Lake Hills Shopping Center

Utility Report

MADDEN
MOORHEAD & STOKES, LLC
CIVIL ENGINEERS

Prepared by:

Madden, Moorhead & Stokes, LLC
431 East Horatio Avenue, Suite 260
Maitland, FL 32751
(407) 629-8330

December 2024

BENJAMIN S. BECKHAM LICENSE No. 79452 STATE OF FLORIDA PROFESSIONAL ENGINEER

This item has been electronically signed and sealed by Benjamin S. Beckham, P.E. using a digital signature and date. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Digitally signed by Benjamin S Beckham
Date: 2025.01.10 14:47:25 -05'00'

Benjamin S. Beckham, P.E. #79452
Certificate of Authorization No. CA-0007723

Documents included herein which have been prepared by professionals other than Madden, Moorhead, and Stokes, LLC. are not covered under the above registered engineer's signature and seal

Appendices

A Potable Water & Wastewater Demand Summary
B Water Main Schematic
C Maximum Daily Flow plus Fire Flow Hydraulic Analysis
D Peak Hour Flow Demand Hydraulic Analysis
E HGL Tie-In Calculations
F Lake Hills Main Blvd. Water Main Report

Potable Water Summary

The proposed project, Lake Hills Shopping Center, is within the municipality of Howey in the Hills, Florida. The project is located near the intersection of C.R. 48 and S.R. 19. The development will consist of supporting infrastructure for a Publix Supermarket with retail shopping and access roads from C.R. 48 and S.R. 19 to the Publix.

The proposed project improvements include an 8" water main system that will connect to the existing 8" watermain on S.R. 19 and will loop through the site to the connect to the existing 8" watermain on Lake Hills Main Blvd. The proposed 8" watermain will service the Publix Supermarket, retail shops and Outparcels C & D. Outparcels A & B will be connected to the 8" watermain along Lake Hills Main Blvd.

The proposed water distribution system is modeled using WaterCAD by Haestad Methods. Two scenarios are modeled for the project: peak hourly flow and maximum daily flow combined with fire flow. The model analyses presented in Appendices C and D demonstrate minimum system pressures greater than 20 psi and maximum velocities less than 10.0 ft/s.

The proposed wastewater system is designed in accordance with Florida Department of Environmental Protection (FDEP) and City of Howie-in-the-Hills standards and regulations.

All elevations presented within this report are referenced to the North American Vertical Datum of 1988 (NAVD88) unless otherwise noted.

Wastewater Summary

Sanitary sewer for the Publix site and outparcels will be collected in an 8" PVC sanitary system. Similar to the water connections, Outparcels C & D will be collected with the onsite system while Outparcels A & B will be collected in the sanitary system along Lake Hills Main Blvd. All sanitary sewer systems will connect to an offsite lift station located on the ajacent proper to the north just off of Lake Hills Main Blvd.

APPENDIX A

Potable Water & Wastewater Demand Summary

Water Demands

UNIT TYPE	DEMAND PER ERC	Sum of ERC's[3]	FLOW SUMMARY					
			AVG. DAY		MAX. DAY[1]		PEAK HOUR[2]	
	(GPD)		(GPD)	(GPM)	(GPD)	(GPM)	(GPD)	(GPM)
Publix Supermarket	350	12	4,200	2.92	8,400	5.83	16,800	11.67
Retail Shops	350	6	2,100	1.46	4,200	2.92	8,400	5.83
Outparcel A (not included in permit)	350	6	2,100	1.46	4,200	2.92	8,400	5.83
Outparcel B (not included in permit)	350	6	2,100	1.46	4,200	2.92	8,400	5.83
Outparcel C	350	6	2,100	1.46	4,200	2.92	8,400	5.83
Outparcel D	350	6	2,100	1.46	4,200	2.92	8,400	5.83
			14,700	10.21	29,400	20.42	58,800	40.83

Fire Flow = 2,625.00 GPM

Max. Day + Fire Flow = 2,645.42 GPM

Sewer Demands

UNIT TYPE	DEMAND PER ERC	Sum of ERC's[3]	FLOW SUMMARY					
			AVG. DAY		MAX. DAY[1]		PEAK HOUR[2]	
	(GPD)		(GPD)	(GPM)	(GPD)	(GPM)	(GPD)	(GPM)
Publix Supermarket	300	8	2,400	1.67	4,800	3.33	9,600	6.67
Retail Shops	300	4	1,200	0.83	2,400	1.67	4,800	3.33
Outparcel A (not included in permit)	300	4	1,200	0.83	2,400	1.67	4,800	3.33
Outparcel B (not included in permit)	300	4	1,200	0.83	2,400	1.67	4,800	3.33
Outparcel C	300	4	1,200	0.83	2,400	1.67	4,800	3.33
Outparcel D	300	4	1,200	0.83	2,400	1.67	4,800	3.33
			8,400	5.83	16,800	11.67	33,600	23.33

Notes:

[1]Max day factor = 2.0

[2]Peak Hour factor = 4.0

[3]Per Orange County Utilities

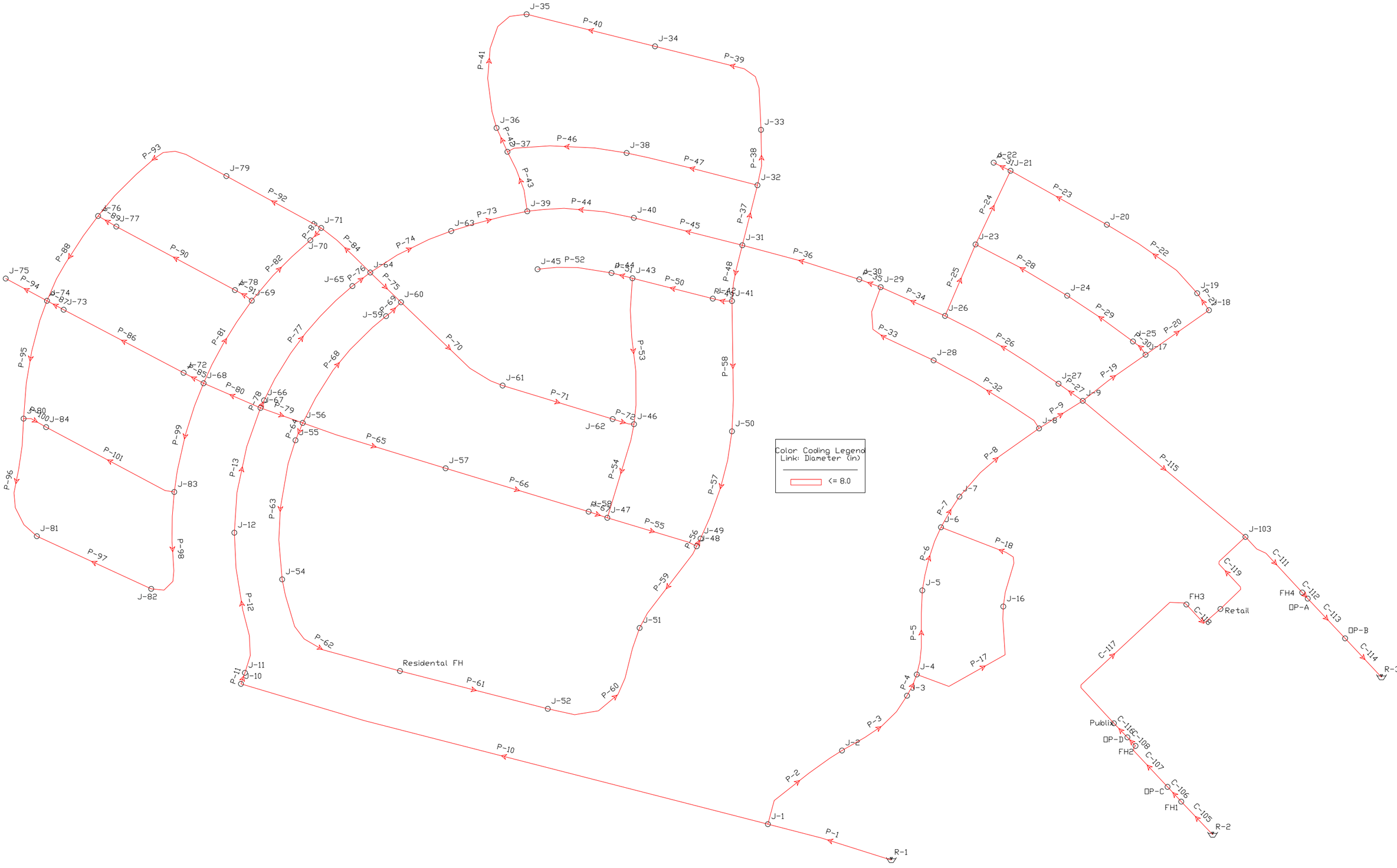
0

Required Fire Flow Demand

BUILDING TYPE	FBC CONST. TYPE	NFPA CONST. TYPE	TOTAL AREA	NFF PER NPFA 1 TABLE 18.4.5.2.1	BUILDING SPRINKLERED	ALLOWABLE NFF REDUCTION PER NFPA 1 18.4.5.3.2	ADJUSTED NFF FOR SPRINKLER CREDIT	MINIMUM ALLOWABLE NFF PER NFPA 1 18.4.5.3.2	REQUIRED FIRE FLOW
Publix/Retail	II-A	II(111)	61,300	3,500	Yes	75%	2,625	1,000	2,625

APPENDIX B

Water Main Schematic


J-35
P-40
J-34
P-39
P-41
J-36
P-42
J-37
P-46
J-38
P-47
J-33
P-38
J-32
P-43
J-39
P-44
J-40
P-45
P-37
J-31
P-36
J-30
J-29
P-34
J-26
P-33
J-28
P-32
J-27
P-27
J-9
P-9
J-8
P-8
J-7
P-7
J-6
P-6
J-5
P-5
J-4
P-4
J-3
P-3
J-2
P-2
J-1
P-1
R-1
P-10
J-11
P-11
J-10
P-12
J-12
P-13
J-63
P-73
P-74
J-64
P-76
J-65
P-77
P-75
J-60
J-59
P-69
P-68
P-70
J-61
P-71
J-62
P-72
J-46
J-45
P-52
J-44
J-43
P-50
P-49
J-42
J-41
P-48
P-53
P-58
J-50
P-57
P-54
J-58
J-47
P-55
P-56
J-49
J-48
P-59
J-51
P-60
J-52
P-61
Residental FH
P-62
J-54
P-63
J-55
P-64
J-56
P-65
J-57
P-66
J-75
P-94
J-74
P-87
J-73
P-86
P-95
J-72
P-85
J-68
P-80
P-78
J-66
P-67
P-79
P-81
P-99
J-80
P-100
J-84
P-101
J-83
P-96
J-81
P-97
J-82
P-98
P-88
J-76
P-89
J-77
P-90
J-78
P-91
J-69
P-82
P-93
J-79
P-92
J-71
P-83
J-70
P-84
Color Coding Legend
Link: Diameter (in)
<= 8.0
J-22
J-21
P-23
J-20
P-22
P-24
J-23
P-28
J-24
P-29
P-25
J-25
P-20
J-19
P-21
J-18
P-30
J-17
P-19
P-115
J-103
C-111
C-119
FH3
C-118
Retail
FH4
C-112
C-113
P-A
P-B
C-114
R-3
C-117
Publix
C-116
P-D
C-108
FH2
C-107
P-C
C-106
FH1
C-105
R-2
P-17
P-18
J-16

APPENDIX C

Maximum Daily Flow plus Fire Flow Hydraulic Analysis

Scenario: NFF
Steady State Analysis
Junction Report

Label	Base Flow (gpm)	Elevation (ft)	Type	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Description
J-48	0.00	79.68	Demand	0.00	193.34	49.18	
J-47	0.00	82.68	Demand	0.00	193.87	48.11	
J-46	0.00	77.74	Demand	0.00	194.26	50.41	
J-63	0.00	69.30	Demand	0.00	195.03	54.40	
J-60	0.00	74.66	Demand	0.00	194.44	51.82	
J-56	0.00	82.12	Demand	0.00	193.97	48.39	
J-40	0.00	73.71	Demand	0.00	195.39	52.65	
J-37	0.00	71.13	Demand	0.00	195.33	53.74	
J-32	0.00	74.10	Demand	0.00	195.43	52.49	
J-45	0.00	72.97	Demand	0.00	194.49	52.58	
J-43	0.00	74.32	Demand	0.00	194.50	51.99	
J-41	0.00	76.94	Demand	0.00	194.71	50.95	
J-10	0.00	92.19	Demand	0.00	202.68	47.80	
J-80	0.00	75.28	Demand	0.00	194.77	51.70	
J-76	0.00	71.68	Demand	0.00	194.76	53.25	
J-103	0.00	93.00	Demand	0.00	201.12	46.78	
FH2	0.00	103.50	Demand	0.00	226.05	53.02	
FH1	0.00	111.00	Demand	0.00	235.19	53.73	
J-68	0.00	78.12	Demand	0.00	194.77	50.47	
J-67	0.00	80.27	Demand	0.00	194.82	49.56	
J-64	0.00	71.89	Demand	0.00	194.75	53.16	
J-74	0.00	72.19	Demand	0.00	194.76	53.03	
J-71	0.00	92.08	Demand	0.00	194.76	44.42	
J-69	0.00	74.40	Demand	0.00	194.76	52.08	
J-9	0.00	87.33	Demand	0.00	201.12	49.23	
J-8	0.00	86.57	Demand	0.00	201.69	49.81	
J-6	0.00	89.32	Demand	0.00	206.52	50.71	
J-21	0.00	72.72	Demand	0.00	200.76	55.40	
J-18	0.00	74.79	Demand	0.00	200.87	54.55	
J-17	0.00	81.27	Demand	0.00	200.91	51.76	
J-4	0.00	94.23	Demand	0.00	208.32	49.36	
J-29	0.00	79.15	Demand	0.00	199.94	52.26	
OP-B	2.92	103.00	Demand	2.92	208.54	45.66	
Retail	2.92	104.00	Demand	2.92	201.33	42.11	
OP-C	2.92	118.00	Demand	2.92	233.07	49.79	
OP-D	2.92	120.00	Demand	2.92	224.82	45.35	
OP-A	2.92	101.00	Demand	2.92	201.98	43.69	
J-75	4.55	72.38	Demand	4.55	194.76	52.95	
J-79	4.55	68.21	Demand	4.55	194.76	54.75	
J-78	4.55	72.88	Demand	4.55	194.76	52.73	
J-82	4.55	81.89	Demand	4.55	194.77	48.84	
J-81	4.55	77.11	Demand	4.55	194.77	50.90	
J-5	4.55	91.92	Demand	4.55	207.32	49.93	
J-77	4.55	70.97	Demand	4.55	194.76	53.56	
J-72	4.55	76.94	Demand	4.55	194.77	50.98	
J-39	4.55	71.82	Demand	4.55	195.28	53.42	
J-70	4.55	70.85	Demand	4.55	194.76	53.61	
J-28	4.55	82.90	Demand	4.55	200.76	50.99	
J-7	4.55	88.68	Demand	4.55	205.04	50.34	
J-73	4.55	74.84	Demand	4.55	194.77	51.89	
J-1	4.55	100.31	Demand	4.55	216.15	50.12	
J-34	4.55	68.89	Demand	4.55	195.38	54.72	
J-2	4.55	97.68	Demand	4.55	212.48	49.67	
J-30	4.55	78.86	Demand	4.55	198.93	51.95	

Scenario: NFF
Steady State Analysis
Junction Report

Label	Base Flow (gpm)	Elevation (ft)	Type	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Description
J-31	4.55	76.16	Demand	4.55	195.50	51.63	
J-33	4.55	71.03	Demand	4.55	195.41	53.81	
J-35	4.55	70.78	Demand	4.55	195.35	53.90	
J-36	4.55	69.86	Demand	4.55	195.34	54.29	
J-84	4.55	75.21	Demand	4.55	194.77	51.73	
J-83	4.55	81.50	Demand	4.55	194.77	49.01	
J-3	4.55	95.14	Demand	4.55	209.49	49.47	
J-12	4.55	84.60	Demand	4.55	198.21	49.15	
J-11	4.55	90.36	Demand	4.55	201.98	48.29	
J-22	4.55	72.18	Demand	4.55	200.76	55.63	
J-52	4.55	85.38	Demand	4.55	188.70	44.70	
J-51	4.55	82.89	Demand	4.55	191.39	46.94	
J-50	4.55	75.91	Demand	4.55	194.02	51.10	
J-20	4.55	74.77	Demand	4.55	200.80	54.53	
J-55	4.55	83.73	Demand	4.55	193.19	47.36	
J-54	4.55	84.37	Demand	4.55	189.81	45.62	
J-27	4.55	85.73	Demand	4.55	200.99	49.87	
J-44	4.55	74.40	Demand	4.55	194.49	51.96	
J-24	4.55	78.41	Demand	4.55	200.81	52.96	
J-42	4.55	75.83	Demand	4.55	194.65	51.41	
J-23	4.55	76.45	Demand	4.55	200.73	53.77	
J-26	4.55	82.67	Demand	4.55	200.59	51.02	
J-38	4.55	71.13	Demand	4.55	195.37	53.75	
J-25	4.55	78.61	Demand	4.55	200.88	52.90	
J-62	4.55	76.47	Demand	4.55	194.27	50.97	
J-16	4.55	91.00	Demand	4.55	207.35	50.34	
J-66	4.55	79.80	Demand	4.55	194.81	49.76	
J-65	4.55	73.00	Demand	4.55	194.76	52.68	
J-57	4.55	84.23	Demand	4.55	193.92	47.46	
J-58	4.55	84.67	Demand	4.55	193.88	47.25	
J-59	4.55	74.50	Demand	4.55	194.35	51.85	
J-19	4.55	74.65	Demand	4.55	200.85	54.60	
J-61	4.55	75.10	Demand	4.55	194.35	51.59	
J-49	4.55	78.48	Demand	4.55	193.44	49.74	
Publix	5.83	104.00	Demand	5.83	222.78	51.39	
Residental FH	1,000.00	87.14	Demand	1,000.00	185.97	42.76	
FH3	1,125.00	101.00	Demand	1,125.00	201.43	43.45	
FH4	1,500.00	101.00	Demand	1,500.00	200.99	43.26	

Scenario: NFF
Steady State Analysis
Pipe Report

Label	Diameter (in)	Length (ft)	Material	Start Node	Stop Node	Hazen-Williams C	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Minor Loss Coefficient	Pressure Pipe Headloss (ft)	Velocity (ft/s)
C-114	8.0	167.00	PVC	OP-B	R-3	120.0	45.66	0.00	0.39	6.86	8.78
C-113	8.0	172.00	PVC	OP-A	OP-B	120.0	43.69	45.66	0.00	6.56	8.77
C-112	8.0	26.00	PVC	FH4	OP-A	120.0	43.26	43.69	0.00	0.99	8.75
C-106	8.0	63.00	PVC	FH1	OP-C	120.0	53.73	49.79	0.00	2.12	8.19
C-105	8.0	143.00	PVC	R-2	FH1	120.0	0.00	53.73	0.39	5.21	8.19
C-108	8.0	37.00	PVC	FH2	OP-D	120.0	53.02	45.35	0.00	1.24	8.17
C-107	8.0	173.00	PVC	OP-C	FH2	120.0	49.79	53.02	1.19	7.02	8.17
C-116	8.0	61.00	PVC	OP-D	Publix	120.0	45.35	51.39	0.00	2.03	8.15
C-117	8.0	597.00	PVC	Publix	FH3	120.0	51.39	43.45	1.60	21.35	8.11
P-1	8.0	405.00	PVC	R-1	J-1	120.0	0.00	50.12	2.00	14.25	7.78
P-2	8.0	342.00	PVC	J-1	J-2	120.0	50.12	49.67	2.00	3.67	4.08
P-3	8.0	272.00	PVC	J-2	J-3	120.0	49.67	49.47	2.00	2.99	4.05
P-4	8.0	74.00	PVC	J-3	J-4	120.0	49.47	49.36	2.00	1.17	4.02
P-7	8.0	113.00	PVC	J-6	J-7	120.0	50.71	50.34	2.00	1.48	3.96
P-8	8.0	332.00	PVC	J-7	J-8	120.0	50.34	49.81	2.00	3.35	3.93
P-35	8.0	72.00	PVC	J-29	J-30	120.0	52.26	51.95	2.00	1.01	3.76
P-36	8.0	383.00	PVC	J-30	J-31	120.0	51.95	51.63	2.00	3.43	3.73
P-10	8.0	1,716.00	PVC	J-1	J-10	120.0	50.12	47.80	2.00	13.47	3.67
P-11	8.0	37.00	PVC	J-10	J-11	120.0	47.80	48.29	2.00	0.70	3.67
P-12	8.0	448.00	PVC	J-11	J-12	120.0	48.29	49.15	2.00	3.77	3.64
P-13	8.0	404.00	PVC	J-12	J-67	120.0	49.15	49.56	2.00	3.39	3.61
P-64	8.0	59.00	PVC	J-55	J-56	120.0	47.36	48.39	2.00	0.78	3.48
P-63	8.0	444.00	PVC	J-54	J-55	120.0	45.62	47.36	2.00	3.38	3.45
P-62	8.0	522.00	PVC	Residental F	J-54	120.0	42.76	45.62	2.00	3.84	3.42
P-59	8.0	314.00	PVC	J-48	J-51	120.0	49.18	46.94	2.00	1.95	3.02
P-60	8.0	463.00	PVC	J-51	J-52	120.0	46.94	44.70	2.00	2.69	2.99
P-61	8.0	480.00	PVC	J-52	Residental FH	120.0	44.70	42.76	2.00	2.73	2.96
P-79	8.0	141.00	PVC	J-67	J-56	120.0	49.56	48.39	2.00	0.85	2.73
P-48	8.0	179.00	PVC	J-31	J-41	120.0	51.63	50.95	2.00	0.80	2.40
P-5	8.0	266.00	PVC	J-4	J-5	120.0	49.36	49.93	2.00	1.00	2.29
P-6	8.0	208.00	PVC	J-5	J-6	120.0	49.93	50.71	2.00	0.80	2.26
P-9	8.0	162.00	PVC	J-8	J-9	120.0	49.81	49.23	2.00	0.58	2.10
P-34	8.0	222.00	PVC	J-29	J-26	120.0	52.26	51.02	2.00	0.65	1.96
P-32	8.0	398.00	PVC	J-8	J-28	120.0	49.81	50.99	2.00	0.94	1.83
P-33	8.0	353.00	PVC	J-28	J-29	120.0	50.99	52.26	2.00	0.82	1.80
P-17	8.0	463.00	PVC	J-4	J-16	120.0	49.36	50.34	2.00	0.97	1.73
P-18	8.0	407.00	PVC	J-16	J-6	120.0	50.34	50.71	2.00	0.84	1.70
P-75	8.0	134.00	PVC	J-64	J-60	120.0	53.16	51.82	2.00	0.31	1.63
P-55	8.0	295.00	PVC	J-47	J-48	120.0	48.11	49.18	2.00	0.53	1.56
P-58	8.0	410.00	PVC	J-50	J-41	120.0	51.10	50.95	2.00	0.68	1.52
P-57	8.0	354.00	PVC	J-49	J-50	120.0	49.74	51.10	2.00	0.58	1.49
P-56	8.0	27.00	PVC	J-48	J-49	120.0	49.18	49.74	2.00	0.10	1.46
P-54	8.0	307.00	PVC	J-46	J-47	120.0	50.41	48.11	2.00	0.38	1.28
P-27	8.0	93.00	PVC	J-27	J-9	120.0	49.87	49.23	2.00	0.13	1.17
P-26	8.0	416.00	PVC	J-26	J-27	120.0	51.02	49.87	2.00	0.40	1.14
P-74	8.0	287.00	PVC	J-63	J-64	120.0	54.40	53.16	2.00	0.28	1.13
P-73	8.0	247.00	PVC	J-39	J-63	120.0	53.42	54.40	2.00	0.25	1.13
P-69	8.0	64.00	PVC	J-59	J-60	120.0	51.85	51.82	2.00	0.09	1.12
P-68	8.0	430.00	PVC	J-56	J-59	120.0	48.39	51.85	2.00	0.38	1.09
P-19	8.0	245.00	PVC	J-9	J-17	120.0	49.23	51.76	2.00	0.21	1.02
C-118	8.0	147.00	PVC	FH3	Retail	120.0	43.45	42.11	0.80	0.10	0.93
C-119	8.0	316.00	PVC	Retail	J-103	120.0	42.11	46.78	1.99	0.21	0.91
P-49	8.0	61.00	PVC	J-41	J-42	120.0	50.95	51.41	2.00	0.06	0.88

Scenario: NFF
Steady State Analysis
Pipe Report

Label	Diameter (in)	Length (ft)	Material	Start Node	Stop Node	Hazen-Williams C	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Minor Loss Coefficient	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-25	8.0	245.00	PVC	J-23	J-26	120.0	53.77	51.02	2.00	0.15	0.85
P-50	8.0	261.00	PVC	J-42	J-43	120.0	51.41	51.99	2.00	0.15	0.85
C-111	8.0	252.00	PVC	J-103	FH4	120.0	46.78	43.26	0.59	0.13	0.83
P-53	8.0	461.00	PVC	J-43	J-46	120.0	51.99	50.41	2.00	0.24	0.82
P-37	8.0	195.00	PVC	J-31	J-32	120.0	51.63	52.49	2.00	0.08	0.68
P-45	8.0	352.00	PVC	J-40	J-31	120.0	52.65	51.63	2.00	0.11	0.62
P-44	8.0	338.00	PVC	J-39	J-40	120.0	53.42	52.65	2.00	0.11	0.62
P-30	8.0	58.00	PVC	J-25	J-17	120.0	52.90	51.76	2.00	0.03	0.59
P-29	8.0	252.00	PVC	J-24	J-25	120.0	52.96	52.90	2.00	0.07	0.56
P-28	8.0	330.00	PVC	J-23	J-24	120.0	53.77	52.96	2.00	0.08	0.54
P-43	8.0	199.00	PVC	J-37	J-39	120.0	53.74	53.42	2.00	0.05	0.53
P-70	8.0	417.00	PVC	J-60	J-61	120.0	51.82	51.59	2.00	0.09	0.52
P-80	8.0	195.00	PVC	J-67	J-68	120.0	49.56	50.47	2.00	0.04	0.50
P-71	8.0	362.00	PVC	J-61	J-62	120.0	51.59	50.97	2.00	0.07	0.49
P-72	8.0	70.00	PVC	J-62	J-46	120.0	50.97	50.41	2.00	0.02	0.46
P-20	8.0	244.00	PVC	J-17	J-18	120.0	51.76	54.55	2.00	0.04	0.43
P-21	8.0	65.00	PVC	J-18	J-19	120.0	54.55	54.60	2.00	0.02	0.43
P-22	8.0	359.00	PVC	J-19	J-20	120.0	54.60	54.53	2.00	0.05	0.40
P-78	8.0	26.00	PVC	J-66	J-67	120.0	49.76	49.56	2.00	0.01	0.39
P-47	8.0	424.00	PVC	J-38	J-32	120.0	53.75	52.49	2.00	0.05	0.38
P-23	8.0	347.00	PVC	J-20	J-21	120.0	54.53	55.40	2.00	0.04	0.37
P-77	8.0	459.00	PVC	J-65	J-66	120.0	52.68	49.76	2.00	0.05	0.36
P-46	8.0	379.00	PVC	J-37	J-38	120.0	53.74	53.75	2.00	0.04	0.35
P-24	8.0	257.00	PVC	J-21	J-23	120.0	55.40	53.77	2.00	0.03	0.34
P-65	8.0	472.00	PVC	J-56	J-57	120.0	48.39	47.46	2.00	0.05	0.34
P-76	8.0	71.00	PVC	J-64	J-65	120.0	53.16	52.68	2.00	0.01	0.33
P-66	8.0	470.00	PVC	J-57	J-58	120.0	47.46	47.25	2.00	0.04	0.31
P-38	8.0	176.00	PVC	J-32	J-33	120.0	52.49	53.81	2.00	0.02	0.30
P-67	8.0	62.00	PVC	J-58	J-47	120.0	47.25	48.11	2.00	0.01	0.28
P-39	8.0	502.00	PVC	J-33	J-34	120.0	53.81	54.72	2.00	0.03	0.27
P-40	8.0	417.00	PVC	J-34	J-35	120.0	54.72	53.90	2.00	0.02	0.24
P-41	8.0	429.00	PVC	J-35	J-36	120.0	53.90	54.29	2.00	0.02	0.21
P-81	8.0	302.00	PVC	J-68	J-69	120.0	50.47	52.08	2.00	0.01	0.20
P-42	8.0	82.00	PVC	J-36	J-37	120.0	54.29	53.74	2.00	0.00	0.18
P-84	8.0	209.00	PVC	J-71	J-64	120.0	44.42	53.16	2.00	0.01	0.18
P-85	8.0	71.00	PVC	J-68	J-72	120.0	50.47	50.98	2.00	0.00	0.15
P-99	8.0	356.00	PVC	J-83	J-68	120.0	49.01	50.47	2.00	0.01	0.14
P-82	8.0	265.00	PVC	J-69	J-70	120.0	52.08	53.61	2.00	0.01	0.14
P-86	8.0	426.00	PVC	J-72	J-73	120.0	50.98	51.89	2.00	0.01	0.12
P-83	8.0	52.00	PVC	J-70	J-71	120.0	53.61	44.42	2.00	0.00	0.11
P-87	8.0	60.00	PVC	J-73	J-74	120.0	51.89	53.03	2.00	0.00	0.09
P-88	8.0	313.00	PVC	J-74	J-76	120.0	53.03	53.25	2.00	0.00	0.09
P-93	8.0	505.00	PVC	J-79	J-76	120.0	54.75	53.25	2.00	0.00	0.09
P-115	8.0	668.00	PVC	J-9	J-103	120.0	49.23	46.78	0.39	0.00	0.09
P-92	8.0	340.00	PVC	J-71	J-79	120.0	44.42	54.75	2.00	0.00	0.06
P-98	8.0	362.00	PVC	J-82	J-83	120.0	48.84	49.01	2.00	0.00	0.06
P-101	8.0	453.00	PVC	J-84	J-83	120.0	51.73	49.01	2.00	0.00	0.06
P-91	8.0	63.00	PVC	J-78	J-69	120.0	52.73	52.08	2.00	0.00	0.06
P-51	8.0	68.00	PVC	J-43	J-44	120.0	51.99	51.96	2.00	0.00	0.03
P-31	8.0	59.00	PVC	J-22	J-21	120.0	55.63	55.40	2.00	0.00	0.03
P-94	8.0	147.00	PVC	J-74	J-75	120.0	53.03	52.95	2.00	0.00	0.03
P-97	8.0	396.00	PVC	J-81	J-82	120.0	50.90	48.84	2.00	0.00	0.03
P-100	8.0	78.00	PVC	J-80	J-84	120.0	51.70	51.73	2.00	0.00	0.03

Scenario: NFF
Steady State Analysis
Pipe Report

Label	Diameter (in)	Length (ft)	Material	Start Node	Stop Node	Hazen-Williams C	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Minor Loss Coefficient	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-90	8.0	423.00	PVC	J-77	J-78	120.0	53.56	52.73	2.00	0.00	0.03
P-95	8.0	380.00	PVC	J-74	J-80	120.0	53.03	51.70	2.00	0.00	0.03
P-89	8.0	66.00	PVC	J-76	J-77	120.0	53.25	53.56	2.00	0.00	0.00
P-96	8.0	397.00	PVC	J-80	J-81	120.0	51.70	50.90	2.00	0.00	0.00
P-52	8.0	234.00	PVC	J-44	J-45	120.0	51.96	52.58	2.00	0.00	0.00

Scenario: NFF
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Calculated Hydraulic Grade (ft)	Outflow (gpm)	Description
R-1	230.40	230.40	1,218.46	
R-2	240.40	240.40	1,282.68	
R-3	215.40	215.40	1,376.34	

APPENDIX D

Peak Hour Flow Demand Hydraulic Analysis

Scenario: NFF
Steady State Analysis
Junction Report

Label	Base Flow (gpm)	Elevation (ft)	Type	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Description
J-56	0.00	82.12	Demand	0.00	223.31	61.09	
Residental FH	0.00	87.14	Demand	0.00	223.29	58.91	
J-48	0.00	79.68	Demand	0.00	223.29	62.13	
J-64	0.00	71.89	Demand	0.00	223.30	65.51	
J-63	0.00	69.30	Demand	0.00	223.30	66.63	
J-60	0.00	74.66	Demand	0.00	223.30	64.31	
J-47	0.00	82.68	Demand	0.00	223.29	60.84	
J-41	0.00	76.94	Demand	0.00	223.29	63.32	
J-40	0.00	73.71	Demand	0.00	223.30	64.72	
J-37	0.00	71.13	Demand	0.00	223.29	65.83	
J-46	0.00	77.74	Demand	0.00	223.29	62.97	
J-45	0.00	72.97	Demand	0.00	223.29	65.04	
J-43	0.00	74.32	Demand	0.00	223.29	64.45	
FH2	0.00	103.50	Demand	0.00	235.96	57.31	
FH1	0.00	111.00	Demand	0.00	238.77	55.28	
J-10	0.00	92.19	Demand	0.00	224.65	57.31	
FH4	0.00	101.00	Demand	0.00	219.96	51.47	
J-103	0.00	93.00	Demand	0.00	223.29	56.37	
FH3	0.00	101.00	Demand	0.00	228.59	55.20	
J-80	0.00	75.28	Demand	0.00	223.29	64.04	
J-69	0.00	74.40	Demand	0.00	223.29	64.42	
J-68	0.00	78.12	Demand	0.00	223.30	62.81	
J-67	0.00	80.27	Demand	0.00	223.34	61.90	
J-76	0.00	71.68	Demand	0.00	223.29	65.59	
J-74	0.00	72.19	Demand	0.00	223.29	65.37	
J-71	0.00	92.08	Demand	0.00	223.29	56.77	
J-32	0.00	74.10	Demand	0.00	223.30	64.55	
J-17	0.00	81.27	Demand	0.00	223.44	61.51	
J-18	0.00	74.79	Demand	0.00	223.44	64.31	
J-29	0.00	79.15	Demand	0.00	223.43	62.43	
J-4	0.00	94.23	Demand	0.00	225.10	56.62	
J-8	0.00	86.57	Demand	0.00	223.64	59.30	
J-9	0.00	87.33	Demand	0.00	223.46	58.90	
J-21	0.00	72.72	Demand	0.00	223.43	65.21	
J-6	0.00	89.32	Demand	0.00	224.68	58.56	
OP-C	5.83	118.00	Demand	5.83	238.11	51.97	
OP-A	5.83	101.00	Demand	5.83	219.64	51.33	
Retail	5.83	104.00	Demand	5.83	226.92	53.18	
OP-D	5.83	120.00	Demand	5.83	235.58	50.00	
OP-B	5.83	103.00	Demand	5.83	217.54	49.56	
J-78	9.11	72.88	Demand	9.11	223.29	65.08	
J-77	9.11	70.97	Demand	9.11	223.29	65.90	
J-73	9.11	74.84	Demand	9.11	223.29	64.23	
J-70	9.11	70.85	Demand	9.11	223.29	65.96	
J-16	9.11	91.00	Demand	9.11	224.86	57.92	
J-72	9.11	76.94	Demand	9.11	223.30	63.32	
J-66	9.11	79.80	Demand	9.11	223.34	62.10	
J-79	9.11	68.21	Demand	9.11	223.29	67.10	
J-5	9.11	91.92	Demand	9.11	224.86	57.51	
J-12	9.11	84.60	Demand	9.11	223.89	60.26	
J-11	9.11	90.36	Demand	9.11	224.53	58.05	
J-1	9.11	100.31	Demand	9.11	227.12	54.87	
J-2	9.11	97.68	Demand	9.11	226.14	55.58	
J-3	9.11	95.14	Demand	9.11	225.38	56.35	

Scenario: NFF
Steady State Analysis
Junction Report

Label	Base Flow (gpm)	Elevation (ft)	Type	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Description
J-81	9.11	77.11	Demand	9.11	223.29	63.24	
J-7	9.11	88.68	Demand	9.11	224.35	58.70	
J-75	9.11	72.38	Demand	9.11	223.29	65.29	
J-84	9.11	75.21	Demand	9.11	223.29	64.07	
J-83	9.11	81.50	Demand	9.11	223.29	61.35	
J-82	9.11	81.89	Demand	9.11	223.29	61.18	
J-44	9.11	74.40	Demand	9.11	223.29	64.42	
J-22	9.11	72.18	Demand	9.11	223.43	65.44	
J-42	9.11	75.83	Demand	9.11	223.29	63.80	
J-28	9.11	82.90	Demand	9.11	223.52	60.84	
J-27	9.11	85.73	Demand	9.11	223.45	59.59	
J-49	9.11	78.48	Demand	9.11	223.29	62.65	
J-25	9.11	78.61	Demand	9.11	223.44	62.66	
J-24	9.11	78.41	Demand	9.11	223.44	62.75	
J-35	9.11	70.78	Demand	9.11	223.29	65.98	
J-36	9.11	69.86	Demand	9.11	223.29	66.38	
J-33	9.11	71.03	Demand	9.11	223.29	65.88	
J-34	9.11	68.89	Demand	9.11	223.29	66.80	
J-30	9.11	78.86	Demand	9.11	223.40	62.54	
J-38	9.11	71.13	Demand	9.11	223.29	65.83	
J-31	9.11	76.16	Demand	9.11	223.30	63.66	
J-39	9.11	71.82	Demand	9.11	223.30	65.54	
J-59	9.11	74.50	Demand	9.11	223.30	64.38	
J-61	9.11	75.10	Demand	9.11	223.29	64.12	
J-57	9.11	84.23	Demand	9.11	223.30	60.17	
J-58	9.11	84.67	Demand	9.11	223.29	59.97	
J-19	9.11	74.65	Demand	9.11	223.44	64.37	
J-65	9.11	73.00	Demand	9.11	223.30	65.03	
J-62	9.11	76.47	Demand	9.11	223.29	63.52	
J-20	9.11	74.77	Demand	9.11	223.43	64.32	
J-52	9.11	85.38	Demand	9.11	223.29	59.67	
J-26	9.11	82.67	Demand	9.11	223.44	60.90	
J-50	9.11	75.91	Demand	9.11	223.29	63.76	
J-51	9.11	82.89	Demand	9.11	223.29	60.74	
J-54	9.11	84.37	Demand	9.11	223.30	60.11	
J-55	9.11	83.73	Demand	9.11	223.30	60.39	
J-23	9.11	76.45	Demand	9.11	223.44	63.59	
Publix	11.67	104.00	Demand	11.67	234.95	56.66	

Scenario: NFF
Steady State Analysis
Pipe Report

Label	Diameter (in)	Length (ft)	Material	Start Node	Stop Node	Hazen-Williams C	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Minor Loss Coefficient	Pressure Pipe Headloss (ft)	Velocity (ft/s)
C-112	8.0	26.00	PVC	FH4	OP-A	120.0	51.47	51.33	0.00	0.32	4.78
C-111	8.0	252.00	PVC	J-103	FH4	120.0	56.37	51.47	0.59	3.33	4.78
C-113	8.0	172.00	PVC	OP-A	OP-B	120.0	51.33	49.56	0.00	2.10	4.74
C-114	8.0	167.00	PVC	OP-B	R-3	120.0	49.56	0.00	0.39	2.14	4.70
C-105	8.0	143.00	PVC	R-2	FH1	120.0	0.00	55.28	0.39	1.63	4.38
C-106	8.0	63.00	PVC	FH1	OP-C	120.0	55.28	51.97	0.00	0.67	4.38
C-107	8.0	173.00	PVC	OP-C	FH2	120.0	51.97	57.31	1.19	2.15	4.35
C-108	8.0	37.00	PVC	FH2	OP-D	120.0	57.31	50.00	0.00	0.38	4.35
C-116	8.0	61.00	PVC	OP-D	Publix	120.0	50.00	56.66	0.00	0.62	4.31
C-118	8.0	147.00	PVC	FH3	Retail	120.0	55.20	53.18	0.80	1.68	4.23
C-117	8.0	597.00	PVC	Publix	FH3	120.0	56.66	55.20	1.60	6.36	4.23
C-119	8.0	316.00	PVC	Retail	J-103	120.0	53.18	56.37	1.99	3.62	4.20
P-1	8.0	405.00	PVC	R-1	J-1	120.0	0.00	54.87	2.00	3.28	3.54
P-2	8.0	342.00	PVC	J-1	J-2	120.0	54.87	55.58	2.00	0.98	2.01
P-3	8.0	272.00	PVC	J-2	J-3	120.0	55.58	56.35	2.00	0.76	1.96
P-4	8.0	74.00	PVC	J-3	J-4	120.0	56.35	56.62	2.00	0.28	1.90
P-7	8.0	113.00	PVC	J-6	J-7	120.0	58.56	58.70	2.00	0.32	1.78
P-8	8.0	332.00	PVC	J-7	J-8	120.0	58.70	59.30	2.00	0.71	1.72
P-10	8.0	1,716.00	PVC	J-1	J-10	120.0	54.87	57.31	2.00	2.47	1.47
P-11	8.0	37.00	PVC	J-10	J-11	120.0	57.31	58.05	2.00	0.12	1.47
P-12	8.0	448.00	PVC	J-11	J-12	120.0	58.05	60.26	2.00	0.64	1.41
P-13	8.0	404.00	PVC	J-12	J-67	120.0	60.26	61.90	2.00	0.54	1.36
P-9	8.0	162.00	PVC	J-8	J-9	120.0	59.30	58.90	2.00	0.18	1.12
P-5	8.0	266.00	PVC	J-4	J-5	120.0	56.62	57.51	2.00	0.25	1.08
P-6	8.0	208.00	PVC	J-5	J-6	120.0	57.51	58.56	2.00	0.18	1.02
P-17	8.0	463.00	PVC	J-4	J-16	120.0	56.62	57.92	2.00	0.24	0.82
P-18	8.0	407.00	PVC	J-16	J-6	120.0	57.92	58.56	2.00	0.19	0.76
P-35	8.0	72.00	PVC	J-29	J-30	120.0	62.43	62.54	2.00	0.03	0.62
P-32	8.0	398.00	PVC	J-8	J-28	120.0	59.30	60.84	2.00	0.12	0.60
P-115	8.0	668.00	PVC	J-9	J-103	120.0	58.90	56.37	0.39	0.17	0.58
P-36	8.0	383.00	PVC	J-30	J-31	120.0	62.54	63.66	2.00	0.10	0.56
P-33	8.0	353.00	PVC	J-28	J-29	120.0	60.84	62.43	2.00	0.09	0.54
P-79	8.0	141.00	PVC	J-67	J-56	120.0	61.90	61.09	2.00	0.04	0.51
P-80	8.0	195.00	PVC	J-67	J-68	120.0	61.90	62.81	2.00	0.04	0.50
P-78	8.0	26.00	PVC	J-66	J-67	120.0	62.10	61.90	2.00	0.01	0.35
P-77	8.0	459.00	PVC	J-65	J-66	120.0	65.03	62.10	2.00	0.03	0.29
P-19	8.0	245.00	PVC	J-9	J-17	120.0	58.90	61.51	2.00	0.02	0.28
P-27	8.0	93.00	PVC	J-27	J-9	120.0	59.59	58.90	2.00	0.01	0.26
P-76	8.0	71.00	PVC	J-64	J-65	120.0	65.51	65.03	2.00	0.00	0.23
P-48	8.0	179.00	PVC	J-31	J-41	120.0	63.66	63.32	2.00	0.01	0.22
P-26	8.0	416.00	PVC	J-26	J-27	120.0	60.90	59.59	2.00	0.02	0.20
P-64	8.0	59.00	PVC	J-55	J-56	120.0	60.39	61.09	2.00	0.00	0.20
P-37	8.0	195.00	PVC	J-31	J-32	120.0	63.66	64.55	2.00	0.01	0.19
P-85	8.0	71.00	PVC	J-68	J-72	120.0	62.81	63.32	2.00	0.00	0.18
P-99	8.0	356.00	PVC	J-83	J-68	120.0	61.35	62.81	2.00	0.01	0.18
P-65	8.0	472.00	PVC	J-56	J-57	120.0	61.09	60.17	2.00	0.01	0.16
P-30	8.0	58.00	PVC	J-25	J-17	120.0	62.66	61.51	2.00	0.00	0.16
P-68	8.0	430.00	PVC	J-56	J-59	120.0	61.09	64.38	2.00	0.01	0.15
P-84	8.0	209.00	PVC	J-71	J-64	120.0	56.77	65.51	2.00	0.00	0.14
P-63	8.0	444.00	PVC	J-54	J-55	120.0	60.11	60.39	2.00	0.01	0.14
P-81	8.0	302.00	PVC	J-68	J-69	120.0	62.81	64.42	2.00	0.01	0.14
P-91	8.0	63.00	PVC	J-78	J-69	120.0	65.08	64.42	2.00	0.00	0.13
P-49	8.0	61.00	PVC	J-41	J-42	120.0	63.32	63.80	2.00	0.00	0.13

Scenario: NFF
Steady State Analysis
Pipe Report

Label	Diameter (in)	Length (ft)	Material	Start Node	Stop Node	Hazen-Williams C	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Minor Loss Coefficient	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-86	8.0	426.00	PVC	J-72	J-73	120.0	63.32	64.23	2.00	0.01	0.13
P-21	8.0	65.00	PVC	J-18	J-19	120.0	64.31	64.37	2.00	0.00	0.12
P-20	8.0	244.00	PVC	J-17	J-18	120.0	61.51	64.31	2.00	0.00	0.12
P-38	8.0	176.00	PVC	J-32	J-33	120.0	64.55	65.88	2.00	0.00	0.12
P-70	8.0	417.00	PVC	J-60	J-61	120.0	64.31	64.12	2.00	0.01	0.12
P-42	8.0	82.00	PVC	J-36	J-37	120.0	66.38	65.83	2.00	0.00	0.11
P-66	8.0	470.00	PVC	J-57	J-58	120.0	60.17	59.97	2.00	0.01	0.10
P-29	8.0	252.00	PVC	J-24	J-25	120.0	62.75	62.66	2.00	0.00	0.10
P-43	8.0	199.00	PVC	J-37	J-39	120.0	65.83	65.54	2.00	0.00	0.10
P-45	8.0	352.00	PVC	J-40	J-31	120.0	64.72	63.66	2.00	0.00	0.10
P-44	8.0	338.00	PVC	J-39	J-40	120.0	65.54	64.72	2.00	0.00	0.10
P-92	8.0	340.00	PVC	J-71	J-79	120.0	56.77	67.10	2.00	0.00	0.09
P-58	8.0	410.00	PVC	J-50	J-41	120.0	63.76	63.32	2.00	0.00	0.09
P-69	8.0	64.00	PVC	J-59	J-60	120.0	64.38	64.31	2.00	0.00	0.09
P-61	8.0	480.00	PVC	J-52	Residental FH	120.0	59.67	58.91	2.00	0.00	0.08
P-62	8.0	522.00	PVC	Residental F	J-54	120.0	58.91	60.11	2.00	0.00	0.08
P-34	8.0	222.00	PVC	J-29	J-26	120.0	62.43	60.90	2.00	0.00	0.08
P-98	8.0	362.00	PVC	J-82	J-83	120.0	61.18	61.35	2.00	0.00	0.07
P-90	8.0	423.00	PVC	J-77	J-78	120.0	65.90	65.08	2.00	0.00	0.07
P-50	8.0	261.00	PVC	J-42	J-43	120.0	63.80	64.45	2.00	0.00	0.07
P-87	8.0	60.00	PVC	J-73	J-74	120.0	64.23	65.37	2.00	0.00	0.07
P-47	8.0	424.00	PVC	J-38	J-32	120.0	65.83	64.55	2.00	0.00	0.07
P-25	8.0	245.00	PVC	J-23	J-26	120.0	63.59	60.90	2.00	0.00	0.06
P-73	8.0	247.00	PVC	J-39	J-63	120.0	65.54	66.63	2.00	0.00	0.06
P-74	8.0	287.00	PVC	J-63	J-64	120.0	66.63	65.51	2.00	0.00	0.06
P-22	8.0	359.00	PVC	J-19	J-20	120.0	64.37	64.32	2.00	0.00	0.06
P-39	8.0	502.00	PVC	J-33	J-34	120.0	65.88	66.80	2.00	0.00	0.06
P-71	8.0	362.00	PVC	J-61	J-62	120.0	64.12	63.52	2.00	0.00	0.06
P-55	8.0	295.00	PVC	J-47	J-48	120.0	60.84	62.13	2.00	0.00	0.06
P-51	8.0	68.00	PVC	J-43	J-44	120.0	64.45	64.42	2.00	0.00	0.06
P-94	8.0	147.00	PVC	J-74	J-75	120.0	65.37	65.29	2.00	0.00	0.06
P-31	8.0	59.00	PVC	J-22	J-21	120.0	65.44	65.21	2.00	0.00	0.06
P-95	8.0	380.00	PVC	J-74	J-80	120.0	65.37	64.04	2.00	0.00	0.06
P-41	8.0	429.00	PVC	J-35	J-36	120.0	65.98	66.38	2.00	0.00	0.05
P-24	8.0	257.00	PVC	J-21	J-23	120.0	65.21	63.59	2.00	0.00	0.05
P-83	8.0	52.00	PVC	J-70	J-71	120.0	65.96	56.77	2.00	0.00	0.05
P-88	8.0	313.00	PVC	J-74	J-76	120.0	65.37	65.59	2.00	0.00	0.05
P-101	8.0	453.00	PVC	J-84	J-83	120.0	64.07	61.35	2.00	0.00	0.05
P-67	8.0	62.00	PVC	J-58	J-47	120.0	59.97	60.84	2.00	0.00	0.05
P-28	8.0	330.00	PVC	J-23	J-24	120.0	63.59	62.75	2.00	0.00	0.05
P-96	8.0	397.00	PVC	J-80	J-81	120.0	64.04	63.24	2.00	0.00	0.05
P-93	8.0	505.00	PVC	J-79	J-76	120.0	67.10	65.59	2.00	0.00	0.04
P-59	8.0	314.00	PVC	J-48	J-51	120.0	62.13	60.74	2.00	0.00	0.03
P-57	8.0	354.00	PVC	J-49	J-50	120.0	62.65	63.76	2.00	0.00	0.03
P-75	8.0	134.00	PVC	J-64	J-60	120.0	65.51	64.31	2.00	0.00	0.03
P-56	8.0	27.00	PVC	J-48	J-49	120.0	62.13	62.65	2.00	0.00	0.02
P-60	8.0	463.00	PVC	J-51	J-52	120.0	60.74	59.67	2.00	0.00	0.02
P-97	8.0	396.00	PVC	J-81	J-82	120.0	63.24	61.18	2.00	0.00	0.01
P-54	8.0	307.00	PVC	J-46	J-47	120.0	62.97	60.84	2.00	0.00	0.01
P-89	8.0	66.00	PVC	J-76	J-77	120.0	65.59	65.90	2.00	0.00	0.01
P-100	8.0	78.00	PVC	J-80	J-84	120.0	64.04	64.07	2.00	0.00	0.01
P-53	8.0	461.00	PVC	J-43	J-46	120.0	64.45	62.97	2.00	0.00	0.01
P-82	8.0	265.00	PVC	J-69	J-70	120.0	64.42	65.96	2.00	0.00	0.01

Scenario: NFF
Steady State Analysis
Pipe Report

Label	Diameter (in)	Length (ft)	Material	Start Node	Stop Node	Hazen-Williams C	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Minor Loss Coefficient	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-46	8.0	379.00	PVC	J-37	J-38	120.0	65.83	65.83	2.00	0.00	0.01
P-23	8.0	347.00	PVC	J-20	J-21	120.0	64.32	65.21	2.00	0.00	0.01
P-40	8.0	417.00	PVC	J-34	J-35	120.0	66.80	65.98	2.00	0.00	0.00
P-72	8.0	70.00	PVC	J-62	J-46	120.0	63.52	62.97	2.00	0.00	0.00
P-52	8.0	234.00	PVC	J-44	J-45	120.0	64.42	65.04	2.00	0.00	0.00

Scenario: NFF
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Calculated Hydraulic Grade (ft)	Outflow (gpm)	Description
R-1	230.40	230.40	555.36	
R-2	240.40	240.40	686.65	
R-3	215.40	215.40	-736.58	

APPENDIX E

HGL Tie-In Calculations

0

Hydraulic Grade Line Calculations

R1

Tie-In Elevation	125.0	Ft	
Connection Pressure	115.4	Ft	50 PSI
Total Head	**240.4**	**Ft**	

R2

Tie-In Elevation	93.0	Ft	
Connection Pressure	115.4	Ft	50 PSI
Total Head	**208.4**	**Ft**	

APPENDIX F

Lake Hills Main Blvd. Water Main Report

Lake Hills Main Blvd. & Mass Grading

Water Main Report

MADDEN
MOORHEAD & STOKES, LLC
CIVIL ENGINEERS

Prepared by:

Madden, Moorhead and Stokes, Inc.
431 East Horatio Avenue, Suite 260
Maitland, FL 32751
(407) 629-8330

November, 2024

David A. Stokes, P.E. #66527
Certificate of Authorization No. EB-0007723

APPENDIX

A Potable Water Demand and Needed Fire Flow Demand Summaries
B Water Main Schematic
C Needed Fire Flow plus Max Day Flow WaterCAD Hydraulic Analysis
D Peak Hour Flow WaterCAD Hydraulic Analysis
E HGL Calculations

WATER MAIN ANALYSIS

The proposed development consists of a spine road for future development. The future development consists of +/- 560 senior living homes. The project has an 8" system that will be looped with a future phase. The connection point is the proposed Water Treatment Plant for the Town of Howey-In-The-Hills. The water main will be owned and maintained by the town.

The water main has been modeled under two conditions: (1) needed fire flow (NFF) per NFPA of 1,000 gpm plus max day flow, and (2) peak hour flow. The model analyses presented in Appendices C and D demonstrate minimum system pressures greater than 20 psi for the needed fire flow plus max day condition.

Appendix A

Potable Water Demand and Needed Fire Flow Demand Summaries

Lake Hills

POTABLE WATER DEMANDS

TYPE	DEMAND PER UNIT (GPD)	# OF UNITS	DEMAND TOTAL (GPD)
Lake Hills	300.00	558	167400
			0
			0
		558	167400

FLOW SUMMARY

AVG DAILY	167400 GPD	116.25 GPM
MAX DAY (x2)	334800 GPD	232.50 GPM
PEAK HOUR (x4)	669600 GPD	465.00 GPM

Lake Hills

NEEDED FIRE FLOW DEMANDS

Needed Fire Flow = 1,000 GPM

Needed fire flow for single family dwellings shall be as follows: homes 5,000SF or less shall provide 1,000 GPM for 1 hour, homes exceeding 5,000 SF shall provide fire flow in accordance with Table 18.4.5.1.2 of NFPQ 1 (FFPC 2012).

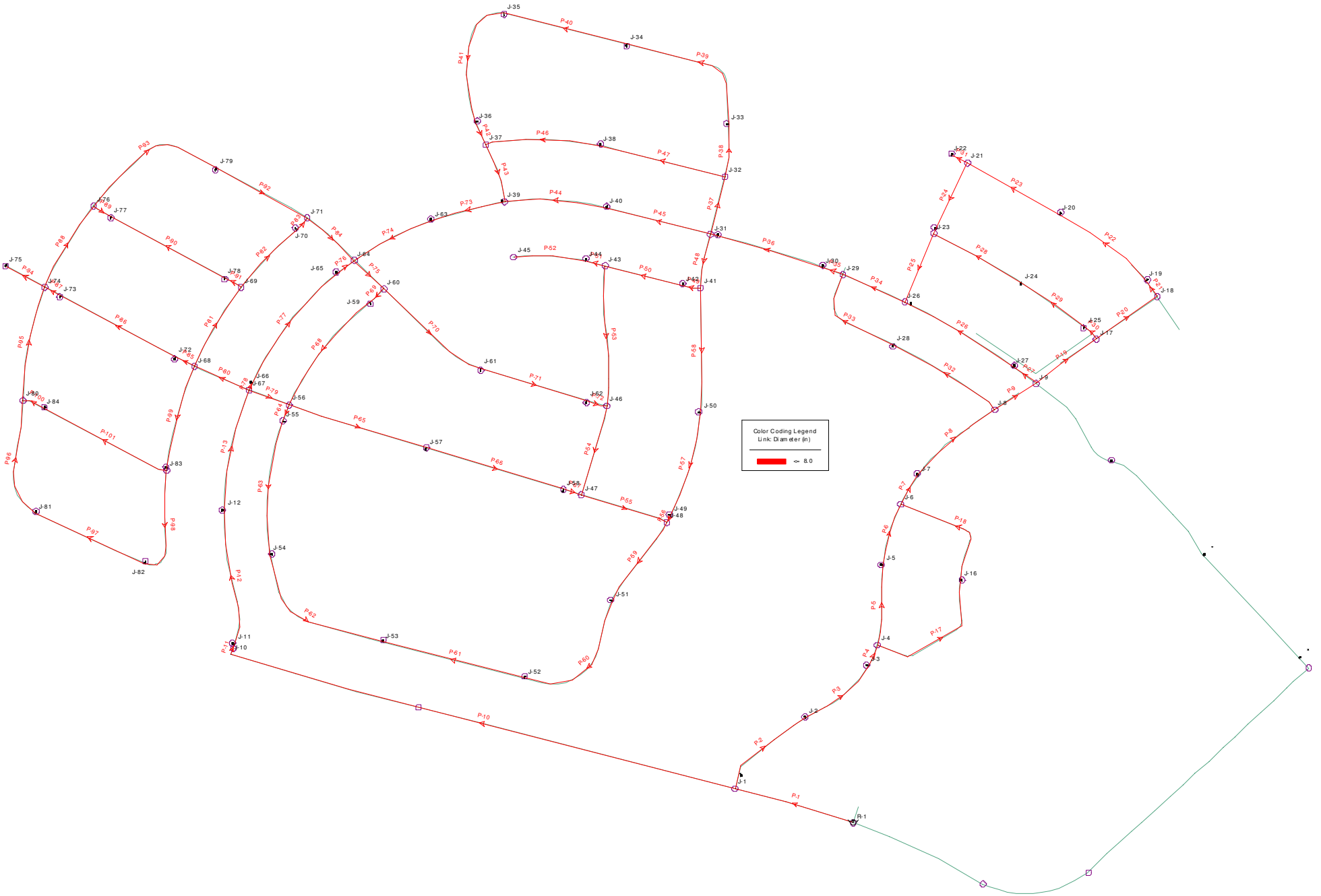
Needed Fire Flow per NFPA = 1,000 GPM
Max Day Demand = 232.50 GPM

TOTAL NFF + MAX DAY DEMAND = 1,232.50 GPM

Appendix B

Water Main Schematic

Scenario: NFF



Appendix C

Needed Fire Flow plus Max Day Flow WaterCAD Hydraulic Analysis

Scenario: NFF
Steady State Analysis
Junction Report

Label	Base Flow (gpm)	Elevation (ft)	Type	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Description
J-1	4.48	100.31	Demand	4.48	215.84	49.99	
J-2	4.48	97.68	Demand	4.48	212.07	49.49	
J-3	4.48	95.14	Demand	4.48	209.00	49.26	
J-4	0.00	94.23	Demand	0.00	207.80	49.14	
J-5	4.48	91.92	Demand	4.48	206.77	49.69	
J-6	0.00	89.32	Demand	0.00	205.94	50.46	
J-7	4.48	88.68	Demand	4.48	204.42	50.08	
J-8	0.00	86.57	Demand	0.00	200.98	49.50	
J-9	0.00	87.33	Demand	0.00	200.37	48.91	
J-10	0.00	92.19	Demand	0.00	202.15	47.58	
J-11	4.48	90.36	Demand	4.48	201.44	48.06	
J-12	4.47	84.60	Demand	4.47	197.61	48.89	
J-16	4.47	91.00	Demand	4.47	206.80	50.10	
J-17	0.00	81.27	Demand	0.00	200.17	51.44	
J-18	0.00	74.79	Demand	0.00	200.13	54.23	
J-19	4.47	74.65	Demand	4.47	200.11	54.28	
J-20	4.47	74.77	Demand	4.47	200.06	54.21	
J-21	0.00	72.72	Demand	0.00	200.02	55.08	
J-22	4.47	72.18	Demand	4.47	200.02	55.31	
J-23	4.47	76.45	Demand	4.47	200.00	53.45	
J-24	4.47	78.41	Demand	4.47	200.07	52.64	
J-25	4.47	78.61	Demand	4.47	200.14	52.58	
J-26	4.47	82.67	Demand	4.47	199.85	50.70	
J-27	4.47	85.73	Demand	4.47	200.25	49.55	
J-28	4.47	82.90	Demand	4.47	200.04	50.68	
J-29	0.00	79.15	Demand	0.00	199.22	51.95	
J-30	4.47	78.86	Demand	4.47	198.22	51.64	
J-31	4.47	76.16	Demand	4.47	194.83	51.34	
J-32	0.00	74.10	Demand	0.00	194.75	52.20	
J-33	4.47	71.03	Demand	4.47	194.74	53.52	
J-34	4.47	68.89	Demand	4.47	194.71	54.43	
J-35	4.47	70.78	Demand	4.47	194.68	53.61	
J-36	4.47	69.86	Demand	4.47	194.67	54.00	
J-37	0.00	71.13	Demand	0.00	194.66	53.45	
J-38	4.47	71.13	Demand	4.47	194.70	53.46	
J-39	4.47	71.82	Demand	4.47	194.61	53.13	
J-40	0.00	73.71	Demand	0.00	194.72	52.36	
J-41	0.00	76.94	Demand	0.00	194.03	50.66	
J-42	4.47	75.83	Demand	4.47	193.98	51.12	
J-43	0.00	74.32	Demand	0.00	193.83	51.70	
J-44	4.47	74.40	Demand	4.47	193.83	51.67	
J-45	0.00	72.97	Demand	0.00	193.83	52.29	
J-46	0.00	77.74	Demand	0.00	193.59	50.12	
J-47	0.00	82.68	Demand	0.00	193.21	47.82	
J-48	0.00	79.68	Demand	0.00	192.67	48.88	
J-49	4.47	78.48	Demand	4.47	192.77	49.45	
J-50	4.47	75.91	Demand	4.47	193.35	50.81	
J-51	4.47	82.89	Demand	4.47	190.70	46.65	
J-52	4.47	85.38	Demand	4.47	187.99	44.39	
J-53	1,004.47	87.14	Demand	1,004.47	185.24	42.44	
J-54	4.47	84.37	Demand	4.47	189.11	45.32	
J-55	4.47	83.73	Demand	4.47	192.52	47.07	
J-56	0.00	82.12	Demand	0.00	193.30	48.10	
J-57	4.47	84.23	Demand	4.47	193.26	47.17	

Scenario: NFF
Steady State Analysis
Junction Report

Label	Base Flow (gpm)	Elevation (ft)	Type	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Description
J-58	4.47	84.67	Demand	4.47	193.21	46.96	
J-59	4.47	74.50	Demand	4.47	193.69	51.57	
J-60	0.00	74.66	Demand	0.00	193.78	51.54	
J-61	4.47	75.10	Demand	4.47	193.68	51.31	
J-62	4.47	76.47	Demand	4.47	193.61	50.68	
J-63	0.00	69.30	Demand	0.00	194.37	54.11	
J-64	0.00	71.89	Demand	0.00	194.09	52.87	
J-65	4.47	73.00	Demand	4.47	194.10	52.39	
J-66	4.47	79.80	Demand	4.47	194.16	49.48	
J-67	0.00	80.27	Demand	0.00	194.16	49.28	
J-68	0.00	78.12	Demand	0.00	194.12	50.19	
J-69	0.00	74.40	Demand	0.00	194.11	51.79	
J-70	4.47	70.85	Demand	4.47	194.10	53.32	
J-71	0.00	92.08	Demand	0.00	194.10	44.14	
J-72	4.47	76.94	Demand	4.47	194.12	50.70	
J-73	4.47	74.84	Demand	4.47	194.11	51.60	
J-74	0.00	72.19	Demand	0.00	194.11	52.75	
J-75	4.47	72.38	Demand	4.47	194.11	52.67	
J-76	0.00	71.68	Demand	0.00	194.11	52.97	
J-77	4.47	70.97	Demand	4.47	194.11	53.27	
J-78	4.47	72.88	Demand	4.47	194.11	52.45	
J-79	4.47	68.21	Demand	4.47	194.10	54.47	
J-80	0.00	75.28	Demand	0.00	194.11	51.41	
J-81	4.47	77.11	Demand	4.47	194.11	50.62	
J-82	4.47	81.89	Demand	4.47	194.11	48.55	
J-83	4.47	81.50	Demand	4.47	194.11	48.72	
J-84	4.47	75.21	Demand	4.47	194.11	51.44	

Scenario: NFF
Steady State Analysis
Pipe Report

Label	Diameter (in)	Length (ft)	Material	Start Node	Stop Node	Hazen-Williams C	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Minor Loss Coefficient	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-1	8.0	405.00	PVC	R-1	J-1	120.0	0.00	49.99	2.00	14.56	7.87
P-2	8.0	342.00	PVC	J-1	J-2	120.0	49.99	49.49	2.00	3.77	4.14
P-3	8.0	272.00	PVC	J-2	J-3	120.0	49.49	49.26	2.00	3.07	4.11
P-4	8.0	74.00	PVC	J-3	J-4	120.0	49.26	49.14	2.00	1.20	4.08
P-5	8.0	266.00	PVC	J-4	J-5	120.0	49.14	49.69	2.00	1.03	2.32
P-6	8.0	208.00	PVC	J-5	J-6	120.0	49.69	50.46	2.00	0.82	2.29
P-7	8.0	113.00	PVC	J-6	J-7	120.0	50.46	50.08	2.00	1.52	4.02
P-8	8.0	332.00	PVC	J-7	J-8	120.0	50.08	49.50	2.00	3.44	3.99
P-9	8.0	162.00	PVC	J-8	J-9	120.0	49.50	48.91	2.00	0.61	2.16
P-10	8.0	1,716.00	PVC	J-1	J-10	120.0	49.99	47.58	2.00	13.69	3.70
P-11	8.0	37.00	PVC	J-10	J-11	120.0	47.58	48.06	2.00	0.71	3.70
P-12	8.0	448.00	PVC	J-11	J-12	120.0	48.06	48.89	2.00	3.83	3.67
P-13	8.0	404.00	PVC	J-12	J-67	120.0	48.89	49.28	2.00	3.45	3.65
P-17	8.0	463.00	PVC	J-4	J-16	120.0	49.14	50.10	2.00	1.00	1.76
P-18	8.0	407.00	PVC	J-16	J-6	120.0	50.10	50.46	2.00	0.86	1.73
P-19	8.0	245.00	PVC	J-9	J-17	120.0	48.91	51.44	2.00	0.20	1.01
P-20	8.0	244.00	PVC	J-17	J-18	120.0	51.44	54.23	2.00	0.04	0.42
P-21	8.0	65.00	PVC	J-18	J-19	120.0	54.23	54.28	2.00	0.01	0.42
P-22	8.0	359.00	PVC	J-19	J-20	120.0	54.28	54.21	2.00	0.05	0.40
P-23	8.0	347.00	PVC	J-20	J-21	120.0	54.21	55.08	2.00	0.04	0.37
P-24	8.0	257.00	PVC	J-21	J-23	120.0	55.08	53.45	2.00	0.03	0.34
P-25	8.0	245.00	PVC	J-23	J-26	120.0	53.45	50.70	2.00	0.14	0.84
P-26	8.0	416.00	PVC	J-26	J-27	120.0	50.70	49.55	2.00	0.39	1.12
P-27	8.0	93.00	PVC	J-27	J-9	120.0	49.55	48.91	2.00	0.12	1.15
P-28	8.0	330.00	PVC	J-23	J-24	120.0	53.45	52.64	2.00	0.08	0.53
P-29	8.0	252.00	PVC	J-24	J-25	120.0	52.64	52.58	2.00	0.07	0.56
P-30	8.0	58.00	PVC	J-25	J-17	120.0	52.58	51.44	2.00	0.03	0.59
P-31	8.0	59.00	PVC	J-22	J-21	120.0	55.31	55.08	2.00	0.00	0.03
P-32	8.0	398.00	PVC	J-8	J-28	120.0	49.50	50.68	2.00	0.94	1.83
P-33	8.0	353.00	PVC	J-28	J-29	120.0	50.68	51.95	2.00	0.82	1.80
P-34	8.0	222.00	PVC	J-29	J-26	120.0	51.95	50.70	2.00	0.63	1.93
P-35	8.0	72.00	PVC	J-29	J-30	120.0	51.95	51.64	2.00	1.00	3.74
P-36	8.0	383.00	PVC	J-30	J-31	120.0	51.64	51.34	2.00	3.39	3.71
P-37	8.0	195.00	PVC	J-31	J-32	120.0	51.34	52.20	2.00	0.08	0.67
P-38	8.0	176.00	PVC	J-32	J-33	120.0	52.20	53.52	2.00	0.02	0.30
P-39	8.0	502.00	PVC	J-33	J-34	120.0	53.52	54.43	2.00	0.03	0.27
P-40	8.0	417.00	PVC	J-34	J-35	120.0	54.43	53.61	2.00	0.02	0.24
P-41	8.0	429.00	PVC	J-35	J-36	120.0	53.61	54.00	2.00	0.02	0.21
P-42	8.0	82.00	PVC	J-36	J-37	120.0	54.00	53.45	2.00	0.00	0.18
P-43	8.0	199.00	PVC	J-37	J-39	120.0	53.45	53.13	2.00	0.05	0.52
P-44	8.0	338.00	PVC	J-39	J-40	120.0	53.13	52.36	2.00	0.11	0.62
P-45	8.0	352.00	PVC	J-40	J-31	120.0	52.36	51.34	2.00	0.11	0.62
P-46	8.0	379.00	PVC	J-37	J-38	120.0	53.45	53.46	2.00	0.04	0.34
P-47	8.0	424.00	PVC	J-38	J-32	120.0	53.46	52.20	2.00	0.05	0.37
P-48	8.0	179.00	PVC	J-31	J-41	120.0	51.34	50.66	2.00	0.80	2.39
P-49	8.0	61.00	PVC	J-41	J-42	120.0	50.66	51.12	2.00	0.06	0.87
P-50	8.0	261.00	PVC	J-42	J-43	120.0	51.12	51.70	2.00	0.15	0.84
P-51	8.0	68.00	PVC	J-43	J-44	120.0	51.70	51.67	2.00	0.00	0.03
P-52	8.0	234.00	PVC	J-44	J-45	120.0	51.67	52.29	2.00	0.00	0.00
P-53	8.0	461.00	PVC	J-43	J-46	120.0	51.70	50.12	2.00	0.24	0.81
P-54	8.0	307.00	PVC	J-46	J-47	120.0	50.12	47.82	2.00	0.38	1.28
P-55	8.0	295.00	PVC	J-47	J-48	120.0	47.82	48.88	2.00	0.54	1.57
P-56	8.0	27.00	PVC	J-48	J-49	120.0	48.88	49.45	2.00	0.10	1.47

Scenario: NFF
Steady State Analysis
Pipe Report

Label	Diameter (in)	Length (ft)	Material	Start Node	Stop Node	Hazen-Williams C	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Minor Loss Coefficient	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-57	8.0	354.00	PVC	J-49	J-50	120.0	49.45	50.81	2.00	0.58	1.50
P-58	8.0	410.00	PVC	J-50	J-41	120.0	50.81	50.66	2.00	0.68	1.52
P-59	8.0	314.00	PVC	J-48	J-51	120.0	48.88	46.65	2.00	1.96	3.03
P-60	8.0	463.00	PVC	J-51	J-52	120.0	46.65	44.39	2.00	2.71	3.01
P-61	8.0	480.00	PVC	J-52	J-53	120.0	44.39	42.44	2.00	2.75	2.98
P-62	8.0	522.00	PVC	J-53	J-54	120.0	42.44	45.32	2.00	3.87	3.43
P-63	8.0	444.00	PVC	J-54	J-55	120.0	45.32	47.07	2.00	3.40	3.46
P-64	8.0	59.00	PVC	J-55	J-56	120.0	47.07	48.10	2.00	0.79	3.49
P-65	8.0	472.00	PVC	J-56	J-57	120.0	48.10	47.17	2.00	0.05	0.34
P-66	8.0	470.00	PVC	J-57	J-58	120.0	47.17	46.96	2.00	0.04	0.32
P-67	8.0	62.00	PVC	J-58	J-47	120.0	46.96	47.82	2.00	0.01	0.29
P-68	8.0	430.00	PVC	J-56	J-59	120.0	48.10	51.57	2.00	0.38	1.09
P-69	8.0	64.00	PVC	J-59	J-60	120.0	51.57	51.54	2.00	0.09	1.12
P-70	8.0	417.00	PVC	J-60	J-61	120.0	51.54	51.31	2.00	0.09	0.52
P-71	8.0	362.00	PVC	J-61	J-62	120.0	51.31	50.68	2.00	0.07	0.49
P-72	8.0	70.00	PVC	J-62	J-46	120.0	50.68	50.12	2.00	0.02	0.47
P-73	8.0	247.00	PVC	J-39	J-63	120.0	53.13	54.11	2.00	0.24	1.11
P-74	8.0	287.00	PVC	J-63	J-64	120.0	54.11	52.87	2.00	0.28	1.11
P-75	8.0	134.00	PVC	J-64	J-60	120.0	52.87	51.54	2.00	0.31	1.64
P-76	8.0	71.00	PVC	J-64	J-65	120.0	52.87	52.39	2.00	0.01	0.34
P-77	8.0	459.00	PVC	J-65	J-66	120.0	52.39	49.48	2.00	0.05	0.37
P-78	8.0	26.00	PVC	J-66	J-67	120.0	49.48	49.28	2.00	0.01	0.40
P-79	8.0	141.00	PVC	J-67	J-56	120.0	49.28	48.10	2.00	0.86	2.75
P-80	8.0	195.00	PVC	J-67	J-68	120.0	49.28	50.19	2.00	0.05	0.50
P-81	8.0	302.00	PVC	J-68	J-69	120.0	50.19	51.79	2.00	0.01	0.20
P-82	8.0	265.00	PVC	J-69	J-70	120.0	51.79	53.32	2.00	0.01	0.15
P-83	8.0	52.00	PVC	J-70	J-71	120.0	53.32	44.14	2.00	0.00	0.12
P-84	8.0	209.00	PVC	J-71	J-64	120.0	44.14	52.87	2.00	0.01	0.19
P-85	8.0	71.00	PVC	J-68	J-72	120.0	50.19	50.70	2.00	0.00	0.15
P-86	8.0	426.00	PVC	J-72	J-73	120.0	50.70	51.60	2.00	0.01	0.12
P-87	8.0	60.00	PVC	J-73	J-74	120.0	51.60	52.75	2.00	0.00	0.10
P-88	8.0	313.00	PVC	J-74	J-76	120.0	52.75	52.97	2.00	0.00	0.10
P-89	8.0	66.00	PVC	J-76	J-77	120.0	52.97	53.27	2.00	0.00	0.00
P-90	8.0	423.00	PVC	J-77	J-78	120.0	53.27	52.45	2.00	0.00	0.03
P-91	8.0	63.00	PVC	J-78	J-69	120.0	52.45	51.79	2.00	0.00	0.06
P-92	8.0	340.00	PVC	J-71	J-79	120.0	44.14	54.47	2.00	0.00	0.07
P-93	8.0	505.00	PVC	J-79	J-76	120.0	54.47	52.97	2.00	0.00	0.10
P-94	8.0	147.00	PVC	J-74	J-75	120.0	52.75	52.67	2.00	0.00	0.03
P-95	8.0	380.00	PVC	J-74	J-80	120.0	52.75	51.41	2.00	0.00	0.03
P-96	8.0	397.00	PVC	J-80	J-81	120.0	51.41	50.62	2.00	0.00	0.00
P-97	8.0	396.00	PVC	J-81	J-82	120.0	50.62	48.55	2.00	0.00	0.03
P-98	8.0	362.00	PVC	J-82	J-83	120.0	48.55	48.72	2.00	0.00	0.06
P-99	8.0	356.00	PVC	J-83	J-68	120.0	48.72	50.19	2.00	0.01	0.14
P-100	8.0	78.00	PVC	J-80	J-84	120.0	51.41	51.44	2.00	0.00	0.03
P-101	8.0	453.00	PVC	J-84	J-83	120.0	51.44	48.72	2.00	0.00	0.06

Scenario: NFF
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Calculated Hydraulic Grade (ft)	Outflow (gpm)	Description
R-1	230.40	230.40	1,232.50	

Appendix D

Peak Hour Flow WaterCAD Hydraulic Analysis

Scenario: NFF
Steady State Analysis
Junction Report

Label	Base Flow (gpm)	Elevation (ft)	Type	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Description
J-1	9.30	100.31	Demand	9.30	230.33	56.25	
J-2	9.30	97.68	Demand	9.30	229.92	57.21	
J-3	9.30	95.14	Demand	9.30	229.62	58.18	
J-4	0.00	94.23	Demand	0.00	229.51	58.53	
J-5	9.30	91.92	Demand	9.30	229.42	59.49	
J-6	0.00	89.32	Demand	0.00	229.36	60.59	
J-7	9.30	88.68	Demand	9.30	229.25	60.82	
J-8	0.00	86.57	Demand	0.00	229.01	61.63	
J-9	0.00	87.33	Demand	0.00	229.00	61.29	
J-10	0.00	87.20	Demand	0.00	229.25	61.46	
J-11	0.00	88.40	Demand	0.00	229.54	61.07	
J-12	0.00	98.10	Demand	0.00	229.85	57.00	
J-13	0.00	105.80	Demand	0.00	229.91	53.70	
J-14	0.00	131.78	Demand	0.00	230.16	42.57	
J-15	0.00	130.96	Demand	0.00	230.27	42.97	
J-16	9.30	91.00	Demand	9.30	229.42	59.89	
J-17	0.00	81.27	Demand	0.00	228.90	63.87	
J-18	0.00	74.79	Demand	0.00	228.88	66.67	
J-19	9.30	74.65	Demand	9.30	228.88	66.73	
J-20	9.30	74.77	Demand	9.30	228.86	66.67	
J-21	0.00	72.72	Demand	0.00	228.85	67.55	
J-22	9.30	72.18	Demand	9.30	228.85	67.78	
J-23	9.30	76.45	Demand	9.30	228.84	65.93	
J-24	9.30	78.41	Demand	9.30	228.87	65.09	
J-25	9.30	78.61	Demand	9.30	228.89	65.02	
J-26	9.30	82.67	Demand	9.30	228.82	63.23	
J-27	9.30	85.73	Demand	9.30	228.95	61.97	
J-28	9.30	82.90	Demand	9.30	228.83	63.14	
J-29	0.00	79.15	Demand	0.00	228.70	64.70	
J-30	9.30	78.86	Demand	9.30	228.58	64.78	
J-31	9.30	76.16	Demand	9.30	228.20	65.78	
J-32	0.00	74.10	Demand	0.00	228.16	66.65	
J-33	9.30	71.03	Demand	9.30	228.15	67.98	
J-34	9.30	68.89	Demand	9.30	228.13	68.90	
J-35	9.30	70.78	Demand	9.30	228.13	68.08	
J-36	9.30	69.86	Demand	9.30	228.12	68.47	
J-37	0.00	71.13	Demand	0.00	228.12	67.92	
J-38	9.30	71.13	Demand	9.30	228.14	67.93	
J-39	9.30	71.82	Demand	9.30	228.12	67.62	
J-40	0.00	73.71	Demand	0.00	228.16	66.82	
J-41	0.00	76.94	Demand	0.00	228.10	65.40	
J-42	9.30	75.83	Demand	9.30	228.09	65.88	
J-43	0.00	74.32	Demand	0.00	228.06	66.52	
J-44	9.30	74.40	Demand	9.30	228.06	66.48	
J-45	0.00	72.97	Demand	0.00	228.06	67.10	
J-46	0.00	77.74	Demand	0.00	228.02	65.02	
J-47	0.00	82.68	Demand	0.00	228.02	62.88	
J-48	0.00	79.68	Demand	0.00	228.02	64.18	
J-49	9.30	78.48	Demand	9.30	228.02	64.70	
J-50	9.30	75.91	Demand	9.30	228.05	65.83	
J-51	9.30	82.89	Demand	9.30	228.01	62.79	
J-52	9.30	85.38	Demand	9.30	228.00	61.71	
J-53	9.30	87.14	Demand	9.30	228.00	60.94	
J-54	9.30	84.37	Demand	9.30	228.00	62.14	

Scenario: NFF
Steady State Analysis
Junction Report

Label	Base Flow (gpm)	Elevation (ft)	Type	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	Description
J-55	9.30	83.73	Demand	9.30	228.00	62.42	
J-56	0.00	82.12	Demand	0.00	228.00	63.12	
J-57	9.30	84.23	Demand	9.30	228.00	62.20	
J-58	9.30	84.67	Demand	9.30	228.01	62.02	
J-59	9.30	74.50	Demand	9.30	228.01	66.42	
J-60	0.00	74.66	Demand	0.00	228.01	66.35	
J-61	9.30	75.10	Demand	9.30	228.01	66.16	
J-62	9.30	76.47	Demand	9.30	228.02	65.57	
J-63	0.00	69.30	Demand	0.00	228.07	68.69	
J-64	0.00	71.89	Demand	0.00	228.02	67.55	
J-65	9.30	73.00	Demand	9.30	228.01	67.07	
J-66	9.30	79.80	Demand	9.30	228.00	64.12	
J-67	0.00	80.27	Demand	0.00	228.00	63.92	
J-68	0.00	78.12	Demand	0.00	227.98	64.84	
J-69	0.00	74.40	Demand	0.00	227.98	66.45	
J-70	9.30	70.85	Demand	9.30	227.99	67.99	
J-71	0.00	92.08	Demand	0.00	227.99	58.80	
J-72	9.30	76.94	Demand	9.30	227.98	65.35	
J-73	9.30	74.84	Demand	9.30	227.98	66.25	
J-74	0.00	72.19	Demand	0.00	227.98	67.40	
J-75	9.30	72.38	Demand	9.30	227.98	67.32	
J-76	0.00	71.68	Demand	0.00	227.98	67.62	
J-77	9.30	70.97	Demand	9.30	227.98	67.93	
J-78	9.30	72.88	Demand	9.30	227.98	67.11	
J-79	9.30	68.21	Demand	9.30	227.98	69.13	
J-80	0.00	75.28	Demand	0.00	227.97	66.06	
J-81	9.30	77.11	Demand	9.30	227.97	65.27	
J-82	9.30	81.89	Demand	9.30	227.97	63.20	
J-83	9.30	81.50	Demand	9.30	227.97	63.37	
J-84	9.30	75.21	Demand	9.30	227.97	66.09	

Scenario: NFF
Steady State Analysis
Pipe Report

Label	Diameter (in)	Length (ft)	Material	Start Node	Stop Node	Hazen-Williams C	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Minor Loss Coefficient	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-1	12.0	405.00	PVC	R-1	J-1	120.0	0.00	56.25	2.00	0.07	0.58
P-2	8.0	342.00	PVC	J-1	J-2	120.0	56.25	57.21	2.00	0.40	1.25
P-3	8.0	272.00	PVC	J-2	J-3	120.0	57.21	58.18	2.00	0.30	1.19
P-4	8.0	74.00	PVC	J-3	J-4	120.0	58.18	58.53	2.00	0.10	1.14
P-5	8.0	266.00	PVC	J-4	J-5	120.0	58.53	59.49	2.00	0.09	0.64
P-6	8.0	208.00	PVC	J-5	J-6	120.0	59.49	60.59	2.00	0.06	0.58
P-7	8.0	113.00	PVC	J-6	J-7	120.0	60.59	60.82	2.00	0.11	1.02
P-8	8.0	332.00	PVC	J-7	J-8	120.0	60.82	61.63	2.00	0.24	0.96
P-9	8.0	162.00	PVC	J-8	J-9	120.0	61.63	61.29	2.00	0.01	0.21
P-10	10.0	364.00	PVC	J-9	J-10	120.0	61.29	61.46	2.00	0.25	1.06
P-11	10.0	440.00	PVC	J-10	J-11	120.0	61.46	61.07	2.00	0.29	1.06
P-12	10.0	463.00	PVC	J-11	J-12	120.0	61.07	57.00	2.00	0.31	1.06
P-13	10.0	46.00	PVC	J-12	J-13	120.0	57.00	53.70	2.00	0.06	1.06
P-14	12.0	990.00	PVC	J-13	J-14	120.0	53.70	42.57	2.00	0.26	0.74
P-15	12.0	365.00	PVC	J-14	J-15	120.0	42.57	42.97	2.00	0.10	0.74
P-16	12.0	470.00	PVC	J-15	R-1	120.0	42.97	0.00	2.00	0.13	0.74
P-17	8.0	463.00	PVC	J-4	J-16	120.0	58.53	59.89	2.00	0.09	0.49
P-18	8.0	407.00	PVC	J-16	J-6	120.0	59.89	60.59	2.00	0.06	0.43
P-19	8.0	245.00	PVC	J-9	J-17	120.0	61.29	63.87	2.00	0.10	0.68
P-20	8.0	244.00	PVC	J-17	J-18	120.0	63.87	66.67	2.00	0.02	0.29
P-21	8.0	65.00	PVC	J-18	J-19	120.0	66.67	66.73	2.00	0.01	0.29
P-22	8.0	359.00	PVC	J-19	J-20	120.0	66.73	66.67	2.00	0.02	0.23
P-23	8.0	347.00	PVC	J-20	J-21	120.0	66.67	67.55	2.00	0.01	0.18
P-24	8.0	257.00	PVC	J-21	J-23	120.0	67.55	65.93	2.00	0.00	0.12
P-25	8.0	245.00	PVC	J-23	J-26	120.0	65.93	63.23	2.00	0.02	0.33
P-26	10.0	416.00	PVC	J-26	J-27	120.0	63.23	61.97	2.00	0.14	0.72
P-27	10.0	93.00	PVC	J-27	J-9	120.0	61.97	61.29	2.00	0.05	0.76
P-28	8.0	330.00	PVC	J-23	J-24	120.0	65.93	65.09	2.00	0.02	0.27
P-29	8.0	252.00	PVC	J-24	J-25	120.0	65.09	65.02	2.00	0.03	0.33
P-30	8.0	58.00	PVC	J-25	J-17	120.0	65.02	63.87	2.00	0.01	0.39
P-31	8.0	59.00	PVC	J-22	J-21	120.0	67.78	67.55	2.00	0.00	0.06
P-32	8.0	398.00	PVC	J-8	J-28	120.0	61.63	63.14	2.00	0.17	0.74
P-33	8.0	353.00	PVC	J-28	J-29	120.0	63.14	64.70	2.00	0.13	0.68
P-34	10.0	222.00	PVC	J-29	J-26	120.0	64.70	63.23	2.00	0.12	0.89
P-35	10.0	72.00	PVC	J-29	J-30	120.0	64.70	64.78	2.00	0.12	1.33
P-36	10.0	383.00	PVC	J-30	J-31	120.0	64.78	65.78	2.00	0.38	1.29
P-37	8.0	195.00	PVC	J-31	J-32	120.0	65.78	66.65	2.00	0.04	0.49
P-38	8.0	176.00	PVC	J-32	J-33	120.0	66.65	67.98	2.00	0.01	0.25
P-39	8.0	502.00	PVC	J-33	J-34	120.0	67.98	68.90	2.00	0.02	0.19
P-40	8.0	417.00	PVC	J-34	J-35	120.0	68.90	68.08	2.00	0.01	0.13
P-41	8.0	429.00	PVC	J-35	J-36	120.0	68.08	68.47	2.00	0.00	0.07
P-42	8.0	82.00	PVC	J-36	J-37	120.0	68.47	67.92	2.00	0.00	0.01
P-43	8.0	199.00	PVC	J-37	J-39	120.0	67.92	67.62	2.00	0.01	0.20
P-44	10.0	338.00	PVC	J-39	J-40	120.0	67.62	66.82	2.00	0.04	0.43
P-45	10.0	352.00	PVC	J-40	J-31	120.0	66.82	65.78	2.00	0.04	0.43
P-46	8.0	379.00	PVC	J-37	J-38	120.0	67.92	67.93	2.00	0.01	0.19
P-47	8.0	424.00	PVC	J-38	J-32	120.0	67.93	66.65	2.00	0.02	0.25
P-48	8.0	179.00	PVC	J-31	J-41	120.0	65.78	65.40	2.00	0.10	0.79
P-49	8.0	61.00	PVC	J-41	J-42	120.0	65.40	65.88	2.00	0.01	0.42
P-50	8.0	261.00	PVC	J-42	J-43	120.0	65.88	66.52	2.00	0.03	0.36
P-51	8.0	68.00	PVC	J-43	J-44	120.0	66.52	66.48	2.00	0.00	0.06
P-52	8.0	234.00	PVC	J-44	J-45	120.0	66.48	67.10	2.00	0.00	0.00
P-53	8.0	461.00	PVC	J-43	J-46	120.0	66.52	65.02	2.00	0.04	0.30

Scenario: NFF
Steady State Analysis
Pipe Report

Label	Diameter (in)	Length (ft)	Material	Start Node	Stop Node	Hazen-Williams C	Upstream Calculated Pressure (psi)	Downstream Calculated Pressure (psi)	Minor Loss Coefficient	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-54	8.0	307.00	PVC	J-46	J-47	120.0	65.02	62.88	2.00	0.00	0.13
P-55	8.0	295.00	PVC	J-47	J-48	120.0	62.88	64.18	2.00	0.00	0.07
P-56	8.0	27.00	PVC	J-48	J-49	120.0	64.18	64.70	2.00	0.00	0.26
P-57	8.0	354.00	PVC	J-49	J-50	120.0	64.70	65.83	2.00	0.03	0.31
P-58	8.0	410.00	PVC	J-50	J-41	120.0	65.83	65.40	2.00	0.05	0.37
P-59	8.0	314.00	PVC	J-48	J-51	120.0	64.18	62.79	2.00	0.01	0.18
P-60	8.0	463.00	PVC	J-51	J-52	120.0	62.79	61.71	2.00	0.01	0.12
P-61	8.0	480.00	PVC	J-52	J-53	120.0	61.71	60.94	2.00	0.00	0.06
P-62	8.0	522.00	PVC	J-53	J-54	120.0	60.94	62.14	2.00	0.00	0.01
P-63	8.0	444.00	PVC	J-54	J-55	120.0	62.14	62.42	2.00	0.00	0.05
P-64	8.0	59.00	PVC	J-55	J-56	120.0	62.42	63.12	2.00	0.00	0.11
P-65	8.0	472.00	PVC	J-56	J-57	120.0	63.12	62.20	2.00	0.00	0.08
P-66	8.0	470.00	PVC	J-57	J-58	120.0	62.20	62.02	2.00	0.01	0.14
P-67	8.0	62.00	PVC	J-58	J-47	120.0	62.02	62.88	2.00	0.00	0.20
P-68	8.0	430.00	PVC	J-56	J-59	120.0	63.12	66.42	2.00	0.01	0.13
P-69	8.0	64.00	PVC	J-59	J-60	120.0	66.42	66.35	2.00	0.00	0.19
P-70	8.0	417.00	PVC	J-60	J-61	120.0	66.35	66.16	2.00	0.00	0.06
P-71	8.0	362.00	PVC	J-61	J-62	120.0	66.16	65.57	2.00	0.01	0.12
P-72	8.0	70.00	PVC	J-62	J-46	120.0	65.57	65.02	2.00	0.00	0.18
P-73	10.0	247.00	PVC	J-39	J-63	120.0	67.62	68.69	2.00	0.05	0.52
P-74	10.0	287.00	PVC	J-63	J-64	120.0	68.69	67.55	2.00	0.05	0.52
P-75	8.0	134.00	PVC	J-64	J-60	120.0	67.55	66.35	2.00	0.00	0.14
P-76	10.0	71.00	PVC	J-64	J-65	120.0	67.55	67.07	2.00	0.00	0.21
P-77	10.0	459.00	PVC	J-65	J-66	120.0	67.07	64.12	2.00	0.01	0.17
P-78	8.0	26.00	PVC	J-66	J-67	120.0	64.12	63.92	2.00	0.00	0.20
P-79	8.0	141.00	PVC	J-67	J-56	120.0	63.92	63.12	2.00	0.00	0.10
P-80	8.0	195.00	PVC	J-67	J-68	120.0	63.92	64.84	2.00	0.02	0.30
P-81	8.0	302.00	PVC	J-68	J-69	120.0	64.84	66.45	2.00	0.00	0.01
P-82	8.0	265.00	PVC	J-69	J-70	120.0	66.45	67.99	2.00	0.01	0.14
P-83	8.0	52.00	PVC	J-70	J-71	120.0	67.99	58.80	2.00	0.00	0.20
P-84	8.0	209.00	PVC	J-71	J-64	120.0	58.80	67.55	2.00	0.02	0.35
P-85	8.0	71.00	PVC	J-68	J-72	120.0	64.84	65.35	2.00	0.00	0.16
P-86	8.0	426.00	PVC	J-72	J-73	120.0	65.35	66.25	2.00	0.00	0.10
P-87	8.0	60.00	PVC	J-73	J-74	120.0	66.25	67.40	2.00	0.00	0.04
P-88	8.0	313.00	PVC	J-74	J-76	120.0	67.40	67.62	2.00	0.00	0.10
P-89	8.0	66.00	PVC	J-76	J-77	120.0	67.62	67.93	2.00	0.00	0.01
P-90	8.0	423.00	PVC	J-77	J-78	120.0	67.93	67.11	2.00	0.00	0.07
P-91	8.0	63.00	PVC	J-78	J-69	120.0	67.11	66.45	2.00	0.00	0.13
P-92	8.0	340.00	PVC	J-71	J-79	120.0	58.80	69.13	2.00	0.01	0.15
P-93	8.0	505.00	PVC	J-79	J-76	120.0	69.13	67.62	2.00	0.00	0.09
P-94	8.0	147.00	PVC	J-74	J-75	120.0	67.40	67.32	2.00	0.00	0.06
P-95	8.0	380.00	PVC	J-74	J-80	120.0	67.40	66.06	2.00	0.00	0.08
P-96	8.0	397.00	PVC	J-80	J-81	120.0	66.06	65.27	2.00	0.00	0.05
P-97	8.0	396.00	PVC	J-81	J-82	120.0	65.27	63.20	2.00	0.00	0.01
P-98	8.0	362.00	PVC	J-82	J-83	120.0	63.20	63.37	2.00	0.00	0.07
P-99	8.0	356.00	PVC	J-83	J-68	120.0	63.37	64.84	2.00	0.01	0.16
P-100	8.0	78.00	PVC	J-80	J-84	120.0	66.06	66.09	2.00	0.00	0.03
P-101	8.0	453.00	PVC	J-84	J-83	120.0	66.09	63.37	2.00	0.00	0.03

Scenario: NFF
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Calculated Hydraulic Grade (ft)	Outflow (gpm)	Description
R-1	230.40	230.40	465.00	

Appendix E

HGL Calculations

HGL CALCULATIONS

Lake Hills

PEAK HOUR FLOW HGL

PEAK HOUR FLOW = 465.00 GPM
TIE-IN PRESSURE AT 465.00 GPM = 50 PSI = 115.4 FT
EXISTING PIPE ELEVATION AT TIE-IN = 115 FT

HGL = 115.4 + 115 = 230.4 FT

NEEDED FIRE FLOW HGL

NEEDED FIRE FLOW + MAX DAY FLOW(LARGEST NEEDED FIRE FLOW USED) = 1,232.50 GPM
TIE-IN PRESSURE AT 1,232.50 GPM = 50 PSI = 115.4 FT
EXISTING PIPE ELEVATION AT TIE-IN = 115 FT

HGL = 115.4 + 115 = 230.4 FT