8.0	430.0	230.26	1.47	0.52	0.00	-	1.20
45	42	41	8.0	400.0	246.23	1.57	0.55	0.00	-	1.36
46	43	42	8.0	260.0	254.22	1.62	0.38	0.00	-	1.45
47	44	43	8.0	250.0	258.22	1.65	0.37	0.00	-	1.49

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
48	67	44	8.0	600.0	182.55	1.17	0.47	0.00	-	0.78
49	45	44	8.0	630.0	110.68	0.71	0.20	0.00	-	0.31
50	46	45	8.0	880.0	123.70	0.79	0.34	0.00	-	0.38
51	47	46	8.0	350.0	143.72	0.92	0.18	0.00	-	0.50
52	48	47	10.0	550.0	155.70	0.64	0.11	0.00	-	0.20
53	48	67	10.0	1480.0	170.59	0.70	0.34	0.00	-	0.23
54	49	48	10.0	490.0	355.29	1.45	0.44	0.00	-	0.91
55	50	49	10.0	1320.0	583.24	2.38	3.00	0.00	-	2.27
56	50	51	12.0	750.0	916.79	2.60	1.62	0.00	-	2.16
57	0	50	14.0	1300.0	1523.01	3.17	3.39	0.00	-	2.61
58	51	52	12.0	400.0	912.80	2.59	0.86	0.00	-	2.14
59	52	53	12.0	710.0	636.88	1.81	0.78	0.00	-	1.10
60	53	54	12.0	750.0	510.62	1.45	0.55	0.00	-	0.73
61	54	55	12.0	590.0	332.23	0.94	0.19	0.00	-	0.33
62	55	56	12.0	350.0	338.61	0.96	0.12	0.00	-	0.34
63	56	57	12.0	840.0	313.61	0.89	0.25	0.00	-	0.30
64	57	58	8.0	600.0	7.77	0.05	0.00	0.00	-	0.00
65	59	58	8.0	550.0	4.10	0.03	0.00	0.00	-	0.00
66	60	59	8.0	170.0	15.21	0.10	0.00	0.00	-	0.01
67	60	21	12.0	1080.0	196.89	0.56	0.14	0.00	-	0.13
68	57	61	12.0	850.0	281.82	0.80	0.21	0.00	-	0.24
69	61	62	8.0	500.0	256.82	1.64	0.74	0.00	-	1.47
70	62	63	8.0	630.0	222.84	1.42	0.71	0.00	-	1.13
71	63	64	8.0	650.0	196.85	1.26	0.59	0.00	-	0.90
72	64	65	8.0	790.0	154.84	0.99	0.46	0.00	-	0.58
73	65	66	8.0	520.0	113.86	0.73	0.17	0.00	-	0.33
74	66	39	8.0	1020.0	85.85	0.55	0.20	0.00	-	0.19
75	68	67	8.0	1210.0	49.97	0.32	0.09	0.00	-	0.07
76	69	68	8.0	850.0	109.03	0.70	0.26	0.00	-	0.30
77	49	69	8.0	520.0	191.95	1.23	0.45	0.00	-	0.86
78	69	70	6.0	350.0	72.91	0.83	0.20	0.00	-	0.58
79	70	71	6.0	1100.0	28.82	0.33	0.11	0.00	-	0.10
80	72	71	6.0	850.0	4.17	0.05	0.00	0.00	-	0.00
81	73	72	8.0	800.0	29.17	0.19	0.02	0.00	-	0.03
82	70	73	6.0	860.0	29.09	0.33	0.09	0.00	-	0.11
83	68	73	6.0	600.0	22.07	0.25	0.04	0.00	-	0.06
84	54	74	12.0	170.0	167.39	0.47	0.02	0.00	-	0.09
85	74	75	12.0	340.0	360.58	1.02	0.13	0.00	-	0.38
86	75	76	12.0	720.0	297.15	0.84	0.19	0.00	-	0.27
87	76	77	12.0	380.0	68.05	0.19	0.01	0.00	-	0.02
88	77	78	14.0	1350.0	30.39	0.06	0.00	0.00	-	0.00
89	78	79	8.0	860.0	9.38	0.06	0.00	0.00	-	0.00
90	77	79	8.0	1300.0	10.64	0.07	0.01	0.00	-	0.00
91	58	80	8.0	750.0	4.87	0.03	0.00	0.00	-	0.00
92	59	80	8.0	750.0	6.13	0.04	0.00	0.00	-	0.00
93	75	81	8.0	400.0	57.41	0.37	0.04	0.00	-	0.09
94	81	82	8.0	260.0	32.69	0.21	0.01	0.00	-	0.03
95	76	84	12.0	850.0	218.11	0.62	0.13	0.00	-	0.15
96	83	82	8.0	810.0	2.69	0.02	0.00	0.00	-	0.00
97	82	55	8.0	230.0	20.38	0.13	0.00	0.00	-	0.01
98	84	60	12.0	660.0	212.09	0.60	0.09	0.00	-	0.14
99	81	83	8.0	980.0	15.70	0.10	0.01	0.00	-	0.01
100	36	85	8.0	170.0	21.96	0.14	0.00	0.00	-	0.02
101	86	85	8.0	170.0	47.03	0.30	0.01	0.00	-	0.06
102	87	86	8.0	350.0	91.89	0.59	0.08	0.00	-	0.22
103	88	87	8.0	700.0	88.17	0.56	0.14	0.00	-	0.20
104	89	88	8.0	230.0	97.19	0.62	0.06	0.00	-	0.24
105	24	89	8.0	330.0	198.57	1.27	0.30	0.00	-	0.92
106	89	90	8.0	840.0	95.37	0.61	0.20	0.00	-	0.24
107	90	87	8.0	240.0	9.74	0.06	0.00	0.00	-	0.00

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
108	90	91	8.0	660.0	79.61	0.51	0.11	0.00	-	0.17
109	86	91	8.0	750.0	38.85	0.25	0.03	0.00	-	0.04
110	91	92	8.0	270.0	94.44	0.60	0.06	0.00	-	0.23
111	85	92	8.0	780.0	62.98	0.40	0.09	0.00	-	0.11
112	92	28	8.0	180.0	150.42	0.96	0.10	0.00	-	0.55
113	52	93	8.0	300.0	254.91	1.63	0.44	0.00	-	1.45
114	93	94	8.0	920.0	108.79	0.69	0.28	0.00	-	0.30
115	94	95	8.0	400.0	95.77	0.61	0.09	0.00	-	0.24
116	95	96	8.0	1470.0	85.76	0.55	0.28	0.00	-	0.19
117	97	96	8.0	430.0	126.41	0.81	0.17	0.00	-	0.40
118	96	74	8.0	270.0	201.18	1.28	0.25	0.00	-	0.94
119	98	97	8.0	270.0	140.41	0.90	0.13	0.00	-	0.48
120	93	98	8.0	720.0	142.13	0.91	0.35	0.00	-	0.49
121	53	98	8.0	240.0	37.24	0.24	0.01	0.00	-	0.04
122	98	99	8.0	730.0	22.98	0.15	0.01	0.00	-	0.02

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	1367.10+
57	1523.01+

Net system demand: 2890 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
24	3.21	24	5.12	86	66.34
25	3.21	25	5.12	85	66.33
57	3.17	57	2.61	91	66.32
4	2.64	55	2.27	92	66.30
5	2.64	56	2.16	28	66.25
6	2.63	58	2.14	33	66.24
56	2.60	26	1.91	29	66.24
58	2.59	4	1.86	30	66.24
55	2.38	5	1.86	32	66.24
7	2.38	6	1.84	37	65.94
88	0.06	107	0.00	95	39.14
32	0.06	89	0.00	94	38.32
107	0.06	80	0.00	46	38.08
89	0.06	32	0.00	7	37.43
64	0.05	64	0.00	1	36.64
80	0.05	88	0.00	47	35.56
92	0.04	92	0.00	52	34.29
91	0.03	96	0.00	93	32.37
65	0.03	91	0.00	50	31.03
96	0.02	65	0.00	51	30.33

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

APPENDIX H

GRAVITY SYSTEM FIRE FLOW MODEL FOR ULTIMATE BUILDOUT OF DEVELOPMENT WITH 2,000 GPM DEMAND AT NODE #51

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June 29, 2018

RANCHO MURIETA ULTIMATE BUILD OUT GRAVITY WATER FIRE FLOW MODEL @ NODE 51
(11-01-001)

Number of pipes: 122 Flow unit of measure: GPM
Number of junction nodes: 99 File name: RMNGFP

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	16.0	1300.0	130.0	0.0	-	310.00
2	1	2	16.0	750.0	130.0	0.0	-	-
3	2	3	16.0	500.0	130.0	0.0	-	-
4	3	4	14.0	1900.0	130.0	0.0	-	-
5	4	5	14.0	500.0	130.0	0.0	-	-
6	5	6	14.0	180.0	130.0	0.0	-	-
7	6	7	14.0	650.0	130.0	0.0	-	-
8	7	8	14.0	890.0	130.0	0.0	-	-
9	8	9	14.0	350.0	130.0	0.0	-	-
10	9	10	14.0	620.0	130.0	0.0	-	-
11	10	11	14.0	920.0	130.0	0.0	-	-
12	11	12	14.0	290.0	130.0	0.0	-	-
13	12	13	14.0	280.0	130.0	0.0	-	-
14	13	14	14.0	550.0	130.0	0.0	-	-
15	14	15	14.0	450.0	130.0	0.0	-	-
16	15	16	14.0	1100.0	130.0	0.0	-	-
17	16	17	14.0	250.0	130.0	0.0	-	-
18	17	18	14.0	420.0	130.0	0.0	-	-
19	18	19	14.0	440.0	130.0	0.0	-	-
20	19	20	12.0	480.0	130.0	0.0	-	-
21	20	13	8.0	3810.0	130.0	0.0	-	-
22	20	21	12.0	770.0	130.0	0.0	-	-
23	21	22	12.0	340.0	130.0	0.0	-	-
24	22	23	8.0	410.0	130.0	0.0	-	-
25	23	24	8.0	210.0	130.0	0.0	-	-
26	24	25	8.0	270.0	130.0	0.0	-	-
27	25	26	8.0	420.0	130.0	0.0	-	-
28	26	27	8.0	1080.0	130.0	0.0	-	-
29	27	28	8.0	230.0	130.0	0.0	-	-
30	28	29	8.0	270.0	130.0	0.0	-	-
31	29	30	10.0	1730.0	130.0	0.0	-	-
32	30	31	10.0	1820.0	130.0	0.0	-	-
33	31	29	8.0	550.0	130.0	0.0	-	-
34	31	32	10.0	350.0	130.0	0.0	-	-
35	32	33	10.0	570.0	130.0	0.0	-	-
36	33	34	10.0	530.0	130.0	0.0	-	-
37	34	35	10.0	620.0	130.0	0.0	-	-
38	35	36	10.0	100.0	130.0	0.0	-	-
39	36	37	8.0	640.0	130.0	0.0	-	-
40	37	35	8.0	410.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	37	38	12.0	670.0	130.0	0.0	-	-
42	38	39	8.0	1170.0	130.0	0.0	-	-
43	39	40	8.0	1430.0	130.0	0.0	-	-
44	40	41	8.0	430.0	130.0	0.0	-	-
45	41	42	8.0	400.0	130.0	0.0	-	-
46	42	43	8.0	260.0	130.0	0.0	-	-
47	43	44	8.0	250.0	130.0	0.0	-	-
48	44	67	8.0	600.0	130.0	0.0	-	-
49	44	45	8.0	630.0	130.0	0.0	-	-
50	45	46	8.0	880.0	130.0	0.0	-	-
51	46	47	8.0	350.0	130.0	0.0	-	-
52	47	48	10.0	550.0	130.0	0.0	-	-
53	48	67	10.0	1480.0	130.0	0.0	-	-
54	48	49	10.0	490.0	130.0	0.0	-	-
55	49	50	10.0	1320.0	130.0	0.0	-	-
56	50	51	12.0	750.0	130.0	0.0	-	-
57	50	0	14.0	1300.0	130.0	0.0	-	305.00
58	51	52	12.0	400.0	130.0	0.0	-	-
59	52	53	12.0	710.0	130.0	0.0	-	-
60	53	54	12.0	750.0	130.0	0.0	-	-
61	54	55	12.0	590.0	130.0	0.0	-	-
62	55	56	12.0	350.0	130.0	0.0	-	-
63	56	57	12.0	840.0	130.0	0.0	-	-
64	57	58	8.0	600.0	130.0	0.0	-	-
65	58	59	8.0	550.0	130.0	0.0	-	-
66	59	60	8.0	170.0	130.0	0.0	-	-
67	60	21	12.0	1080.0	130.0	0.0	-	-
68	57	61	12.0	850.0	130.0	0.0	-	-
69	61	62	8.0	500.0	130.0	0.0	-	-
70	62	63	8.0	630.0	130.0	0.0	-	-
71	63	64	8.0	650.0	130.0	0.0	-	-
72	64	65	8.0	790.0	130.0	0.0	-	-
73	65	66	8.0	520.0	130.0	0.0	-	-
74	66	39	8.0	1020.0	130.0	0.0	-	-
75	67	68	8.0	1210.0	130.0	0.0	-	-
76	68	69	8.0	850.0	130.0	0.0	-	-
77	69	49	8.0	520.0	130.0	0.0	-	-
78	69	70	6.0	350.0	130.0	0.0	-	-
79	70	71	6.0	1100.0	130.0	0.0	-	-
80	71	72	6.0	850.0	130.0	0.0	-	-
81	72	73	8.0	800.0	130.0	0.0	-	-
82	73	70	6.0	860.0	130.0	0.0	-	-
83	73	68	6.0	600.0	130.0	0.0	-	-
84	74	54	12.0	170.0	130.0	0.0	-	-
85	74	75	12.0	340.0	130.0	0.0	-	-
86	75	76	12.0	720.0	130.0	0.0	-	-
87	76	77	12.0	380.0	130.0	0.0	-	-
88	77	78	14.0	1350.0	130.0	0.0	-	-
89	78	79	8.0	860.0	130.0	0.0	-	-
90	79	77	8.0	1300.0	130.0	0.0	-	-
91	80	58	8.0	750.0	130.0	0.0	-	-
92	80	59	8.0	750.0	130.0	0.0	-	-
93	81	75	8.0	400.0	130.0	0.0	-	-
94	81	82	8.0	260.0	130.0	0.0	-	-
95	84	76	12.0	850.0	130.0	0.0	-	-
96	82	83	8.0	810.0	130.0	0.0	-	-
97	82	55	8.0	230.0	130.0	0.0	-	-
98	84	60	12.0	660.0	130.0	0.0	-	-
99	83	81	8.0	980.0	130.0	0.0	-	-
100	85	36	8.0	170.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
101	85	86	8.0	170.0	130.0	0.0	-	-
102	86	87	8.0	350.0	130.0	0.0	-	-
103	87	88	8.0	700.0	130.0	0.0	-	-
104	88	89	8.0	230.0	130.0	0.0	-	-
105	89	24	8.0	330.0	130.0	0.0	-	-
106	89	90	8.0	840.0	130.0	0.0	-	-
107	90	87	8.0	240.0	130.0	0.0	-	-
108	90	91	8.0	660.0	130.0	0.0	-	-
109	91	86	8.0	750.0	130.0	0.0	-	-
110	91	92	8.0	270.0	130.0	0.0	-	-
111	92	85	8.0	780.0	130.0	0.0	-	-
112	92	28	8.0	180.0	130.0	0.0	-	-
113	93	52	8.0	300.0	130.0	0.0	-	-
114	93	94	8.0	920.0	130.0	0.0	-	-
115	94	95	8.0	400.0	130.0	0.0	-	-
116	95	96	8.0	1470.0	130.0	0.0	-	-
117	96	97	8.0	430.0	130.0	0.0	-	-
118	96	74	8.0	270.0	130.0	0.0	-	-
119	97	98	8.0	270.0	130.0	0.0	-	-
120	98	93	8.0	720.0	130.0	0.0	-	-
121	98	53	8.0	240.0	130.0	0.0	-	-
122	99	98	8.0	730.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	0.00	224.00	1, 2
2	0.00	193.00	2, 3
3	99.02	164.00	3, 4
4	0.00	176.00	4, 5
5	7.00	197.00	5, 6
6	118.01	203.00	6, 7
7	20.02	215.00	7, 8
8	54.99	198.00	8, 9
9	140.99	183.00	9, 10
10	229.01	192.00	10, 11
11	47.98	182.00	11, 12
12	65.98	173.00	12, 13
13	24.01	170.00	13, 14, 21
14	61.99	170.00	14, 15
15	21.99	173.00	15, 16
16	97.00	156.00	16, 17
17	15.98	164.00	17, 18
18	21.99	171.00	18, 19
19	4.98	172.00	19, 20
20	0.00	160.00	20, 21, 22
21	0.00	174.00	22, 23, 67
22	29.98	177.00	23, 24
23	0.00	154.00	24, 25
24	9.02	148.00	25, 26, 105
25	50.99	148.00	26, 27
26	340.01	144.00	27, 28
27	0.00	142.00	28, 29
28	0.00	140.00	29, 30, 112
29	0.00	140.00	30, 31, 33
30	9.02	140.00	31, 32
31	75.00	142.00	32, 33, 34
32	24.01	140.00	34, 35
33	93.99	140.00	35, 36

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
34	0.00	143.00	36, 37
35	0.00	141.00	37, 38, 40
36	0.00	141.00	38, 39, 100
37	0.00	141.00	39, 40, 41
38	15.98	154.00	41, 42
39	104.00	162.00	42, 43, 74
40	27.02	204.00	43, 44
41	15.98	196.00	44, 45
42	7.99	179.00	45, 46
43	3.99	173.00	46, 47
44	35.01	173.00	47, 48, 49
45	13.02	182.00	49, 50
46	20.02	210.00	50, 51
47	11.98	216.00	51, 52
48	29.00	200.00	52, 53, 54
49	36.00	192.00	54, 55, 77
50	22.98	230.00	55, 56, 57
51	2003.98	230.00	56, 58
52	21.01	220.00	58, 59, 113
53	89.01	208.00	59, 60, 121
54	11.00	192.00	60, 61, 84
55	14.00	195.00	61, 62, 97
56	25.00	192.00	62, 63
57	24.01	170.00	63, 64, 68
58	7.00	178.00	64, 65, 91
59	4.98	190.00	65, 66, 92
60	0.00	193.00	66, 67, 98
61	25.00	156.00	68, 69
62	33.98	156.00	69, 70
63	25.99	154.00	70, 71
64	42.01	160.00	71, 72
65	40.98	172.00	72, 73
66	28.01	166.00	73, 74
67	38.02	193.00	48, 53, 75
68	36.99	170.00	75, 76, 83
69	10.01	206.00	76, 77, 78
70	14.99	197.00	78, 79, 82
71	32.99	198.00	79, 80
72	25.00	187.00	80, 81
73	21.99	172.00	81, 82, 83
74	7.99	182.00	84, 85, 118
75	6.01	180.00	85, 86, 93
76	11.00	162.00	86, 87, 95
77	27.02	160.00	87, 88, 90
78	21.01	202.00	88, 89
79	20.02	180.00	89, 90
80	11.00	180.00	91, 92
81	9.02	187.00	93, 94, 99
82	14.99	185.00	94, 96, 97
83	13.02	180.00	96, 99
84	6.01	182.00	95, 98
85	6.01	140.00	100, 101, 111
86	6.01	140.00	101, 102, 109
87	6.01	142.00	102, 103, 107
88	9.02	144.00	103, 104
89	6.01	144.00	104, 105, 106
90	6.01	142.00	106, 107, 108
91	24.01	140.00	108, 109, 110
92	7.00	140.00	110, 111, 112
93	3.99	224.00	113, 114, 120
94	13.02	210.00	114, 115

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
95	10.01	208.00	115, 116
96	11.00	180.00	116, 117, 118
97	14.00	190.00	117, 119
98	15.98	204.00	119, 120, 121, 122
99	22.98	194.00	122

Simulation Results

Number of trials: 10
Convergence : 0.0006

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	16.0	1300.0	1835.70	2.93	2.50	0.00	-	1.92
2	1	2	16.0	750.0	1835.70	2.93	1.44	0.00	-	1.92
3	2	3	16.0	500.0	1835.70	2.93	0.96	0.00	-	1.92
4	3	4	14.0	1900.0	1736.68	3.62	6.32	0.00	-	3.33
5	4	5	14.0	500.0	1736.68	3.62	1.66	0.00	-	3.33
6	5	6	14.0	180.0	1729.68	3.60	0.59	0.00	-	3.30
7	6	7	14.0	650.0	1611.67	3.36	1.88	0.00	-	2.90
8	7	8	14.0	890.0	1591.65	3.32	2.52	0.00	-	2.83
9	8	9	14.0	350.0	1536.67	3.20	0.93	0.00	-	2.65
10	9	10	14.0	620.0	1395.68	2.91	1.38	0.00	-	2.22
11	10	11	14.0	920.0	1166.67	2.43	1.47	0.00	-	1.59
12	11	12	14.0	290.0	1118.69	2.33	0.43	0.00	-	1.47
13	12	13	14.0	280.0	1052.71	2.19	0.37	0.00	-	1.32
14	13	14	14.0	550.0	853.39	1.78	0.49	0.00	-	0.89
15	14	15	14.0	450.0	791.40	1.65	0.35	0.00	-	0.78
16	15	16	14.0	1100.0	769.41	1.60	0.81	0.00	-	0.74
17	16	17	14.0	250.0	672.41	1.40	0.14	0.00	-	0.57
18	17	18	14.0	420.0	656.43	1.37	0.23	0.00	-	0.55
19	18	19	14.0	440.0	634.44	1.32	0.23	0.00	-	0.52
20	19	20	12.0	480.0	629.45	1.79	0.52	0.00	-	1.08
21	13	20	8.0	3810.0	175.30	1.12	2.77	0.00	-	0.73
22	20	21	12.0	770.0	804.76	2.28	1.31	0.00	-	1.70
23	21	22	12.0	340.0	506.62	1.44	0.24	0.00	-	0.72
24	22	23	8.0	410.0	476.63	3.04	1.90	0.00	-	4.63
25	23	24	8.0	210.0	476.63	3.04	0.97	0.00	-	4.63
26	24	25	8.0	270.0	288.15	1.84	0.49	0.00	-	1.82
27	25	26	8.0	420.0	237.15	1.51	0.53	0.00	-	1.27
28	27	26	8.0	1080.0	102.86	0.66	0.29	0.00	-	0.27
29	28	27	8.0	230.0	102.86	0.66	0.06	0.00	-	0.27
30	28	29	8.0	270.0	50.21	0.32	0.02	0.00	-	0.07
31	29	30	10.0	1730.0	22.41	0.09	0.01	0.00	-	0.01
32	30	31	10.0	1820.0	13.39	0.05	0.00	0.00	-	0.00
33	29	31	8.0	550.0	27.80	0.18	0.01	0.00	-	0.02
34	32	31	10.0	350.0	33.81	0.14	0.00	0.00	-	0.01
35	33	32	10.0	570.0	57.83	0.24	0.02	0.00	-	0.03
36	34	33	10.0	530.0	151.82	0.62	0.10	0.00	-	0.19
37	35	34	10.0	620.0	151.82	0.62	0.12	0.00	-	0.19
38	36	35	10.0	100.0	41.99	0.17	0.00	0.00	-	0.02
39	37	36	8.0	640.0	85.71	0.55	0.12	0.00	-	0.19
40	37	35	8.0	410.0	109.83	0.70	0.13	0.00	-	0.31
41	38	37	12.0	670.0	195.53	0.55	0.08	0.00	-	0.12
42	39	38	8.0	1170.0	211.51	1.35	1.20	0.00	-	1.03
43	40	39	8.0	1430.0	287.56	1.84	2.60	0.00	-	1.82
44	41	40	8.0	430.0	314.58	2.01	0.92	0.00	-	2.15
45	42	41	8.0	400.0	330.56	2.11	0.94	0.00	-	2.35
46	43	42	8.0	260.0	338.55	2.16	0.64	0.00	-	2.46
47	44	43	8.0	250.0	342.55	2.19	0.63	0.00	-	2.51

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
48	67	44	8.0	600.0	235.83	1.51	0.75	0.00	-	1.26
49	45	44	8.0	630.0	141.72	0.90	0.31	0.00	-	0.49
50	46	45	8.0	880.0	154.74	0.99	0.51	0.00	-	0.58
51	47	46	8.0	350.0	174.76	1.12	0.25	0.00	-	0.72
52	48	47	10.0	550.0	186.74	0.76	0.15	0.00	-	0.28
53	48	67	10.0	1480.0	200.58	0.82	0.47	0.00	-	0.31
54	49	48	10.0	490.0	416.32	1.70	0.60	0.00	-	1.22
55	50	49	10.0	1320.0	667.57	2.73	3.85	0.00	-	2.92
56	50	51	12.0	750.0	2363.86	6.71	9.36	0.00	-	12.48
57	0	50	14.0	1300.0	3054.41	6.37	12.31	0.00	-	9.47
58	51	52	12.0	400.0	359.88	1.02	0.15	0.00	-	0.38
59	52	53	12.0	710.0	239.35	0.68	0.13	0.00	-	0.18
60	53	54	12.0	750.0	123.54	0.35	0.04	0.00	-	0.05
61	54	55	12.0	590.0	161.07	0.46	0.05	0.00	-	0.09
62	55	56	12.0	350.0	170.09	0.48	0.03	0.00	-	0.10
63	56	57	12.0	840.0	145.09	0.41	0.06	0.00	-	0.07
64	58	57	8.0	600.0	102.85	0.66	0.16	0.00	-	0.27
65	59	58	8.0	550.0	73.12	0.47	0.08	0.00	-	0.14
66	60	59	8.0	170.0	125.83	0.80	0.07	0.00	-	0.39
67	21	60	12.0	1080.0	298.14	0.85	0.29	0.00	-	0.27
68	57	61	12.0	850.0	223.93	0.64	0.13	0.00	-	0.16
69	61	62	8.0	500.0	198.92	1.27	0.46	0.00	-	0.92
70	62	63	8.0	630.0	164.94	1.05	0.41	0.00	-	0.65
71	63	64	8.0	650.0	138.96	0.89	0.31	0.00	-	0.47
72	64	65	8.0	790.0	96.94	0.62	0.19	0.00	-	0.24
73	65	66	8.0	520.0	55.96	0.36	0.05	0.00	-	0.09
74	66	39	8.0	1020.0	27.95	0.18	0.02	0.00	-	0.02
75	68	67	8.0	1210.0	73.28	0.47	0.17	0.00	-	0.14
76	69	68	8.0	850.0	125.81	0.80	0.33	0.00	-	0.39
77	49	69	8.0	520.0	215.25	1.37	0.55	0.00	-	1.06
78	69	70	6.0	350.0	79.44	0.90	0.24	0.00	-	0.68
79	70	71	6.0	1100.0	31.35	0.36	0.13	0.00	-	0.12
80	72	71	6.0	850.0	1.64	0.02	0.00	0.00	-	0.00
81	73	72	8.0	800.0	26.64	0.17	0.02	0.00	-	0.02
82	70	73	6.0	860.0	33.09	0.38	0.12	0.00	-	0.13
83	68	73	6.0	600.0	15.54	0.18	0.02	0.00	-	0.03
84	74	54	12.0	170.0	48.54	0.14	0.00	0.00	-	0.01
85	75	74	12.0	340.0	21.18	0.06	0.00	0.00	-	0.00
86	76	75	12.0	720.0	87.24	0.25	0.02	0.00	-	0.03
87	76	77	12.0	380.0	68.05	0.19	0.01	0.00	-	0.02
88	77	78	14.0	1350.0	30.39	0.06	0.00	0.00	-	0.00
89	78	79	8.0	860.0	9.38	0.06	0.00	0.00	-	0.00
90	77	79	8.0	1300.0	10.64	0.07	0.01	0.00	-	0.00
91	80	58	8.0	750.0	36.73	0.23	0.03	0.00	-	0.04
92	59	80	8.0	750.0	47.73	0.30	0.05	0.00	-	0.07
93	75	81	8.0	400.0	60.05	0.38	0.04	0.00	-	0.10
94	81	82	8.0	260.0	34.54	0.22	0.01	0.00	-	0.04
95	84	76	12.0	850.0	166.29	0.47	0.08	0.00	-	0.09
96	83	82	8.0	810.0	3.47	0.02	0.00	0.00	-	0.00
97	82	55	8.0	230.0	23.02	0.15	0.00	0.00	-	0.02
98	60	84	12.0	660.0	172.30	0.49	0.06	0.00	-	0.10
99	81	83	8.0	980.0	16.48	0.11	0.01	0.00	-	0.01
100	36	85	8.0	170.0	43.71	0.28	0.01	0.00	-	0.06
101	86	85	8.0	170.0	29.48	0.19	0.00	0.00	-	0.03
102	87	86	8.0	350.0	78.28	0.50	0.06	0.00	-	0.16
103	88	87	8.0	700.0	78.81	0.50	0.12	0.00	-	0.17
104	89	88	8.0	230.0	87.83	0.56	0.05	0.00	-	0.20
105	24	89	8.0	330.0	179.47	1.15	0.25	0.00	-	0.76
106	89	90	8.0	840.0	85.62	0.55	0.16	0.00	-	0.19
107	90	87	8.0	240.0	5.48	0.04	0.00	0.00	-	0.00

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
108	90	91	8.0	660.0	74.12	0.47	0.10	0.00	-	0.15
109	86	91	8.0	750.0	42.78	0.27	0.04	0.00	-	0.05
110	91	92	8.0	270.0	92.89	0.59	0.06	0.00	-	0.22
111	85	92	8.0	780.0	67.18	0.43	0.10	0.00	-	0.12
112	92	28	8.0	180.0	153.07	0.98	0.10	0.00	-	0.57
113	52	93	8.0	300.0	99.53	0.64	0.08	0.00	-	0.25
114	93	94	8.0	920.0	42.84	0.27	0.05	0.00	-	0.05
115	94	95	8.0	400.0	29.82	0.19	0.01	0.00	-	0.03
116	95	96	8.0	1470.0	19.81	0.13	0.02	0.00	-	0.01
117	97	96	8.0	430.0	26.53	0.17	0.01	0.00	-	0.02
118	96	74	8.0	270.0	35.34	0.23	0.01	0.00	-	0.04
119	98	97	8.0	270.0	40.53	0.26	0.01	0.00	-	0.05
120	93	98	8.0	720.0	52.69	0.34	0.06	0.00	-	0.08
121	53	98	8.0	240.0	26.80	0.17	0.01	0.00	-	0.02
122	98	99	8.0	730.0	22.98	0.15	0.01	0.00	-	0.02

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	1835.69+
57	3054.40+

Net system demand: 4890 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
56	6.71	56	12.48	3	61.14
57	6.37	57	9.47	86	60.62
4	3.62	24	4.63	85	60.62
5	3.62	25	4.63	91	60.60
6	3.60	4	3.33	92	60.57
7	3.36	5	3.33	28	60.53
8	3.32	6	3.30	33	60.53
9	3.20	55	2.92	29	60.52
24	3.04	7	2.90	32	60.52
25	3.04	8	2.83	30	60.52
99	0.11	99	0.01	98	34.26
31	0.09	31	0.01	46	33.73
90	0.07	90	0.00	53	32.52
88	0.06	89	0.00	95	32.52
85	0.06	32	0.00	94	31.66
89	0.06	85	0.00	47	31.24
32	0.05	88	0.00	52	27.38
107	0.04	107	0.00	50	27.17
96	0.02	96	0.00	93	25.61
80	0.02	80	0.00	51	23.11

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

APPENDIX I

RANCHO MURIETA HYDRONEUMATIC WATER SYSTEM DIAGRAM

CALERO RESERVOIR

CHESBRO RESERVOIR

CLEMENTIA RESERVOIR

BASS LAKE

LAKE JEAN

PARK

VILLAGE "G"

VILLAGE "H"

VILLAGE "F"

VILLAGE "A"

VILLAGE "B"

VILLAGE "C"

VILLAGE "D"

VILLAGE "E"

THE RESIDENCES of MURIETA HILLS (198 LOTS)

RESERVOIR NO. 1

RIO OSO TANK

WATER TREATMENT PLANT

BOOSTER PUMP FOR LOTS 12-22

POTENTIAL NEW TANK SITE

PIPE UPGRADE TO 12" WITH VILLAGE 'A', 'B', OR 'C'

DISCONNECT EX. 16" PIPE WITH VILLAGE 'B' OR 'C'

DISCONNECT GRAVITY ADD PRESSURE VALVE

VILLAGE 'B' LOTS BELOW ELEVATION 222 REQUIRE PRESSURE REDUCERS

GRANLEES PUMP STATION

GRANLEES DAMS

C.I.A. DITCH

CLUB HOUSE

GOLF COURSE MAINTENANCE BUILDINGS

PEDESTRIAN BRIDGE

CLEMENTIA PARK

VAN VLECK TANK

LAKEVIEW (99 LOTS)

RIVERVIEW (140 LOTS)

222' CONTOUR

PUERTO DR

GUADALUPE DR

GUADALUPE LAKE

CAMINO DEL LAGO

MURIETA PARKWAY

ALAMEDA DR

DE LA CRUZ DR

THE RETREAT NORTH

THE RETREAT EAST

CLEMENTIA CIRCLE

VIA SERENO

UNIT 1

UNIT 2

UNIT 2A

UNIT 2B

UNIT 3

UNIT 3A

UNIT 3B

UNIT 4

UNIT 5

UNIT 6

COSUMNES RIVER

LEGEND

HYDROPNEUMATIC

PROPOSED — 12"(PIPE SIZE)

EXISTING — 12"(PIPE SIZE)

HYDRO NODE — 7 (EXISTING) 7 (PROPOSED)

GRAVITY

PROPOSED — 12"(PIPE SIZE)

EXISTING — 12"(PIPE SIZE)

SHED LINE

222' CONTOUR — HYDROPNEUMATIC ABOVE 222' / GRAVITY BELOW 222'

SCALE: 1"=300'

300' 0' 300' 600' 900'

GRAPHIC SCALE: 1"=300'

RANCHO MURIETA WATER HYDRONEUMATIC PLAN

JUNE, 2018

BAKER-WILLIAMS ENGINEERING GROUP
Engineering / Surveying / Land Planning / Entitlement Processing / GPS Services
6020 Rutland Drive, Suite 19 ~ Carmichael, CA. 95608
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APPENDIX J

HYDRONEUMATIC SYSTEM STATIC MODEL FOR EXISTING DEVELOPMENT

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June 29, 2018

RANCHO MURIETA EXISTING HYDRONEUMATIC WATER STATIC MODEL
(11-01-001)

Number of pipes: 41 Flow unit of measure: GPM
Number of junction nodes: 33 File name: RMNHEX

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	18.0	520.0	130.0	0.0	-	438.60
2	1	2	14.0	230.0	130.0	0.0	-	-
3	2	3	8.0	440.0	130.0	0.0	-	-
4	3	4	8.0	320.0	130.0	0.0	-	-
5	4	5	6.0	1550.0	130.0	0.0	-	-
6	5	6	8.0	380.0	130.0	0.0	-	-
7	5	3	8.0	220.0	130.0	0.0	-	-
8	6	7	8.0	840.0	130.0	0.0	-	-
9	7	8	8.0	310.0	130.0	0.0	-	-
10	8	9	8.0	580.0	130.0	0.0	-	-
11	9	10	8.0	970.0	130.0	0.0	-	-
12	10	11	8.0	850.0	130.0	0.0	-	-
13	11	12	8.0	520.0	130.0	0.0	-	-
14	12	13	8.0	360.0	130.0	0.0	-	-
15	13	14	8.0	200.0	130.0	0.0	-	-
16	14	15	8.0	500.0	130.0	0.0	-	-
17	15	16	8.0	950.0	130.0	0.0	-	-
18	16	17	8.0	430.0	130.0	0.0	-	-
19	17	18	10.0	370.0	130.0	0.0	-	-
20	18	19	10.0	530.0	130.0	0.0	-	-
21	19	20	10.0	820.0	130.0	0.0	-	-
22	20	21	10.0	550.0	130.0	0.0	-	-
23	21	22	10.0	420.0	130.0	0.0	-	-
24	22	23	10.0	800.0	130.0	0.0	-	-
25	23	24	8.0	720.0	130.0	0.0	-	-
26	24	25	8.0	800.0	130.0	0.0	-	-
27	25	1	8.0	690.0	130.0	0.0	-	-
28	25	31	8.0	740.0	130.0	0.0	-	-
29	26	27	8.0	220.0	130.0	0.0	-	-
30	26	22	10.0	740.0	130.0	0.0	-	-
31	27	28	8.0	450.0	130.0	0.0	-	-
33	29	2	14.0	790.0	130.0	0.0	-	-
34	29	30	10.0	250.0	130.0	0.0	-	-
35	29	32	8.0	990.0	130.0	0.0	-	-
36	30	18	10.0	650.0	130.0	0.0	-	-
37	30	31	8.0	1150.0	130.0	0.0	-	-
38	31	25	8.0	900.0	130.0	0.0	-	-
39	32	15	8.0	860.0	130.0	0.0	-	-
40	32	33	8.0	270.0	130.0	0.0	-	-
41	33	6	8.0	620.0	130.0	0.0	-	-
42	33	13	8.0	1800.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	33.98	244.00	1, 2, 27
2	13.02	243.00	2, 3, 33
3	13.02	250.00	3, 4, 7
4	42.01	234.00	4, 5
5	14.99	236.00	5, 6, 7
6	14.99	223.00	6, 8, 41
7	33.98	238.00	8, 9
8	28.01	246.00	9, 10
9	24.01	249.00	10, 11
10	32.00	242.00	11, 12
11	15.98	256.00	12, 13
12	14.00	259.00	13, 14
13	17.01	262.00	14, 15, 42
14	15.98	266.00	15, 16
15	32.00	282.00	16, 17, 39
16	25.99	318.00	17, 18
17	11.00	318.00	18, 19
18	15.98	278.00	19, 20, 36
19	27.02	264.00	20, 21
20	33.98	283.00	21, 22
21	36.99	270.00	22, 23
22	22.98	270.00	23, 24, 30
23	32.99	258.00	24, 25
24	29.98	242.00	25, 26
25	28.01	238.00	26, 27, 28, 38
26	3.01	270.00	29, 30
27	7.00	262.00	29, 31
28	10.01	240.00	31
29	14.00	280.00	33, 34, 35
30	14.99	272.00	34, 36, 37
31	29.00	250.00	28, 37, 38
32	40.98	248.00	35, 39, 40
33	29.00	244.00	40, 41, 42

Simulation Results

Number of trials: 10
Convergence : 0.0044

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Losses (ft) Minor	Pump Head	Hd Loss /1000 ft
1	0	1	18.0	520.0	757.90	0.96	0.11	0.00	-	0.21
2	1	2	14.0	230.0	577.76	1.20	0.10	0.00	-	0.43
3	2	3	8.0	440.0	189.44	1.21	0.37	0.00	-	0.84
4	3	4	8.0	320.0	57.17	0.36	0.03	0.00	-	0.09
5	4	5	6.0	1550.0	15.16	0.17	0.05	0.00	-	0.03
6	5	6	8.0	380.0	119.41	0.76	0.14	0.00	-	0.36
7	3	5	8.0	220.0	119.25	0.76	0.08	0.00	-	0.36
8	6	7	8.0	840.0	84.89	0.54	0.16	0.00	-	0.19
9	7	8	8.0	310.0	50.91	0.32	0.02	0.00	-	0.07
10	8	9	8.0	580.0	22.90	0.15	0.01	0.00	-	0.02
11	10	9	8.0	970.0	1.11	0.01	0.00	0.00	-	0.00
12	11	10	8.0	850.0	33.12	0.21	0.03	0.00	-	0.03
13	12	11	8.0	520.0	49.10	0.31	0.04	0.00	-	0.07
14	13	12	8.0	360.0	63.10	0.40	0.04	0.00	-	0.11
15	14	13	8.0	200.0	41.16	0.26	0.01	0.00	-	0.05
16	15	14	8.0	500.0	57.14	0.36	0.05	0.00	-	0.09
17	16	15	8.0	950.0	47.68	0.30	0.06	0.00	-	0.07
18	17	16	8.0	430.0	73.66	0.47	0.06	0.00	-	0.15

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
19	18	17	10.0	370.0	84.66	0.35	0.02	0.00	-	0.06
20	18	19	10.0	530.0	103.91	0.42	0.05	0.00	-	0.09
21	19	20	10.0	820.0	76.89	0.31	0.04	0.00	-	0.05
22	20	21	10.0	550.0	42.91	0.18	0.01	0.00	-	0.02
23	21	22	10.0	420.0	5.92	0.02	0.00	0.00	-	0.00
24	23	22	10.0	800.0	37.08	0.15	0.01	0.00	-	0.01
25	24	23	8.0	720.0	70.07	0.45	0.10	0.00	-	0.13
26	25	24	8.0	800.0	100.05	0.64	0.21	0.00	-	0.26
27	1	25	8.0	690.0	146.16	0.93	0.36	0.00	-	0.52
28	25	31	8.0	740.0	9.47	0.06	0.00	0.00	-	0.00
29	26	27	8.0	220.0	17.01	0.11	0.00	0.00	-	0.01
30	22	26	10.0	740.0	20.02	0.08	0.00	0.00	-	0.00
31	27	28	8.0	450.0	10.01	0.06	0.00	0.00	-	0.00
33	2	29	14.0	790.0	375.31	0.78	0.15	0.00	-	0.19
34	29	30	10.0	250.0	230.44	0.94	0.10	0.00	-	0.41
35	29	32	8.0	990.0	130.87	0.84	0.42	0.00	-	0.42
36	30	18	10.0	650.0	204.55	0.84	0.21	0.00	-	0.33
37	30	31	8.0	1150.0	10.90	0.07	0.00	0.00	-	0.00
38	25	31	8.0	900.0	8.63	0.06	0.00	0.00	-	0.00
39	32	15	8.0	860.0	41.47	0.26	0.04	0.00	-	0.05
40	32	33	8.0	270.0	48.42	0.31	0.02	0.00	-	0.07
41	6	33	8.0	620.0	19.53	0.12	0.01	0.00	-	0.01
42	33	13	8.0	1800.0	38.95	0.25	0.08	0.00	-	0.04

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	757.90+

Net system demand: 758 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
3	1.21	3	0.84	6	93.08
2	1.20	27	0.52	4	88.40
1	0.96	2	0.43	5	87.51
34	0.94	35	0.42	25	86.72
27	0.93	34	0.41	7	86.51
36	0.84	6	0.36	28	85.72
35	0.84	7	0.36	24	84.90
33	0.78	36	0.33	10	84.77
6	0.76	26	0.26	2	84.67
7	0.76	1	0.21	1	84.28
10	0.15	24	0.01	21	72.72
41	0.12	41	0.01	22	72.72
29	0.11	29	0.01	26	72.72
30	0.08	30	0.00	30	71.99
37	0.07	37	0.00	18	69.30
31	0.06	31	0.00	29	68.57
28	0.06	28	0.00	15	67.50
38	0.06	38	0.00	20	67.09
23	0.02	23	0.00	17	51.96
11	0.01	11	0.00	16	51.93

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

APPENDIX K

HYDRONEUMATIC SYSTEM FIRE FLOW MODEL FOR EXISTING DEVELOPMENT WITH 2,000 GPM DEMAND AT NODE #16

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June 29, 2018

RANCHO MURIETA EXISTING HYDRONEUMATIC WATER FIRE FLOW MODEL @ NODE 16
(11-01-001)

Number of pipes: 41 Flow unit of measure: GPM
Number of junction nodes: 33 File name: RMNHEX

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	18.0	520.0	130.0	0.0	-	438.60
2	1	2	14.0	230.0	130.0	0.0	-	-
3	2	3	8.0	440.0	130.0	0.0	-	-
4	3	4	8.0	320.0	130.0	0.0	-	-
5	4	5	6.0	1550.0	130.0	0.0	-	-
6	5	6	8.0	380.0	130.0	0.0	-	-
7	5	3	8.0	220.0	130.0	0.0	-	-
8	6	7	8.0	840.0	130.0	0.0	-	-
9	7	8	8.0	310.0	130.0	0.0	-	-
10	8	9	8.0	580.0	130.0	0.0	-	-
11	9	10	8.0	970.0	130.0	0.0	-	-
12	10	11	8.0	850.0	130.0	0.0	-	-
13	11	12	8.0	520.0	130.0	0.0	-	-
14	12	13	8.0	360.0	130.0	0.0	-	-
15	13	14	8.0	200.0	130.0	0.0	-	-
16	14	15	8.0	500.0	130.0	0.0	-	-
17	15	16	8.0	950.0	130.0	0.0	-	-
18	16	17	8.0	430.0	130.0	0.0	-	-
19	17	18	10.0	370.0	130.0	0.0	-	-
20	18	19	10.0	530.0	130.0	0.0	-	-
21	19	20	10.0	820.0	130.0	0.0	-	-
22	20	21	10.0	550.0	130.0	0.0	-	-
23	21	22	10.0	420.0	130.0	0.0	-	-
24	22	23	10.0	800.0	130.0	0.0	-	-
25	23	24	8.0	720.0	130.0	0.0	-	-
26	24	25	8.0	800.0	130.0	0.0	-	-
27	25	1	8.0	690.0	130.0	0.0	-	-
28	25	31	8.0	740.0	130.0	0.0	-	-
29	26	27	8.0	220.0	130.0	0.0	-	-
30	26	22	10.0	740.0	130.0	0.0	-	-
31	27	28	8.0	450.0	130.0	0.0	-	-
33	29	2	14.0	790.0	130.0	0.0	-	-
34	29	30	10.0	250.0	130.0	0.0	-	-
35	29	32	8.0	990.0	130.0	0.0	-	-
36	30	18	10.0	650.0	130.0	0.0	-	-
37	30	31	8.0	1150.0	130.0	0.0	-	-
38	31	25	8.0	900.0	130.0	0.0	-	-
39	32	15	8.0	860.0	130.0	0.0	-	-
40	32	33	8.0	270.0	130.0	0.0	-	-
41	33	6	8.0	620.0	130.0	0.0	-	-
42	33	13	8.0	1800.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	33.98	244.00	1, 2, 27
2	13.02	243.00	2, 3, 33
3	13.02	250.00	3, 4, 7
4	42.01	234.00	4, 5
5	14.99	236.00	5, 6, 7
6	14.99	223.00	6, 8, 41
7	33.98	238.00	8, 9
8	28.01	246.00	9, 10
9	24.01	249.00	10, 11
10	32.00	242.00	11, 12
11	15.98	256.00	12, 13
12	14.00	259.00	13, 14
13	17.01	262.00	14, 15, 42
14	15.98	266.00	15, 16
15	32.00	282.00	16, 17, 39
16	2026.02	318.00	17, 18
17	11.00	318.00	18, 19
18	15.98	278.00	19, 20, 36
19	27.02	264.00	20, 21
20	33.98	283.00	21, 22
21	36.99	270.00	22, 23
22	22.98	270.00	23, 24, 30
23	32.99	258.00	24, 25
24	29.98	242.00	25, 26
25	28.01	238.00	26, 27, 28, 38
26	3.01	270.00	29, 30
27	7.00	262.00	29, 31
28	10.01	240.00	31
29	14.00	280.00	33, 34, 35
30	14.99	272.00	34, 36, 37
31	29.00	250.00	28, 37, 38
32	40.98	248.00	35, 39, 40
33	29.00	244.00	40, 41, 42

Simulation Results

Number of trials: 7
Convergence : 0.0021

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	18.0	520.0	2757.93	3.48	1.20	0.00	-	2.30
2	1	2	14.0	230.0	2173.73	4.53	1.16	0.00	-	5.04
3	2	3	8.0	440.0	623.68	3.98	3.35	0.00	-	7.62
4	3	4	8.0	320.0	117.99	0.75	0.11	0.00	-	0.35
5	4	5	6.0	1550.0	75.98	0.86	0.97	0.00	-	0.63
6	5	6	8.0	380.0	553.66	3.53	2.32	0.00	-	6.11
7	3	5	8.0	220.0	492.67	3.14	1.08	0.00	-	4.92
8	6	7	8.0	840.0	260.69	1.66	1.27	0.00	-	1.51
9	7	8	8.0	310.0	226.71	1.45	0.36	0.00	-	1.17
10	8	9	8.0	580.0	198.70	1.27	0.53	0.00	-	0.92
11	9	10	8.0	970.0	174.69	1.11	0.70	0.00	-	0.72
12	10	11	8.0	850.0	142.68	0.91	0.42	0.00	-	0.50
13	11	12	8.0	520.0	126.71	0.81	0.21	0.00	-	0.40
14	12	13	8.0	360.0	112.70	0.72	0.12	0.00	-	0.32
15	13	14	8.0	200.0	347.26	2.22	0.52	0.00	-	2.58
16	14	15	8.0	500.0	331.28	2.11	1.18	0.00	-	2.36
17	15	16	8.0	950.0	792.81	5.06	11.29	0.00	-	11.88
18	17	16	8.0	430.0	1233.21	7.87	11.58	0.00	-	26.93

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Losses (ft) Minor	Pump Head	Hd Loss /1000 ft
19	18	17	10.0	370.0	1244.21	5.08	3.42	0.00	-	9.24
20	19	18	10.0	530.0	162.73	0.66	0.11	0.00	-	0.21
21	20	19	10.0	820.0	189.75	0.78	0.23	0.00	-	0.28
22	21	20	10.0	550.0	223.73	0.91	0.21	0.00	-	0.38
23	22	21	10.0	420.0	260.71	1.06	0.21	0.00	-	0.51
24	23	22	10.0	800.0	303.72	1.24	0.54	0.00	-	0.68
25	24	23	8.0	720.0	336.71	2.15	1.75	0.00	-	2.43
26	25	24	8.0	800.0	366.69	2.34	2.28	0.00	-	2.85
27	1	25	8.0	690.0	550.22	3.51	4.17	0.00	-	6.04
28	25	31	8.0	740.0	81.85	0.52	0.13	0.00	-	0.18
29	26	27	8.0	220.0	17.01	0.11	0.00	0.00	-	0.01
30	22	26	10.0	740.0	20.02	0.08	0.00	0.00	-	0.00
31	27	28	8.0	450.0	10.01	0.06	0.00	0.00	-	0.00
33	2	29	14.0	790.0	1537.03	3.20	2.10	0.00	-	2.65
34	29	30	10.0	250.0	985.93	4.03	1.50	0.00	-	6.00
35	29	32	8.0	990.0	537.10	3.43	5.72	0.00	-	5.78
36	30	18	10.0	650.0	1097.46	4.48	4.76	0.00	-	7.32
37	31	30	8.0	1150.0	126.53	0.81	0.46	0.00	-	0.40
38	25	31	8.0	900.0	73.67	0.47	0.13	0.00	-	0.15
39	32	15	8.0	860.0	493.53	3.15	4.25	0.00	-	4.94
40	32	33	8.0	270.0	2.59	0.02	0.00	0.00	-	0.00
41	6	33	8.0	620.0	277.98	1.77	1.06	0.00	-	1.71
42	33	13	8.0	1800.0	251.57	1.61	2.55	0.00	-	1.42

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	2757.93+

Net system demand: 2758 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
18	7.87	18	26.93	6	89.48
19	5.08	17	11.88	4	86.14
17	5.06	19	9.24	5	84.85
2	4.53	3	7.62	25	84.60
36	4.48	36	7.32	1	83.81
34	4.03	6	6.11	2	83.74
3	3.98	27	6.04	7	82.42
6	3.53	34	6.00	24	81.88
27	3.51	35	5.78	28	81.75
1	3.48	2	5.04	10	80.00
21	0.78	4	0.35	14	69.05
4	0.75	14	0.32	22	68.75
14	0.72	21	0.28	26	68.75
20	0.66	20	0.21	21	68.66
28	0.52	28	0.18	29	66.80
38	0.47	38	0.15	18	64.95
29	0.11	29	0.01	20	62.93
30	0.08	30	0.00	15	61.61
31	0.06	31	0.00	17	46.14
40	0.02	40	0.00	16	41.12

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

APPENDIX L

HYDRONEUMATIC SYSTEM STATIC MODEL FOR EXISTING & ENTITLED DEVELOPMENT

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June 29, 2018

RANCHO MURIETA EXISTING & ENTITLED HYDRONEUMATIC WATER STATIC MODEL
(11-01-001)

Number of pipes: 41 Flow unit of measure: GPM
Number of junction nodes: 33 File name: RMNHEN

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	18.0	520.0	130.0	0.0	-	438.60
2	1	2	14.0	230.0	130.0	0.0	-	-
3	2	3	8.0	440.0	130.0	0.0	-	-
4	3	4	8.0	320.0	130.0	0.0	-	-
5	4	5	6.0	1550.0	130.0	0.0	-	-
6	5	6	8.0	380.0	130.0	0.0	-	-
7	5	3	8.0	220.0	130.0	0.0	-	-
8	6	7	8.0	840.0	130.0	0.0	-	-
9	7	8	8.0	310.0	130.0	0.0	-	-
10	8	9	8.0	580.0	130.0	0.0	-	-
11	9	10	8.0	970.0	130.0	0.0	-	-
12	10	11	8.0	850.0	130.0	0.0	-	-
13	11	12	8.0	520.0	130.0	0.0	-	-
14	12	13	8.0	360.0	130.0	0.0	-	-
15	13	14	8.0	200.0	130.0	0.0	-	-
16	14	15	8.0	500.0	130.0	0.0	-	-
17	15	16	8.0	950.0	130.0	0.0	-	-
18	16	17	8.0	430.0	130.0	0.0	-	-
19	17	18	10.0	370.0	130.0	0.0	-	-
20	18	19	10.0	530.0	130.0	0.0	-	-
21	19	20	10.0	820.0	130.0	0.0	-	-
22	20	21	10.0	550.0	130.0	0.0	-	-
23	21	22	10.0	420.0	130.0	0.0	-	-
24	22	23	10.0	800.0	130.0	0.0	-	-
25	23	24	8.0	720.0	130.0	0.0	-	-
26	24	25	8.0	800.0	130.0	0.0	-	-
27	25	1	8.0	690.0	130.0	0.0	-	-
28	25	31	8.0	740.0	130.0	0.0	-	-
29	26	27	8.0	220.0	130.0	0.0	-	-
30	26	22	10.0	740.0	130.0	0.0	-	-
31	27	28	8.0	450.0	130.0	0.0	-	-
33	29	2	14.0	790.0	130.0	0.0	-	-
34	29	30	10.0	250.0	130.0	0.0	-	-
35	29	32	8.0	990.0	130.0	0.0	-	-
36	30	18	10.0	650.0	130.0	0.0	-	-
37	30	31	8.0	1150.0	130.0	0.0	-	-
38	31	25	8.0	900.0	130.0	0.0	-	-
39	32	15	8.0	860.0	130.0	0.0	-	-
40	32	33	8.0	270.0	130.0	0.0	-	-
41	33	6	8.0	620.0	130.0	0.0	-	-
42	33	13	8.0	1800.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	33.98	244.00	1, 2, 27
2	13.02	243.00	2, 3, 33
3	13.02	250.00	3, 4, 7
4	42.01	234.00	4, 5
5	14.99	236.00	5, 6, 7
6	14.99	223.00	6, 8, 41
7	33.98	238.00	8, 9
8	28.01	246.00	9, 10
9	122.99	249.00	10, 11
10	32.00	242.00	11, 12
11	115.00	256.00	12, 13
12	14.00	259.00	13, 14
13	17.01	262.00	14, 15, 42
14	15.98	266.00	15, 16
15	32.00	282.00	16, 17, 39
16	25.99	318.00	17, 18
17	11.00	318.00	18, 19
18	15.98	278.00	19, 20, 36
19	27.02	264.00	20, 21
20	33.98	283.00	21, 22
21	36.99	270.00	22, 23
22	22.98	270.00	23, 24, 30
23	32.99	258.00	24, 25
24	29.98	242.00	25, 26
25	28.01	238.00	26, 27, 28, 38
26	3.01	270.00	29, 30
27	7.00	262.00	29, 31
28	10.01	240.00	31
29	14.00	280.00	33, 34, 35
30	14.99	272.00	34, 36, 37
31	29.00	250.00	28, 37, 38
32	40.98	248.00	35, 39, 40
33	29.00	244.00	40, 41, 42

Simulation Results

Number of trials: 10
Convergence : 0.0002

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	18.0	520.0	955.89	1.21	0.17	0.00	-	0.32
2	1	2	14.0	230.0	745.50	1.55	0.16	0.00	-	0.69
3	2	3	8.0	440.0	263.55	1.68	0.68	0.00	-	1.55
4	3	4	8.0	320.0	67.90	0.43	0.04	0.00	-	0.13
5	4	5	6.0	1550.0	25.89	0.29	0.13	0.00	-	0.09
6	5	6	8.0	380.0	193.53	1.24	0.33	0.00	-	0.87
7	3	5	8.0	220.0	182.63	1.17	0.17	0.00	-	0.78
8	6	7	8.0	840.0	172.17	1.10	0.59	0.00	-	0.70
9	7	8	8.0	310.0	138.19	0.88	0.14	0.00	-	0.47
10	8	9	8.0	580.0	110.19	0.70	0.18	0.00	-	0.31
11	10	9	8.0	970.0	12.80	0.08	0.01	0.00	-	0.01
12	11	10	8.0	850.0	44.81	0.29	0.05	0.00	-	0.06
13	12	11	8.0	520.0	159.80	1.02	0.32	0.00	-	0.61
14	13	12	8.0	360.0	173.81	1.11	0.26	0.00	-	0.71
15	14	13	8.0	200.0	114.26	0.73	0.07	0.00	-	0.33
16	15	14	8.0	500.0	130.24	0.83	0.21	0.00	-	0.42
17	16	15	8.0	950.0	106.43	0.68	0.27	0.00	-	0.29
18	17	16	8.0	430.0	132.42	0.85	0.19	0.00	-	0.43

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Losses (ft) Minor	Pump Head	Hd Loss /1000 ft
19	18	17	10.0	370.0	143.42	0.59	0.06	0.00	-	0.17
20	18	19	10.0	530.0	92.10	0.38	0.04	0.00	-	0.07
21	19	20	10.0	820.0	65.08	0.27	0.03	0.00	-	0.04
22	20	21	10.0	550.0	31.10	0.13	0.01	0.00	-	0.01
23	22	21	10.0	420.0	5.88	0.02	0.00	0.00	-	0.00
24	23	22	10.0	800.0	48.89	0.20	0.02	0.00	-	0.02
25	24	23	8.0	720.0	81.88	0.52	0.13	0.00	-	0.18
26	25	24	8.0	800.0	111.86	0.71	0.25	0.00	-	0.32
27	1	25	8.0	690.0	176.41	1.13	0.51	0.00	-	0.73
28	25	31	8.0	740.0	19.24	0.12	0.01	0.00	-	0.01
29	26	27	8.0	220.0	17.01	0.11	0.00	0.00	-	0.01
30	22	26	10.0	740.0	20.02	0.08	0.00	0.00	-	0.00
31	27	28	8.0	450.0	10.01	0.06	0.00	0.00	-	0.00
33	2	29	14.0	790.0	468.93	0.98	0.23	0.00	-	0.29
34	29	30	10.0	250.0	258.94	1.06	0.13	0.00	-	0.50
35	29	32	8.0	990.0	195.98	1.25	0.88	0.00	-	0.89
36	30	18	10.0	650.0	251.50	1.03	0.31	0.00	-	0.48
37	31	30	8.0	1150.0	7.55	0.05	0.00	0.00	-	0.00
38	25	31	8.0	900.0	17.31	0.11	0.01	0.00	-	0.01
39	32	15	8.0	860.0	55.81	0.36	0.08	0.00	-	0.09
40	32	33	8.0	270.0	99.19	0.63	0.07	0.00	-	0.25
41	6	33	8.0	620.0	6.36	0.04	0.00	0.00	-	0.00
42	33	13	8.0	1800.0	76.56	0.49	0.28	0.00	-	0.16

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	955.89+

Net system demand: 956 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
3	1.68	3	1.55	6	92.77
2	1.55	35	0.89	4	88.21
35	1.25	6	0.87	5	87.28
6	1.24	7	0.78	25	86.63
1	1.21	27	0.73	7	86.02
7	1.17	14	0.71	28	85.59
27	1.13	8	0.70	24	84.79
14	1.11	2	0.69	2	84.62
8	1.10	13	0.61	1	84.25
34	1.06	34	0.50	10	84.14
22	0.13	28	0.01	22	72.59
28	0.12	38	0.01	21	72.59
38	0.11	22	0.01	26	72.59
29	0.11	29	0.01	30	71.90
30	0.08	11	0.01	18	69.16
11	0.08	30	0.00	29	68.48
31	0.06	31	0.00	15	67.20
37	0.05	37	0.00	20	66.96
41	0.04	41	0.00	17	51.80
23	0.02	23	0.00	16	51.72

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

APPENDIX M

HYDRONEUMATIC SYSTEM FIRE FLOW MODEL FOR EXISTING & ENTITLED DEVELOPMENT WITH 2,000 GPM DEMAND AT NODE #16

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June 29, 2018

RANCHO MURIETA EXISTING & ENTITLED HYDRONEUMATIC WATER FLOW MODEL @ NODE 16
(11-01-001)

Number of pipes: 41 Flow unit of measure: GPM
Number of junction nodes: 33 File name: RMNHEN

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	18.0	520.0	130.0	0.0	-	438.60
2	1	2	14.0	230.0	130.0	0.0	-	-
3	2	3	8.0	440.0	130.0	0.0	-	-
4	3	4	8.0	320.0	130.0	0.0	-	-
5	4	5	6.0	1550.0	130.0	0.0	-	-
6	5	6	8.0	380.0	130.0	0.0	-	-
7	5	3	8.0	220.0	130.0	0.0	-	-
8	6	7	8.0	840.0	130.0	0.0	-	-
9	7	8	8.0	310.0	130.0	0.0	-	-
10	8	9	8.0	580.0	130.0	0.0	-	-
11	9	10	8.0	970.0	130.0	0.0	-	-
12	10	11	8.0	850.0	130.0	0.0	-	-
13	11	12	8.0	520.0	130.0	0.0	-	-
14	12	13	8.0	360.0	130.0	0.0	-	-
15	13	14	8.0	200.0	130.0	0.0	-	-
16	14	15	8.0	500.0	130.0	0.0	-	-
17	15	16	8.0	950.0	130.0	0.0	-	-
18	16	17	8.0	430.0	130.0	0.0	-	-
19	17	18	10.0	370.0	130.0	0.0	-	-
20	18	19	10.0	530.0	130.0	0.0	-	-
21	19	20	10.0	820.0	130.0	0.0	-	-
22	20	21	10.0	550.0	130.0	0.0	-	-
23	21	22	10.0	420.0	130.0	0.0	-	-
24	22	23	10.0	800.0	130.0	0.0	-	-
25	23	24	8.0	720.0	130.0	0.0	-	-
26	24	25	8.0	800.0	130.0	0.0	-	-
27	25	1	8.0	690.0	130.0	0.0	-	-
28	25	31	8.0	740.0	130.0	0.0	-	-
29	26	27	8.0	220.0	130.0	0.0	-	-
30	26	22	10.0	740.0	130.0	0.0	-	-
31	27	28	8.0	450.0	130.0	0.0	-	-
33	29	2	14.0	790.0	130.0	0.0	-	-
34	29	30	10.0	250.0	130.0	0.0	-	-
35	29	32	8.0	990.0	130.0	0.0	-	-
36	30	18	10.0	650.0	130.0	0.0	-	-
37	30	31	8.0	1150.0	130.0	0.0	-	-
38	31	25	8.0	900.0	130.0	0.0	-	-
39	32	15	8.0	860.0	130.0	0.0	-	-
40	32	33	8.0	270.0	130.0	0.0	-	-
41	33	6	8.0	620.0	130.0	0.0	-	-
42	33	13	8.0	1800.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	33.98	244.00	1, 2, 27
2	13.02	243.00	2, 3, 33
3	13.02	250.00	3, 4, 7
4	42.01	234.00	4, 5
5	14.99	236.00	5, 6, 7
6	14.99	223.00	6, 8, 41
7	33.98	238.00	8, 9
8	28.01	246.00	9, 10
9	122.99	249.00	10, 11
10	32.00	242.00	11, 12
11	115.00	256.00	12, 13
12	14.00	259.00	13, 14
13	17.01	262.00	14, 15, 42
14	15.98	266.00	15, 16
15	32.00	282.00	16, 17, 39
16	2026.02	318.00	17, 18
17	11.00	318.00	18, 19
18	15.98	278.00	19, 20, 36
19	27.02	264.00	20, 21
20	33.98	283.00	21, 22
21	36.99	270.00	22, 23
22	22.98	270.00	23, 24, 30
23	32.99	258.00	24, 25
24	29.98	242.00	25, 26
25	28.01	238.00	26, 27, 28, 38
26	3.01	270.00	29, 30
27	7.00	262.00	29, 31
28	10.01	240.00	31
29	14.00	280.00	33, 34, 35
30	14.99	272.00	34, 36, 37
31	29.00	250.00	28, 37, 38
32	40.98	248.00	35, 39, 40
33	29.00	244.00	40, 41, 42

Simulation Results

Number of trials: 7
Convergence : 0.0019

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	18.0	520.0	2955.92	3.73	1.36	0.00	-	2.62
2	1	2	14.0	230.0	2347.93	4.89	1.34	0.00	-	5.82
3	2	3	8.0	440.0	706.53	4.51	4.22	0.00	-	9.60
4	3	4	8.0	320.0	129.42	0.83	0.13	0.00	-	0.41
5	4	5	6.0	1550.0	87.40	0.99	1.26	0.00	-	0.81
6	5	6	8.0	380.0	636.51	4.06	3.01	0.00	-	7.91
7	3	5	8.0	220.0	564.10	3.60	1.39	0.00	-	6.33
8	6	7	8.0	840.0	341.80	2.18	2.10	0.00	-	2.50
9	7	8	8.0	310.0	307.83	1.96	0.64	0.00	-	2.06
10	8	9	8.0	580.0	279.82	1.79	1.00	0.00	-	1.73
11	9	10	8.0	970.0	156.83	1.00	0.57	0.00	-	0.59
12	10	11	8.0	850.0	124.83	0.80	0.33	0.00	-	0.39
13	11	12	8.0	520.0	9.83	0.06	0.00	0.00	-	0.00
14	13	12	8.0	360.0	4.18	0.03	0.00	0.00	-	0.00
15	13	14	8.0	200.0	280.59	1.79	0.35	0.00	-	1.74
16	14	15	8.0	500.0	264.61	1.69	0.78	0.00	-	1.56
17	15	16	8.0	950.0	755.09	4.82	10.32	0.00	-	10.86
18	17	16	8.0	430.0	1270.93	8.11	12.25	0.00	-	28.48

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
19	18	17	10.0	370.0	1281.92	5.24	3.61	0.00	-	9.76
20	19	18	10.0	530.0	173.26	0.71	0.13	0.00	-	0.24
21	20	19	10.0	820.0	200.29	0.82	0.26	0.00	-	0.31
22	21	20	10.0	550.0	234.26	0.96	0.23	0.00	-	0.42
23	22	21	10.0	420.0	271.25	1.11	0.23	0.00	-	0.55
24	23	22	10.0	800.0	314.25	1.28	0.58	0.00	-	0.72
25	24	23	8.0	720.0	347.24	2.22	1.85	0.00	-	2.58
26	25	24	8.0	800.0	377.23	2.41	2.40	0.00	-	3.00
27	1	25	8.0	690.0	574.01	3.66	4.51	0.00	-	6.53
28	25	31	8.0	740.0	88.84	0.57	0.15	0.00	-	0.21
29	26	27	8.0	220.0	17.01	0.11	0.00	0.00	-	0.01
30	22	26	10.0	740.0	20.02	0.08	0.00	0.00	-	0.00
31	27	28	8.0	450.0	10.01	0.06	0.00	0.00	-	0.00
33	2	29	14.0	790.0	1628.38	3.39	2.33	0.00	-	2.95
34	29	30	10.0	250.0	999.85	4.08	1.54	0.00	-	6.16
35	29	32	8.0	990.0	614.53	3.92	7.34	0.00	-	7.41
36	30	18	10.0	650.0	1124.64	4.59	4.98	0.00	-	7.66
37	31	30	8.0	1150.0	139.78	0.89	0.55	0.00	-	0.48
38	25	31	8.0	900.0	79.93	0.51	0.15	0.00	-	0.17
39	32	15	8.0	860.0	522.49	3.33	4.72	0.00	-	5.49
40	32	33	8.0	270.0	51.06	0.33	0.02	0.00	-	0.07
41	6	33	8.0	620.0	279.71	1.79	1.07	0.00	-	1.73
42	33	13	8.0	1800.0	301.78	1.93	3.58	0.00	-	1.99

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	2955.92+

Net system demand: 2956 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
18	8.11	18	28.48	6	88.52
19	5.24	17	10.86	4	85.60
2	4.89	19	9.76	25	84.38
17	4.82	3	9.60	5	84.19
36	4.59	6	7.91	1	83.74
3	4.51	36	7.66	2	83.59
34	4.08	35	7.41	24	81.61
6	4.06	27	6.53	28	81.42
35	3.92	7	6.33	7	81.11
1	3.73	34	6.16	31	79.12
12	0.80	21	0.31	22	68.42
20	0.71	20	0.24	26	68.42
28	0.57	28	0.21	21	68.32
38	0.51	38	0.17	14	67.72
40	0.33	40	0.07	29	66.55
29	0.11	29	0.01	18	64.59
30	0.08	30	0.00	20	62.59
31	0.06	31	0.00	15	60.45
13	0.06	13	0.00	17	45.69
14	0.03	14	0.00	16	40.38

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

APPENDIX N

HYDRONEUMATIC SYSTEM STATIC MODEL FOR EXISTING, ENTITLED & VILLAGE A STAND-ALONE DEVELOPMENT

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June 29, 2018

RANCHO MURIETA EXISTING, ENTITLED & VILLAGE A HYDRONEUMATIC WATER SYSTEM
STATIC MODEL
(11-01-001)

Number of pipes: 50 Flow unit of measure: GPM
Number of junction nodes: 41 File name: RMNHFA

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	18.0	520.0	130.0	0.0	-	438.60
2	1	2	14.0	230.0	130.0	0.0	-	-
3	2	3	8.0	440.0	130.0	0.0	-	-
4	3	4	8.0	320.0	130.0	0.0	-	-
5	4	5	6.0	1550.0	130.0	0.0	-	-
6	5	6	8.0	380.0	130.0	0.0	-	-
7	5	3	8.0	220.0	130.0	0.0	-	-
8	6	7	8.0	840.0	130.0	0.0	-	-
9	7	8	8.0	310.0	130.0	0.0	-	-
10	8	9	8.0	580.0	130.0	0.0	-	-
11	9	10	8.0	970.0	130.0	0.0	-	-
12	10	11	8.0	850.0	130.0	0.0	-	-
13	11	12	8.0	520.0	130.0	0.0	-	-
14	12	13	8.0	360.0	130.0	0.0	-	-
15	13	14	8.0	200.0	130.0	0.0	-	-
16	14	15	8.0	500.0	130.0	0.0	-	-
17	15	16	8.0	950.0	130.0	0.0	-	-
18	16	17	8.0	430.0	130.0	0.0	-	-
19	17	18	10.0	370.0	130.0	0.0	-	-
20	18	19	10.0	530.0	130.0	0.0	-	-
21	19	20	10.0	820.0	130.0	0.0	-	-
22	20	21	10.0	550.0	130.0	0.0	-	-
23	21	22	10.0	420.0	130.0	0.0	-	-
24	22	23	10.0	800.0	130.0	0.0	-	-
25	23	24	8.0	720.0	130.0	0.0	-	-
26	24	25	8.0	800.0	130.0	0.0	-	-
27	25	1	8.0	690.0	130.0	0.0	-	-
28	25	31	8.0	740.0	130.0	0.0	-	-
29	26	27	8.0	220.0	130.0	0.0	-	-
30	26	22	10.0	740.0	130.0	0.0	-	-
31	27	28	8.0	450.0	130.0	0.0	-	-
33	29	2	14.0	790.0	130.0	0.0	-	-
34	29	30	10.0	250.0	130.0	0.0	-	-
35	29	32	8.0	990.0	130.0	0.0	-	-
36	30	18	10.0	650.0	130.0	0.0	-	-
37	30	31	8.0	1150.0	130.0	0.0	-	-
38	31	25	8.0	900.0	130.0	0.0	-	-
39	32	15	8.0	860.0	130.0	0.0	-	-
40	32	33	8.0	270.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	33	6	8.0	620.0	130.0	0.0	-	-
42	34	13	8.0	1800.0	130.0	0.0	-	-
43	34	23	8.0	560.0	130.0	0.0	-	-
44	34	24	12.0	730.0	130.0	0.0	-	-
45	34	35	12.0	540.0	130.0	0.0	-	-
46	35	36	12.0	610.0	130.0	0.0	-	-
47	36	37	12.0	520.0	130.0	0.0	-	-
48	37	38	12.0	370.0	130.0	0.0	-	-
49	38	39	12.0	290.0	130.0	0.0	-	-
50	39	40	14.0	910.0	130.0	0.0	-	-
51	40	41	14.0	310.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	33.98	244.00	1, 2, 27
2	13.02	243.00	2, 3, 33
3	13.02	250.00	3, 4, 7
4	42.01	234.00	4, 5
5	14.99	236.00	5, 6, 7
6	14.99	223.00	6, 8, 41
7	33.98	238.00	8, 9
8	28.01	246.00	9, 10
9	122.99	249.00	10, 11
10	32.00	242.00	11, 12
11	115.00	256.00	12, 13
12	14.00	259.00	13, 14
13	17.01	262.00	14, 15, 42
14	15.98	266.00	15, 16
15	32.00	282.00	16, 17, 39
16	25.99	318.00	17, 18
17	11.00	318.00	18, 19
18	15.98	278.00	19, 20, 36
19	27.02	264.00	20, 21
20	33.98	283.00	21, 22
21	36.99	270.00	22, 23
22	22.98	270.00	23, 24, 30
23	32.99	258.00	24, 25, 43
24	29.98	242.00	25, 26, 44
25	28.01	238.00	26, 27, 28, 38
26	3.01	270.00	29, 30
27	7.00	262.00	29, 31
28	10.01	240.00	31
29	14.00	280.00	33, 34, 35
30	14.99	272.00	34, 36, 37
31	29.00	250.00	28, 37, 38
32	40.98	248.00	35, 39, 40
33	29.00	244.00	40, 41
34	21.99	246.00	42, 43, 44, 45
35	11.00	238.00	45, 46
36	11.98	238.00	46, 47
37	6.01	250.00	47, 48
38	11.98	221.00	48, 49
39	11.98	228.00	49, 50
40	14.99	242.00	50, 51
41	0.99	236.00	51

Simulation Results

Number of trials: 10
Convergence : 0.0001

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	18.0	520.0	1046.83	1.32	0.20	0.00	-	0.38
2	1	2	14.0	230.0	797.62	1.66	0.18	0.00	-	0.79
3	2	3	8.0	440.0	249.12	1.59	0.61	0.00	-	1.39
4	3	4	8.0	320.0	65.85	0.42	0.04	0.00	-	0.12
5	4	5	6.0	1550.0	23.83	0.27	0.11	0.00	-	0.07
6	5	6	8.0	380.0	179.10	1.14	0.29	0.00	-	0.76
7	3	5	8.0	220.0	170.26	1.09	0.15	0.00	-	0.69
8	6	7	8.0	840.0	180.28	1.15	0.64	0.00	-	0.77
9	7	8	8.0	310.0	146.30	0.93	0.16	0.00	-	0.52
10	8	9	8.0	580.0	118.30	0.76	0.20	0.00	-	0.35
11	10	9	8.0	970.0	4.69	0.03	0.00	0.00	-	0.00
12	11	10	8.0	850.0	36.70	0.23	0.03	0.00	-	0.04
13	12	11	8.0	520.0	151.69	0.97	0.29	0.00	-	0.56
14	13	12	8.0	360.0	165.70	1.06	0.24	0.00	-	0.65
15	14	13	8.0	200.0	116.36	0.74	0.07	0.00	-	0.34
16	15	14	8.0	500.0	132.33	0.84	0.22	0.00	-	0.43
17	16	15	8.0	950.0	73.42	0.47	0.14	0.00	-	0.14
18	17	16	8.0	430.0	99.41	0.63	0.11	0.00	-	0.25
19	18	17	10.0	370.0	110.40	0.45	0.04	0.00	-	0.10
20	18	19	10.0	530.0	168.94	0.69	0.12	0.00	-	0.23
21	19	20	10.0	820.0	141.92	0.58	0.14	0.00	-	0.17
22	20	21	10.0	550.0	107.94	0.44	0.05	0.00	-	0.10
23	21	22	10.0	420.0	70.95	0.29	0.02	0.00	-	0.05
24	22	23	10.0	800.0	27.95	0.11	0.01	0.00	-	0.01
25	24	23	8.0	720.0	34.60	0.22	0.03	0.00	-	0.04
26	25	24	8.0	800.0	192.32	1.23	0.69	0.00	-	0.86
27	1	25	8.0	690.0	215.23	1.37	0.73	0.00	-	1.06
28	31	25	8.0	740.0	2.68	0.02	0.00	0.00	-	0.00
29	26	27	8.0	220.0	17.01	0.11	0.00	0.00	-	0.01
30	22	26	10.0	740.0	20.02	0.08	0.00	0.00	-	0.00
31	27	28	8.0	450.0	10.01	0.06	0.00	0.00	-	0.00
33	2	29	14.0	790.0	535.48	1.12	0.30	0.00	-	0.38
34	29	30	10.0	250.0	344.40	1.41	0.21	0.00	-	0.86
35	29	32	8.0	990.0	177.07	1.13	0.73	0.00	-	0.74
36	30	18	10.0	650.0	295.32	1.21	0.42	0.00	-	0.64
37	30	31	8.0	1150.0	34.09	0.22	0.04	0.00	-	0.04
38	31	25	8.0	900.0	2.41	0.02	0.00	0.00	-	0.00
39	32	15	8.0	860.0	90.92	0.58	0.19	0.00	-	0.22
40	32	33	8.0	270.0	45.17	0.29	0.02	0.00	-	0.06
41	33	6	8.0	620.0	16.17	0.10	0.01	0.00	-	0.01
42	34	13	8.0	1800.0	66.36	0.42	0.22	0.00	-	0.12
43	23	34	8.0	560.0	29.56	0.19	0.02	0.00	-	0.03
44	24	34	12.0	730.0	127.73	0.36	0.04	0.00	-	0.06
45	34	35	12.0	540.0	68.94	0.20	0.01	0.00	-	0.02
46	35	36	12.0	610.0	57.95	0.16	0.01	0.00	-	0.01
47	36	37	12.0	520.0	45.96	0.13	0.00	0.00	-	0.01
48	37	38	12.0	370.0	39.95	0.11	0.00	0.00	-	0.01
49	38	39	12.0	290.0	27.96	0.08	0.00	0.00	-	0.00
50	39	40	14.0	910.0	15.98	0.03	0.00	0.00	-	0.00
51	40	41	14.0	310.0	0.99	0.00	0.00	0.00	-	0.00

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	1046.83+

Net system demand: 1047 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
2	1.66	3	1.39	38	93.56
3	1.59	27	1.06	6	92.81
34	1.41	26	0.86	39	90.53
27	1.37	34	0.86	4	88.21
1	1.32	2	0.79	5	87.30
26	1.23	8	0.77	41	87.06
36	1.21	6	0.76	25	86.52
8	1.15	35	0.74	35	86.20
6	1.14	7	0.69	36	86.20
35	1.13	14	0.65	7	86.03
29	0.11	24	0.01	21	72.36
41	0.10	48	0.01	22	72.35
30	0.08	30	0.00	26	72.35
49	0.08	31	0.00	30	71.81
31	0.06	49	0.00	18	69.03
50	0.03	51	0.00	29	68.43
11	0.03	50	0.00	15	67.17
28	0.02	38	0.00	20	66.75
38	0.02	28	0.00	17	51.68
51	0.00	11	0.00	16	51.63

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

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APPENDIX O

HYDRONEUMATIC SYSTEM FIRE FLOW MODEL FOR EXISTING, ENTITLED & VILLAGE A STAND-ALONE DEVELOPMENT WITH 2,000 GPM DEMAND AT NODE #40

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June 29, 2018

RANCHO MURIETA EXISTING, ENTITLED & VILLAGE A HYDRONEUMATIC WATER SYSTEM
FIRE FLOW MODEL @ NODE 40
(11-01-001)

Number of pipes: 50 Flow unit of measure: GPM
Number of junction nodes: 41 File name: RMNHFA

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	18.0	520.0	130.0	0.0	-	438.60
2	1	2	14.0	230.0	130.0	0.0	-	-
3	2	3	8.0	440.0	130.0	0.0	-	-
4	3	4	8.0	320.0	130.0	0.0	-	-
5	4	5	6.0	1550.0	130.0	0.0	-	-
6	5	6	8.0	380.0	130.0	0.0	-	-
7	5	3	8.0	220.0	130.0	0.0	-	-
8	6	7	8.0	840.0	130.0	0.0	-	-
9	7	8	8.0	310.0	130.0	0.0	-	-
10	8	9	8.0	580.0	130.0	0.0	-	-
11	9	10	8.0	970.0	130.0	0.0	-	-
12	10	11	8.0	850.0	130.0	0.0	-	-
13	11	12	8.0	520.0	130.0	0.0	-	-
14	12	13	8.0	360.0	130.0	0.0	-	-
15	13	14	8.0	200.0	130.0	0.0	-	-
16	14	15	8.0	500.0	130.0	0.0	-	-
17	15	16	8.0	950.0	130.0	0.0	-	-
18	16	17	8.0	430.0	130.0	0.0	-	-
19	17	18	10.0	370.0	130.0	0.0	-	-
20	18	19	10.0	530.0	130.0	0.0	-	-
21	19	20	10.0	820.0	130.0	0.0	-	-
22	20	21	10.0	550.0	130.0	0.0	-	-
23	21	22	10.0	420.0	130.0	0.0	-	-
24	22	23	10.0	800.0	130.0	0.0	-	-
25	23	24	8.0	720.0	130.0	0.0	-	-
26	24	25	8.0	800.0	130.0	0.0	-	-
27	25	1	8.0	690.0	130.0	0.0	-	-
28	25	31	8.0	740.0	130.0	0.0	-	-
29	26	27	8.0	220.0	130.0	0.0	-	-
30	26	22	10.0	740.0	130.0	0.0	-	-
31	27	28	8.0	450.0	130.0	0.0	-	-
33	29	2	14.0	790.0	130.0	0.0	-	-
34	29	30	10.0	250.0	130.0	0.0	-	-
35	29	32	8.0	990.0	130.0	0.0	-	-
36	30	18	10.0	650.0	130.0	0.0	-	-
37	30	31	8.0	1150.0	130.0	0.0	-	-
38	31	25	8.0	900.0	130.0	0.0	-	-
39	32	15	8.0	860.0	130.0	0.0	-	-
40	32	33	8.0	270.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	33	6	8.0	620.0	130.0	0.0	-	-
42	34	13	8.0	1800.0	130.0	0.0	-	-
43	34	23	8.0	560.0	130.0	0.0	-	-
44	34	24	12.0	730.0	130.0	0.0	-	-
45	34	35	12.0	540.0	130.0	0.0	-	-
46	35	36	12.0	610.0	130.0	0.0	-	-
47	36	37	12.0	520.0	130.0	0.0	-	-
48	37	38	12.0	370.0	130.0	0.0	-	-
49	38	39	12.0	290.0	130.0	0.0	-	-
50	39	40	14.0	910.0	130.0	0.0	-	-
51	40	41	14.0	310.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	33.98	244.00	1, 2, 27
2	13.02	243.00	2, 3, 33
3	13.02	250.00	3, 4, 7
4	42.01	234.00	4, 5
5	14.99	236.00	5, 6, 7
6	14.99	223.00	6, 8, 41
7	33.98	238.00	8, 9
8	28.01	246.00	9, 10
9	122.99	249.00	10, 11
10	32.00	242.00	11, 12
11	115.00	256.00	12, 13
12	14.00	259.00	13, 14
13	17.01	262.00	14, 15, 42
14	15.98	266.00	15, 16
15	32.00	282.00	16, 17, 39
16	25.99	318.00	17, 18
17	11.00	318.00	18, 19
18	15.98	278.00	19, 20, 36
19	27.02	264.00	20, 21
20	33.98	283.00	21, 22
21	36.99	270.00	22, 23
22	22.98	270.00	23, 24, 30
23	32.99	258.00	24, 25, 43
24	29.98	242.00	25, 26, 44
25	28.01	238.00	26, 27, 28, 38
26	3.01	270.00	29, 30
27	7.00	262.00	29, 31
28	10.01	240.00	31
29	14.00	280.00	33, 34, 35
30	14.99	272.00	34, 36, 37
31	29.00	250.00	28, 37, 38
32	40.98	248.00	35, 39, 40
33	29.00	244.00	40, 41
34	21.99	246.00	42, 43, 44, 45
35	11.00	238.00	45, 46
36	11.98	238.00	46, 47
37	6.01	250.00	47, 48
38	11.98	221.00	48, 49
39	11.98	228.00	49, 50
40	2015.02	242.00	50, 51
41	0.99	236.00	51

Simulation Results

Number of trials: 5
Convergence : 0.0008

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	18.0	520.0	3046.86	3.84	1.44	0.00	-	2.77
2	1	2	14.0	230.0	2242.53	4.67	1.23	0.00	-	5.34
3	2	3	8.0	440.0	571.10	3.64	2.85	0.00	-	6.47
4	3	4	8.0	320.0	110.73	0.71	0.10	0.00	-	0.31
5	4	5	6.0	1550.0	68.72	0.78	0.81	0.00	-	0.52
6	5	6	8.0	380.0	501.08	3.20	1.93	0.00	-	5.08
7	3	5	8.0	220.0	447.35	2.86	0.91	0.00	-	4.12
8	6	7	8.0	840.0	398.70	2.54	2.79	0.00	-	3.33
9	7	8	8.0	310.0	364.72	2.33	0.87	0.00	-	2.82
10	8	9	8.0	580.0	336.71	2.15	1.41	0.00	-	2.43
11	9	10	8.0	970.0	213.72	1.36	1.02	0.00	-	1.05
12	10	11	8.0	850.0	181.72	1.16	0.66	0.00	-	0.78
13	11	12	8.0	520.0	66.72	0.43	0.06	0.00	-	0.12
14	12	13	8.0	360.0	52.72	0.34	0.03	0.00	-	0.08
15	14	13	8.0	200.0	484.37	3.09	0.95	0.00	-	4.77
16	15	14	8.0	500.0	500.35	3.19	2.53	0.00	-	5.07
17	16	15	8.0	950.0	108.00	0.69	0.28	0.00	-	0.30
18	17	16	8.0	430.0	133.99	0.86	0.19	0.00	-	0.44
19	18	17	10.0	370.0	144.99	0.59	0.06	0.00	-	0.17
20	18	19	10.0	530.0	812.67	3.32	2.22	0.00	-	4.20
21	19	20	10.0	820.0	785.65	3.21	3.23	0.00	-	3.94
22	20	21	10.0	550.0	751.67	3.07	2.00	0.00	-	3.63
23	21	22	10.0	420.0	714.69	2.92	1.39	0.00	-	3.31
24	22	23	10.0	800.0	671.68	2.74	2.36	0.00	-	2.95
25	23	24	8.0	720.0	159.63	1.02	0.44	0.00	-	0.61
26	25	24	8.0	800.0	962.18	6.14	13.61	0.00	-	17.01
27	1	25	8.0	690.0	770.35	4.92	7.77	0.00	-	11.27
28	31	25	8.0	740.0	115.72	0.74	0.25	0.00	-	0.34
29	26	27	8.0	220.0	17.01	0.11	0.00	0.00	-	0.01
30	22	26	10.0	740.0	20.02	0.08	0.00	0.00	-	0.00
31	27	28	8.0	450.0	10.01	0.06	0.00	0.00	-	0.00
33	2	29	14.0	790.0	1658.41	3.46	2.41	0.00	-	3.05
34	29	30	10.0	250.0	1237.46	5.05	2.29	0.00	-	9.14
35	29	32	8.0	990.0	406.95	2.60	3.42	0.00	-	3.46
36	30	18	10.0	650.0	973.64	3.98	3.81	0.00	-	5.86
37	30	31	8.0	1150.0	248.83	1.59	1.60	0.00	-	1.39
38	31	25	8.0	900.0	104.11	0.66	0.25	0.00	-	0.28
39	32	15	8.0	860.0	424.35	2.71	3.21	0.00	-	3.73
40	33	32	8.0	270.0	58.39	0.37	0.03	0.00	-	0.09
41	6	33	8.0	620.0	87.38	0.56	0.12	0.00	-	0.20
42	13	34	8.0	1800.0	520.08	3.32	9.80	0.00	-	5.44
43	23	34	8.0	560.0	479.06	3.06	2.62	0.00	-	4.67
44	24	34	12.0	730.0	1091.82	3.10	2.18	0.00	-	2.98
45	34	35	12.0	540.0	2068.98	5.87	5.26	0.00	-	9.75
46	35	36	12.0	610.0	2057.98	5.84	5.89	0.00	-	9.65
47	36	37	12.0	520.0	2045.99	5.80	4.97	0.00	-	9.55
48	37	38	12.0	370.0	2039.98	5.79	3.51	0.00	-	9.50
49	38	39	12.0	290.0	2027.99	5.75	2.72	0.00	-	9.39
50	39	40	14.0	910.0	2016.01	4.20	3.99	0.00	-	4.39
51	40	41	14.0	310.0	0.99	0.00	0.00	0.00	-	0.00

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	3046.86+

Net system demand: 3047 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
26	6.14	26	17.01	6	89.81
45	5.87	27	11.27	4	86.23
46	5.84	45	9.75	5	85.01
47	5.80	46	9.65	1	83.70
48	5.79	47	9.55	2	83.60
49	5.75	48	9.50	25	82.93
34	5.05	49	9.39	7	82.10
27	4.92	34	9.14	33	80.65
2	4.67	3	6.47	3	79.34
50	4.20	36	5.86	10	78.93
38	0.66	38	0.28	21	64.98
19	0.59	41	0.20	18	64.75
41	0.56	19	0.17	22	64.38
13	0.43	13	0.12	26	64.38
40	0.37	40	0.09	37	63.91
14	0.34	14	0.08	40	62.94
29	0.11	29	0.01	15	62.78
30	0.08	30	0.00	20	60.22
31	0.06	31	0.00	17	47.39
51	0.00	51	0.00	16	47.30

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

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APPENDIX P

HYDRONEUMATIC SYSTEM STATIC MODEL FOR EXISTING, ENTITLED & VILLAGE B STAND-ALONE DEVELOPMENT

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June 29, 2018

RANCHO MURIETA EXISTING, ENTITLED & VILLAGE B HYDRONEUMATIC WATER SYSTEM
STATIC MODEL
(11-01-001)

Number of pipes: 70 Flow unit of measure: GPM
Number of junction nodes: 56 File name: RMNHFB

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	18.0	520.0	130.0	0.0	-	438.60
2	1	2	14.0	230.0	130.0	0.0	-	-
3	2	3	8.0	440.0	130.0	0.0	-	-
4	3	4	8.0	320.0	130.0	0.0	-	-
5	4	5	6.0	1550.0	130.0	0.0	-	-
6	5	6	8.0	380.0	130.0	0.0	-	-
7	5	3	8.0	220.0	130.0	0.0	-	-
8	6	7	8.0	840.0	130.0	0.0	-	-
9	7	8	8.0	310.0	130.0	0.0	-	-
10	8	9	8.0	580.0	130.0	0.0	-	-
11	9	10	8.0	970.0	130.0	0.0	-	-
12	10	11	8.0	850.0	130.0	0.0	-	-
13	11	12	8.0	520.0	130.0	0.0	-	-
14	12	13	8.0	360.0	130.0	0.0	-	-
15	13	14	8.0	200.0	130.0	0.0	-	-
16	14	15	8.0	500.0	130.0	0.0	-	-
17	15	16	8.0	950.0	130.0	0.0	-	-
18	16	17	8.0	430.0	130.0	0.0	-	-
19	17	18	10.0	370.0	130.0	0.0	-	-
20	18	19	10.0	530.0	130.0	0.0	-	-
21	19	20	10.0	820.0	130.0	0.0	-	-
22	20	21	10.0	550.0	130.0	0.0	-	-
23	21	22	10.0	420.0	130.0	0.0	-	-
24	22	23	10.0	800.0	130.0	0.0	-	-
25	23	24	8.0	720.0	130.0	0.0	-	-
26	24	25	8.0	800.0	130.0	0.0	-	-
27	25	1	8.0	690.0	130.0	0.0	-	-
28	25	31	8.0	740.0	130.0	0.0	-	-
29	26	27	8.0	220.0	130.0	0.0	-	-
30	26	22	10.0	740.0	130.0	0.0	-	-
31	27	28	8.0	450.0	130.0	0.0	-	-
33	29	2	14.0	790.0	130.0	0.0	-	-
34	29	30	10.0	250.0	130.0	0.0	-	-
35	29	32	8.0	990.0	130.0	0.0	-	-
36	30	18	10.0	650.0	130.0	0.0	-	-
37	30	31	8.0	1150.0	130.0	0.0	-	-
38	31	25	8.0	900.0	130.0	0.0	-	-
39	32	15	8.0	860.0	130.0	0.0	-	-
40	32	33	8.0	270.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	33	6	8.0	620.0	130.0	0.0	-	-
42	33	13	8.0	1800.0	130.0	0.0	-	-
43	34	23	8.0	560.0	130.0	0.0	-	-
44	34	24	12.0	730.0	130.0	0.0	-	-
45	34	35	12.0	540.0	130.0	0.0	-	-
46	35	36	12.0	610.0	130.0	0.0	-	-
47	36	37	12.0	520.0	130.0	0.0	-	-
48	37	38	12.0	370.0	130.0	0.0	-	-
49	38	39	12.0	290.0	130.0	0.0	-	-
50	39	40	14.0	910.0	130.0	0.0	-	-
51	40	41	14.0	310.0	130.0	0.0	-	-
52	41	42	12.0	420.0	130.0	0.0	-	-
53	42	43	12.0	240.0	130.0	0.0	-	-
54	43	44	12.0	650.0	130.0	0.0	-	-
55	44	45	12.0	290.0	130.0	0.0	-	-
56	45	46	12.0	300.0	130.0	0.0	-	-
57	46	47	8.0	920.0	130.0	0.0	-	-
58	47	48	8.0	560.0	130.0	0.0	-	-
59	48	49	8.0	400.0	130.0	0.0	-	-
60	49	50	8.0	1020.0	130.0	0.0	-	-
61	50	51	8.0	690.0	130.0	0.0	-	-
62	51	42	8.0	620.0	130.0	0.0	-	-
63	52	51	8.0	300.0	130.0	0.0	-	-
64	53	52	8.0	700.0	130.0	0.0	-	-
65	54	48	8.0	160.0	130.0	0.0	-	-
66	54	50	8.0	460.0	130.0	0.0	-	-
67	54	55	8.0	320.0	130.0	0.0	-	-
68	55	44	8.0	850.0	130.0	0.0	-	-
69	55	45	8.0	940.0	130.0	0.0	-	-
70	56	43	8.0	740.0	130.0	0.0	-	-
71	46	39	16.0	1300.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	33.98	244.00	1, 2, 27
2	13.02	243.00	2, 3, 33
3	13.02	250.00	3, 4, 7
4	42.01	234.00	4, 5
5	14.99	236.00	5, 6, 7
6	14.99	223.00	6, 8, 41
7	33.98	238.00	8, 9
8	28.01	246.00	9, 10
9	122.99	249.00	10, 11
10	32.00	242.00	11, 12
11	115.00	256.00	12, 13
12	14.00	259.00	13, 14
13	17.01	262.00	14, 15, 42
14	15.98	266.00	15, 16
15	32.00	282.00	16, 17, 39
16	25.99	318.00	17, 18
17	11.00	318.00	18, 19
18	15.98	278.00	19, 20, 36
19	27.02	264.00	20, 21
20	33.98	283.00	21, 22
21	36.99	270.00	22, 23
22	22.98	270.00	23, 24, 30
23	32.99	258.00	24, 25, 43
24	29.98	242.00	25, 26, 44

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
25	28.01	238.00	26, 27, 28, 38
26	3.01	270.00	29, 30
27	7.00	262.00	29, 31
28	10.01	240.00	31
29	14.00	280.00	33, 34, 35
30	14.99	272.00	34, 36, 37
31	29.00	250.00	28, 37, 38
32	40.98	248.00	35, 39, 40
33	29.00	244.00	40, 41, 42
34	21.99	246.00	43, 44, 45
35	11.00	238.00	45, 46
36	11.98	238.00	46, 47
37	6.01	250.00	47, 48
38	11.98	221.00	48, 49
39	11.98	228.00	49, 50, 71
40	14.99	242.00	50, 51
41	0.99	236.00	51, 52
42	6.01	240.00	52, 53, 62
43	11.98	236.00	53, 54, 70
44	11.00	236.00	54, 55, 68
45	3.99	256.00	55, 56, 69
46	7.99	222.00	56, 57, 71
47	21.01	176.00	57, 58
48	7.99	218.00	58, 59, 65
49	3.01	214.00	59, 60
50	9.02	186.00	60, 61, 66
51	10.01	218.00	61, 62, 63
52	7.00	212.00	63, 64
53	7.00	194.00	64
54	7.99	221.00	65, 66, 67
55	13.02	245.00	67, 68, 69
56	10.01	212.00	70

Simulation Results

Number of trials: 12
Convergence : 0.0002

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	18.0	520.0	1183.87	1.49	0.25	0.00	-	0.48
2	1	2	14.0	230.0	904.63	1.89	0.23	0.00	-	0.99
3	2	3	8.0	440.0	283.63	1.81	0.78	0.00	-	1.77
4	3	4	8.0	320.0	70.74	0.45	0.04	0.00	-	0.14
5	4	5	6.0	1550.0	28.73	0.33	0.16	0.00	-	0.10
6	5	6	8.0	380.0	213.60	1.36	0.40	0.00	-	1.05
7	3	5	8.0	220.0	199.86	1.28	0.20	0.00	-	0.93
8	6	7	8.0	840.0	174.69	1.11	0.61	0.00	-	0.72
9	7	8	8.0	310.0	140.71	0.90	0.15	0.00	-	0.48
10	8	9	8.0	580.0	112.70	0.72	0.19	0.00	-	0.32
11	10	9	8.0	970.0	10.29	0.07	0.00	0.00	-	0.00
12	11	10	8.0	850.0	42.29	0.27	0.04	0.00	-	0.05
13	12	11	8.0	520.0	157.29	1.00	0.31	0.00	-	0.59
14	13	12	8.0	360.0	171.29	1.09	0.25	0.00	-	0.70
15	14	13	8.0	200.0	105.89	0.68	0.06	0.00	-	0.29
16	15	14	8.0	500.0	121.87	0.78	0.19	0.00	-	0.37
17	16	15	8.0	950.0	77.24	0.49	0.15	0.00	-	0.16
18	17	16	8.0	430.0	103.23	0.66	0.12	0.00	-	0.27
19	18	17	10.0	370.0	114.23	0.47	0.04	0.00	-	0.11
20	18	19	10.0	530.0	201.64	0.82	0.17	0.00	-	0.32

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Losses (ft) Minor	Pump Head	Hd Loss /1000 ft
21	19	20	10.0	820.0	174.62	0.71	0.20	0.00	-	0.24
22	20	21	10.0	550.0	140.64	0.57	0.09	0.00	-	0.16
23	21	22	10.0	420.0	103.66	0.42	0.04	0.00	-	0.09
24	22	23	10.0	800.0	60.66	0.25	0.03	0.00	-	0.03
25	24	23	8.0	720.0	29.45	0.19	0.02	0.00	-	0.03
26	25	24	8.0	800.0	230.29	1.47	0.96	0.00	-	1.20
27	1	25	8.0	690.0	245.26	1.57	0.93	0.00	-	1.35
28	31	25	8.0	740.0	6.86	0.04	0.00	0.00	-	0.00
29	26	27	8.0	220.0	17.01	0.11	0.00	0.00	-	0.01
30	22	26	10.0	740.0	20.02	0.08	0.00	0.00	-	0.00
31	27	28	8.0	450.0	10.01	0.06	0.00	0.00	-	0.00
33	2	29	14.0	790.0	607.99	1.27	0.38	0.00	-	0.48
34	29	30	10.0	250.0	388.88	1.59	0.27	0.00	-	1.07
35	29	32	8.0	990.0	205.10	1.31	0.96	0.00	-	0.97
36	30	18	10.0	650.0	331.85	1.36	0.52	0.00	-	0.80
37	30	31	8.0	1150.0	42.04	0.27	0.06	0.00	-	0.05
38	31	25	8.0	900.0	6.18	0.04	0.00	0.00	-	0.00
39	32	15	8.0	860.0	76.63	0.49	0.13	0.00	-	0.16
40	32	33	8.0	270.0	87.49	0.56	0.05	0.00	-	0.20
41	6	33	8.0	620.0	23.92	0.15	0.01	0.00	-	0.02
42	33	13	8.0	1800.0	82.41	0.53	0.32	0.00	-	0.18
43	23	34	8.0	560.0	57.11	0.36	0.05	0.00	-	0.09
44	24	34	12.0	730.0	170.86	0.48	0.07	0.00	-	0.10
45	34	35	12.0	540.0	205.98	0.58	0.07	0.00	-	0.14
46	35	36	12.0	610.0	194.98	0.55	0.07	0.00	-	0.12
47	36	37	12.0	520.0	183.00	0.52	0.06	0.00	-	0.11
48	37	38	12.0	370.0	176.99	0.50	0.04	0.00	-	0.10
49	38	39	12.0	290.0	165.00	0.47	0.03	0.00	-	0.09
50	39	40	14.0	910.0	66.69	0.14	0.01	0.00	-	0.01
51	40	41	14.0	310.0	51.70	0.11	0.00	0.00	-	0.00
52	41	42	12.0	420.0	50.71	0.14	0.00	0.00	-	0.01
53	42	43	12.0	240.0	18.01	0.05	0.00	0.00	-	0.00
54	44	43	12.0	650.0	3.99	0.01	0.00	0.00	-	0.00
55	45	44	12.0	290.0	32.10	0.09	0.00	0.00	-	0.00
56	46	45	12.0	300.0	53.59	0.15	0.00	0.00	-	0.01
57	46	47	8.0	920.0	24.74	0.16	0.02	0.00	-	0.02
58	47	48	8.0	560.0	3.74	0.02	0.00	0.00	-	0.00
59	48	49	8.0	400.0	3.58	0.02	0.00	0.00	-	0.00
60	49	50	8.0	1020.0	0.58	0.00	0.00	0.00	-	0.00
61	51	50	8.0	690.0	2.68	0.02	0.00	0.00	-	0.00
62	42	51	8.0	620.0	26.69	0.17	0.01	0.00	-	0.02
63	51	52	8.0	300.0	14.00	0.09	0.00	0.00	-	0.01
64	52	53	8.0	700.0	7.00	0.04	0.00	0.00	-	0.00
65	54	48	8.0	160.0	7.84	0.05	0.00	0.00	-	0.00
66	54	50	8.0	460.0	5.77	0.04	0.00	0.00	-	0.00
67	55	54	8.0	320.0	21.60	0.14	0.00	0.00	-	0.02
68	44	55	8.0	850.0	17.12	0.11	0.01	0.00	-	0.01
69	45	55	8.0	940.0	17.50	0.11	0.01	0.00	-	0.01
70	43	56	8.0	740.0	10.01	0.06	0.00	0.00	-	0.00
71	39	46	16.0	1300.0	86.33	0.14	0.01	0.00	-	0.01

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	1183.86+

Net system demand: 1184 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
2	1.89	3	1.77	47	112.70
3	1.81	27	1.35	50	108.37
34	1.59	26	1.20	53	104.90
27	1.57	34	1.07	56	97.11
1	1.49	6	1.05	52	97.10
26	1.47	2	0.99	49	96.24
6	1.36	35	0.97	48	94.50
36	1.36	7	0.93	51	94.50
35	1.31	36	0.80	38	93.23
7	1.28	8	0.72	54	93.20
65	0.05	64	0.00	21	72.15
64	0.04	28	0.00	22	72.13
28	0.04	53	0.00	26	72.13
38	0.04	38	0.00	30	71.71
66	0.04	66	0.00	18	68.88
58	0.02	61	0.00	29	68.36
59	0.02	60	0.00	15	67.01
61	0.02	59	0.00	20	66.56
54	0.01	58	0.00	17	51.53
60	0.00	54	0.00	16	51.48

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

APPENDIX Q

HYDRONEUMATIC SYSTEM FIRE FLOW MODEL FOR EXISTING, ENTITLED & VILLAGE B STAND-ALONE DEVELOPMENT WITH 2,000 GPM DEMAND AT NODE #45

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June 29, 2018

RANCHO MURIETA EXISTING, ENTITLED & VILLAGE B HYDRONEUMATIC WATER SYSTEM
FIRE FLOW MODEL @ NODE 45
(11-01-001)

Number of pipes: 70
Number of junction nodes: 56

Flow unit of measure: GPM
File name: RMNHFB

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	18.0	520.0	130.0	0.0	-	438.60
2	1	2	14.0	230.0	130.0	0.0	-	-
3	2	3	8.0	440.0	130.0	0.0	-	-
4	3	4	8.0	320.0	130.0	0.0	-	-
5	4	5	6.0	1550.0	130.0	0.0	-	-
6	5	6	8.0	380.0	130.0	0.0	-	-
7	5	3	8.0	220.0	130.0	0.0	-	-
8	6	7	8.0	840.0	130.0	0.0	-	-
9	7	8	8.0	310.0	130.0	0.0	-	-
10	8	9	8.0	580.0	130.0	0.0	-	-
11	9	10	8.0	970.0	130.0	0.0	-	-
12	10	11	8.0	850.0	130.0	0.0	-	-
13	11	12	8.0	520.0	130.0	0.0	-	-
14	12	13	8.0	360.0	130.0	0.0	-	-
15	13	14	8.0	200.0	130.0	0.0	-	-
16	14	15	8.0	500.0	130.0	0.0	-	-
17	15	16	8.0	950.0	130.0	0.0	-	-
18	16	17	8.0	430.0	130.0	0.0	-	-
19	17	18	10.0	370.0	130.0	0.0	-	-
20	18	19	10.0	530.0	130.0	0.0	-	-
21	19	20	10.0	820.0	130.0	0.0	-	-
22	20	21	10.0	550.0	130.0	0.0	-	-
23	21	22	10.0	420.0	130.0	0.0	-	-
24	22	23	10.0	800.0	130.0	0.0	-	-
25	23	24	8.0	720.0	130.0	0.0	-	-
26	24	25	8.0	800.0	130.0	0.0	-	-
27	25	1	8.0	690.0	130.0	0.0	-	-
28	25	31	8.0	740.0	130.0	0.0	-	-
29	26	27	8.0	220.0	130.0	0.0	-	-
30	26	22	10.0	740.0	130.0	0.0	-	-
31	27	28	8.0	450.0	130.0	0.0	-	-
33	29	2	14.0	790.0	130.0	0.0	-	-
34	29	30	10.0	250.0	130.0	0.0	-	-
35	29	32	8.0	990.0	130.0	0.0	-	-
36	30	18	10.0	650.0	130.0	0.0	-	-
37	30	31	8.0	1150.0	130.0	0.0	-	-
38	31	25	8.0	900.0	130.0	0.0	-	-
39	32	15	8.0	860.0	130.0	0.0	-	-
40	32	33	8.0	270.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	33	6	8.0	620.0	130.0	0.0	-	-
42	33	13	8.0	1800.0	130.0	0.0	-	-
43	34	23	8.0	560.0	130.0	0.0	-	-
44	34	24	12.0	730.0	130.0	0.0	-	-
45	34	35	12.0	540.0	130.0	0.0	-	-
46	35	36	12.0	610.0	130.0	0.0	-	-
47	36	37	12.0	520.0	130.0	0.0	-	-
48	37	38	12.0	370.0	130.0	0.0	-	-
49	38	39	12.0	290.0	130.0	0.0	-	-
50	39	40	14.0	910.0	130.0	0.0	-	-
51	40	41	14.0	310.0	130.0	0.0	-	-
52	41	42	12.0	420.0	130.0	0.0	-	-
53	42	43	12.0	240.0	130.0	0.0	-	-
54	43	44	12.0	650.0	130.0	0.0	-	-
55	44	45	12.0	290.0	130.0	0.0	-	-
56	45	46	12.0	300.0	130.0	0.0	-	-
57	46	47	8.0	920.0	130.0	0.0	-	-
58	47	48	8.0	560.0	130.0	0.0	-	-
59	48	49	8.0	400.0	130.0	0.0	-	-
60	49	50	8.0	1020.0	130.0	0.0	-	-
61	50	51	8.0	690.0	130.0	0.0	-	-
62	51	42	8.0	620.0	130.0	0.0	-	-
63	52	51	8.0	300.0	130.0	0.0	-	-
64	53	52	8.0	700.0	130.0	0.0	-	-
65	54	48	8.0	160.0	130.0	0.0	-	-
66	54	50	8.0	460.0	130.0	0.0	-	-
67	54	55	8.0	320.0	130.0	0.0	-	-
68	55	44	8.0	850.0	130.0	0.0	-	-
69	55	45	8.0	940.0	130.0	0.0	-	-
70	56	43	8.0	740.0	130.0	0.0	-	-
71	46	39	16.0	1300.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	33.98	244.00	1, 2, 27
2	13.02	243.00	2, 3, 33
3	13.02	250.00	3, 4, 7
4	42.01	234.00	4, 5
5	14.99	236.00	5, 6, 7
6	14.99	223.00	6, 8, 41
7	33.98	238.00	8, 9
8	28.01	246.00	9, 10
9	122.99	249.00	10, 11
10	32.00	242.00	11, 12
11	115.00	256.00	12, 13
12	14.00	259.00	13, 14
13	17.01	262.00	14, 15, 42
14	15.98	266.00	15, 16
15	32.00	282.00	16, 17, 39
16	25.99	318.00	17, 18
17	11.00	318.00	18, 19
18	15.98	278.00	19, 20, 36
19	27.02	264.00	20, 21
20	33.98	283.00	21, 22
21	36.99	270.00	22, 23
22	22.98	270.00	23, 24, 30
23	32.99	258.00	24, 25, 43
24	29.98	242.00	25, 26, 44

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
25	28.01	238.00	26, 27, 28, 38
26	3.01	270.00	29, 30
27	7.00	262.00	29, 31
28	10.01	240.00	31
29	14.00	280.00	33, 34, 35
30	14.99	272.00	34, 36, 37
31	29.00	250.00	28, 37, 38
32	40.98	248.00	35, 39, 40
33	29.00	244.00	40, 41, 42
34	21.99	246.00	43, 44, 45
35	11.00	238.00	45, 46
36	11.98	238.00	46, 47
37	6.01	250.00	47, 48
38	11.98	221.00	48, 49
39	11.98	228.00	49, 50, 71
40	14.99	242.00	50, 51
41	0.99	236.00	51, 52
42	6.01	240.00	52, 53, 62
43	11.98	236.00	53, 54, 70
44	11.00	236.00	54, 55, 68
45	2003.98	256.00	55, 56, 69
46	7.99	222.00	56, 57, 71
47	21.01	176.00	57, 58
48	7.99	218.00	58, 59, 65
49	3.01	214.00	59, 60
50	9.02	186.00	60, 61, 66
51	10.01	218.00	61, 62, 63
52	7.00	212.00	63, 64
53	7.00	194.00	64
54	7.99	221.00	65, 66, 67
55	13.02	245.00	67, 68, 69
56	10.01	212.00	70

Simulation Results

Number of trials: 9
Convergence : 0.0003

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	18.0	520.0	3183.85	4.01	1.56	0.00	-	3.01
2	1	2	14.0	230.0	2221.68	4.63	1.21	0.00	-	5.25
3	2	3	8.0	440.0	507.00	3.24	2.28	0.00	-	5.19
4	3	4	8.0	320.0	101.87	0.65	0.09	0.00	-	0.27
5	4	5	6.0	1550.0	59.86	0.68	0.62	0.00	-	0.40
6	5	6	8.0	380.0	436.98	2.79	1.50	0.00	-	3.94
7	3	5	8.0	220.0	392.11	2.50	0.71	0.00	-	3.23
8	6	7	8.0	840.0	243.64	1.55	1.12	0.00	-	1.34
9	7	8	8.0	310.0	209.66	1.34	0.31	0.00	-	1.01
10	8	9	8.0	580.0	181.65	1.16	0.45	0.00	-	0.78
11	9	10	8.0	970.0	58.67	0.37	0.09	0.00	-	0.10
12	10	11	8.0	850.0	26.66	0.17	0.02	0.00	-	0.02
13	12	11	8.0	520.0	88.34	0.56	0.11	0.00	-	0.20
14	13	12	8.0	360.0	102.34	0.65	0.10	0.00	-	0.27
15	13	14	8.0	200.0	57.59	0.37	0.02	0.00	-	0.09
16	14	15	8.0	500.0	41.62	0.27	0.03	0.00	-	0.05
17	15	16	8.0	950.0	278.60	1.78	1.63	0.00	-	1.71
18	16	17	8.0	430.0	252.61	1.61	0.61	0.00	-	1.43
19	17	18	10.0	370.0	241.61	0.99	0.16	0.00	-	0.44
20	18	19	10.0	530.0	1158.39	4.73	4.29	0.00	-	8.09

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
21	19	20	10.0	820.0	1131.37	4.62	6.35	0.00	-	7.74
22	20	21	10.0	550.0	1097.39	4.48	4.03	0.00	-	7.32
23	21	22	10.0	420.0	1060.41	4.33	2.89	0.00	-	6.87
24	22	23	10.0	800.0	1017.41	4.16	5.09	0.00	-	6.36
25	23	24	8.0	720.0	282.35	1.80	1.26	0.00	-	1.76
26	25	24	8.0	800.0	1273.53	8.13	22.87	0.00	-	28.59
27	1	25	8.0	690.0	928.20	5.92	10.98	0.00	-	15.91
28	31	25	8.0	740.0	196.53	1.25	0.66	0.00	-	0.90
29	26	27	8.0	220.0	17.01	0.11	0.00	0.00	-	0.01
30	22	26	10.0	740.0	20.02	0.08	0.00	0.00	-	0.00
31	27	28	8.0	450.0	10.01	0.06	0.00	0.00	-	0.00
33	2	29	14.0	790.0	1701.66	3.55	2.53	0.00	-	3.20
34	29	30	10.0	250.0	1350.09	5.51	2.69	0.00	-	10.74
35	29	32	8.0	990.0	337.57	2.15	2.42	0.00	-	2.44
36	30	18	10.0	650.0	932.76	3.81	3.52	0.00	-	5.42
37	30	31	8.0	1150.0	402.34	2.57	3.89	0.00	-	3.38
38	31	25	8.0	900.0	176.82	1.13	0.66	0.00	-	0.74
39	32	15	8.0	860.0	268.99	1.72	1.38	0.00	-	1.61
40	32	33	8.0	270.0	27.60	0.18	0.01	0.00	-	0.02
41	6	33	8.0	620.0	178.34	1.14	0.46	0.00	-	0.75
42	33	13	8.0	1800.0	176.95	1.13	1.33	0.00	-	0.74
43	23	34	8.0	560.0	702.06	4.48	5.31	0.00	-	9.49
44	24	34	12.0	730.0	1525.90	4.33	4.05	0.00	-	5.55
45	34	35	12.0	540.0	2205.97	6.26	5.93	0.00	-	10.98
46	35	36	12.0	610.0	2194.97	6.23	6.63	0.00	-	10.88
47	36	37	12.0	520.0	2182.99	6.19	5.60	0.00	-	10.77
48	37	38	12.0	370.0	2176.97	6.18	3.96	0.00	-	10.71
49	38	39	12.0	290.0	2164.99	6.14	3.07	0.00	-	10.60
50	39	40	14.0	910.0	763.09	1.59	0.66	0.00	-	0.73
51	40	41	14.0	310.0	748.10	1.56	0.22	0.00	-	0.70
52	41	42	12.0	420.0	747.11	2.12	0.62	0.00	-	1.48
53	42	43	12.0	240.0	608.32	1.73	0.24	0.00	-	1.01
54	43	44	12.0	650.0	586.32	1.66	0.61	0.00	-	0.94
55	44	45	12.0	290.0	621.94	1.76	0.31	0.00	-	1.05
56	46	45	12.0	300.0	1258.29	3.57	1.16	0.00	-	3.88
57	46	47	8.0	920.0	123.63	0.79	0.35	0.00	-	0.38
58	47	48	8.0	560.0	102.62	0.65	0.15	0.00	-	0.27
59	49	48	8.0	400.0	19.32	0.12	0.00	0.00	-	0.01
60	50	49	8.0	1020.0	22.33	0.14	0.02	0.00	-	0.02
61	51	50	8.0	690.0	108.77	0.69	0.21	0.00	-	0.30
62	42	51	8.0	620.0	132.78	0.85	0.27	0.00	-	0.43
63	51	52	8.0	300.0	14.00	0.09	0.00	0.00	-	0.01
64	52	53	8.0	700.0	7.00	0.04	0.00	0.00	-	0.00
65	48	54	8.0	160.0	113.95	0.73	0.05	0.00	-	0.33
66	50	54	8.0	460.0	77.42	0.49	0.07	0.00	-	0.16
67	54	55	8.0	320.0	183.38	1.17	0.25	0.00	-	0.79
68	55	44	8.0	850.0	46.61	0.30	0.05	0.00	-	0.06
69	55	45	8.0	940.0	123.75	0.79	0.36	0.00	-	0.38
70	43	56	8.0	740.0	10.01	0.06	0.00	0.00	-	0.00
71	39	46	16.0	1300.0	1389.91	2.22	1.49	0.00	-	1.15

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	3183.85+

Net system demand: 3184 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
26	8.13	26	28.59	6	90.28
45	6.26	27	15.91	4	86.43
46	6.23	45	10.98	5	85.29
47	6.19	46	10.88	47	84.97
48	6.18	47	10.77	1	83.65
49	6.14	34	10.74	2	83.56
27	5.92	48	10.71	7	83.29
34	5.51	49	10.60	25	81.49
20	4.73	43	9.49	10	81.19
2	4.63	20	8.09	33	80.98
40	0.18	40	0.02	43	59.02
12	0.17	12	0.02	44	58.75
60	0.14	60	0.02	20	57.83
59	0.12	59	0.01	42	57.39
29	0.11	29	0.01	40	56.89
63	0.09	63	0.01	37	56.76
30	0.08	30	0.00	55	54.88
70	0.06	70	0.00	45	49.96
31	0.06	31	0.00	16	47.61
64	0.04	64	0.00	17	47.34

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

APPENDIX R

HYDRONEUMATIC SYSTEM STATIC MODEL FOR EXISTING, ENTITLED & VILLAGE C STAND-ALONE DEVELOPMENT

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June 29, 2018

RANCHO MURIETA EXISTING, ENTITLED & VILLAGE C HYDRONEUMATIC WATER SYSTEM
STATIC MODEL

Number of pipes: 60 Flow unit of measure: GPM
Number of junction nodes: 48 File name: RMNHFC

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	18.0	520.0	130.0	0.0	-	438.60
2	1	2	14.0	230.0	130.0	0.0	-	-
3	2	3	8.0	440.0	130.0	0.0	-	-
4	3	4	8.0	320.0	130.0	0.0	-	-
5	4	5	6.0	1550.0	130.0	0.0	-	-
6	5	6	8.0	380.0	130.0	0.0	-	-
7	5	3	8.0	220.0	130.0	0.0	-	-
8	6	7	8.0	840.0	130.0	0.0	-	-
9	7	8	8.0	310.0	130.0	0.0	-	-
10	8	9	8.0	580.0	130.0	0.0	-	-
11	9	10	8.0	970.0	130.0	0.0	-	-
12	10	11	8.0	850.0	130.0	0.0	-	-
13	11	12	8.0	520.0	130.0	0.0	-	-
14	12	13	8.0	360.0	130.0	0.0	-	-
15	13	14	8.0	200.0	130.0	0.0	-	-
16	14	15	8.0	500.0	130.0	0.0	-	-
17	15	16	8.0	950.0	130.0	0.0	-	-
18	16	17	8.0	430.0	130.0	0.0	-	-
19	17	18	10.0	370.0	130.0	0.0	-	-
20	18	19	10.0	530.0	130.0	0.0	-	-
21	19	20	10.0	820.0	130.0	0.0	-	-
22	20	21	10.0	550.0	130.0	0.0	-	-
23	21	22	10.0	420.0	130.0	0.0	-	-
24	22	23	10.0	800.0	130.0	0.0	-	-
25	23	24	8.0	720.0	130.0	0.0	-	-
26	24	25	8.0	800.0	130.0	0.0	-	-
27	25	1	8.0	690.0	130.0	0.0	-	-
28	25	31	8.0	740.0	130.0	0.0	-	-
29	26	27	8.0	220.0	130.0	0.0	-	-
30	26	22	10.0	740.0	130.0	0.0	-	-
31	27	28	8.0	450.0	130.0	0.0	-	-
32	28	61	8.0	1020.0	130.0	0.0	-	-
33	29	2	14.0	790.0	130.0	0.0	-	-
34	29	30	10.0	250.0	130.0	0.0	-	-
35	29	32	8.0	990.0	130.0	0.0	-	-
36	30	18	10.0	650.0	130.0	0.0	-	-
37	30	31	8.0	1150.0	130.0	0.0	-	-
38	31	25	8.0	900.0	130.0	0.0	-	-
39	32	15	8.0	860.0	130.0	0.0	-	-
40	32	33	8.0	270.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	33	6	8.0	620.0	130.0	0.0	-	-
42	33	13	8.0	1800.0	130.0	0.0	-	-
43	34	23	8.0	560.0	130.0	0.0	-	-
44	34	24	12.0	730.0	130.0	0.0	-	-
45	34	35	12.0	540.0	130.0	0.0	-	-
46	35	36	12.0	610.0	130.0	0.0	-	-
47	36	37	12.0	520.0	130.0	0.0	-	-
48	37	38	12.0	370.0	130.0	0.0	-	-
49	38	39	12.0	290.0	130.0	0.0	-	-
50	39	40	14.0	910.0	130.0	0.0	-	-
51	40	41	14.0	310.0	130.0	0.0	-	-
73	57	58	12.0	600.0	130.0	0.0	-	-
74	58	59	12.0	490.0	130.0	0.0	-	-
75	59	60	12.0	460.0	130.0	0.0	-	-
76	60	26	12.0	580.0	130.0	0.0	-	-
77	61	28	8.0	1010.0	130.0	0.0	-	-
78	61	58	8.0	1010.0	130.0	0.0	-	-
79	62	27	8.0	950.0	130.0	0.0	-	-
80	57	46	12.0	1040.0	130.0	0.0	-	-
81	46	39	16.0	1300.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	33.98	244.00	1, 2, 27
2	13.02	243.00	2, 3, 33
3	13.02	250.00	3, 4, 7
4	42.01	234.00	4, 5
5	14.99	236.00	5, 6, 7
6	14.99	223.00	6, 8, 41
7	33.98	238.00	8, 9
8	28.01	246.00	9, 10
9	122.99	249.00	10, 11
10	32.00	242.00	11, 12
11	115.00	256.00	12, 13
12	14.00	259.00	13, 14
13	17.01	262.00	14, 15, 42
14	15.98	266.00	15, 16
15	32.00	282.00	16, 17, 39
16	25.99	318.00	17, 18
17	11.00	318.00	18, 19
18	15.98	278.00	19, 20, 36
19	27.02	264.00	20, 21
20	33.98	283.00	21, 22
21	36.99	270.00	22, 23
22	22.98	270.00	23, 24, 30
23	32.99	258.00	24, 25, 43
24	29.98	242.00	25, 26, 44
25	28.01	238.00	26, 27, 28, 38
26	3.01	270.00	29, 30, 76
27	7.00	262.00	29, 31, 79
28	10.01	240.00	31, 32, 77
29	14.00	280.00	33, 34, 35
30	14.99	272.00	34, 36, 37
31	29.00	250.00	28, 37, 38
32	40.98	248.00	35, 39, 40
33	29.00	244.00	40, 41, 42
34	21.99	246.00	43, 44, 45
35	11.00	238.00	45, 46

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
36	11.98	238.00	46, 47
37	6.01	250.00	47, 48
38	11.98	221.00	48, 49
39	11.98	228.00	49, 50, 81
40	14.99	242.00	50, 51
41	0.99	236.00	51
46	0.00	222.00	80, 81
57	2.02	205.00	73, 80
58	21.99	216.00	73, 74, 78
59	25.00	234.00	74, 75
60	21.01	244.00	75, 76
61	27.02	210.00	32, 77, 78
62	18.00	305.00	79

Simulation Results

Number of trials: 10
Convergence : 0.0003

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	18.0	520.0	1161.87	1.46	0.24	0.00	-	0.46
2	1	2	14.0	230.0	890.18	1.86	0.22	0.00	-	0.96
3	2	3	8.0	440.0	281.77	1.80	0.77	0.00	-	1.75
4	3	4	8.0	320.0	70.48	0.45	0.04	0.00	-	0.13
5	4	5	6.0	1550.0	28.47	0.32	0.16	0.00	-	0.10
6	5	6	8.0	380.0	211.75	1.35	0.39	0.00	-	1.03
7	3	5	8.0	220.0	198.27	1.27	0.20	0.00	-	0.91
8	6	7	8.0	840.0	174.42	1.11	0.60	0.00	-	0.72
9	7	8	8.0	310.0	140.45	0.90	0.15	0.00	-	0.48
10	8	9	8.0	580.0	112.44	0.72	0.19	0.00	-	0.32
11	10	9	8.0	970.0	10.55	0.07	0.00	0.00	-	0.00
12	11	10	8.0	850.0	42.55	0.27	0.04	0.00	-	0.05
13	12	11	8.0	520.0	157.55	1.01	0.31	0.00	-	0.60
14	13	12	8.0	360.0	171.56	1.09	0.25	0.00	-	0.70
15	14	13	8.0	200.0	106.71	0.68	0.06	0.00	-	0.29
16	15	14	8.0	500.0	122.69	0.78	0.19	0.00	-	0.38
17	16	15	8.0	950.0	79.92	0.51	0.16	0.00	-	0.17
18	17	16	8.0	430.0	105.90	0.68	0.12	0.00	-	0.29
19	18	17	10.0	370.0	116.90	0.48	0.04	0.00	-	0.12
20	18	19	10.0	530.0	193.60	0.79	0.16	0.00	-	0.29
21	19	20	10.0	820.0	166.58	0.68	0.18	0.00	-	0.22
22	20	21	10.0	550.0	132.60	0.54	0.08	0.00	-	0.15
23	21	22	10.0	420.0	95.61	0.39	0.03	0.00	-	0.08
24	23	22	10.0	800.0	25.63	0.10	0.01	0.00	-	0.01
25	24	23	8.0	720.0	48.79	0.31	0.05	0.00	-	0.07
26	25	24	8.0	800.0	216.35	1.38	0.86	0.00	-	1.07
27	1	25	8.0	690.0	237.72	1.52	0.88	0.00	-	1.28
28	31	25	8.0	740.0	3.49	0.02	0.00	0.00	-	0.00
29	26	27	8.0	220.0	44.08	0.28	0.01	0.00	-	0.06
30	22	26	10.0	740.0	98.26	0.40	0.06	0.00	-	0.08
31	27	28	8.0	450.0	19.08	0.12	0.01	0.00	-	0.01
32	28	61	8.0	1020.0	4.52	0.03	0.00	0.00	-	0.00
33	2	29	14.0	790.0	595.39	1.24	0.36	0.00	-	0.46
34	29	30	10.0	250.0	377.10	1.54	0.25	0.00	-	1.01
35	29	32	8.0	990.0	204.28	1.30	0.95	0.00	-	0.96
36	30	18	10.0	650.0	326.48	1.33	0.50	0.00	-	0.78
37	30	31	8.0	1150.0	35.63	0.23	0.04	0.00	-	0.04
38	31	25	8.0	900.0	3.14	0.02	0.00	0.00	-	0.00
39	32	15	8.0	860.0	74.78	0.48	0.13	0.00	-	0.15

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
40	32	33	8.0	270.0	88.52	0.56	0.06	0.00	-	0.20
41	6	33	8.0	620.0	22.33	0.14	0.01	0.00	-	0.02
42	33	13	8.0	1800.0	81.86	0.52	0.32	0.00	-	0.18
43	34	23	8.0	560.0	9.84	0.06	0.00	0.00	-	0.00
44	24	34	12.0	730.0	137.57	0.39	0.05	0.00	-	0.06
45	34	35	12.0	540.0	105.74	0.30	0.02	0.00	-	0.04
46	35	36	12.0	610.0	94.75	0.27	0.02	0.00	-	0.03
47	36	37	12.0	520.0	82.76	0.23	0.01	0.00	-	0.03
48	37	38	12.0	370.0	76.75	0.22	0.01	0.00	-	0.02
49	38	39	12.0	290.0	64.76	0.18	0.00	0.00	-	0.02
50	39	40	14.0	910.0	15.98	0.03	0.00	0.00	-	0.00
51	40	41	14.0	310.0	0.99	0.00	0.00	0.00	-	0.00
73	57	58	12.0	600.0	34.78	0.10	0.00	0.00	-	0.01
74	59	58	12.0	490.0	5.17	0.01	0.00	0.00	-	0.00
75	60	59	12.0	460.0	30.17	0.09	0.00	0.00	-	0.00
76	26	60	12.0	580.0	51.18	0.15	0.01	0.00	-	0.01
77	28	61	8.0	1010.0	4.55	0.03	0.00	0.00	-	0.00
78	58	61	8.0	1010.0	17.95	0.11	0.01	0.00	-	0.01
79	27	62	8.0	950.0	18.00	0.11	0.01	0.00	-	0.01
80	46	57	12.0	1040.0	36.80	0.10	0.01	0.00	-	0.01
81	39	46	16.0	1300.0	36.80	0.06	0.00	0.00	-	0.00

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	1161.87+

Net system demand: 1162 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
2	1.86	3	1.75	57	100.32
3	1.80	27	1.28	61	98.14
34	1.54	26	1.07	58	95.55
27	1.52	6	1.03	38	93.39
1	1.46	34	1.01	46	92.95
26	1.38	2	0.96	6	92.64
6	1.35	35	0.96	39	90.35
36	1.33	7	0.91	4	88.11
35	1.30	36	0.78	59	87.75
7	1.27	8	0.72	5	87.17
11	0.07	75	0.00	22	72.18
43	0.06	43	0.00	26	72.15
81	0.06	81	0.00	30	71.73
50	0.03	77	0.00	18	68.91
77	0.03	74	0.00	29	68.37
32	0.03	51	0.00	15	67.03
28	0.02	50	0.00	20	66.59
38	0.02	38	0.00	62	56.97
74	0.01	32	0.00	17	51.56
51	0.00	28	0.00	16	51.50

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

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APPENDIX S

HYDRONEUMATIC SYSTEM FIRE FLOW MODEL FOR EXISTING, ENTITLED & VILLAGE C STAND-ALONE DEVELOPMENT WITH 2,000 GPM DEMAND AT NODE #26

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June 29, 2018

RANCHO MURIETA EXISTING, ENTITLED & VILLAGE C HYDRONEUMATIC WATER SYSTEM
FIRE FLOW MODEL @ NODE 26
(11-01-001)

Number of pipes: 60 Flow unit of measure: GPM
Number of junction nodes: 48 File name: RMNHFC

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	18.0	520.0	130.0	0.0	-	438.60
2	1	2	14.0	230.0	130.0	0.0	-	-
3	2	3	8.0	440.0	130.0	0.0	-	-
4	3	4	8.0	320.0	130.0	0.0	-	-
5	4	5	6.0	1550.0	130.0	0.0	-	-
6	5	6	8.0	380.0	130.0	0.0	-	-
7	5	3	8.0	220.0	130.0	0.0	-	-
8	6	7	8.0	840.0	130.0	0.0	-	-
9	7	8	8.0	310.0	130.0	0.0	-	-
10	8	9	8.0	580.0	130.0	0.0	-	-
11	9	10	8.0	970.0	130.0	0.0	-	-
12	10	11	8.0	850.0	130.0	0.0	-	-
13	11	12	8.0	520.0	130.0	0.0	-	-
14	12	13	8.0	360.0	130.0	0.0	-	-
15	13	14	8.0	200.0	130.0	0.0	-	-
16	14	15	8.0	500.0	130.0	0.0	-	-
17	15	16	8.0	950.0	130.0	0.0	-	-
18	16	17	8.0	430.0	130.0	0.0	-	-
19	17	18	10.0	370.0	130.0	0.0	-	-
20	18	19	10.0	530.0	130.0	0.0	-	-
21	19	20	10.0	820.0	130.0	0.0	-	-
22	20	21	10.0	550.0	130.0	0.0	-	-
23	21	22	10.0	420.0	130.0	0.0	-	-
24	22	23	10.0	800.0	130.0	0.0	-	-
25	23	24	8.0	720.0	130.0	0.0	-	-
26	24	25	8.0	800.0	130.0	0.0	-	-
27	25	1	8.0	690.0	130.0	0.0	-	-
28	25	31	8.0	740.0	130.0	0.0	-	-
29	26	27	8.0	220.0	130.0	0.0	-	-
30	26	22	10.0	740.0	130.0	0.0	-	-
31	27	28	8.0	450.0	130.0	0.0	-	-
32	28	61	8.0	1020.0	130.0	0.0	-	-
33	29	2	14.0	790.0	130.0	0.0	-	-
34	29	30	10.0	250.0	130.0	0.0	-	-
35	29	32	8.0	990.0	130.0	0.0	-	-
36	30	18	10.0	650.0	130.0	0.0	-	-
37	30	31	8.0	1150.0	130.0	0.0	-	-
38	31	25	8.0	900.0	130.0	0.0	-	-
39	32	15	8.0	860.0	130.0	0.0	-	-
40	32	33	8.0	270.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	33	6	8.0	620.0	130.0	0.0	-	-
42	33	13	8.0	1800.0	130.0	0.0	-	-
43	34	23	8.0	560.0	130.0	0.0	-	-
44	34	24	12.0	730.0	130.0	0.0	-	-
45	34	35	12.0	540.0	130.0	0.0	-	-
46	35	36	12.0	610.0	130.0	0.0	-	-
47	36	37	12.0	520.0	130.0	0.0	-	-
48	37	38	12.0	370.0	130.0	0.0	-	-
49	38	39	12.0	290.0	130.0	0.0	-	-
50	39	40	14.0	910.0	130.0	0.0	-	-
51	40	41	14.0	310.0	130.0	0.0	-	-
73	57	58	12.0	600.0	130.0	0.0	-	-
74	58	59	12.0	490.0	130.0	0.0	-	-
75	59	60	12.0	460.0	130.0	0.0	-	-
76	60	26	12.0	580.0	130.0	0.0	-	-
77	61	28	8.0	1010.0	130.0	0.0	-	-
78	61	58	8.0	1010.0	130.0	0.0	-	-
79	62	27	8.0	950.0	130.0	0.0	-	-
80	57	46	12.0	1040.0	130.0	0.0	-	-
81	46	39	16.0	1300.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	33.98	244.00	1, 2, 27
2	13.02	243.00	2, 3, 33
3	13.02	250.00	3, 4, 7
4	42.01	234.00	4, 5
5	14.99	236.00	5, 6, 7
6	14.99	223.00	6, 8, 41
7	33.98	238.00	8, 9
8	28.01	246.00	9, 10
9	122.99	249.00	10, 11
10	32.00	242.00	11, 12
11	115.00	256.00	12, 13
12	14.00	259.00	13, 14
13	17.01	262.00	14, 15, 42
14	15.98	266.00	15, 16
15	32.00	282.00	16, 17, 39
16	25.99	318.00	17, 18
17	11.00	318.00	18, 19
18	15.98	278.00	19, 20, 36
19	27.02	264.00	20, 21
20	33.98	283.00	21, 22
21	36.99	270.00	22, 23
22	22.98	270.00	23, 24, 30
23	32.99	258.00	24, 25, 43
24	29.98	242.00	25, 26, 44
25	28.01	238.00	26, 27, 28, 38
26	3.01	270.00	29, 30, 76
27	2006.99	262.00	29, 31, 79
28	10.01	240.00	31, 32, 77
29	14.00	280.00	33, 34, 35
30	14.99	272.00	34, 36, 37
31	29.00	250.00	28, 37, 38
32	40.98	248.00	35, 39, 40
33	29.00	244.00	40, 41, 42
34	21.99	246.00	43, 44, 45
35	11.00	238.00	45, 46

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
36	11.98	238.00	46, 47
37	6.01	250.00	47, 48
38	11.98	221.00	48, 49
39	11.98	228.00	49, 50, 81
40	14.99	242.00	50, 51
41	0.99	236.00	51
46	0.00	222.00	80, 81
57	2.02	205.00	73, 80
58	21.99	216.00	73, 74, 78
59	25.00	234.00	74, 75
60	21.01	244.00	75, 76
61	27.02	210.00	32, 77, 78
62	18.00	305.00	79

Simulation Results

Number of trials: 6
Convergence : 0.0011

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	18.0	520.0	3161.86	3.99	1.54	0.00	-	2.97
2	1	2	14.0	230.0	2250.16	4.69	1.24	0.00	-	5.38
3	2	3	8.0	440.0	516.04	3.29	2.36	0.00	-	5.37
4	3	4	8.0	320.0	103.12	0.66	0.09	0.00	-	0.27
5	4	5	6.0	1550.0	61.11	0.69	0.65	0.00	-	0.42
6	5	6	8.0	380.0	446.01	2.85	1.56	0.00	-	4.10
7	3	5	8.0	220.0	399.90	2.55	0.74	0.00	-	3.35
8	6	7	8.0	840.0	247.69	1.58	1.16	0.00	-	1.38
9	7	8	8.0	310.0	213.71	1.36	0.33	0.00	-	1.05
10	8	9	8.0	580.0	185.70	1.19	0.47	0.00	-	0.81
11	9	10	8.0	970.0	62.71	0.40	0.10	0.00	-	0.11
12	10	11	8.0	850.0	30.71	0.20	0.02	0.00	-	0.03
13	12	11	8.0	520.0	84.29	0.54	0.10	0.00	-	0.19
14	13	12	8.0	360.0	98.29	0.63	0.09	0.00	-	0.25
15	13	14	8.0	200.0	66.89	0.43	0.02	0.00	-	0.12
16	14	15	8.0	500.0	50.91	0.32	0.04	0.00	-	0.07
17	15	16	8.0	950.0	297.36	1.90	1.84	0.00	-	1.93
18	16	17	8.0	430.0	271.37	1.73	0.70	0.00	-	1.63
19	17	18	10.0	370.0	260.37	1.06	0.19	0.00	-	0.51
20	18	19	10.0	530.0	1247.34	5.10	4.92	0.00	-	9.28
21	19	20	10.0	820.0	1220.32	4.98	7.31	0.00	-	8.91
22	20	21	10.0	550.0	1186.34	4.85	4.65	0.00	-	8.46
23	21	22	10.0	420.0	1149.35	4.69	3.35	0.00	-	7.97
24	23	22	10.0	800.0	205.58	0.84	0.26	0.00	-	0.33
25	24	23	8.0	720.0	288.26	1.84	1.31	0.00	-	1.82
26	25	24	8.0	800.0	1162.59	7.42	19.32	0.00	-	24.15
27	1	25	8.0	690.0	877.72	5.60	9.90	0.00	-	14.35
28	31	25	8.0	740.0	164.70	1.05	0.48	0.00	-	0.65
29	26	27	8.0	220.0	1537.43	9.81	8.91	0.00	-	40.52
30	22	26	10.0	740.0	1331.95	5.44	7.75	0.00	-	10.48
31	28	27	8.0	450.0	487.55	3.11	2.17	0.00	-	4.83
32	61	28	8.0	1020.0	248.12	1.58	1.41	0.00	-	1.38
33	2	29	14.0	790.0	1721.10	3.59	2.58	0.00	-	3.27
34	29	30	10.0	250.0	1359.81	5.55	2.72	0.00	-	10.89
35	29	32	8.0	990.0	347.29	2.22	2.55	0.00	-	2.58
36	30	18	10.0	650.0	1002.94	4.10	4.03	0.00	-	6.20
37	30	31	8.0	1150.0	341.87	2.18	2.88	0.00	-	2.50
38	31	25	8.0	900.0	148.18	0.95	0.48	0.00	-	0.53
39	32	15	8.0	860.0	278.46	1.78	1.47	0.00	-	1.71

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
40	32	33	8.0	270.0	27.85	0.18	0.01	0.00	-	0.02
41	6	33	8.0	620.0	183.33	1.17	0.49	0.00	-	0.79
42	33	13	8.0	1800.0	182.19	1.16	1.40	0.00	-	0.78
43	23	34	8.0	560.0	49.69	0.32	0.04	0.00	-	0.07
44	24	34	12.0	730.0	844.35	2.40	1.35	0.00	-	1.85
45	34	35	12.0	540.0	872.05	2.47	1.06	0.00	-	1.97
46	35	36	12.0	610.0	861.05	2.44	1.17	0.00	-	1.92
47	36	37	12.0	520.0	849.06	2.41	0.97	0.00	-	1.87
48	37	38	12.0	370.0	843.05	2.39	0.68	0.00	-	1.85
49	38	39	12.0	290.0	831.07	2.36	0.52	0.00	-	1.80
50	39	40	14.0	910.0	15.98	0.03	0.00	0.00	-	0.00
51	40	41	14.0	310.0	0.99	0.00	0.00	0.00	-	0.00
73	57	58	12.0	600.0	801.08	2.27	1.01	0.00	-	1.68
74	58	59	12.0	490.0	254.50	0.72	0.10	0.00	-	0.20
75	59	60	12.0	460.0	229.50	0.65	0.08	0.00	-	0.17
76	60	26	12.0	580.0	208.50	0.59	0.08	0.00	-	0.14
77	61	28	8.0	1010.0	249.44	1.59	1.41	0.00	-	1.40
78	58	61	8.0	1010.0	524.58	3.35	5.59	0.00	-	5.53
79	27	62	8.0	950.0	18.00	0.11	0.01	0.00	-	0.01
80	46	57	12.0	1040.0	803.10	2.28	1.76	0.00	-	1.69
81	39	46	16.0	1300.0	803.10	1.28	0.54	0.00	-	0.42

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	3161.85+

Net system demand: 3162 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
29	9.81	29	40.52	6	90.21
26	7.42	26	24.15	4	86.39
27	5.60	27	14.35	5	85.25
34	5.55	34	10.89	57	84.40
30	5.44	30	10.48	1	83.66
20	5.10	20	9.28	2	83.56
21	4.98	21	8.91	7	83.20
22	4.85	22	8.46	25	81.97
23	4.69	23	7.97	10	81.08
2	4.69	36	6.20	33	80.89
13	0.54	76	0.14	18	64.34
15	0.43	15	0.12	15	63.79
11	0.40	11	0.11	21	60.50
16	0.32	16	0.07	22	59.05
43	0.32	43	0.07	20	56.88
12	0.20	12	0.03	26	55.69
40	0.18	40	0.02	27	55.29
79	0.11	79	0.01	16	47.40
50	0.03	51	0.00	17	47.09
51	0.00	50	0.00	62	36.65

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

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APPENDIX T

HYDRONEUMATIC SYSTEM STATIC MODEL FOR EXISTING, ENTITLED & VILLAGE H STAND-ALONE DEVELOPMENT

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June 29, 2018

RANCHO MURIETA EXISTING, ENTITLED & VILLAGE H HYDRONEUMATIC WATER SYSTEM
STATIC MODEL
(11-01-001)

Number of pipes: 54 Flow unit of measure: GPM
Number of junction nodes: 42 File name: RMNHFH

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	18.0	520.0	130.0	0.0	-	438.60
2	1	2	14.0	230.0	130.0	0.0	-	-
3	2	3	8.0	440.0	130.0	0.0	-	-
4	3	4	8.0	320.0	130.0	0.0	-	-
5	4	5	6.0	1550.0	130.0	0.0	-	-
6	5	6	8.0	380.0	130.0	0.0	-	-
7	5	3	8.0	220.0	130.0	0.0	-	-
8	6	7	8.0	840.0	130.0	0.0	-	-
9	7	8	8.0	310.0	130.0	0.0	-	-
10	8	9	8.0	580.0	130.0	0.0	-	-
11	9	10	8.0	970.0	130.0	0.0	-	-
12	10	11	8.0	850.0	130.0	0.0	-	-
13	11	12	8.0	520.0	130.0	0.0	-	-
14	12	13	8.0	360.0	130.0	0.0	-	-
15	13	14	8.0	200.0	130.0	0.0	-	-
16	14	15	8.0	500.0	130.0	0.0	-	-
17	15	16	8.0	950.0	130.0	0.0	-	-
18	16	17	8.0	430.0	130.0	0.0	-	-
19	17	18	10.0	370.0	130.0	0.0	-	-
20	18	19	10.0	530.0	130.0	0.0	-	-
21	19	20	10.0	820.0	130.0	0.0	-	-
22	20	21	10.0	550.0	130.0	0.0	-	-
23	21	22	10.0	420.0	130.0	0.0	-	-
24	22	23	10.0	800.0	130.0	0.0	-	-
25	23	24	8.0	720.0	130.0	0.0	-	-
26	24	25	8.0	800.0	130.0	0.0	-	-
27	25	1	8.0	690.0	130.0	0.0	-	-
28	25	31	8.0	740.0	130.0	0.0	-	-
29	26	27	8.0	220.0	130.0	0.0	-	-
30	26	22	10.0	740.0	130.0	0.0	-	-
31	27	28	8.0	450.0	130.0	0.0	-	-
33	29	2	14.0	790.0	130.0	0.0	-	-
34	29	30	10.0	250.0	130.0	0.0	-	-
35	29	32	8.0	990.0	130.0	0.0	-	-
36	30	18	10.0	650.0	130.0	0.0	-	-
37	30	31	8.0	1150.0	130.0	0.0	-	-
38	31	25	8.0	900.0	130.0	0.0	-	-
39	32	15	8.0	860.0	130.0	0.0	-	-
40	32	33	8.0	270.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	33	6	8.0	620.0	130.0	0.0	-	-
42	33	13	8.0	1800.0	130.0	0.0	-	-
107	86	87	12.0	530.0	130.0	0.0	-	-
108	87	94	12.0	900.0	130.0	0.0	-	-
109	88	86	12.0	810.0	130.0	0.0	-	-
110	88	17	12.0	310.0	130.0	0.0	-	-
111	88	89	12.0	640.0	130.0	0.0	-	-
112	89	16	8.0	370.0	130.0	0.0	-	-
113	89	90	12.0	1140.0	130.0	0.0	-	-
114	90	14	8.0	580.0	130.0	0.0	-	-
115	90	91	12.0	1040.0	130.0	0.0	-	-
116	91	12	8.0	170.0	130.0	0.0	-	-
117	92	90	12.0	520.0	130.0	0.0	-	-
118	93	92	8.0	620.0	130.0	0.0	-	-
119	94	92	12.0	370.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	33.98	244.00	1, 2, 27
2	13.02	243.00	2, 3, 33
3	13.02	250.00	3, 4, 7
4	42.01	234.00	4, 5
5	14.99	236.00	5, 6, 7
6	14.99	223.00	6, 8, 41
7	33.98	238.00	8, 9
8	28.01	246.00	9, 10
9	122.99	249.00	10, 11
10	32.00	242.00	11, 12
11	115.00	256.00	12, 13
12	14.00	259.00	13, 14, 116
13	17.01	262.00	14, 15, 42
14	15.98	266.00	15, 16, 114
15	32.00	282.00	16, 17, 39
16	25.99	318.00	17, 18, 112
17	11.00	318.00	18, 19, 110
18	15.98	278.00	19, 20, 36
19	27.02	264.00	20, 21
20	33.98	283.00	21, 22
21	36.99	270.00	22, 23
22	22.98	270.00	23, 24, 30
23	32.99	258.00	24, 25
24	29.98	242.00	25, 26
25	28.01	238.00	26, 27, 28, 38
26	3.01	270.00	29, 30
27	7.00	262.00	29, 31
28	10.01	240.00	31
29	14.00	280.00	33, 34, 35
30	14.99	272.00	34, 36, 37
31	29.00	250.00	28, 37, 38
32	40.98	248.00	35, 39, 40
33	29.00	244.00	40, 41, 42
86	14.99	310.00	107, 109
87	6.01	300.00	107, 108
88	9.02	322.00	109, 110, 111
89	11.98	313.00	111, 112, 113
90	18.00	274.00	113, 114, 115, 117
91	10.01	272.00	115, 116

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
92	9.02	278.00	117, 118, 119
93	10.01	300.00	118
94	7.00	287.00	108, 119

Simulation Results

Number of trials: 15
Convergence : 0.0003

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	18.0	520.0	1051.95	1.33	0.20	0.00	-	0.39
2	1	2	14.0	230.0	812.24	1.69	0.19	0.00	-	0.81
3	2	3	8.0	440.0	259.70	1.66	0.66	0.00	-	1.50
4	3	4	8.0	320.0	67.35	0.43	0.04	0.00	-	0.12
5	4	5	6.0	1550.0	25.34	0.29	0.13	0.00	-	0.08
6	5	6	8.0	380.0	189.68	1.21	0.32	0.00	-	0.84
7	3	5	8.0	220.0	179.33	1.14	0.17	0.00	-	0.76
8	6	7	8.0	840.0	156.08	1.00	0.49	0.00	-	0.59
9	7	8	8.0	310.0	122.10	0.78	0.12	0.00	-	0.37
10	8	9	8.0	580.0	94.10	0.60	0.13	0.00	-	0.23
11	10	9	8.0	970.0	28.89	0.18	0.02	0.00	-	0.03
12	11	10	8.0	850.0	60.90	0.39	0.09	0.00	-	0.10
13	12	11	8.0	520.0	175.89	1.12	0.38	0.00	-	0.73
14	13	12	8.0	360.0	89.00	0.57	0.07	0.00	-	0.21
15	14	13	8.0	200.0	48.37	0.31	0.01	0.00	-	0.07
16	15	14	8.0	500.0	56.25	0.36	0.04	0.00	-	0.09
17	16	15	8.0	950.0	9.17	0.06	0.00	0.00	-	0.00
18	17	16	8.0	430.0	59.81	0.38	0.04	0.00	-	0.10
19	18	17	10.0	370.0	251.21	1.03	0.18	0.00	-	0.48
20	18	19	10.0	530.0	69.81	0.29	0.02	0.00	-	0.04
21	19	20	10.0	820.0	42.79	0.17	0.01	0.00	-	0.02
22	20	21	10.0	550.0	8.81	0.04	0.00	0.00	-	0.00
23	22	21	10.0	420.0	28.18	0.12	0.00	0.00	-	0.01
24	23	22	10.0	800.0	71.18	0.29	0.04	0.00	-	0.05
25	24	23	8.0	720.0	104.17	0.66	0.20	0.00	-	0.28
26	25	24	8.0	800.0	134.16	0.86	0.35	0.00	-	0.44
27	1	25	8.0	690.0	205.73	1.31	0.67	0.00	-	0.98
28	25	31	8.0	740.0	22.93	0.15	0.01	0.00	-	0.02
29	26	27	8.0	220.0	17.01	0.11	0.00	0.00	-	0.01
30	22	26	10.0	740.0	20.02	0.08	0.00	0.00	-	0.00
31	27	28	8.0	450.0	10.01	0.06	0.00	0.00	-	0.00
33	2	29	14.0	790.0	539.53	1.12	0.30	0.00	-	0.38
34	29	30	10.0	250.0	337.43	1.38	0.21	0.00	-	0.82
35	29	32	8.0	990.0	188.10	1.20	0.82	0.00	-	0.83
36	30	18	10.0	650.0	337.00	1.38	0.53	0.00	-	0.82
37	31	30	8.0	1150.0	14.56	0.09	0.01	0.00	-	0.01
38	25	31	8.0	900.0	20.63	0.13	0.01	0.00	-	0.01
39	32	15	8.0	860.0	79.08	0.50	0.14	0.00	-	0.17
40	32	33	8.0	270.0	68.04	0.43	0.03	0.00	-	0.13
41	6	33	8.0	620.0	18.60	0.12	0.01	0.00	-	0.01
42	33	13	8.0	1800.0	57.64	0.37	0.17	0.00	-	0.09
107	86	87	12.0	530.0	71.73	0.20	0.01	0.00	-	0.02
108	87	94	12.0	900.0	65.72	0.19	0.01	0.00	-	0.02
109	88	86	12.0	810.0	86.73	0.25	0.02	0.00	-	0.03
110	17	88	12.0	310.0	180.41	0.51	0.03	0.00	-	0.11
111	88	89	12.0	640.0	84.66	0.24	0.02	0.00	-	0.03
112	16	89	8.0	370.0	24.64	0.16	0.01	0.00	-	0.02
113	89	90	12.0	1140.0	97.32	0.28	0.04	0.00	-	0.03

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Losses (ft) Minor	Pump Head	Hd Loss /1000 ft
114	90	14	8.0	580.0	8.10	0.05	0.00	0.00	-	0.00
115	90	91	12.0	1040.0	110.91	0.31	0.04	0.00	-	0.04
116	91	12	8.0	170.0	100.90	0.64	0.04	0.00	-	0.26
117	92	90	12.0	520.0	39.69	0.11	0.00	0.00	-	0.01
118	92	93	8.0	620.0	10.01	0.06	0.00	0.00	-	0.00
119	94	92	12.0	370.0	58.72	0.17	0.00	0.00	-	0.01

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	1051.94+

Net system demand: 1052 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
2	1.69	3	1.50	6	92.76
3	1.66	27	0.98	4	88.19
34	1.38	6	0.84	5	87.27
36	1.38	35	0.83	25	86.55
1	1.33	34	0.82	7	86.05
27	1.31	36	0.82	28	85.42
6	1.21	2	0.81	24	84.66
35	1.20	7	0.76	2	84.59
7	1.14	13	0.73	1	84.24
33	1.12	8	0.59	10	84.22
23	0.12	29	0.01	15	67.14
117	0.11	23	0.01	20	66.79
29	0.11	37	0.01	94	64.96
37	0.09	117	0.01	87	59.34
30	0.08	30	0.00	93	59.33
118	0.06	118	0.00	86	55.01
31	0.06	31	0.00	89	53.71
17	0.06	17	0.00	17	51.56
114	0.05	114	0.00	16	51.55
22	0.04	22	0.00	88	49.82

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

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APPENDIX U

HYDRONEUMATIC SYSTEM FIRE FLOW MODEL FOR EXISTING, ENTITLED & VILLAGE H STAND-ALONE DEVELOPMENT WITH 2,000 GPM DEMAND AT NODE #88

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June 29, 2018

RANCHO MURIETA EXISTING, ENTITLED & VILLAGE H HYDRONEUMATIC WATER SYSTEM
FIRE FLOW MODEL @ NODE 88
(11-01-001)

Number of pipes: 54 Flow unit of measure: GPM
Number of junction nodes: 42 File name: RMNHFH

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	18.0	520.0	130.0	0.0	-	438.60
2	1	2	14.0	230.0	130.0	0.0	-	-
3	2	3	8.0	440.0	130.0	0.0	-	-
4	3	4	8.0	320.0	130.0	0.0	-	-
5	4	5	6.0	1550.0	130.0	0.0	-	-
6	5	6	8.0	380.0	130.0	0.0	-	-
7	5	3	8.0	220.0	130.0	0.0	-	-
8	6	7	8.0	840.0	130.0	0.0	-	-
9	7	8	8.0	310.0	130.0	0.0	-	-
10	8	9	8.0	580.0	130.0	0.0	-	-
11	9	10	8.0	970.0	130.0	0.0	-	-
12	10	11	8.0	850.0	130.0	0.0	-	-
13	11	12	8.0	520.0	130.0	0.0	-	-
14	12	13	8.0	360.0	130.0	0.0	-	-
15	13	14	8.0	200.0	130.0	0.0	-	-
16	14	15	8.0	500.0	130.0	0.0	-	-
17	15	16	8.0	950.0	130.0	0.0	-	-
18	16	17	8.0	430.0	130.0	0.0	-	-
19	17	18	10.0	370.0	130.0	0.0	-	-
20	18	19	10.0	530.0	130.0	0.0	-	-
21	19	20	10.0	820.0	130.0	0.0	-	-
22	20	21	10.0	550.0	130.0	0.0	-	-
23	21	22	10.0	420.0	130.0	0.0	-	-
24	22	23	10.0	800.0	130.0	0.0	-	-
25	23	24	8.0	720.0	130.0	0.0	-	-
26	24	25	8.0	800.0	130.0	0.0	-	-
27	25	1	8.0	690.0	130.0	0.0	-	-
28	25	31	8.0	740.0	130.0	0.0	-	-
29	26	27	8.0	220.0	130.0	0.0	-	-
30	26	22	10.0	740.0	130.0	0.0	-	-
31	27	28	8.0	450.0	130.0	0.0	-	-
33	29	2	14.0	790.0	130.0	0.0	-	-
34	29	30	10.0	250.0	130.0	0.0	-	-
35	29	32	8.0	990.0	130.0	0.0	-	-
36	30	18	10.0	650.0	130.0	0.0	-	-
37	30	31	8.0	1150.0	130.0	0.0	-	-
38	31	25	8.0	900.0	130.0	0.0	-	-
39	32	15	8.0	860.0	130.0	0.0	-	-
40	32	33	8.0	270.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	33	6	8.0	620.0	130.0	0.0	-	-
42	33	13	8.0	1800.0	130.0	0.0	-	-
107	86	87	12.0	530.0	130.0	0.0	-	-
108	87	94	12.0	900.0	130.0	0.0	-	-
109	88	86	12.0	810.0	130.0	0.0	-	-
110	88	17	12.0	310.0	130.0	0.0	-	-
111	88	89	12.0	640.0	130.0	0.0	-	-
112	89	16	8.0	370.0	130.0	0.0	-	-
113	89	90	12.0	1140.0	130.0	0.0	-	-
114	90	14	8.0	580.0	130.0	0.0	-	-
115	90	91	12.0	1040.0	130.0	0.0	-	-
116	91	12	8.0	170.0	130.0	0.0	-	-
117	92	90	12.0	520.0	130.0	0.0	-	-
118	93	92	8.0	620.0	130.0	0.0	-	-
119	94	92	12.0	370.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	33.98	244.00	1, 2, 27
2	13.02	243.00	2, 3, 33
3	13.02	250.00	3, 4, 7
4	42.01	234.00	4, 5
5	14.99	236.00	5, 6, 7
6	14.99	223.00	6, 8, 41
7	33.98	238.00	8, 9
8	28.01	246.00	9, 10
9	122.99	249.00	10, 11
10	32.00	242.00	11, 12
11	115.00	256.00	12, 13
12	14.00	259.00	13, 14, 116
13	17.01	262.00	14, 15, 42
14	15.98	266.00	15, 16, 114
15	32.00	282.00	16, 17, 39
16	25.99	318.00	17, 18, 112
17	11.00	318.00	18, 19, 110
18	15.98	278.00	19, 20, 36
19	27.02	264.00	20, 21
20	33.98	283.00	21, 22
21	36.99	270.00	22, 23
22	22.98	270.00	23, 24, 30
23	32.99	258.00	24, 25
24	29.98	242.00	25, 26
25	28.01	238.00	26, 27, 28, 38
26	3.01	270.00	29, 30
27	7.00	262.00	29, 31
28	10.01	240.00	31
29	14.00	280.00	33, 34, 35
30	14.99	272.00	34, 36, 37
31	29.00	250.00	28, 37, 38
32	40.98	248.00	35, 39, 40
33	29.00	244.00	40, 41, 42
86	14.99	310.00	107, 109
87	6.01	300.00	107, 108
88	2009.01	322.00	109, 110, 111
89	11.98	313.00	111, 112, 113
90	18.00	274.00	113, 114, 115, 117
91	10.01	272.00	115, 116

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
92	9.02	278.00	117, 118, 119
93	10.01	300.00	118
94	7.00	287.00	108, 119

Simulation Results

Number of trials: 12
Convergence : 0.0000

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	18.0	520.0	3051.93	3.85	1.45	0.00	-	2.78
2	1	2	14.0	230.0	2415.49	5.03	1.41	0.00	-	6.13
3	2	3	8.0	440.0	709.88	4.53	4.26	0.00	-	9.68
4	3	4	8.0	320.0	129.88	0.83	0.13	0.00	-	0.42
5	4	5	6.0	1550.0	87.86	1.00	1.27	0.00	-	0.82
6	5	6	8.0	380.0	639.86	4.08	3.04	0.00	-	7.99
7	3	5	8.0	220.0	566.99	3.62	1.41	0.00	-	6.39
8	6	7	8.0	840.0	367.59	2.35	2.40	0.00	-	2.86
9	7	8	8.0	310.0	333.61	2.13	0.74	0.00	-	2.39
10	8	9	8.0	580.0	305.60	1.95	1.18	0.00	-	2.03
11	9	10	8.0	970.0	182.62	1.17	0.76	0.00	-	0.78
12	10	11	8.0	850.0	150.61	0.96	0.47	0.00	-	0.55
13	11	12	8.0	520.0	35.61	0.23	0.02	0.00	-	0.04
14	13	12	8.0	360.0	243.17	1.55	0.48	0.00	-	1.33
15	13	14	8.0	200.0	67.95	0.43	0.03	0.00	-	0.13
16	15	14	8.0	500.0	216.68	1.38	0.54	0.00	-	1.08
17	15	16	8.0	950.0	211.48	1.35	0.98	0.00	-	1.03
18	17	16	8.0	430.0	101.78	0.65	0.11	0.00	-	0.27
19	18	17	10.0	370.0	1388.11	5.67	4.19	0.00	-	11.31
20	19	18	10.0	530.0	196.04	0.80	0.16	0.00	-	0.30
21	20	19	10.0	820.0	223.07	0.91	0.31	0.00	-	0.38
22	21	20	10.0	550.0	257.04	1.05	0.27	0.00	-	0.50
23	22	21	10.0	420.0	294.03	1.20	0.27	0.00	-	0.64
24	23	22	10.0	800.0	337.03	1.38	0.66	0.00	-	0.82
25	24	23	8.0	720.0	370.02	2.36	2.09	0.00	-	2.90
26	25	24	8.0	800.0	400.01	2.55	2.68	0.00	-	3.35
27	1	25	8.0	690.0	602.47	3.85	4.93	0.00	-	7.15
28	25	31	8.0	740.0	91.83	0.59	0.16	0.00	-	0.22
29	26	27	8.0	220.0	17.01	0.11	0.00	0.00	-	0.01
30	22	26	10.0	740.0	20.02	0.08	0.00	0.00	-	0.00
31	27	28	8.0	450.0	10.01	0.06	0.00	0.00	-	0.00
33	2	29	14.0	790.0	1692.59	3.53	2.51	0.00	-	3.17
34	29	30	10.0	250.0	1077.58	4.40	1.77	0.00	-	7.08
35	29	32	8.0	990.0	601.01	3.84	7.04	0.00	-	7.12
36	30	18	10.0	650.0	1208.04	4.93	5.68	0.00	-	8.74
37	31	30	8.0	1150.0	145.46	0.93	0.59	0.00	-	0.51
38	25	31	8.0	900.0	82.62	0.53	0.16	0.00	-	0.18
39	32	15	8.0	860.0	460.17	2.94	3.73	0.00	-	4.34
40	32	33	8.0	270.0	99.86	0.64	0.07	0.00	-	0.26
41	6	33	8.0	620.0	257.27	1.64	0.92	0.00	-	1.48
42	33	13	8.0	1800.0	328.13	2.09	4.18	0.00	-	2.32
107	87	86	12.0	530.0	249.37	0.71	0.10	0.00	-	0.19
108	94	87	12.0	900.0	255.38	0.72	0.18	0.00	-	0.20
109	86	88	12.0	810.0	234.38	0.66	0.14	0.00	-	0.17
110	17	88	12.0	310.0	1275.33	3.62	1.23	0.00	-	3.98
111	89	88	12.0	640.0	499.30	1.42	0.45	0.00	-	0.70
112	16	89	8.0	370.0	287.27	1.83	0.67	0.00	-	1.81
113	90	89	12.0	1140.0	224.01	0.64	0.18	0.00	-	0.16
114	14	90	8.0	580.0	268.65	1.71	0.93	0.00	-	1.60

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Losses (ft) Minor	Pump Head	Hd Loss /1000 ft
115	91	90	12.0	1040.0	254.77	0.72	0.21	0.00	-	0.20
116	12	91	8.0	170.0	264.78	1.69	0.27	0.00	-	1.56
117	90	92	12.0	520.0	281.42	0.80	0.13	0.00	-	0.24
118	92	93	8.0	620.0	10.01	0.06	0.00	0.00	-	0.00
119	92	94	12.0	370.0	262.39	0.74	0.08	0.00	-	0.21

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	3051.93+

Net system demand: 3052 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
19	5.67	19	11.31	6	88.42
2	5.03	3	9.68	4	85.52
36	4.93	36	8.74	25	84.16
3	4.53	6	7.99	5	84.10
34	4.40	27	7.15	1	83.70
6	4.08	35	7.12	2	83.52
1	3.85	34	7.08	24	81.27
27	3.85	7	6.39	28	80.94
35	3.84	2	6.13	7	80.88
7	3.62	39	4.34	33	78.92
40	0.64	107	0.19	92	61.91
113	0.64	38	0.18	15	60.87
28	0.59	109	0.17	94	57.98
38	0.53	113	0.16	93	52.38
15	0.43	15	0.13	87	52.26
13	0.23	13	0.04	86	47.89
29	0.11	29	0.01	89	46.72
30	0.08	30	0.00	17	44.89
118	0.06	118	0.00	16	44.84
31	0.06	31	0.00	88	42.63

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

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APPENDIX V

HYDRONEUMATIC SYSTEM STATIC MODEL FOR ULTIMATE BUILD OUT DEVELOPMENT

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June 29, 2018

RANCHO MURIETA ULTIMATE BUILD OUT HYDRONEUMATIC WATER SYSTEM STATIC MODEL
(11-01-001)

Number of pipes: 126 Flow unit of measure: GPM
Number of junction nodes: 102 File name: RMNHFU

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	18.0	520.0	130.0	0.0	-	438.60
2	1	2	14.0	230.0	130.0	0.0	-	-
3	2	3	8.0	440.0	130.0	0.0	-	-
4	3	4	8.0	320.0	130.0	0.0	-	-
5	4	5	6.0	1550.0	130.0	0.0	-	-
6	5	6	8.0	380.0	130.0	0.0	-	-
7	5	3	8.0	220.0	130.0	0.0	-	-
8	6	7	8.0	840.0	130.0	0.0	-	-
9	7	8	8.0	310.0	130.0	0.0	-	-
10	8	9	8.0	580.0	130.0	0.0	-	-
11	9	10	8.0	970.0	130.0	0.0	-	-
12	10	11	8.0	850.0	130.0	0.0	-	-
13	11	12	8.0	520.0	130.0	0.0	-	-
14	12	13	8.0	360.0	130.0	0.0	-	-
15	13	14	8.0	200.0	130.0	0.0	-	-
16	14	15	8.0	500.0	130.0	0.0	-	-
17	15	16	8.0	950.0	130.0	0.0	-	-
18	16	17	8.0	430.0	130.0	0.0	-	-
19	17	18	10.0	370.0	130.0	0.0	-	-
20	18	19	10.0	530.0	130.0	0.0	-	-
21	19	20	10.0	820.0	130.0	0.0	-	-
22	20	21	10.0	550.0	130.0	0.0	-	-
23	21	22	10.0	420.0	130.0	0.0	-	-
24	22	23	10.0	800.0	130.0	0.0	-	-
25	23	24	8.0	720.0	130.0	0.0	-	-
26	24	25	8.0	800.0	130.0	0.0	-	-
27	25	1	8.0	690.0	130.0	0.0	-	-
28	25	31	8.0	740.0	130.0	0.0	-	-
29	26	27	8.0	220.0	130.0	0.0	-	-
30	26	22	10.0	740.0	130.0	0.0	-	-
31	27	28	8.0	450.0	130.0	0.0	-	-
32	28	61	8.0	1020.0	130.0	0.0	-	-
33	29	2	14.0	790.0	130.0	0.0	-	-
34	29	30	10.0	250.0	130.0	0.0	-	-
35	29	32	8.0	990.0	130.0	0.0	-	-
36	30	18	10.0	650.0	130.0	0.0	-	-
37	30	31	8.0	1150.0	130.0	0.0	-	-
38	31	25	8.0	900.0	130.0	0.0	-	-
39	32	15	8.0	860.0	130.0	0.0	-	-
40	32	33	8.0	270.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	33	6	8.0	620.0	130.0	0.0	-	-
42	33	13	8.0	1800.0	130.0	0.0	-	-
43	34	23	8.0	560.0	130.0	0.0	-	-
44	34	24	12.0	730.0	130.0	0.0	-	-
45	34	35	12.0	540.0	130.0	0.0	-	-
46	35	36	12.0	610.0	130.0	0.0	-	-
47	36	37	12.0	520.0	130.0	0.0	-	-
48	37	38	8.0	370.0	130.0	0.0	-	-
49	38	39	8.0	290.0	130.0	0.0	-	-
50	39	40	14.0	910.0	130.0	0.0	-	-
51	40	41	14.0	310.0	130.0	0.0	-	-
52	41	42	12.0	420.0	130.0	0.0	-	-
53	42	43	12.0	240.0	130.0	0.0	-	-
54	43	44	12.0	650.0	130.0	0.0	-	-
55	44	45	12.0	290.0	130.0	0.0	-	-
56	45	46	12.0	300.0	130.0	0.0	-	-
57	46	47	8.0	920.0	130.0	0.0	-	-
58	47	48	8.0	560.0	130.0	0.0	-	-
59	48	49	8.0	400.0	130.0	0.0	-	-
60	49	50	8.0	1020.0	130.0	0.0	-	-
61	50	51	8.0	690.0	130.0	0.0	-	-
62	51	42	8.0	620.0	130.0	0.0	-	-
63	52	51	8.0	300.0	130.0	0.0	-	-
64	53	52	8.0	700.0	130.0	0.0	-	-
65	54	48	8.0	160.0	130.0	0.0	-	-
66	54	50	8.0	460.0	130.0	0.0	-	-
67	54	55	8.0	320.0	130.0	0.0	-	-
68	55	44	8.0	850.0	130.0	0.0	-	-
69	55	45	8.0	940.0	130.0	0.0	-	-
70	56	43	8.0	740.0	130.0	0.0	-	-
72	46	39	16.0	1300.0	130.0	0.0	-	-
73	57	58	12.0	600.0	130.0	0.0	-	-
74	58	59	12.0	490.0	130.0	0.0	-	-
75	59	60	12.0	460.0	130.0	0.0	-	-
76	60	26	12.0	580.0	130.0	0.0	-	-
77	61	28	8.0	1010.0	130.0	0.0	-	-
78	61	58	8.0	1010.0	130.0	0.0	-	-
79	62	27	8.0	950.0	130.0	0.0	-	-
80	46	57	12.0	1040.0	130.0	0.0	-	-
81	57	39	16.0	1300.0	130.0	0.0	-	-
82	63	57	12.0	1430.0	130.0	0.0	-	-
83	63	64	8.0	790.0	130.0	0.0	-	-
84	64	65	8.0	590.0	130.0	0.0	-	-
85	65	66	8.0	350.0	130.0	0.0	-	-
86	66	68	12.0	890.0	130.0	0.0	-	-
87	67	65	8.0	460.0	130.0	0.0	-	-
88	68	69	12.0	890.0	130.0	0.0	-	-
89	69	70	12.0	1030.0	130.0	0.0	-	-
90	70	71	12.0	510.0	130.0	0.0	-	-
91	71	73	12.0	1210.0	130.0	0.0	-	-
92	72	71	12.0	730.0	130.0	0.0	-	-
93	73	74	12.0	440.0	130.0	0.0	-	-
94	74	75	12.0	720.0	130.0	0.0	-	-
95	75	76	12.0	180.0	130.0	0.0	-	-
96	76	77	12.0	180.0	130.0	0.0	-	-
97	77	80	8.0	630.0	130.0	0.0	-	-
98	78	74	8.0	390.0	130.0	0.0	-	-
99	78	76	8.0	570.0	130.0	0.0	-	-
100	79	78	8.0	600.0	130.0	0.0	-	-
101	80	75	8.0	310.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
102	81	80	8.0	380.0	130.0	0.0	-	-
103	82	84	12.0	850.0	130.0	0.0	-	-
104	83	82	8.0	530.0	130.0	0.0	-	-
105	84	86	12.0	840.0	130.0	0.0	-	-
106	85	84	8.0	270.0	130.0	0.0	-	-
107	86	87	12.0	530.0	130.0	0.0	-	-
108	87	94	12.0	900.0	130.0	0.0	-	-
109	88	86	12.0	810.0	130.0	0.0	-	-
110	88	17	12.0	310.0	130.0	0.0	-	-
111	88	89	12.0	640.0	130.0	0.0	-	-
112	89	16	8.0	370.0	130.0	0.0	-	-
113	89	90	12.0	1140.0	130.0	0.0	-	-
114	90	14	8.0	580.0	130.0	0.0	-	-
115	90	91	12.0	1040.0	130.0	0.0	-	-
116	91	12	8.0	170.0	130.0	0.0	-	-
117	92	90	12.0	520.0	130.0	0.0	-	-
118	93	92	8.0	620.0	130.0	0.0	-	-
119	94	92	12.0	370.0	130.0	0.0	-	-
120	95	96	12.0	800.0	130.0	0.0	-	-
121	96	97	12.0	1020.0	130.0	0.0	-	-
122	97	98	12.0	450.0	130.0	0.0	-	-
123	98	99	12.0	290.0	130.0	0.0	-	-
124	99	100	12.0	1060.0	130.0	0.0	-	-
125	100	101	12.0	1570.0	130.0	0.0	-	-
126	101	102	12.0	1400.0	130.0	0.0	-	-
127	102	94	12.0	400.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	33.98	244.00	1, 2, 27
2	13.02	243.00	2, 3, 33
3	13.02	250.00	3, 4, 7
4	42.01	234.00	4, 5
5	14.99	236.00	5, 6, 7
6	14.99	223.00	6, 8, 41
7	33.98	238.00	8, 9
8	28.01	246.00	9, 10
9	122.99	249.00	10, 11
10	32.00	242.00	11, 12
11	115.00	256.00	12, 13
12	14.00	259.00	13, 14, 116
13	17.01	262.00	14, 15, 42
14	15.98	266.00	15, 16, 114
15	32.00	282.00	16, 17, 39
16	25.99	318.00	17, 18, 112
17	11.00	318.00	18, 19, 110
18	15.98	278.00	19, 20, 36
19	27.02	264.00	20, 21
20	33.98	283.00	21, 22
21	36.99	270.00	22, 23
22	22.98	270.00	23, 24, 30
23	32.99	258.00	24, 25, 43
24	29.98	242.00	25, 26, 44
25	28.01	238.00	26, 27, 28, 38
26	3.01	270.00	29, 30, 76
27	7.00	262.00	29, 31, 79
28	10.01	240.00	31, 32, 77
29	14.00	280.00	33, 34, 35

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
30	14.99	272.00	34, 36, 37
31	29.00	250.00	28, 37, 38
32	40.98	248.00	35, 39, 40
33	29.00	244.00	40, 41, 42
34	21.99	246.00	43, 44, 45
35	11.00	238.00	45, 46
36	11.98	238.00	46, 47
37	6.01	250.00	47, 48
38	11.98	221.00	48, 49
39	11.98	228.00	49, 50, 72, 81
40	14.99	242.00	50, 51
41	0.99	236.00	51, 52
42	6.01	240.00	52, 53, 62
43	11.98	236.00	53, 54, 70
44	11.00	236.00	54, 55, 68
45	3.99	256.00	55, 56, 69
46	7.99	222.00	56, 57, 72, 80
47	21.01	176.00	57, 58
48	7.99	218.00	58, 59, 65
49	3.01	214.00	59, 60
50	9.02	186.00	60, 61, 66
51	10.01	218.00	61, 62, 63
52	7.00	212.00	63, 64
53	7.00	194.00	64
54	7.99	221.00	65, 66, 67
55	13.02	245.00	67, 68, 69
56	10.01	212.00	70
57	2.02	205.00	73, 80, 81, 82
58	21.99	216.00	73, 74, 78
59	25.00	234.00	74, 75
60	21.01	244.00	75, 76
61	27.02	210.00	32, 77, 78
62	18.00	305.00	79
63	3.01	210.00	82, 83
64	9.02	210.00	83, 84
65	2.02	232.00	84, 85, 87
66	4.98	240.00	85, 86
67	3.01	250.00	87
68	7.00	266.00	86, 88
69	4.98	214.00	88, 89
70	6.01	210.00	89, 90
71	11.98	266.00	90, 91, 92
72	7.00	238.00	92
73	0.99	199.00	91, 93
74	7.99	220.00	93, 94, 98
75	11.00	212.00	94, 95, 101
76	6.01	210.00	95, 96, 99
77	10.01	198.00	96, 97
78	14.99	210.00	98, 99, 100
79	7.00	202.00	100
80	7.99	213.00	97, 101, 102
81	4.98	238.00	102
82	7.99	260.00	103, 104
83	4.98	290.00	104
84	2.02	250.00	103, 105, 106
85	3.99	280.00	106
86	14.99	310.00	105, 107, 109
87	6.01	300.00	107, 108
88	9.02	322.00	109, 110, 111
89	11.98	313.00	111, 112, 113
90	18.00	274.00	113, 114, 115, 117

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
91	10.01	272.00	115, 116
92	9.02	278.00	117, 118, 119
93	10.01	300.00	118
94	7.00	287.00	108, 119, 127
95	6.01	300.00	120
96	3.99	305.00	120, 121
97	3.01	288.00	121, 122
98	10.01	308.00	122, 123
99	14.00	344.00	123, 124
100	10.01	344.00	124, 125
101	0.00	290.00	125, 126
102	0.00	288.00	126, 127

Simulation Results

Number of trials: 14
Convergence : 0.0001

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	18.0	520.0	1590.98	2.01	0.43	0.00	-	0.83
2	1	2	14.0	230.0	1205.43	2.51	0.39	0.00	-	1.69
3	2	3	8.0	440.0	338.58	2.16	1.08	0.00	-	2.46
4	3	4	8.0	320.0	78.47	0.50	0.05	0.00	-	0.16
5	4	5	6.0	1550.0	36.45	0.41	0.25	0.00	-	0.16
6	5	6	8.0	380.0	268.56	1.71	0.61	0.00	-	1.60
7	3	5	8.0	220.0	247.10	1.58	0.30	0.00	-	1.37
8	6	7	8.0	840.0	179.44	1.15	0.64	0.00	-	0.76
9	7	8	8.0	310.0	145.46	0.93	0.16	0.00	-	0.51
10	8	9	8.0	580.0	117.45	0.75	0.20	0.00	-	0.35
11	10	9	8.0	970.0	5.53	0.04	0.00	0.00	-	0.00
12	11	10	8.0	850.0	37.54	0.24	0.04	0.00	-	0.04
13	12	11	8.0	520.0	152.54	0.97	0.29	0.00	-	0.56
14	13	12	8.0	360.0	94.88	0.61	0.08	0.00	-	0.23
15	14	13	8.0	200.0	8.35	0.05	0.00	0.00	-	0.00
16	15	14	8.0	500.0	70.33	0.45	0.07	0.00	-	0.13
17	15	16	8.0	950.0	44.74	0.29	0.06	0.00	-	0.06
18	17	16	8.0	430.0	24.36	0.16	0.01	0.00	-	0.02
19	18	17	10.0	370.0	179.98	0.74	0.10	0.00	-	0.26
20	18	19	10.0	530.0	318.31	1.30	0.39	0.00	-	0.74
21	19	20	10.0	820.0	291.29	1.19	0.51	0.00	-	0.63
22	20	21	10.0	550.0	257.31	1.05	0.27	0.00	-	0.50
23	21	22	10.0	420.0	220.33	0.90	0.16	0.00	-	0.37
24	23	22	10.0	800.0	73.92	0.30	0.04	0.00	-	0.05
25	24	23	8.0	720.0	86.53	0.55	0.14	0.00	-	0.20
26	25	24	8.0	800.0	358.66	2.29	2.19	0.00	-	2.74
27	1	25	8.0	690.0	351.57	2.24	1.82	0.00	-	2.64
28	31	25	8.0	740.0	18.47	0.12	0.01	0.00	-	0.01
29	26	27	8.0	220.0	86.89	0.55	0.04	0.00	-	0.20
30	22	26	10.0	740.0	271.27	1.11	0.41	0.00	-	0.55
31	27	28	8.0	450.0	61.89	0.40	0.05	0.00	-	0.11
32	28	61	8.0	1020.0	25.87	0.17	0.02	0.00	-	0.02
33	2	29	14.0	790.0	853.83	1.78	0.71	0.00	-	0.89
34	29	30	10.0	250.0	593.35	2.42	0.59	0.00	-	2.34
35	29	32	8.0	990.0	246.48	1.57	1.35	0.00	-	1.37
36	30	18	10.0	650.0	514.27	2.10	1.17	0.00	-	1.80
37	30	31	8.0	1150.0	64.09	0.41	0.13	0.00	-	0.11
38	31	25	8.0	900.0	16.62	0.11	0.01	0.00	-	0.01
39	32	15	8.0	860.0	147.08	0.94	0.45	0.00	-	0.52
40	32	33	8.0	270.0	58.42	0.37	0.03	0.00	-	0.09

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
41	6	33	8.0	620.0	74.13	0.47	0.09	0.00	-	0.15
42	33	13	8.0	1800.0	103.55	0.66	0.49	0.00	-	0.27
43	34	23	8.0	560.0	20.39	0.13	0.01	0.00	-	0.01
44	24	34	12.0	730.0	242.15	0.69	0.13	0.00	-	0.18
45	34	35	12.0	540.0	199.77	0.57	0.07	0.00	-	0.13
46	35	36	12.0	610.0	188.77	0.54	0.07	0.00	-	0.12
47	36	37	12.0	520.0	176.78	0.50	0.05	0.00	-	0.10
48	37	38	8.0	370.0	170.77	1.09	0.26	0.00	-	0.69
49	38	39	8.0	290.0	158.79	1.01	0.18	0.00	-	0.60
50	39	40	14.0	910.0	60.56	0.13	0.01	0.00	-	0.01
51	40	41	14.0	310.0	45.57	0.09	0.00	0.00	-	0.00
52	41	42	12.0	420.0	44.58	0.13	0.00	0.00	-	0.01
53	42	43	12.0	240.0	12.42	0.04	0.00	0.00	-	0.00
54	44	43	12.0	650.0	9.57	0.03	0.00	0.00	-	0.00
55	45	44	12.0	290.0	37.46	0.11	0.00	0.00	-	0.01
56	46	45	12.0	300.0	59.16	0.17	0.00	0.00	-	0.01
57	46	47	8.0	920.0	25.31	0.16	0.02	0.00	-	0.02
58	47	48	8.0	560.0	4.30	0.03	0.00	0.00	-	0.00
59	48	49	8.0	400.0	3.91	0.02	0.00	0.00	-	0.00
60	49	50	8.0	1020.0	0.90	0.01	0.00	0.00	-	0.00
61	51	50	8.0	690.0	2.13	0.01	0.00	0.00	-	0.00
62	42	51	8.0	620.0	26.15	0.17	0.01	0.00	-	0.02
63	51	52	8.0	300.0	14.00	0.09	0.00	0.00	-	0.01
64	52	53	8.0	700.0	7.00	0.04	0.00	0.00	-	0.00
65	54	48	8.0	160.0	7.60	0.05	0.00	0.00	-	0.00
66	54	50	8.0	460.0	5.99	0.04	0.00	0.00	-	0.00
67	55	54	8.0	320.0	21.57	0.14	0.00	0.00	-	0.02
68	44	55	8.0	850.0	16.89	0.11	0.01	0.00	-	0.01
69	45	55	8.0	940.0	17.70	0.11	0.01	0.00	-	0.01
70	43	56	8.0	740.0	10.01	0.06	0.00	0.00	-	0.00
72	39	46	16.0	1300.0	62.48	0.10	0.00	0.00	-	0.00
73	58	57	12.0	600.0	138.23	0.39	0.04	0.00	-	0.06
74	59	58	12.0	490.0	135.36	0.38	0.03	0.00	-	0.06
75	60	59	12.0	460.0	160.36	0.45	0.04	0.00	-	0.09
76	26	60	12.0	580.0	181.37	0.51	0.06	0.00	-	0.11
77	28	61	8.0	1010.0	26.01	0.17	0.02	0.00	-	0.02
78	61	58	8.0	1010.0	24.86	0.16	0.02	0.00	-	0.02
79	27	62	8.0	950.0	18.00	0.11	0.01	0.00	-	0.01
80	57	46	12.0	1040.0	29.97	0.09	0.00	0.00	-	0.00
81	39	57	16.0	1300.0	23.76	0.04	0.00	0.00	-	0.00
82	57	63	12.0	1430.0	129.99	0.37	0.08	0.00	-	0.06
83	63	64	8.0	790.0	126.98	0.81	0.32	0.00	-	0.40
84	64	65	8.0	590.0	117.96	0.75	0.21	0.00	-	0.35
85	65	66	8.0	350.0	112.93	0.72	0.11	0.00	-	0.32
86	66	68	12.0	890.0	107.95	0.31	0.04	0.00	-	0.04
87	65	67	8.0	460.0	3.01	0.02	0.00	0.00	-	0.00
88	68	69	12.0	890.0	100.95	0.29	0.03	0.00	-	0.04
89	69	70	12.0	1030.0	95.97	0.27	0.03	0.00	-	0.03
90	70	71	12.0	510.0	89.95	0.26	0.01	0.00	-	0.03
91	71	73	12.0	1210.0	70.96	0.20	0.02	0.00	-	0.02
92	71	72	12.0	730.0	7.00	0.02	0.00	0.00	-	0.00
93	73	74	12.0	440.0	69.98	0.20	0.01	0.00	-	0.02
94	74	75	12.0	720.0	41.31	0.12	0.00	0.00	-	0.01
95	75	76	12.0	180.0	21.26	0.06	0.00	0.00	-	0.00
96	76	77	12.0	180.0	13.92	0.04	0.00	0.00	-	0.00
97	77	80	8.0	630.0	3.91	0.02	0.00	0.00	-	0.00
98	74	78	8.0	390.0	20.67	0.13	0.01	0.00	-	0.01
99	76	78	8.0	570.0	1.32	0.01	0.00	0.00	-	0.00
100	78	79	8.0	600.0	7.00	0.04	0.00	0.00	-	0.00
101	75	80	8.0	310.0	9.06	0.06	0.00	0.00	-	0.00

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Losses (ft) Minor	Pump Head	Hd Loss /1000 ft
102	80	81	8.0	380.0	4.98	0.03	0.00	0.00	-	0.00
103	84	82	12.0	850.0	12.97	0.04	0.00	0.00	-	0.00
104	82	83	8.0	530.0	4.98	0.03	0.00	0.00	-	0.00
105	86	84	12.0	840.0	18.99	0.05	0.00	0.00	-	0.00
106	84	85	8.0	270.0	3.99	0.03	0.00	0.00	-	0.00
107	86	87	12.0	530.0	52.15	0.15	0.01	0.00	-	0.01
108	87	94	12.0	900.0	46.13	0.13	0.01	0.00	-	0.01
109	88	86	12.0	810.0	86.13	0.24	0.02	0.00	-	0.03
110	17	88	12.0	310.0	144.62	0.41	0.02	0.00	-	0.07
111	88	89	12.0	640.0	49.47	0.14	0.01	0.00	-	0.01
112	16	89	8.0	370.0	43.12	0.28	0.02	0.00	-	0.05
113	89	90	12.0	1140.0	80.60	0.23	0.03	0.00	-	0.02
114	14	90	8.0	580.0	46.01	0.29	0.04	0.00	-	0.06
115	90	91	12.0	1040.0	81.67	0.23	0.03	0.00	-	0.02
116	91	12	8.0	170.0	71.66	0.46	0.02	0.00	-	0.14
117	90	92	12.0	520.0	26.94	0.08	0.00	0.00	-	0.00
118	92	93	8.0	620.0	10.01	0.06	0.00	0.00	-	0.00
119	92	94	12.0	370.0	7.91	0.02	0.00	0.00	-	0.00
120	96	95	12.0	800.0	6.01	0.02	0.00	0.00	-	0.00
121	97	96	12.0	1020.0	10.01	0.03	0.00	0.00	-	0.00
122	98	97	12.0	450.0	13.02	0.04	0.00	0.00	-	0.00
123	99	98	12.0	290.0	23.03	0.07	0.00	0.00	-	0.00
124	100	99	12.0	1060.0	37.03	0.11	0.01	0.00	-	0.01
125	101	100	12.0	1570.0	47.04	0.13	0.01	0.00	-	0.01
126	102	101	12.0	1400.0	47.04	0.13	0.01	0.00	-	0.01
127	94	102	12.0	400.0	47.04	0.13	0.00	0.00	-	0.01

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	1590.98+

Net system demand: 1591 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
2	2.51	26	2.74	47	111.53
34	2.42	27	2.64	50	107.20
26	2.29	3	2.46	53	103.73
27	2.24	34	2.34	77	101.63
3	2.16	36	1.80	73	101.20
36	2.10	2	1.69	79	99.90
1	2.01	6	1.60	57	98.97
33	1.78	7	1.37	61	96.83
6	1.71	35	1.37	63	96.77
7	1.58	33	0.89	64	96.63
106	0.03	96	0.00	96	56.39
97	0.02	92	0.00	62	55.69
59	0.02	87	0.00	98	55.09
119	0.02	81	0.00	86	54.24
92	0.02	61	0.00	89	52.95
87	0.02	60	0.00	17	50.80
120	0.02	59	0.00	16	50.79
61	0.01	58	0.00	88	49.05
99	0.01	54	0.00	100	39.49
60	0.01	53	0.00	99	39.49

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.

APPENDIX W

HYDRONEUMATIC SYSTEM FIRE FLOW MODEL FOR ULTIMATE BUILD OUT DEVELOPMENT WITH 2,000 GPM DEMAND AT NODE #26

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June 29, 2018

RANCHO MURIETA ULTIMATE BUILD OUT HYDRONEUMATIC WATER SYSTEM
FIRE FLOW MODEL @ NODE 26
(11-01-001)

Number of pipes: 126 Flow unit of measure: GPM
Number of junction nodes: 102 File name: RMNHFU

Summary of Input Data

Pipe Data:

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
1	0	1	18.0	520.0	130.0	0.0	-	438.60
2	1	2	14.0	230.0	130.0	0.0	-	-
3	2	3	8.0	440.0	130.0	0.0	-	-
4	3	4	8.0	320.0	130.0	0.0	-	-
5	4	5	6.0	1550.0	130.0	0.0	-	-
6	5	6	8.0	380.0	130.0	0.0	-	-
7	5	3	8.0	220.0	130.0	0.0	-	-
8	6	7	8.0	840.0	130.0	0.0	-	-
9	7	8	8.0	310.0	130.0	0.0	-	-
10	8	9	8.0	580.0	130.0	0.0	-	-
11	9	10	8.0	970.0	130.0	0.0	-	-
12	10	11	8.0	850.0	130.0	0.0	-	-
13	11	12	8.0	520.0	130.0	0.0	-	-
14	12	13	8.0	360.0	130.0	0.0	-	-
15	13	14	8.0	200.0	130.0	0.0	-	-
16	14	15	8.0	500.0	130.0	0.0	-	-
17	15	16	8.0	950.0	130.0	0.0	-	-
18	16	17	8.0	430.0	130.0	0.0	-	-
19	17	18	10.0	370.0	130.0	0.0	-	-
20	18	19	10.0	530.0	130.0	0.0	-	-
21	19	20	10.0	820.0	130.0	0.0	-	-
22	20	21	10.0	550.0	130.0	0.0	-	-
23	21	22	10.0	420.0	130.0	0.0	-	-
24	22	23	10.0	800.0	130.0	0.0	-	-
25	23	24	8.0	720.0	130.0	0.0	-	-
26	24	25	8.0	800.0	130.0	0.0	-	-
27	25	1	8.0	690.0	130.0	0.0	-	-
28	25	31	8.0	740.0	130.0	0.0	-	-
29	26	27	8.0	220.0	130.0	0.0	-	-
30	26	22	10.0	740.0	130.0	0.0	-	-
31	27	28	8.0	450.0	130.0	0.0	-	-
32	28	61	8.0	1020.0	130.0	0.0	-	-
33	29	2	14.0	790.0	130.0	0.0	-	-
34	29	30	10.0	250.0	130.0	0.0	-	-
35	29	32	8.0	990.0	130.0	0.0	-	-
36	30	18	10.0	650.0	130.0	0.0	-	-
37	30	31	8.0	1150.0	130.0	0.0	-	-
38	31	25	8.0	900.0	130.0	0.0	-	-
39	32	15	8.0	860.0	130.0	0.0	-	-
40	32	33	8.0	270.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
41	33	6	8.0	620.0	130.0	0.0	-	-
42	33	13	8.0	1800.0	130.0	0.0	-	-
43	34	23	8.0	560.0	130.0	0.0	-	-
44	34	24	12.0	730.0	130.0	0.0	-	-
45	34	35	12.0	540.0	130.0	0.0	-	-
46	35	36	12.0	610.0	130.0	0.0	-	-
47	36	37	12.0	520.0	130.0	0.0	-	-
48	37	38	8.0	370.0	130.0	0.0	-	-
49	38	39	8.0	290.0	130.0	0.0	-	-
50	39	40	14.0	910.0	130.0	0.0	-	-
51	40	41	14.0	310.0	130.0	0.0	-	-
52	41	42	12.0	420.0	130.0	0.0	-	-
53	42	43	12.0	240.0	130.0	0.0	-	-
54	43	44	12.0	650.0	130.0	0.0	-	-
55	44	45	12.0	290.0	130.0	0.0	-	-
56	45	46	12.0	300.0	130.0	0.0	-	-
57	46	47	8.0	920.0	130.0	0.0	-	-
58	47	48	8.0	560.0	130.0	0.0	-	-
59	48	49	8.0	400.0	130.0	0.0	-	-
60	49	50	8.0	1020.0	130.0	0.0	-	-
61	50	51	8.0	690.0	130.0	0.0	-	-
62	51	42	8.0	620.0	130.0	0.0	-	-
63	52	51	8.0	300.0	130.0	0.0	-	-
64	53	52	8.0	700.0	130.0	0.0	-	-
65	54	48	8.0	160.0	130.0	0.0	-	-
66	54	50	8.0	460.0	130.0	0.0	-	-
67	54	55	8.0	320.0	130.0	0.0	-	-
68	55	44	8.0	850.0	130.0	0.0	-	-
69	55	45	8.0	940.0	130.0	0.0	-	-
70	56	43	8.0	740.0	130.0	0.0	-	-
72	46	39	16.0	1300.0	130.0	0.0	-	-
73	57	58	12.0	600.0	130.0	0.0	-	-
74	58	59	12.0	490.0	130.0	0.0	-	-
75	59	60	12.0	460.0	130.0	0.0	-	-
76	60	26	12.0	580.0	130.0	0.0	-	-
77	61	28	8.0	1010.0	130.0	0.0	-	-
78	61	58	8.0	1010.0	130.0	0.0	-	-
79	62	27	8.0	950.0	130.0	0.0	-	-
80	46	57	12.0	1040.0	130.0	0.0	-	-
81	57	39	16.0	1300.0	130.0	0.0	-	-
82	63	57	12.0	1430.0	130.0	0.0	-	-
83	63	64	8.0	790.0	130.0	0.0	-	-
84	64	65	8.0	590.0	130.0	0.0	-	-
85	65	66	8.0	350.0	130.0	0.0	-	-
86	66	68	12.0	890.0	130.0	0.0	-	-
87	67	65	8.0	460.0	130.0	0.0	-	-
88	68	69	12.0	890.0	130.0	0.0	-	-
89	69	70	12.0	1030.0	130.0	0.0	-	-
90	70	71	12.0	510.0	130.0	0.0	-	-
91	71	73	12.0	1210.0	130.0	0.0	-	-
92	72	71	12.0	730.0	130.0	0.0	-	-
93	73	74	12.0	440.0	130.0	0.0	-	-
94	74	75	12.0	720.0	130.0	0.0	-	-
95	75	76	12.0	180.0	130.0	0.0	-	-
96	76	77	12.0	180.0	130.0	0.0	-	-
97	77	80	8.0	630.0	130.0	0.0	-	-
98	78	74	8.0	390.0	130.0	0.0	-	-
99	78	76	8.0	570.0	130.0	0.0	-	-
100	79	78	8.0	600.0	130.0	0.0	-	-
101	80	75	8.0	310.0	130.0	0.0	-	-

Pipe	Node #1	Node #2	Dia (in)	Length (ft)	H-W Coeff	Minor Fact	Pump Type	FGN Grade
102	81	80	8.0	380.0	130.0	0.0	-	-
103	82	84	12.0	850.0	130.0	0.0	-	-
104	83	82	8.0	530.0	130.0	0.0	-	-
105	84	86	12.0	840.0	130.0	0.0	-	-
106	85	84	8.0	270.0	130.0	0.0	-	-
107	86	87	12.0	530.0	130.0	0.0	-	-
108	87	94	12.0	900.0	130.0	0.0	-	-
109	88	86	12.0	810.0	130.0	0.0	-	-
110	88	17	12.0	310.0	130.0	0.0	-	-
111	88	89	12.0	640.0	130.0	0.0	-	-
112	89	16	8.0	370.0	130.0	0.0	-	-
113	89	90	12.0	1140.0	130.0	0.0	-	-
114	90	14	8.0	580.0	130.0	0.0	-	-
115	90	91	12.0	1040.0	130.0	0.0	-	-
116	91	12	8.0	170.0	130.0	0.0	-	-
117	92	90	12.0	520.0	130.0	0.0	-	-
118	93	92	8.0	620.0	130.0	0.0	-	-
119	94	92	12.0	370.0	130.0	0.0	-	-
120	95	96	12.0	800.0	130.0	0.0	-	-
121	96	97	12.0	1020.0	130.0	0.0	-	-
122	97	98	12.0	450.0	130.0	0.0	-	-
123	98	99	12.0	290.0	130.0	0.0	-	-
124	99	100	12.0	1060.0	130.0	0.0	-	-
125	100	101	12.0	1570.0	130.0	0.0	-	-
126	101	102	12.0	1400.0	130.0	0.0	-	-
127	102	94	12.0	400.0	130.0	0.0	-	-

Junction Node Data:

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
1	33.98	244.00	1, 2, 27
2	13.02	243.00	2, 3, 33
3	13.02	250.00	3, 4, 7
4	42.01	234.00	4, 5
5	14.99	236.00	5, 6, 7
6	14.99	223.00	6, 8, 41
7	33.98	238.00	8, 9
8	28.01	246.00	9, 10
9	122.99	249.00	10, 11
10	32.00	242.00	11, 12
11	115.00	256.00	12, 13
12	14.00	259.00	13, 14, 116
13	17.01	262.00	14, 15, 42
14	15.98	266.00	15, 16, 114
15	32.00	282.00	16, 17, 39
16	25.99	318.00	17, 18, 112
17	11.00	318.00	18, 19, 110
18	15.98	278.00	19, 20, 36
19	27.02	264.00	20, 21
20	33.98	283.00	21, 22
21	36.99	270.00	22, 23
22	22.98	270.00	23, 24, 30
23	32.99	258.00	24, 25, 43
24	29.98	242.00	25, 26, 44
25	28.01	238.00	26, 27, 28, 38
26	2002.99	270.00	29, 30, 76
27	7.00	262.00	29, 31, 79
28	10.01	240.00	31, 32, 77
29	14.00	280.00	33, 34, 35

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
30	14.99	272.00	34, 36, 37
31	29.00	250.00	28, 37, 38
32	40.98	248.00	35, 39, 40
33	29.00	244.00	40, 41, 42
34	21.99	246.00	43, 44, 45
35	11.00	238.00	45, 46
36	11.98	238.00	46, 47
37	6.01	250.00	47, 48
38	11.98	221.00	48, 49
39	11.98	228.00	49, 50, 72, 81
40	14.99	242.00	50, 51
41	0.99	236.00	51, 52
42	6.01	240.00	52, 53, 62
43	11.98	236.00	53, 54, 70
44	11.00	236.00	54, 55, 68
45	3.99	256.00	55, 56, 69
46	7.99	222.00	56, 57, 72, 80
47	21.01	176.00	57, 58
48	7.99	218.00	58, 59, 65
49	3.01	214.00	59, 60
50	9.02	186.00	60, 61, 66
51	10.01	218.00	61, 62, 63
52	7.00	212.00	63, 64
53	7.00	194.00	64
54	7.99	221.00	65, 66, 67
55	13.02	245.00	67, 68, 69
56	10.01	212.00	70
57	2.02	205.00	73, 80, 81, 82
58	21.99	216.00	73, 74, 78
59	25.00	234.00	74, 75
60	21.01	244.00	75, 76
61	27.02	210.00	32, 77, 78
62	18.00	305.00	79
63	3.01	210.00	82, 83
64	9.02	210.00	83, 84
65	2.02	232.00	84, 85, 87
66	4.98	240.00	85, 86
67	3.01	250.00	87
68	7.00	266.00	86, 88
69	4.98	214.00	88, 89
70	6.01	210.00	89, 90
71	11.98	266.00	90, 91, 92
72	7.00	238.00	92
73	0.99	199.00	91, 93
74	7.99	220.00	93, 94, 98
75	11.00	212.00	94, 95, 101
76	6.01	210.00	95, 96, 99
77	10.01	198.00	96, 97
78	14.99	210.00	98, 99, 100
79	7.00	202.00	100
80	7.99	213.00	97, 101, 102
81	4.98	238.00	102
82	7.99	260.00	103, 104
83	4.98	290.00	104
84	2.02	250.00	103, 105, 106
85	3.99	280.00	106
86	14.99	310.00	105, 107, 109
87	6.01	300.00	107, 108
88	9.02	322.00	109, 110, 111
89	11.98	313.00	111, 112, 113
90	18.00	274.00	113, 114, 115, 117

Node #	Demand (GPM)	Elev (ft)	Connecting Pipes
91	10.01	272.00	115, 116
92	9.02	278.00	117, 118, 119
93	10.01	300.00	118
94	7.00	287.00	108, 119, 127
95	6.01	300.00	120
96	3.99	305.00	120, 121
97	3.01	288.00	121, 122
98	10.01	308.00	122, 123
99	14.00	344.00	123, 124
100	10.01	344.00	124, 125
101	0.00	290.00	125, 126
102	0.00	288.00	126, 127

Simulation Results

Number of trials: 12
Convergence : 0.0007

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
1	0	1	18.0	520.0	3590.97	4.53	1.95	0.00	-	3.76
2	1	2	14.0	230.0	2586.11	5.39	1.60	0.00	-	6.96
3	2	3	8.0	440.0	625.73	3.99	3.37	0.00	-	7.67
4	3	4	8.0	320.0	118.27	0.75	0.11	0.00	-	0.35
5	4	5	6.0	1550.0	76.26	0.87	0.98	0.00	-	0.63
6	5	6	8.0	380.0	555.71	3.55	2.34	0.00	-	6.15
7	3	5	8.0	220.0	494.44	3.16	1.09	0.00	-	4.96
8	6	7	8.0	840.0	311.04	1.99	1.76	0.00	-	2.10
9	7	8	8.0	310.0	277.06	1.77	0.53	0.00	-	1.70
10	8	9	8.0	580.0	249.05	1.59	0.81	0.00	-	1.39
11	9	10	8.0	970.0	126.06	0.80	0.38	0.00	-	0.39
12	10	11	8.0	850.0	94.06	0.60	0.19	0.00	-	0.23
13	12	11	8.0	520.0	20.94	0.13	0.01	0.00	-	0.01
14	13	12	8.0	360.0	187.66	1.20	0.30	0.00	-	0.82
15	13	14	8.0	200.0	50.89	0.32	0.01	0.00	-	0.07
16	15	14	8.0	500.0	146.57	0.94	0.26	0.00	-	0.52
17	15	16	8.0	950.0	184.41	1.18	0.76	0.00	-	0.80
18	16	17	8.0	430.0	110.84	0.71	0.13	0.00	-	0.31
19	17	18	10.0	370.0	319.55	1.31	0.28	0.00	-	0.74
20	18	19	10.0	530.0	1391.62	5.68	6.02	0.00	-	11.36
21	19	20	10.0	820.0	1364.60	5.57	8.99	0.00	-	10.96
22	20	21	10.0	550.0	1330.62	5.44	5.75	0.00	-	10.46
23	21	22	10.0	420.0	1293.64	5.28	4.17	0.00	-	9.93
24	23	22	10.0	800.0	362.47	1.48	0.75	0.00	-	0.94
25	24	23	8.0	720.0	328.71	2.10	1.68	0.00	-	2.33
26	25	24	8.0	800.0	1285.33	8.20	23.26	0.00	-	29.08
27	1	25	8.0	690.0	970.88	6.20	11.93	0.00	-	17.30
28	31	25	8.0	740.0	180.27	1.15	0.57	0.00	-	0.77
29	27	26	8.0	220.0	56.18	0.36	0.02	0.00	-	0.09
30	22	26	10.0	740.0	1633.12	6.67	11.31	0.00	-	15.28
31	28	27	8.0	450.0	81.18	0.52	0.08	0.00	-	0.17
32	61	28	8.0	1020.0	45.47	0.29	0.06	0.00	-	0.06
33	2	29	14.0	790.0	1947.36	4.06	3.25	0.00	-	4.11
34	29	30	10.0	250.0	1474.50	6.02	3.16	0.00	-	12.65
35	29	32	8.0	990.0	458.85	2.93	4.27	0.00	-	4.32
36	30	18	10.0	650.0	1088.05	4.44	4.68	0.00	-	7.20
37	30	31	8.0	1150.0	371.46	2.37	3.36	0.00	-	2.92
38	31	25	8.0	900.0	162.19	1.04	0.57	0.00	-	0.63
39	32	15	8.0	860.0	362.99	2.32	2.41	0.00	-	2.80
40	32	33	8.0	270.0	54.88	0.35	0.02	0.00	-	0.08

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Minor	Pump Head	Hd Loss /1000 ft
41	6	33	8.0	620.0	229.68	1.47	0.74	0.00	-	1.20
42	33	13	8.0	1800.0	255.57	1.63	2.63	0.00	-	1.46
43	34	23	8.0	560.0	66.75	0.43	0.07	0.00	-	0.12
44	24	34	12.0	730.0	926.64	2.63	1.61	0.00	-	2.20
45	34	35	12.0	540.0	837.90	2.38	0.99	0.00	-	1.83
46	35	36	12.0	610.0	826.90	2.35	1.09	0.00	-	1.78
47	36	37	12.0	520.0	814.91	2.31	0.90	0.00	-	1.74
48	37	38	8.0	370.0	808.90	5.16	4.56	0.00	-	12.33
49	38	39	8.0	290.0	796.92	5.09	3.48	0.00	-	12.00
50	39	40	14.0	910.0	119.40	0.25	0.02	0.00	-	0.02
51	40	41	14.0	310.0	104.41	0.22	0.01	0.00	-	0.02
52	41	42	12.0	420.0	103.42	0.29	0.02	0.00	-	0.04
53	42	43	12.0	240.0	65.08	0.18	0.00	0.00	-	0.02
54	43	44	12.0	650.0	43.09	0.12	0.00	0.00	-	0.01
55	44	45	12.0	290.0	14.92	0.04	0.00	0.00	-	0.00
56	46	45	12.0	300.0	4.99	0.01	0.00	0.00	-	0.00
57	46	47	8.0	920.0	20.63	0.13	0.01	0.00	-	0.01
58	48	47	8.0	560.0	0.37	0.00	0.00	0.00	-	0.00
59	48	49	8.0	400.0	0.30	0.00	0.00	0.00	-	0.00
60	50	49	8.0	1020.0	2.71	0.02	0.00	0.00	-	0.00
61	51	50	8.0	690.0	8.31	0.05	0.00	0.00	-	0.00
62	42	51	8.0	620.0	32.33	0.21	0.02	0.00	-	0.03
63	51	52	8.0	300.0	14.00	0.09	0.00	0.00	-	0.01
64	52	53	8.0	700.0	7.00	0.04	0.00	0.00	-	0.00
65	54	48	8.0	160.0	8.67	0.06	0.00	0.00	-	0.00
66	54	50	8.0	460.0	3.42	0.02	0.00	0.00	-	0.00
67	55	54	8.0	320.0	20.07	0.13	0.00	0.00	-	0.01
68	44	55	8.0	850.0	17.17	0.11	0.01	0.00	-	0.01
69	45	55	8.0	940.0	15.92	0.10	0.01	0.00	-	0.01
70	43	56	8.0	740.0	10.01	0.06	0.00	0.00	-	0.00
72	39	46	16.0	1300.0	226.39	0.36	0.05	0.00	-	0.04
73	57	58	12.0	600.0	499.90	1.42	0.42	0.00	-	0.70
74	58	59	12.0	490.0	359.70	1.02	0.19	0.00	-	0.38
75	59	60	12.0	460.0	334.70	0.95	0.15	0.00	-	0.33
76	60	26	12.0	580.0	313.69	0.89	0.17	0.00	-	0.30
77	61	28	8.0	1010.0	45.72	0.29	0.06	0.00	-	0.06
78	58	61	8.0	1010.0	118.21	0.75	0.35	0.00	-	0.35
79	27	62	8.0	950.0	18.00	0.11	0.01	0.00	-	0.01
80	46	57	12.0	1040.0	192.77	0.55	0.13	0.00	-	0.12
81	39	57	16.0	1300.0	439.14	0.70	0.18	0.00	-	0.14
82	57	63	12.0	1430.0	129.99	0.37	0.08	0.00	-	0.06
83	63	64	8.0	790.0	126.98	0.81	0.32	0.00	-	0.40
84	64	65	8.0	590.0	117.96	0.75	0.21	0.00	-	0.35
85	65	66	8.0	350.0	112.93	0.72	0.11	0.00	-	0.32
86	66	68	12.0	890.0	107.95	0.31	0.04	0.00	-	0.04
87	65	67	8.0	460.0	3.01	0.02	0.00	0.00	-	0.00
88	68	69	12.0	890.0	100.95	0.29	0.03	0.00	-	0.04
89	69	70	12.0	1030.0	95.97	0.27	0.03	0.00	-	0.03
90	70	71	12.0	510.0	89.95	0.26	0.01	0.00	-	0.03
91	71	73	12.0	1210.0	70.96	0.20	0.02	0.00	-	0.02
92	71	72	12.0	730.0	7.00	0.02	0.00	0.00	-	0.00
93	73	74	12.0	440.0	69.98	0.20	0.01	0.00	-	0.02
94	74	75	12.0	720.0	41.31	0.12	0.00	0.00	-	0.01
95	75	76	12.0	180.0	21.26	0.06	0.00	0.00	-	0.00
96	76	77	12.0	180.0	13.92	0.04	0.00	0.00	-	0.00
97	77	80	8.0	630.0	3.91	0.02	0.00	0.00	-	0.00
98	74	78	8.0	390.0	20.67	0.13	0.01	0.00	-	0.01
99	76	78	8.0	570.0	1.32	0.01	0.00	0.00	-	0.00
100	78	79	8.0	600.0	7.00	0.04	0.00	0.00	-	0.00
101	75	80	8.0	310.0	9.06	0.06	0.00	0.00	-	0.00

Pipe	Nodes (Q--->)		Dia (in)	Length (ft)	Flow (GPM)	Vel (fps)	Losses (ft) Head	Losses (ft) Minor	Pump Head	Hd Loss /1000 ft
102	80	81	8.0	380.0	4.98	0.03	0.00	0.00	-	0.00
103	84	82	12.0	850.0	12.97	0.04	0.00	0.00	-	0.00
104	82	83	8.0	530.0	4.98	0.03	0.00	0.00	-	0.00
105	86	84	12.0	840.0	18.99	0.05	0.00	0.00	-	0.00
106	84	85	8.0	270.0	3.99	0.03	0.00	0.00	-	0.00
107	87	86	12.0	530.0	90.93	0.26	0.02	0.00	-	0.03
108	94	87	12.0	900.0	96.94	0.27	0.03	0.00	-	0.03
109	86	88	12.0	810.0	56.95	0.16	0.01	0.00	-	0.01
110	88	17	12.0	310.0	219.70	0.62	0.05	0.00	-	0.15
111	89	88	12.0	640.0	171.77	0.49	0.06	0.00	-	0.10
112	16	89	8.0	370.0	47.58	0.30	0.02	0.00	-	0.06
113	90	89	12.0	1140.0	136.18	0.39	0.07	0.00	-	0.06
114	14	90	8.0	580.0	181.49	1.16	0.45	0.00	-	0.77
115	91	90	12.0	1040.0	142.71	0.40	0.07	0.00	-	0.07
116	12	91	8.0	170.0	152.72	0.97	0.10	0.00	-	0.56
117	90	92	12.0	520.0	170.02	0.48	0.05	0.00	-	0.10
118	92	93	8.0	620.0	10.01	0.06	0.00	0.00	-	0.00
119	92	94	12.0	370.0	150.99	0.43	0.03	0.00	-	0.08
120	96	95	12.0	800.0	6.01	0.02	0.00	0.00	-	0.00
121	97	96	12.0	1020.0	10.01	0.03	0.00	0.00	-	0.00
122	98	97	12.0	450.0	13.02	0.04	0.00	0.00	-	0.00
123	99	98	12.0	290.0	23.03	0.07	0.00	0.00	-	0.00
124	100	99	12.0	1060.0	37.03	0.11	0.01	0.00	-	0.01
125	101	100	12.0	1570.0	47.04	0.13	0.01	0.00	-	0.01
126	102	101	12.0	1400.0	47.04	0.13	0.01	0.00	-	0.01
127	94	102	12.0	400.0	47.04	0.13	0.00	0.00	-	0.01

Summary of inflows (+) and outflows (-):

Pipe #	Flow (GPM)
1	3590.96+

Net system demand: 3591 GPM

Maximum-Minimum Summary:

Pipe #	Vel (fps)	Pipe #	HL/1000 ft	Node #	Press (psi)
26	8.20	26	29.08	47	92.19
30	6.67	27	17.30	6	88.94
27	6.20	30	15.28	50	87.86
34	6.02	34	12.65	4	85.61
20	5.68	48	12.33	53	84.39
21	5.57	49	12.00	5	84.32
22	5.44	20	11.36	1	83.48
2	5.39	21	10.96	2	83.22
23	5.28	22	10.46	77	82.23
48	5.16	23	9.93	73	81.81
97	0.02	99	0.00	26	51.01
66	0.02	97	0.00	98	50.39
92	0.02	96	0.00	86	49.52
87	0.02	92	0.00	89	48.25
60	0.02	87	0.00	16	46.09
120	0.02	66	0.00	17	46.03
56	0.01	60	0.00	88	44.32
99	0.01	59	0.00	62	35.84
58	0.00	58	0.00	100	34.80
59	0.00	56	0.00	99	34.79

NOTE: 'HL/1000 ft' does NOT include Minor Losses; and Pipes with zero flow are not included under Minimum 'Vel (fps)'.