Hydraulic Network Analysis for Fire & Domestic Water Service

Solana Torrance

S/W Corner of Hawthorne Boulevard & Via Valmonte
Torrance, California 90505

August 5, 2016

Prepared For:

ReyLenn Properties LLC

Prepared By:

KHR ASSOCIATES
Consulting Engineers - Surveyors - Planners
20411 SW Birch Street - Suite 310
Newport Beach, California 92660
Tele: 949-756-6440
Fax: 949-756-6444

ATTESTATION

This report has been prepared by, and under the direction of, the undersigned, a duly Registered Civil Engineer in the State of California. Except as noted, the undersigned attests to the technical information contained herein, and has judged to be acceptable the qualifications of any technical specialists providing engineering data for this report, upon which findings, conclusions, and recommendations are based.

James H. Kawamura, P.E.
Registered Civil Engineer No. C30560
Exp. 3/31/18

Date: August 5, 2016

Table of Contents Page

I. Executive Summary 1

Summary of Findings & Conclusions 1

Summary of Recommendations 2

II. Introduction 3

Project Location 3

Project Description 3

Water System 6

III. Water Demand Assumptions: 9

IV. Fire Flow Assumptions: 10

V. HGL at Fixed Grade Node 12

VI. Project Site Water Distribution 13

VII. Findings, Conclusions, & Recommendations 15

Findings & Conclusions 15

Recommendations 16

VIII. Appendix Section 17

Solana Torrance
Hydraulic Network Analysis for
Fire & Domestic Water Service

August 5, 2016

I. Executive Summary

This Hydraulic Network Analysis was prepared to determine the fire and domestic water service needed for a proposed 300 unit multi-family residential development, known as *Solana Torrance*. The proposed *Project* is to be developed on approximately 6.06 acres of a 24.68 acre property along the west side of Hawthorne Boulevard, between Via Valmonte and north of Rolling Hills Road.

This analysis was commissioned by **ReyLenn Properties, LLC**, Solana Beach, California, the developer of the proposed *Project*, and prepared by **KHR Associates**, Newport Beach, California, the *Project* Civil Engineer. The findings, conclusions, and recommendations presented herein are solely those of **KHR Associates**, and do not necessarily reflect the opinions of **ReyLenn Properties, LLC**, the City of Torrance, or any other interested parties.

Summary of Findings & Conclusions

Based on the Hydraulic Network Analysis for the proposed *Project*, the following findings and conclusions were made:

1) The *Project* site is undeveloped and is not currently serviced by a source of potable water.
2) Water service for the proposed *Project* will be provided by the City of Torrance Municipal Water Department.
3) Fire hydrants are currently located on various streets surrounding the *Project* site, including one on the north side Via Valmonte opposite the *Project* site, and one on the west side of Hawthorne Boulevard, just south of Via Valmonte.
4) Fire flow tests, conducted by the Torrance Fire Department at the above two hydrants, indicated that the flow rate at the Hawthorne Boulevard fire hydrant delivered 7,248 gallons per minute (gpm) at 145 pounds per square inch (psi) static pressure, while producing a residual pressure of 110 psi at the Via Valmonte fire hydrant.
5) Conversely, fire flow tests, indicated that the flow rate at the Via Valmonte fire hydrant delivered 12,740 gpm at 152 psi static pressure ,with a residual pressure of 140 psi at the Hawthorne Boulevard fire hydrant.

6) Based on typical water demand rates for multi-family residential uses of 300 gallons per unit (including a pro rata share of water for overall site irrigation), total domestic water usage by the proposed *Project* is projected to be 90,000 gallons per day (gpd).
7) Assuming landscape coverage of 50 percent of the *Project* site, approximately 7,700 gpd will be consumed by landscape irrigation.
8) In addition to on-site fire hydrants and stand pipes, a new fire hydrant will be required on Hawthorne Boulevard mid-way between Via Valmonte and the main entrance driveway to the *Project* site.
9) Assuming the addition of a new fire hydrant on Hawthorne Boulevard, the analysis presented herein indicates adequate water pressure and flow to meet a sustained 1,500 gpm at both hydrants flowing simultaneously (3,000 gpm, total), along with domestic water being delivered at 250 gpm and fire sprinklers flowing at 300 gpm.
10) The *Project* site, and the City of Torrance in general, is not currently supplied by the West Basin recycled water pipeline system.
11) The hydraulic grade line calculations show that more than adequate head is available to deliver fire water to the highest building.
12) Water distribution calculations show that the Maximum Day Demand of 3,840 gpm for water flowing simultaneously to fire hydrants, domestic water use, and sprinkler system is met under all scenarios.

Summary of Recommendations

Based on the above findings and conclusions, the following recommendations are made:

1) Domestic and fire water service can be provided for the proposed *Project* without adversely impacting the City's existing water system.
2) The proposed *Project* shall be designed to provide appropriately-sized new domestic and fire water services, and on-site water systems to meet projected demands under daily domestic use and during a major fire event.
3) A new off-site fire hydrant shall be installed on Hawthorne Boulevard at the location indicated in this analysis.
4) All relevant sections of Division 7, Chapter 6 (Water) of the City of Torrance Municipal Code shall be followed.

II. Introduction

ReyLenn Properties, LLC, Solana Beach, California, is proposing to develop multi-family residential project on a vacant property in the City of Torrance, California. The boundary of the proposed *Project* contains 24.68 acres of vacant land, of which only 6.06 acres of disturbed land (resulting from a former quarry operation) is proposed to be improved with a multi-family residential community, known as *Solana Torrance*, along with various off-site improvements to Via Valmonte and Hawthorne Boulevard. The remaining balance of the site (approximately 18.62 acres) is to be preserved as natural open space.

Project Location

As illustrated in Figure 1, the proposed *Project* site is located in the southern-most part of the City of Torrance, in the Hillside Neighborhood District. Figure 2 illustrates the limits of the proposed development within the *Project* boundary, while the Development Site Plan is depicted in Figure 3.

Project Description

The proposed residential community will consist of 300 multi-family dwelling units, 676 parking spaces in a subterranean parking structure and approximately 10,000 square feet of common amenity space/management offices. The unit mix includes 171 one-bedroom; 113 two-bedroom; and 16 three-bedroom units. Common amenities include a large swimming pool, clubhouse, fitness center, and an abundance of landscaping around the site and on the podium deck.

Access to the *Project* site is proposed to be provided via one driveway entrance on Hawthorne Boulevard (right-in/right-out only) and one driveway on Via Valmonte (right-in/right-out only).

The 18.62 acres of open space contiguous to the *Project* site will be left undeveloped to return to its natural state.

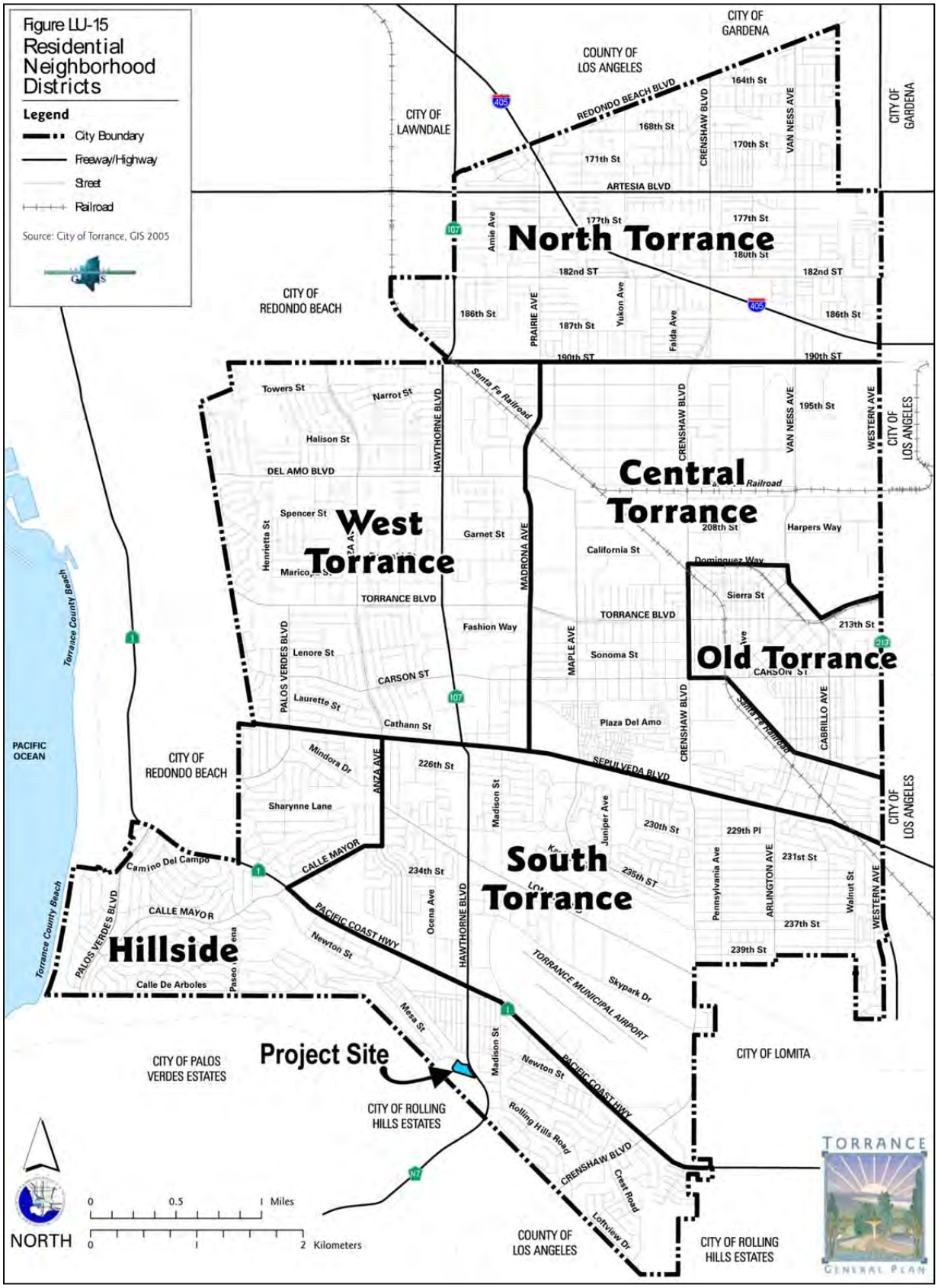


Figure 1 – Project Site Location

Figure 2 – Project Boundary & Development Limits

Figure 3 – Development Site Plan

Water System

A key component of the infrastructure needed to support the proposed *Project* is the provision of potable water for domestic use (i.e., consumption by residents and irrigation purposes), and for fire protection. As illustrated in Figure 4, water services for the proposed *Project* site will be provided by the Torrance Municipal Water Department (TMWD).

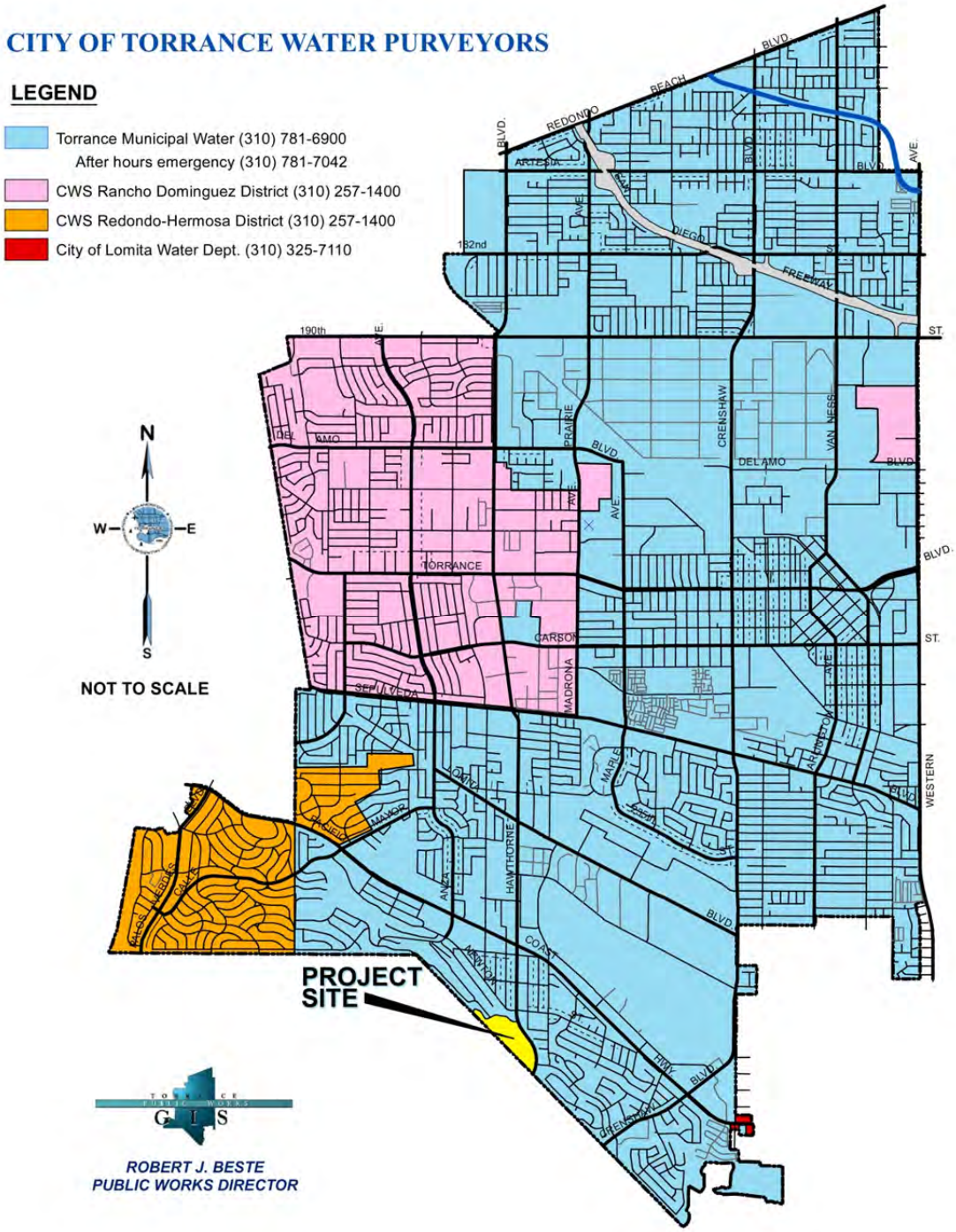


Figure 4 – City of Torrance Water Purveyors

Figure 5 illustrates TMWD's Water Pressures in the City. The water pressure is indicated as being 50 to 55 psi near the *Project* site. However, it is reported by the City that water pressures in both the 10-inch water main in Hawthorne Boulevard and the 12-inch water main in Via Valmonte are significantly higher than the area averages.

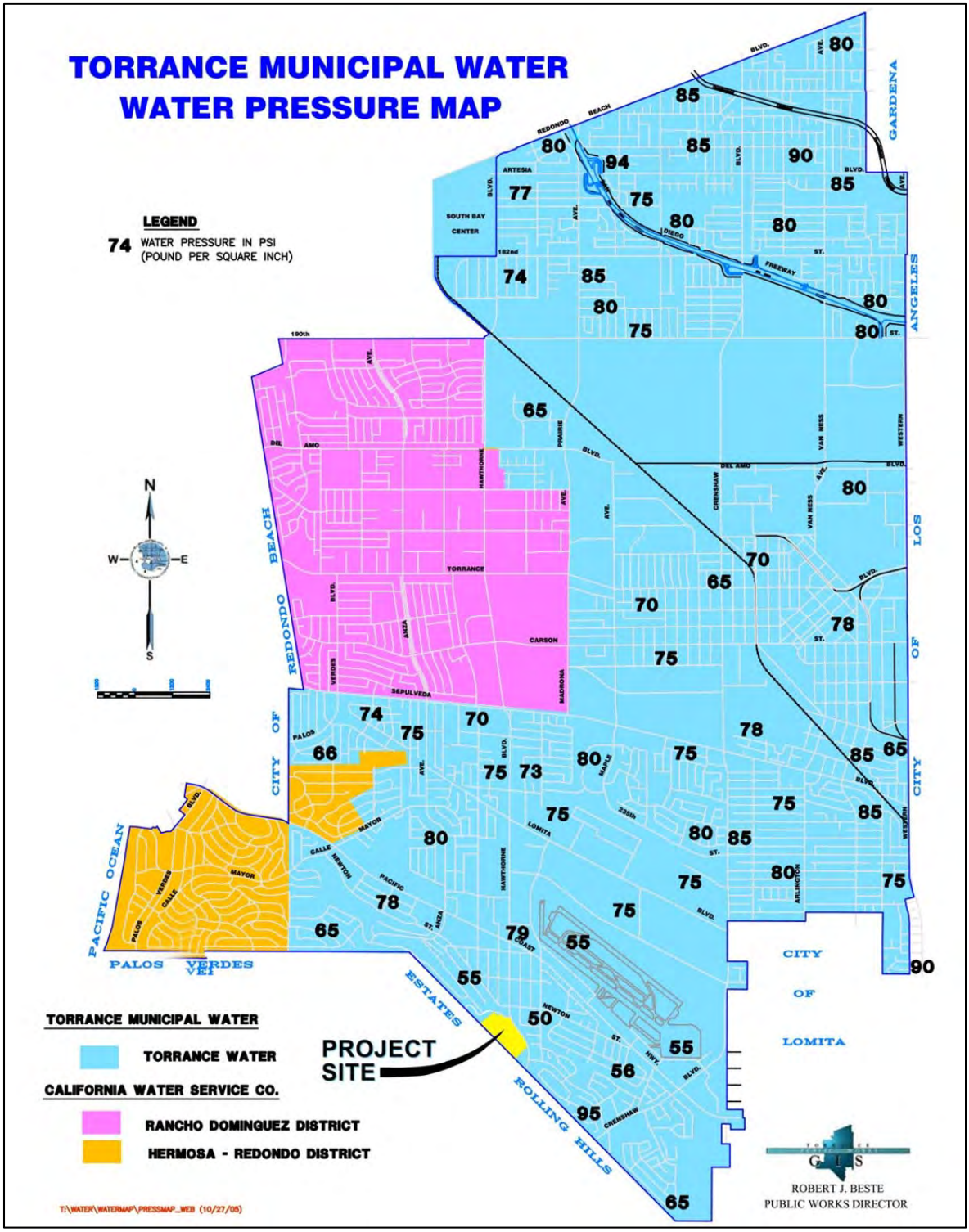


Figure 5 – Water Pressure Zones

In addition to potable water, the West Basin Municipal Water District supplies recycled water to various South Bay and Palos Verdes Peninsula municipalities. However, with the exception of a small area abutting the City of Redondo Beach, West Basin's recycled water pipeline system does not presently service the City of Torrance, and does not extend to the proposed *Project* site. West Basin's source of recycled water is the City of Los Angeles' Hyperion Treatment Plant.

III. Water Demand Assumptions:

Water usage by the proposed *Project* can determined on the bases of two main sources of demand – domestic use (including irrigation); and fire demand. Domestic water use is a daily demand on the City's water resources, while fire demand occurs on in the event of a fire at or adjacent to the *Project* site. Daily water usage for a multi-family residential uses can be calculated by applying average water demand rates established by water districts and/or local agencies. Although water demands vary with the size of multi-family residential units (e.g., a one-bedroom unit will use less water than a two-bedroom unit, etc.), the total number of 300 dwelling units was assumed to use approximately 275 gallon per day per unit without regard to the unit mix.

For estimating irrigation water usage, the University of California Division of Agriculture and Natural Resources' "Landscape Water Requirement Calculators," were utilized. It was assumed that 50 percent of the *Project* site (3 acres) will be landscaped with groupings of mass planting of trees and shrubs. It was calculated that approximately 7,700 gallons per day will be consumed by landscape irrigation (or 25.8 gallons per day per unit).

A. Domestic Water:

Average Water Demand (including landscaping use at 25.8 gpd/unit) = 300 gpd/unit

Average Daily Demands (ADD):	$\frac{[300 \text{ X } 300]}{24 \text{ X } 60}$	= 62.5 gpm
Maximum Day Demand (MDD):	4.0 x ADD = 4.0 x 62.5	= 250 gpm
Peak Hour Demand (PHD):	6.0 x ADD = 6.0 x 62.5	= 375 gpm

B. Fire Sprinkler Demand (per Building Floor Area Demand NFPA 13) = 300 gpm

C. Fire Hydrant Demand 1,500 gpm (minimum) = 1,500 gpm

Total Water Demand:

MDD (1) + Fire Sprinkler (1) + Fire Hydrant (2) = 250 + 300 + 2 x 1,500 = 3,550 gpm

Fire flow demand: (2) 1,500 gpm fire hydrant at 20 psi (minimum allowable per 50% reduction for sprinkler system per UFC Appendix III for Type V - n hr. construction), Maximum fire area for building type per Site Plan.

For calculations, pipeline friction factor (adjusted to include minor pipeline losses):

Pipe Material - PVC Coefficient = 150
Pipe Material - DIP Coefficient = 130

IV. Fire Flow Assumptions:

The results of the City of Torrance Water Department fire flow tests, conducted on July 27, 2016, at two existing fire hydrants in close proximity to the *Project* site are as follows:

24619 Hawthorne Boulevard – Water Main 10" ACP
Flow at FH # 110-2-07 and Residual at FH # 110-5-01
Results – 145 psi Static Pressure
110 psi Residual Pressure
Flow rate 7,248 gpm

24635 Via Valmonte – Water Main 12" DIP
Flow at FH # 110-5-01 and Residual at FH # 110-2-07
Results – 152 psi Static Pressure
140 psi Residual Pressure
Flow rate 12,740 gpm

The locations of the two fire hydrants tested, as well as the existing water pipeline network in proximity to the *Project* site, are depicted in Figure 6. Each hydrant was tested twice for flow and residual pressure (i.e., once for flow at hydrant 01 and residual pressure at hydrant 07, and once for flow at hydrant 07 and residual pressure at hydrant 01).

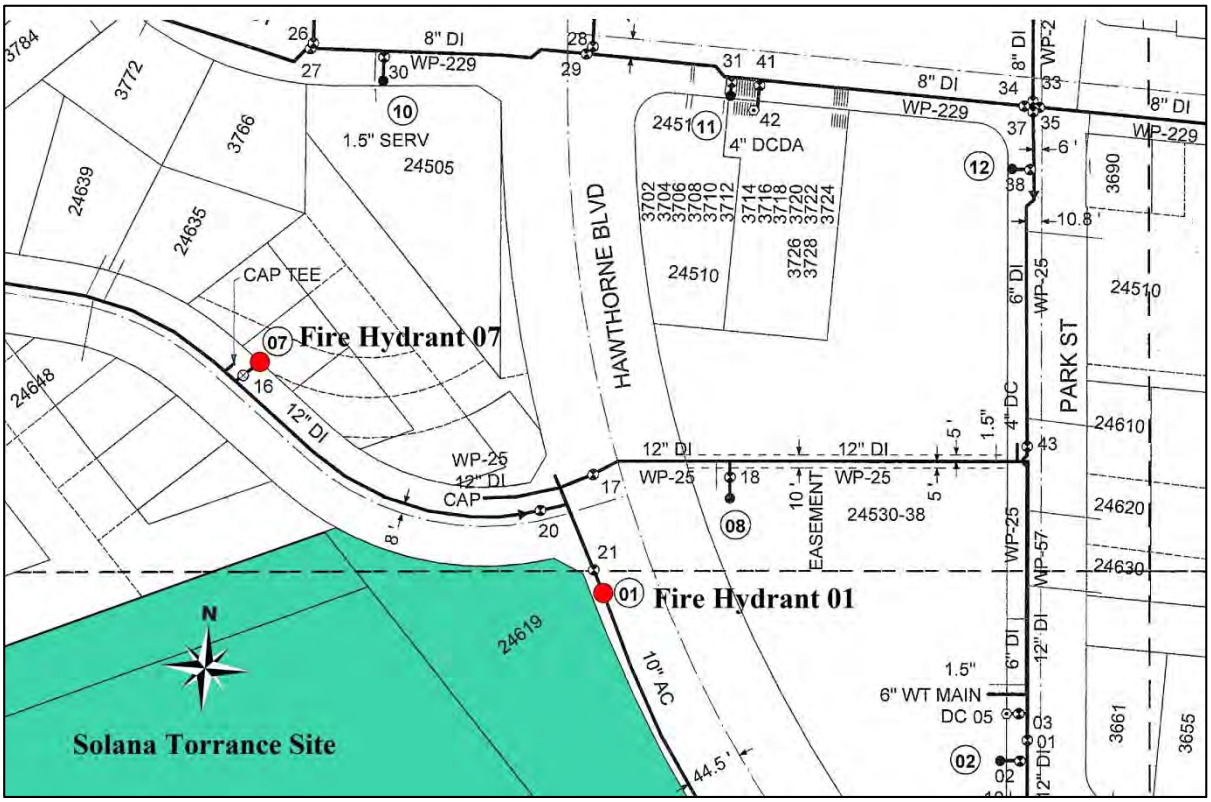


Figure 6 – Fire Flow Test Fire Hydrant Locations

The measured flows, residual pressures, and static pressures at the existing fire hydrants were found to be very high – far exceeding the 50 to 55 psi indicated on the City's Water Pressure Map.

V. HGL at Fixed Grade Node

In order to determine whether or not the hydraulic grade line (HGL) in the water pipeline system would be sufficient to deliver fire water to the highest building elevations, the following calculations were made using Bentley WaterCAD V8i (Select 4), a water distribution modeling and management program by Haestad Methods, Watertown, Connecticut.

Head losses:

4" Water Meter: 5.4 psi
8" Reduced pressure assembly: 12.50 psi
10" Reduced pressure assembly: 6.00 psi

Node Elevations:

Water lateral connections at 1' below top of meter.
Fire hydrant connections at 2.5' above finished surface.

Calculated Head with Hawthorne Blvd. @ pressure 110.0 psi:

Elevation of Measured Fire Hydrant # 110-5-01		177.90 ft.
Equivalent Head Pressure	110 x 2.308	253.88 ft.
Available HGL at Fixed Grade Node		**431.78 ft.**

Calculated Head Required to Deliver Water to Highest Point of Building:

Maximum Building Height (per Architect)	96.00 ft.
Elevation at Ground Plane (per Grading Plan)	192.00 ft.
Total Head Required	**288.00 ft.**

The conclusion is that the HGL provides more than adequate head to deliver fire water to the roof of the highest building of the *Project*.

VI. Project Site Water Distribution

The following calculated fire flow rates in gallons per minute (gpm) at existing and new on-site fire hydrants under varying scenarios are shown to meet the required Maximum, Day Demand of 3,840 gpm for fire, domestic, and sprinkler system flowing simultaneously:

Fire hydrant @ junction J-3, J-9, fire sprinkler J-4 & Maximum Day Demand @ J-20 flowing simultaneously Scenario 1A:

Adjustment for minor head losses.
3,840 gpm total fire flows at junction J-3, J-4, J-9, & J-20.

Fire hydrant @ junction J-3, J-16, fire sprinkler J-4 & Maximum Day Demand @ J-20 flowing simultaneously Scenario 1B:

Adjustment for minor head losses.
3,840 gpm total fire flows at junction J-3, J-4, J-16, & J-20.

Fire hydrant @ junction J-3, J-21, fire sprinkler J-4 & Maximum Day Demand @ J-20 flowing simultaneously Scenario 1C:

Adjustment for minor head losses.
3,840 gpm total fire flows at junction J-3, J-4, J-20 & J-21.

Fire hydrant @ junction J-3, J-22, fire sprinkler J-4 & Maximum Day Demand @ J-20 flowing simultaneously Scenario 1D:

Adjustment for minor head losses.
3,840 gpm total fire flows at junction J-3, J-4, J-20, & J-22.

Fire hydrant @ junction J-9, J-16, fire sprinkler J-4 & Maximum Day Demand @ J-20 flowing simultaneously Scenario 1E:

Adjustment for minor head losses.
3,840 gpm total fire flows at junction J-4, J-9, J-16 & J-20.

Fire hydrant @ junction J-9, J-21, fire sprinkler J-4 & Maximum Day Demand @ J-20 flowing simultaneously Scenario 1F:

Adjustment for minor head losses.
3,840 gpm total fire flows at junction J-4, J-9, J-20, & J-21.

Fire hydrant @ junction J-9, J-22, fire sprinkler J-4 & Maximum Day Demand @ J-20 flowing simultaneously Scenario 1G:

Adjustment for minor head losses.
3,840 gpm total fire flows at junction J-4, J-9, J-20, & J-22.

Fire hydrant @ junction J-16, J-21, fire sprinkler J-4 & Maximum Day Demand @ J-20 flowing simultaneously Scenario 1H:

Adjustment for minor head losses.
3,840 gpm total fire flows at junction J-4, J-16, J-20, & J-21.

Fire hydrant @ junction J-16, J-22, fire sprinkler J-4 & Maximum Day Demand @ J-20 flowing simultaneously Scenario 1J:

Adjustment for minor head losses.
3,840 gpm total fire flows at junction J-4, J-16, J-20, & J-22.

Fire hydrant @ junction J-21, J-22, fire sprinkler J-4 & Maximum Day Demand @ J-20 flowing simultaneously Scenario 1K:

Adjustment for minor head losses.
3,840 gpm total fire flows at junction J-4, J-20, J-21 & J-22.

VII. Findings, Conclusions, & Recommendations

Based on the Hydraulic Network Analysis for the proposed *Project*, the following findings, conclusions, and recommendations are made:

Findings & Conclusions

1) The *Project* site is undeveloped and is not currently serviced by a source of potable water.
2) Water service for the proposed *Project* will be provided by the City of Torrance Municipal Water Department.
3) Fire hydrants are currently located on various streets surrounding the *Project* site, including one on the north side Via Valmonte opposite the *Project* site, and one on the west side of Hawthorne Boulevard, just south of Via Valmonte.
4) Fire flow tests, conducted by the Torrance Fire Department at the above two hydrants, indicated that the flow rate at the Hawthorne Boulevard fire hydrant delivered 7,248 gallons per minute (gpm) at 145 pounds per square inch (psi) static pressure, while producing a residual pressure of 110 psi at the Via Valmonte fire hydrant.
5) Conversely, fire flow tests, indicated that the flow rate at the Via Valmonte fire hydrant delivered 12,740 gpm at 152 psi static pressure ,with a residual pressure of 140 psi at the Hawthorne Boulevard fire hydrant.
6) Based on typical water demand rates for multi-family residential uses of 300 gallons per unit (including a pro rata share of water for overall site irrigation), total domestic water usage by the proposed *Project* is projected to be 90,000 gallons per day (gpd).
7) Assuming landscape coverage of 50 percent of the *Project* site, approximately 7,700 gpd will be consumed by landscape irrigation.
8) In addition to on-site fire hydrants and stand pipes, a new fire hydrant will be required on Hawthorne Boulevard mid-way between Via Valmonte and the main entrance driveway to the *Project* site.
9) Assuming the addition of a new fire hydrant on Hawthorne Boulevard, the analysis presented herein indicates adequate water pressure and flow to meet a sustained 1,500 gpm at both hydrants flowing simultaneously (3,000 gpm, total), along with domestic water being delivered at 250 gpm and fire sprinklers flowing at 300 gpm.
10) The *Project* site, and the City of Torrance in general, is not currently supplied by the West Basin recycled water pipeline system.
11) The hydraulic grade line calculations show that more than adequate head is available to deliver fire water to the highest building.

12) Water distribution calculations show that the Maximum Day Demand of 3,840 gpm for water flowing simultaneously to fire hydrants, domestic water use, and sprinkler system is met under all scenarios.

Recommendations

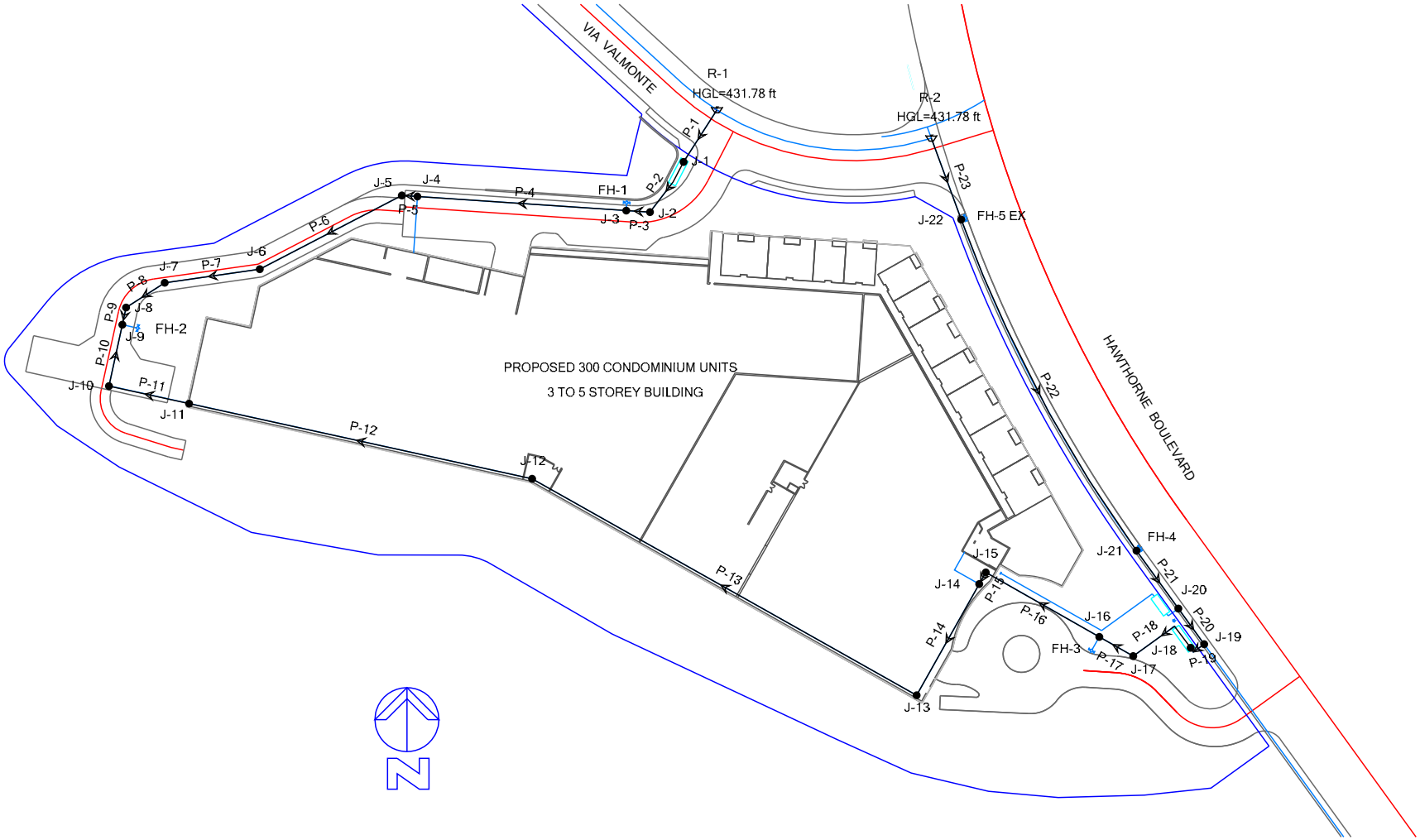
Based on the above findings and conclusions, the following recommendations are made:

1) Domestic and fire water service can be provided for the proposed *Project* without adversely impacting the City's existing water system.
2) The proposed *Project* shall be designed to provide appropriately-sized new domestic and fire water services, and on-site water systems to meet projected demands under daily domestic use and during a major fire event.
3) A new off-site fire hydrant shall be installed on Hawthorne Boulevard at the location indicated in this analysis.
4) All relevant sections of Division 7, Chapter 6 (Water) of the City of Torrance Municipal Code shall be followed.

VIII. Appendix Section

Supporting water calculations are provided on the following pages.

Scenario: FH J-3, J-9 & Fire sprinkler J-4, Domestic Water J-20, Flow Simultaneously Scenario IA:



FlexTable: Pipe Table

Current Time: 0.000 hours

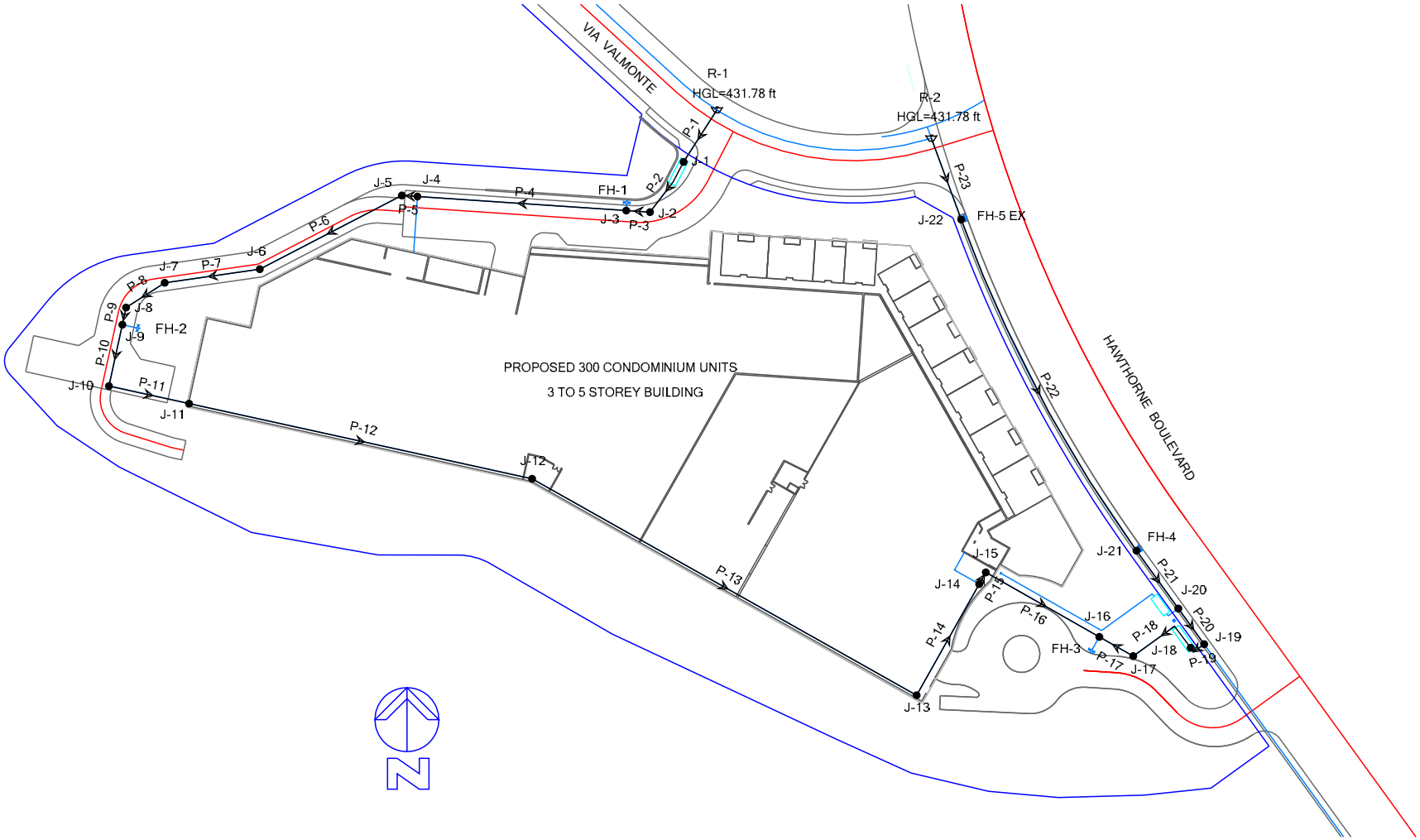
Label	Start Node	Stop Node	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Headloss Gradient (ft/ft)	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)
P-1	R-1	J-1	47	10.0	PVC	150.0	0.111	2.500	2,488	10.16
P-2	J-1	J-2	46	10.0	PVC	150.0	0.113	2.500	2,488	10.16
P-3	J-2	J-3	18	10.0	PVC	150.0	0.247	2.500	2,488	10.16
P-4	J-3	J-4	159	10.0	PVC	150.0	0.009	2.650	988	4.03
P-5	J-4	J-5	12	8.0	PVC	150.0	0.016	0.350	688	4.39
P-6	J-5	J-6	122	8.0	PVC	150.0	0.007	0.200	688	4.39
P-7	J-6	J-7	73	8.0	PVC	150.0	0.007	0.100	688	4.39
P-8	J-7	J-8	35	8.0	PVC	150.0	0.008	0.100	688	4.39
P-9	J-8	J-9	13	8.0	PVC	150.0	0.015	0.350	688	4.39
P-10	J-9	J-10	48	8.0	PVC	150.0	0.017	0.800	-812	5.19
P-11	J-10	J-11	62	8.0	PVC	150.0	0.010	0.050	-812	5.19
P-12	J-11	J-12	267	8.0	PVC	150.0	0.010	0.100	-812	5.19
P-13	J-12	J-13	335	8.0	PVC	150.0	0.011	0.800	-812	5.19
P-14	J-13	J-14	97	8.0	PVC	150.0	0.011	0.350	-812	5.19
P-15	J-14	J-15	10	8.0	PVC	150.0	0.017	0.170	-812	5.19
P-16	J-15	J-16	99	8.0	PVC	150.0	0.011	0.350	-812	5.19
P-17	J-16	J-17	30	8.0	PVC	150.0	0.029	1.380	-812	5.19
P-18	J-17	J-18	59	8.0	PVC	150.0	0.019	1.380	-812	5.19
P-19	J-18	J-19	14	8.0	PVC	150.0	0.081	2.380	-812	5.19
P-20	J-19	J-20	33	10.0	Ductile Iron	125.0	0.006	0.350	-812	3.32
P-21	J-20	J-21	54	10.0	Ductile Iron	125.0	0.015	0.350	-1,352	5.52
P-22	J-21	J-22	285	10.0	Ductile Iron	125.0	0.012	0.350	-1,352	5.52
P-23	J-22	R-2	66	10.0	Ductile Iron	125.0	0.014	0.350	-1,352	5.52

FlexTable: Junction Table

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pattern (Constituent)	Pressure Head (ft)	Pressure (psi)
J-1	188.26	0	426.57	Fixed	238.31	103
J-2	193.00	0	421.39	Fixed	228.39	99
J-3	193.33	1,500	416.92	Fixed	223.59	97
J-4	201.00	300	415.52	Fire Sprinkler	214.52	93
J-5	201.33	0	415.33	Fixed	214.00	93
J-6	208.33	0	414.42	Fixed	206.09	89
J-7	214.00	0	413.88	Fixed	199.88	86
J-8	215.77	0	413.60	Fixed	197.83	86
J-9	216.90	1,500	413.40	Fixed	196.50	85
J-10	217.50	0	414.19	Fixed	196.69	85
J-11	217.50	0	414.81	Fixed	197.31	85
J-12	199.00	0	417.39	Fixed	218.39	94
J-13	199.00	0	420.92	Fixed	221.92	96
J-14	199.00	0	421.99	Fixed	222.99	96
J-15	199.00	0	422.16	Fixed	223.16	97
J-16	196.70	0	423.25	Fixed	226.55	98
J-17	195.40	0	424.11	Fixed	228.71	99
J-18	186.00	0	425.25	Fixed	239.25	104
J-19	186.00	0	426.37	Fixed	240.37	104
J-20	185.50	540	426.59	Water Domestic	241.09	104
J-21	184.50	0	427.38	Fire Hydrant	242.88	105
J-22	177.90	0	430.85	Fire Hydrant	252.95	109

Scenario: FH J-3, J-16 & Fire sprinkler J-4, Domestic Water J-20, Flow Simultaneously Scenario IB:



FlexTable: Pipe Table

Current Time: 0.000 hours

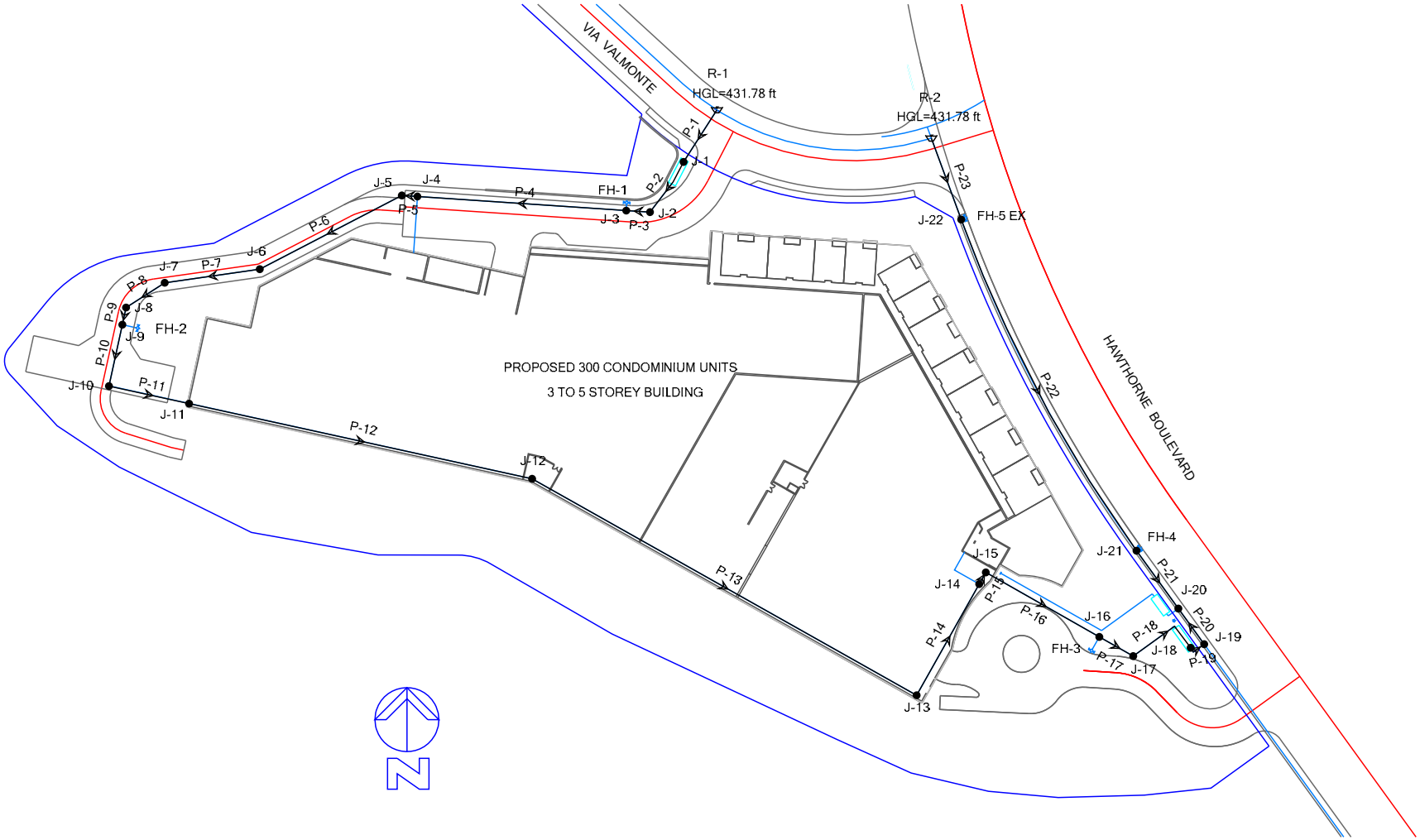
Label	Start Node	Stop Node	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Headloss Gradient (ft/ft)	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)
P-1	R-1	J-1	47	10.0	PVC	150.0	0.083	2.500	2,151	8.79
P-2	J-1	J-2	46	10.0	PVC	150.0	0.085	2.500	2,151	8.79
P-3	J-2	J-3	18	10.0	PVC	150.0	0.185	2.500	2,151	8.79
P-4	J-3	J-4	159	10.0	PVC	150.0	0.004	2.650	651	2.66
P-5	J-4	J-5	12	8.0	PVC	150.0	0.004	0.350	351	2.24
P-6	J-5	J-6	122	8.0	PVC	150.0	0.002	0.200	351	2.24
P-7	J-6	J-7	73	8.0	PVC	150.0	0.002	0.100	351	2.24
P-8	J-7	J-8	35	8.0	PVC	150.0	0.002	0.100	351	2.24
P-9	J-8	J-9	13	8.0	PVC	150.0	0.004	0.350	351	2.24
P-10	J-9	J-10	48	8.0	PVC	150.0	0.003	0.800	351	2.24
P-11	J-10	J-11	62	8.0	PVC	150.0	0.002	0.050	351	2.24
P-12	J-11	J-12	267	8.0	PVC	150.0	0.002	0.100	351	2.24
P-13	J-12	J-13	335	8.0	PVC	150.0	0.002	0.800	351	2.24
P-14	J-13	J-14	97	8.0	PVC	150.0	0.002	0.350	351	2.24
P-15	J-14	J-15	10	8.0	PVC	150.0	0.003	0.170	351	2.24
P-16	J-15	J-16	99	8.0	PVC	150.0	0.002	0.350	351	2.24
P-17	J-16	J-17	30	8.0	PVC	150.0	0.057	1.380	-1,149	7.34
P-18	J-17	J-18	59	8.0	PVC	150.0	0.038	1.380	-1,149	7.34
P-19	J-18	J-19	14	8.0	PVC	150.0	0.161	2.380	-1,149	7.34
P-20	J-19	J-20	33	10.0	Ductile Iron	125.0	0.012	0.350	-1,149	4.70
P-21	J-20	J-21	54	10.0	Ductile Iron	125.0	0.022	0.350	-1,689	6.90
P-22	J-21	J-22	285	10.0	Ductile Iron	125.0	0.018	0.350	-1,689	6.90
P-23	J-22	R-2	66	10.0	Ductile Iron	125.0	0.021	0.350	-1,689	6.90

FlexTable: Junction Table

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pattern (Constituent)	Pressure Head (ft)	Pressure (psi)
J-1	188.26	0	427.87	Fixed	239.61	104
J-2	193.00	0	423.98	Fixed	230.98	100
J-3	193.33	1,500	420.63	Fixed	227.30	98
J-4	201.00	300	420.00	Fire Sprinkler	219.00	95
J-5	201.33	0	419.95	Fixed	218.62	95
J-6	208.33	0	419.69	Fixed	211.36	91
J-7	214.00	0	419.53	Fixed	205.53	89
J-8	215.77	0	419.45	Fixed	203.68	88
J-9	216.90	0	419.40	Fixed	202.50	88
J-10	217.50	0	419.24	Fixed	201.74	87
J-11	217.50	0	419.11	Fixed	201.61	87
J-12	199.00	0	418.57	Fixed	219.57	95
J-13	199.00	0	417.83	Fixed	218.83	95
J-14	199.00	0	417.61	Fixed	218.61	95
J-15	199.00	0	417.58	Fixed	218.58	95
J-16	196.70	1,500	417.35	Fixed	220.65	95
J-17	195.40	0	419.04	Fixed	223.64	97
J-18	186.00	0	421.26	Fixed	235.26	102
J-19	186.00	0	423.50	Fixed	237.50	103
J-20	185.50	540	423.91	Water Domestic	238.41	103
J-21	184.50	0	425.12	Fire Hydrant	240.62	104
J-22	177.90	0	430.37	Fire Hydrant	252.47	109

Scenario: FH J-3, J-21 & Fire sprinkler J-4, Domestic Water J-20, Flow Simultaneously Scenario IC:



FlexTable: Pipe Table

Current Time: 0.000 hours

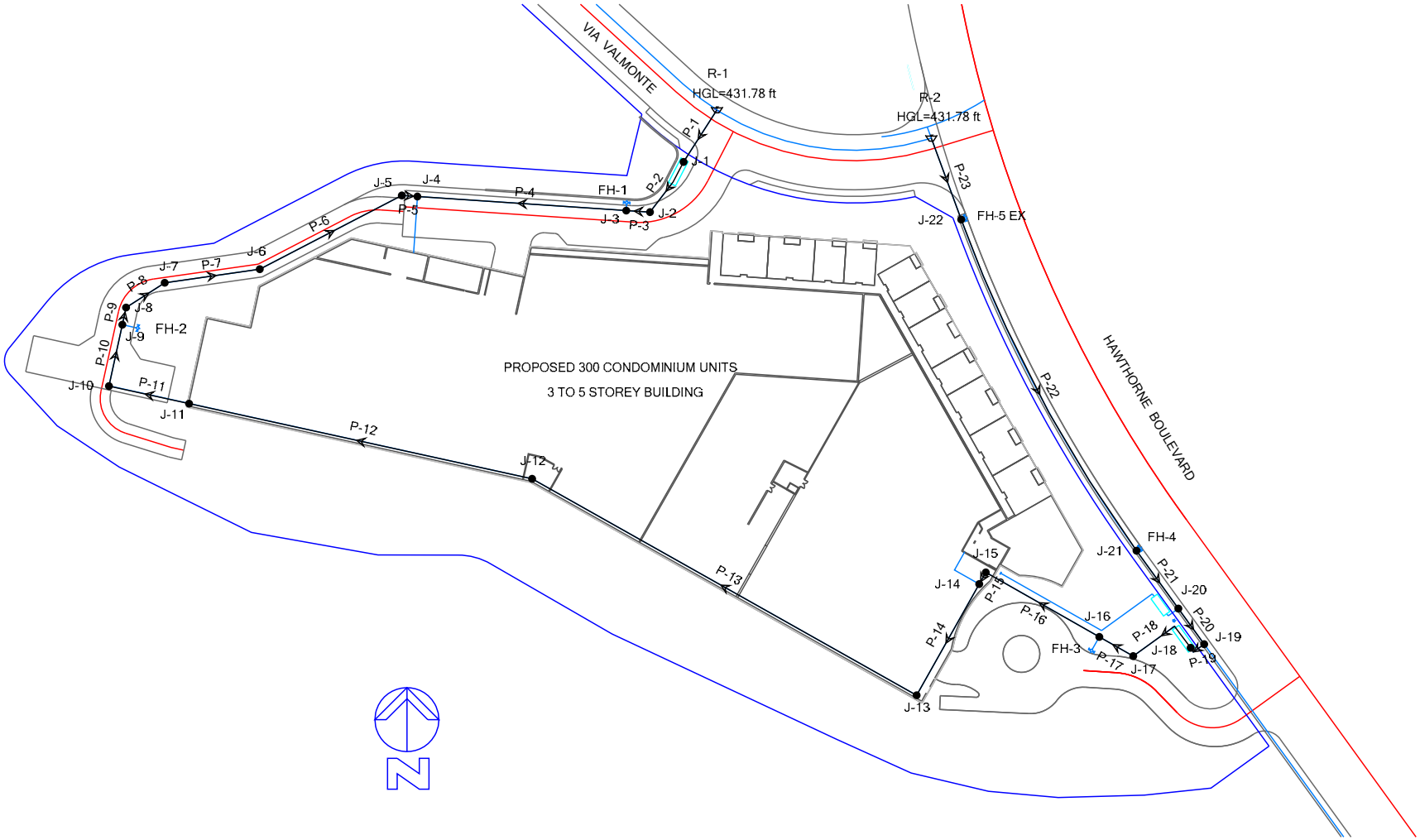
Label	Start Node	Stop Node	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Headloss Gradient (ft/ft)	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)
P-1	R-1	J-1	47	10.0	PVC	150.0	0.064	2.500	1,876	7.66
P-2	J-1	J-2	46	10.0	PVC	150.0	0.065	2.500	1,876	7.66
P-3	J-2	J-3	18	10.0	PVC	150.0	0.141	2.500	1,876	7.66
P-4	J-3	J-4	159	10.0	PVC	150.0	0.001	2.650	376	1.54
P-5	J-4	J-5	12	8.0	PVC	150.0	0.000	0.350	76	0.49
P-6	J-5	J-6	122	8.0	PVC	150.0	0.000	0.200	76	0.49
P-7	J-6	J-7	73	8.0	PVC	150.0	0.000	0.100	76	0.49
P-8	J-7	J-8	35	8.0	PVC	150.0	0.000	0.100	76	0.49
P-9	J-8	J-9	13	8.0	PVC	150.0	0.000	0.350	76	0.49
P-10	J-9	J-10	48	8.0	PVC	150.0	0.000	0.800	76	0.49
P-11	J-10	J-11	62	8.0	PVC	150.0	0.000	0.050	76	0.49
P-12	J-11	J-12	267	8.0	PVC	150.0	0.000	0.100	76	0.49
P-13	J-12	J-13	335	8.0	PVC	150.0	0.000	0.800	76	0.49
P-14	J-13	J-14	97	8.0	PVC	150.0	0.000	0.350	76	0.49
P-15	J-14	J-15	10	8.0	PVC	150.0	0.000	0.170	76	0.49
P-16	J-15	J-16	99	8.0	PVC	150.0	0.000	0.350	76	0.49
P-17	J-16	J-17	30	8.0	PVC	150.0	0.000	1.380	76	0.49
P-18	J-17	J-18	59	8.0	PVC	150.0	0.000	1.380	76	0.49
P-19	J-18	J-19	14	8.0	PVC	150.0	0.001	2.380	76	0.49
P-20	J-19	J-20	33	10.0	Ductile Iron	125.0	0.000	0.350	76	0.31
P-21	J-20	J-21	54	10.0	Ductile Iron	125.0	0.002	0.350	-464	1.90
P-22	J-21	J-22	285	10.0	Ductile Iron	125.0	0.024	0.350	-1,964	8.02
P-23	J-22	R-2	66	10.0	Ductile Iron	125.0	0.028	0.350	-1,964	8.02

FlexTable: Junction Table

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pattern (Constituent)	Pressure Head (ft)	Pressure (psi)
J-1	188.26	0	428.79	Fixed	240.53	104
J-2	193.00	0	425.81	Fixed	232.81	101
J-3	193.33	1,500	423.26	Fixed	229.93	99
J-4	201.00	300	423.04	Fire Sprinkler	222.04	96
J-5	201.33	0	423.04	Fixed	221.71	96
J-6	208.33	0	423.02	Fixed	214.69	93
J-7	214.00	0	423.01	Fixed	209.01	90
J-8	215.77	0	423.01	Fixed	207.24	90
J-9	216.90	0	423.01	Fixed	206.11	89
J-10	217.50	0	423.00	Fixed	205.50	89
J-11	217.50	0	422.99	Fixed	205.49	89
J-12	199.00	0	422.96	Fixed	223.96	97
J-13	199.00	0	422.91	Fixed	223.91	97
J-14	199.00	0	422.90	Fixed	223.90	97
J-15	199.00	0	422.90	Fixed	223.90	97
J-16	196.70	0	422.89	Fixed	226.19	98
J-17	195.40	0	422.88	Fixed	227.48	98
J-18	186.00	0	422.87	Fixed	236.87	102
J-19	186.00	0	422.86	Fixed	236.86	102
J-20	185.50	540	422.85	Water Domestic	237.35	103
J-21	184.50	1,500	422.96	Fire Hydrant	238.46	103
J-22	177.90	0	429.91	Fire Hydrant	252.01	109

Scenario: FH J-3, J-22 & Fire sprinkler J-4, Domestic Water J-20, Flow Simultaneously Scenario ID:



FlexTable: Pipe Table

Current Time: 0.000 hours

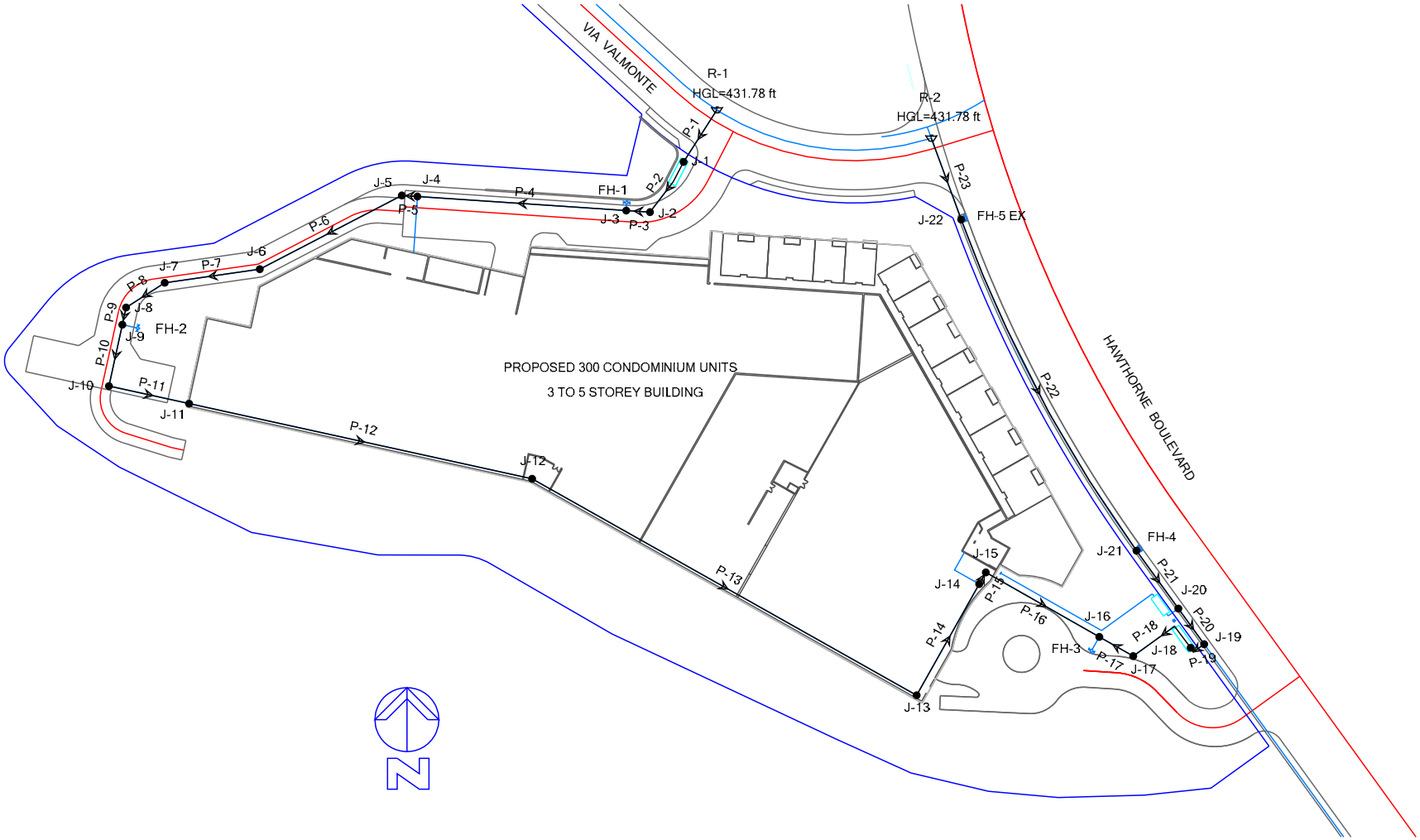
Label	Start Node	Stop Node	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Headloss Gradient (ft/ft)	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)
P-1	R-1	J-1	47	10.0	PVC	150.0	0.044	2.500	1,548	6.32
P-2	J-1	J-2	46	10.0	PVC	150.0	0.044	2.500	1,548	6.32
P-3	J-2	J-3	18	10.0	PVC	150.0	0.097	2.500	1,548	6.32
P-4	J-3	J-4	159	10.0	PVC	150.0	0.000	2.650	48	0.20
P-5	J-4	J-5	12	8.0	PVC	150.0	0.002	0.350	-252	1.61
P-6	J-5	J-6	122	8.0	PVC	150.0	0.001	0.200	-252	1.61
P-7	J-6	J-7	73	8.0	PVC	150.0	0.001	0.100	-252	1.61
P-8	J-7	J-8	35	8.0	PVC	150.0	0.001	0.100	-252	1.61
P-9	J-8	J-9	13	8.0	PVC	150.0	0.002	0.350	-252	1.61
P-10	J-9	J-10	48	8.0	PVC	150.0	0.002	0.800	-252	1.61
P-11	J-10	J-11	62	8.0	PVC	150.0	0.001	0.050	-252	1.61
P-12	J-11	J-12	267	8.0	PVC	150.0	0.001	0.100	-252	1.61
P-13	J-12	J-13	335	8.0	PVC	150.0	0.001	0.800	-252	1.61
P-14	J-13	J-14	97	8.0	PVC	150.0	0.001	0.350	-252	1.61
P-15	J-14	J-15	10	8.0	PVC	150.0	0.002	0.170	-252	1.61
P-16	J-15	J-16	99	8.0	PVC	150.0	0.001	0.350	-252	1.61
P-17	J-16	J-17	30	8.0	PVC	150.0	0.003	1.380	-252	1.61
P-18	J-17	J-18	59	8.0	PVC	150.0	0.002	1.380	-252	1.61
P-19	J-18	J-19	14	8.0	PVC	150.0	0.008	2.380	-252	1.61
P-20	J-19	J-20	33	10.0	Ductile Iron	125.0	0.001	0.350	-252	1.03
P-21	J-20	J-21	54	10.0	Ductile Iron	125.0	0.005	0.350	-792	3.23
P-22	J-21	J-22	285	10.0	Ductile Iron	125.0	0.004	0.350	-792	3.23
P-23	J-22	R-2	66	10.0	Ductile Iron	125.0	0.038	0.350	-2,292	9.36

FlexTable: Junction Table

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pattern (Constituent)	Pressure Head (ft)	Pressure (psi)
J-1	188.26	0	429.73	Fixed	241.47	104
J-2	193.00	0	427.69	Fixed	234.69	102
J-3	193.33	1,500	425.94	Fixed	232.61	101
J-4	201.00	300	425.94	Fire Sprinkler	224.94	97
J-5	201.33	0	425.97	Fixed	224.64	97
J-6	208.33	0	426.11	Fixed	217.78	94
J-7	214.00	0	426.19	Fixed	212.19	92
J-8	215.77	0	426.23	Fixed	210.46	91
J-9	216.90	0	426.26	Fixed	209.36	91
J-10	217.50	0	426.34	Fixed	208.84	90
J-11	217.50	0	426.41	Fixed	208.91	90
J-12	199.00	0	426.71	Fixed	227.71	99
J-13	199.00	0	427.10	Fixed	228.10	99
J-14	199.00	0	427.22	Fixed	228.22	99
J-15	199.00	0	427.24	Fixed	228.24	99
J-16	196.70	0	427.36	Fixed	230.66	100
J-17	195.40	0	427.45	Fixed	232.05	100
J-18	186.00	0	427.57	Fixed	241.57	105
J-19	186.00	0	427.68	Fixed	241.68	105
J-20	185.50	540	427.70	Water Domestic	242.20	105
J-21	184.50	0	427.99	Fire Hydrant	243.49	105
J-22	177.90	1,500	429.28	Fire Hydrant	251.38	109

Scenario: FH J-9, J-16 & Fire sprinkler J-4, Domestic Water J-20, Flow Simultaneously Scenario IE:



FlexTable: Pipe Table

Current Time: 0.000 hours

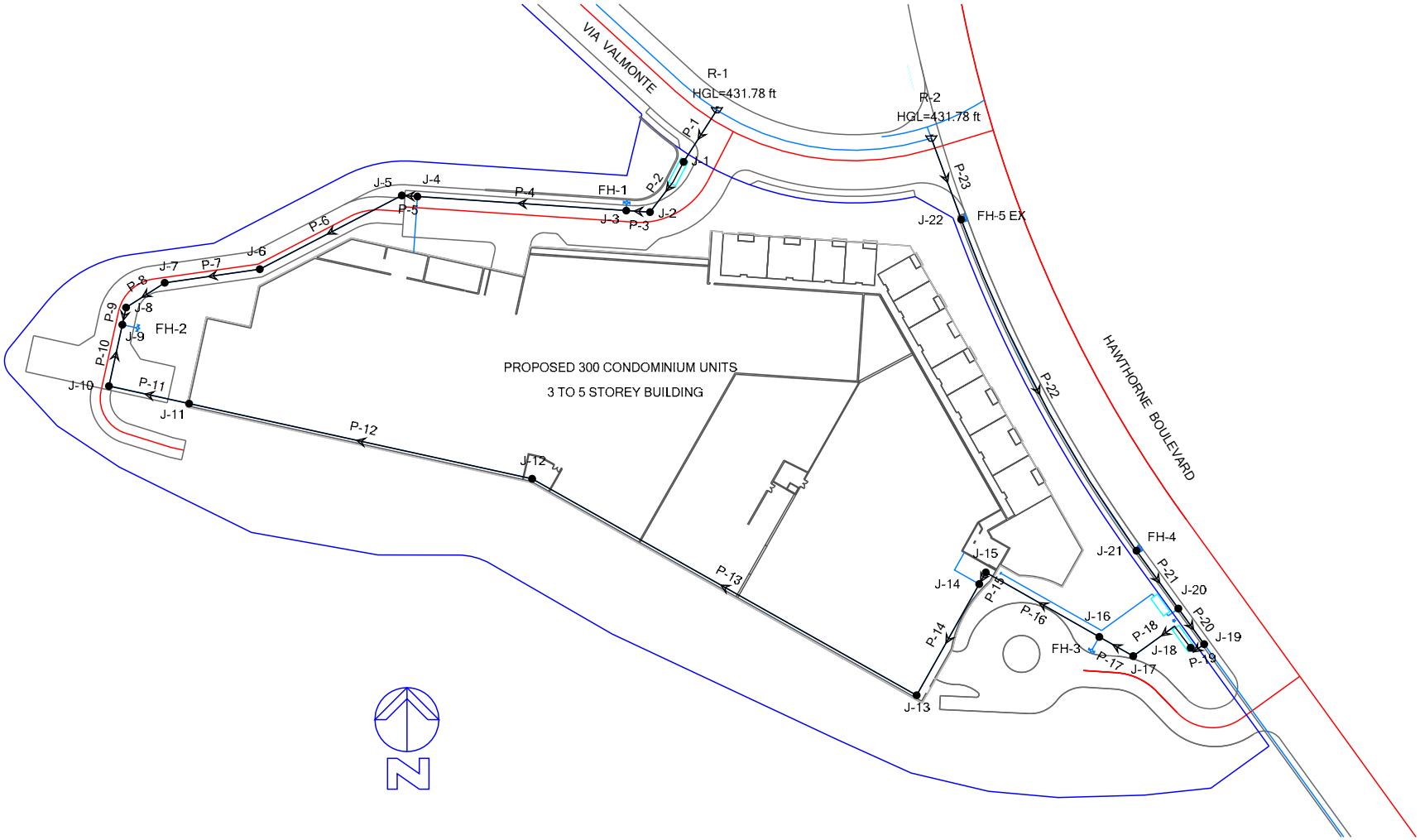
Label	Start Node	Stop Node	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Headloss Gradient (ft/ft)	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)
P-1	R-1	J-1	47	10.0	PVC	150.0	0.060	2.500	1,816	7.42
P-2	J-1	J-2	46	10.0	PVC	150.0	0.061	2.500	1,816	7.42
P-3	J-2	J-3	18	10.0	PVC	150.0	0.132	2.500	1,816	7.42
P-4	J-3	J-4	159	10.0	PVC	150.0	0.029	2.650	1,816	7.42
P-5	J-4	J-5	12	8.0	PVC	150.0	0.073	0.350	1,516	9.68
P-6	J-5	J-6	122	8.0	PVC	150.0	0.033	0.200	1,516	9.68
P-7	J-6	J-7	73	8.0	PVC	150.0	0.032	0.100	1,516	9.68
P-8	J-7	J-8	35	8.0	PVC	150.0	0.034	0.100	1,516	9.68
P-9	J-8	J-9	13	8.0	PVC	150.0	0.068	0.350	1,516	9.68
P-10	J-9	J-10	48	8.0	PVC	150.0	0.000	0.800	16	0.10
P-11	J-10	J-11	62	8.0	PVC	150.0	0.000	0.050	16	0.10
P-12	J-11	J-12	267	8.0	PVC	150.0	0.000	0.100	16	0.10
P-13	J-12	J-13	335	8.0	PVC	150.0	0.000	0.800	16	0.10
P-14	J-13	J-14	97	8.0	PVC	150.0	0.000	0.350	16	0.10
P-15	J-14	J-15	10	8.0	PVC	150.0	0.000	0.170	16	0.10
P-16	J-15	J-16	99	8.0	PVC	150.0	0.000	0.350	16	0.10
P-17	J-16	J-17	30	8.0	PVC	150.0	0.094	1.380	-1,484	9.47
P-18	J-17	J-18	59	8.0	PVC	150.0	0.062	1.380	-1,484	9.47
P-19	J-18	J-19	14	8.0	PVC	150.0	0.268	2.380	-1,484	9.47
P-20	J-19	J-20	33	10.0	Ductile Iron	125.0	0.020	0.350	-1,484	6.06
P-21	J-20	J-21	54	10.0	Ductile Iron	125.0	0.031	0.350	-2,024	8.27
P-22	J-21	J-22	285	10.0	Ductile Iron	125.0	0.026	0.350	-2,024	8.27
P-23	J-22	R-2	66	10.0	Ductile Iron	125.0	0.030	0.350	-2,024	8.27

FlexTable: Junction Table

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pattern (Constituent)	Pressure Head (ft)	Pressure (psi)
J-1	188.26	0	428.97	Fixed	240.71	104
J-2	193.00	0	426.18	Fixed	233.18	101
J-3	193.33	0	423.79	Fixed	230.46	100
J-4	201.00	300	419.26	Fire Sprinkler	218.26	94
J-5	201.33	0	418.39	Fixed	217.06	94
J-6	208.33	0	414.42	Fixed	206.09	89
J-7	214.00	0	412.07	Fixed	198.07	86
J-8	215.77	0	410.87	Fixed	195.10	84
J-9	216.90	1,500	409.95	Fixed	193.05	84
J-10	217.50	0	409.95	Fixed	192.45	83
J-11	217.50	0	409.95	Fixed	192.45	83
J-12	199.00	0	409.95	Fixed	210.95	91
J-13	199.00	0	409.95	Fixed	210.95	91
J-14	199.00	0	409.95	Fixed	210.95	91
J-15	199.00	0	409.95	Fixed	210.95	91
J-16	196.70	1,500	409.95	Fixed	213.25	92
J-17	195.40	0	412.73	Fixed	217.33	94
J-18	186.00	0	416.37	Fixed	230.37	100
J-19	186.00	0	420.09	Fixed	234.09	101
J-20	185.50	540	420.75	Water Domestic	235.25	102
J-21	184.50	0	422.45	Fire Hydrant	237.95	103
J-22	177.90	0	429.80	Fire Hydrant	251.90	109

Scenario: FH J-9, J-21 & Fire sprinkler J-4, Domestic Water J-20, Flow Simultaneously Scenario IF:



FlexTable: Pipe Table

Current Time: 0.000 hours

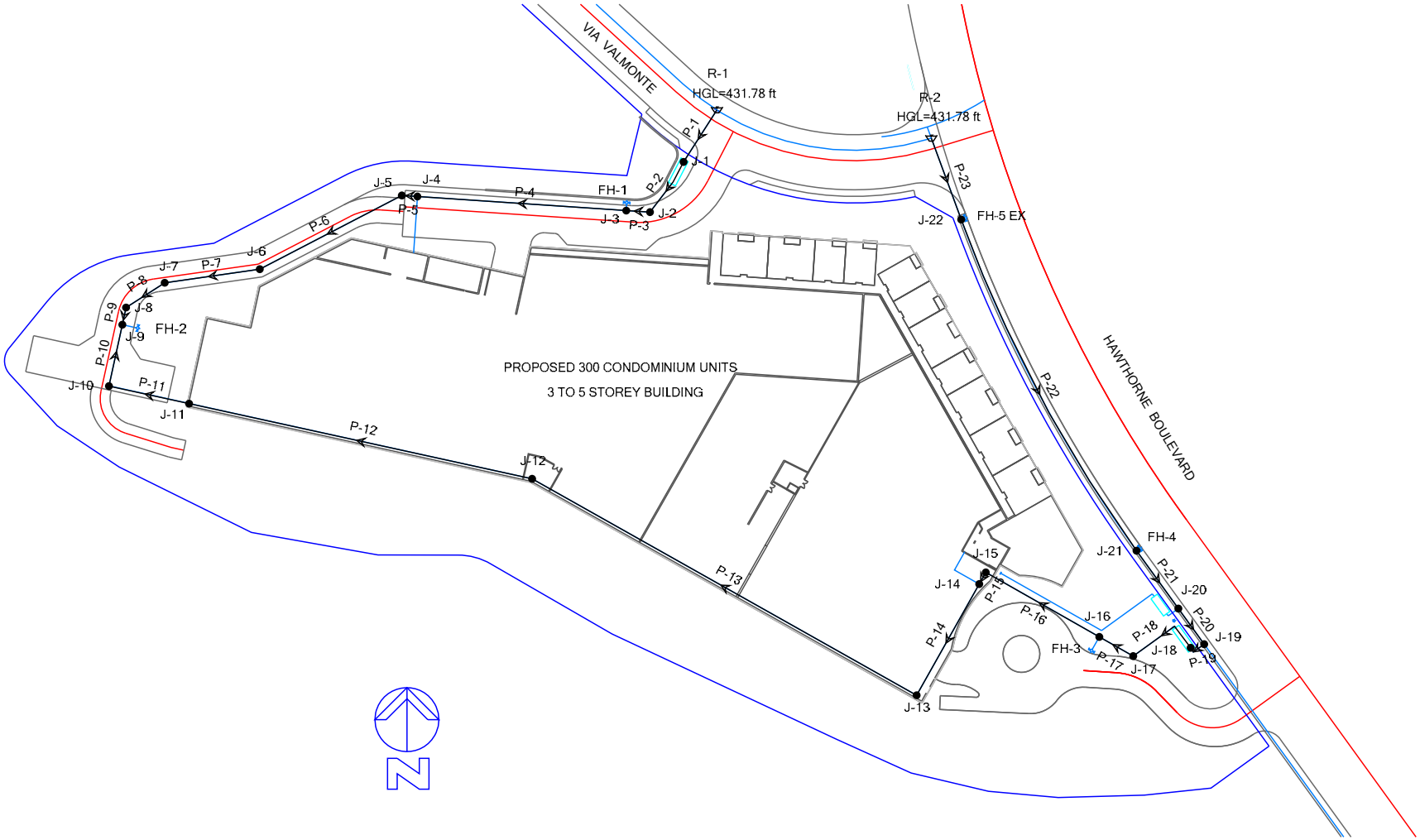
Label	Start Node	Stop Node	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Headloss Gradient (ft/ft)	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)
P-1	R-1	J-1	47	10.0	PVC	150.0	0.041	2.500	1,499	6.12
P-2	J-1	J-2	46	10.0	PVC	150.0	0.042	2.500	1,499	6.12
P-3	J-2	J-3	18	10.0	PVC	150.0	0.091	2.500	1,499	6.12
P-4	J-3	J-4	159	10.0	PVC	150.0	0.020	2.650	1,499	6.12
P-5	J-4	J-5	12	8.0	PVC	150.0	0.047	0.350	1,199	7.65
P-6	J-5	J-6	122	8.0	PVC	150.0	0.021	0.200	1,199	7.65
P-7	J-6	J-7	73	8.0	PVC	150.0	0.021	0.100	1,199	7.65
P-8	J-7	J-8	35	8.0	PVC	150.0	0.022	0.100	1,199	7.65
P-9	J-8	J-9	13	8.0	PVC	150.0	0.043	0.350	1,199	7.65
P-10	J-9	J-10	48	8.0	PVC	150.0	0.002	0.800	-301	1.92
P-11	J-10	J-11	62	8.0	PVC	150.0	0.002	0.050	-301	1.92
P-12	J-11	J-12	267	8.0	PVC	150.0	0.002	0.100	-301	1.92
P-13	J-12	J-13	335	8.0	PVC	150.0	0.002	0.800	-301	1.92
P-14	J-13	J-14	97	8.0	PVC	150.0	0.002	0.350	-301	1.92
P-15	J-14	J-15	10	8.0	PVC	150.0	0.002	0.170	-301	1.92
P-16	J-15	J-16	99	8.0	PVC	150.0	0.002	0.350	-301	1.92
P-17	J-16	J-17	30	8.0	PVC	150.0	0.004	1.380	-301	1.92
P-18	J-17	J-18	59	8.0	PVC	150.0	0.003	1.380	-301	1.92
P-19	J-18	J-19	14	8.0	PVC	150.0	0.011	2.380	-301	1.92
P-20	J-19	J-20	33	10.0	Ductile Iron	125.0	0.001	0.350	-301	1.23
P-21	J-20	J-21	54	10.0	Ductile Iron	125.0	0.006	0.350	-841	3.44
P-22	J-21	J-22	285	10.0	Ductile Iron	125.0	0.034	0.350	-2,341	9.56
P-23	J-22	R-2	66	10.0	Ductile Iron	125.0	0.040	0.350	-2,341	9.56

FlexTable: Junction Table

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pattern (Constituent)	Pressure Head (ft)	Pressure (psi)
J-1	188.26	0	429.86	Fixed	241.60	105
J-2	193.00	0	427.94	Fixed	234.94	102
J-3	193.33	0	426.31	Fixed	232.98	101
J-4	201.00	300	423.18	Fire Sprinkler	222.18	96
J-5	201.33	0	422.63	Fixed	221.30	96
J-6	208.33	0	420.06	Fixed	211.73	92
J-7	214.00	0	418.54	Fixed	204.54	88
J-8	215.77	0	417.77	Fixed	202.00	87
J-9	216.90	1,500	417.19	Fixed	200.29	87
J-10	217.50	0	417.31	Fixed	199.81	86
J-11	217.50	0	417.40	Fixed	199.90	86
J-12	199.00	0	417.81	Fixed	218.81	95
J-13	199.00	0	418.37	Fixed	219.37	95
J-14	199.00	0	418.54	Fixed	219.54	95
J-15	199.00	0	418.56	Fixed	219.56	95
J-16	196.70	0	418.73	Fixed	222.03	96
J-17	195.40	0	418.86	Fixed	223.46	97
J-18	186.00	0	419.03	Fixed	233.03	101
J-19	186.00	0	419.18	Fixed	233.18	101
J-20	185.50	540	419.22	Water Domestic	233.72	101
J-21	184.50	1,500	419.54	Fire Hydrant	235.04	102
J-22	177.90	0	429.17	Fire Hydrant	251.27	109

Scenario: FH J-9, J-22 & Fire sprinkler J-4, Domestic Water J-20, Flow Simultaneously Scenario IG:



FlexTable: Pipe Table

Current Time: 0.000 hours

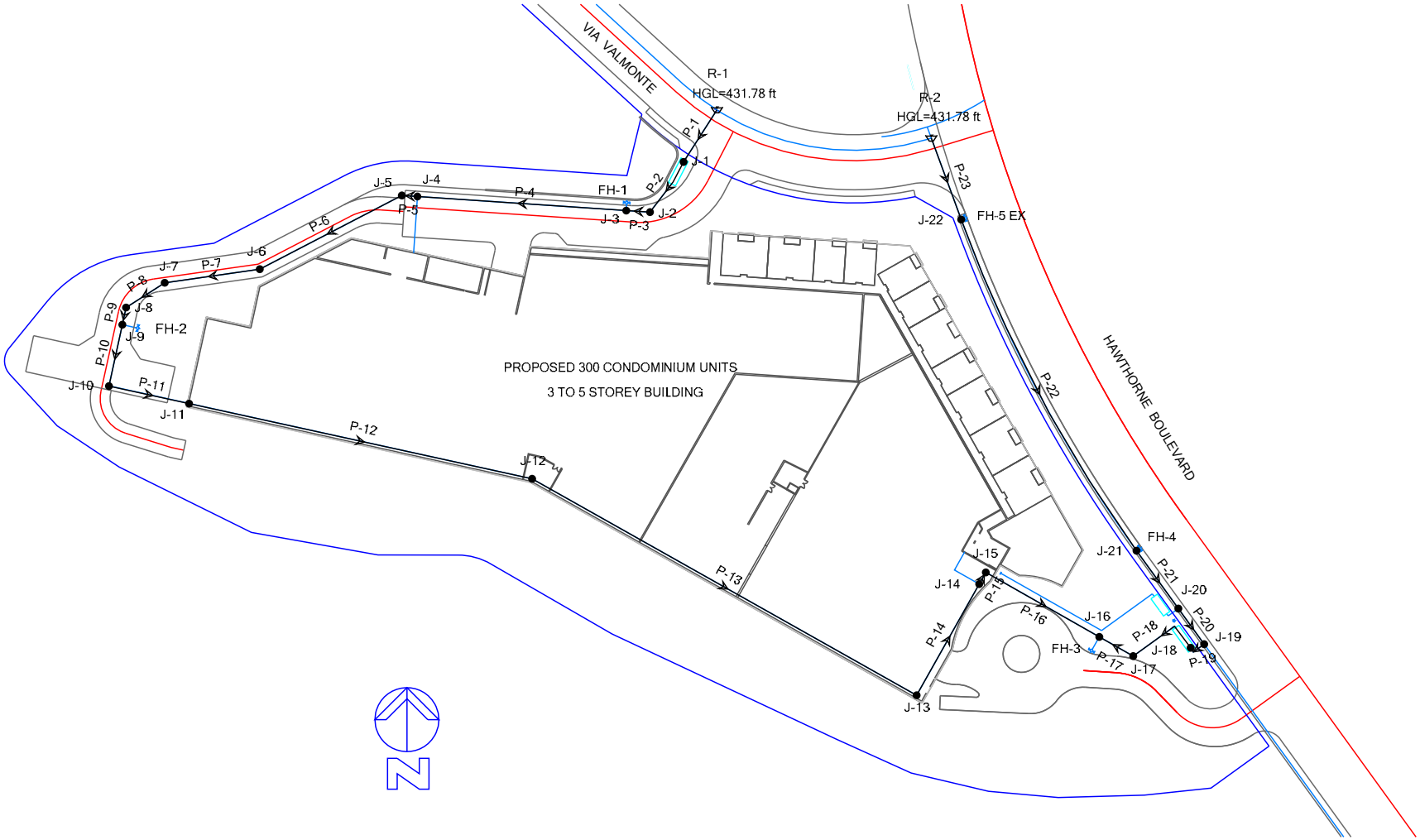
Label	Start Node	Stop Node	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Headloss Gradient (ft/ft)	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)
P-1	R-1	J-1	47	10.0	PVC	150.0	0.031	2.500	1,303	5.32
P-2	J-1	J-2	46	10.0	PVC	150.0	0.032	2.500	1,303	5.32
P-3	J-2	J-3	18	10.0	PVC	150.0	0.069	2.500	1,303	5.32
P-4	J-3	J-4	159	10.0	PVC	150.0	0.015	2.650	1,303	5.32
P-5	J-4	J-5	12	8.0	PVC	150.0	0.033	0.350	1,003	6.40
P-6	J-5	J-6	122	8.0	PVC	150.0	0.015	0.200	1,003	6.40
P-7	J-6	J-7	73	8.0	PVC	150.0	0.015	0.100	1,003	6.40
P-8	J-7	J-8	35	8.0	PVC	150.0	0.016	0.100	1,003	6.40
P-9	J-8	J-9	13	8.0	PVC	150.0	0.031	0.350	1,003	6.40
P-10	J-9	J-10	48	8.0	PVC	150.0	0.006	0.800	-497	3.17
P-11	J-10	J-11	62	8.0	PVC	150.0	0.004	0.050	-497	3.17
P-12	J-11	J-12	267	8.0	PVC	150.0	0.004	0.100	-497	3.17
P-13	J-12	J-13	335	8.0	PVC	150.0	0.004	0.800	-497	3.17
P-14	J-13	J-14	97	8.0	PVC	150.0	0.004	0.350	-497	3.17
P-15	J-14	J-15	10	8.0	PVC	150.0	0.006	0.170	-497	3.17
P-16	J-15	J-16	99	8.0	PVC	150.0	0.004	0.350	-497	3.17
P-17	J-16	J-17	30	8.0	PVC	150.0	0.011	1.380	-497	3.17
P-18	J-17	J-18	59	8.0	PVC	150.0	0.007	1.380	-497	3.17
P-19	J-18	J-19	14	8.0	PVC	150.0	0.031	2.380	-497	3.17
P-20	J-19	J-20	33	10.0	Ductile Iron	125.0	0.002	0.350	-497	2.03
P-21	J-20	J-21	54	10.0	Ductile Iron	125.0	0.009	0.350	-1,037	4.24
P-22	J-21	J-22	285	10.0	Ductile Iron	125.0	0.007	0.350	-1,037	4.24
P-23	J-22	R-2	66	10.0	Ductile Iron	125.0	0.046	0.350	-2,537	10.36

FlexTable: Junction Table

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pattern (Constituent)	Pressure Head (ft)	Pressure (psi)
J-1	188.26	0	430.32	Fixed	242.06	105
J-2	193.00	0	428.86	Fixed	235.86	102
J-3	193.33	0	427.62	Fixed	234.29	101
J-4	201.00	300	425.23	Fire Sprinkler	224.23	97
J-5	201.33	0	424.84	Fixed	223.51	97
J-6	208.33	0	423.00	Fixed	214.67	93
J-7	214.00	0	421.91	Fixed	207.91	90
J-8	215.77	0	421.35	Fixed	205.58	89
J-9	216.90	1,500	420.94	Fixed	204.04	88
J-10	217.50	0	421.25	Fixed	203.75	88
J-11	217.50	0	421.50	Fixed	204.00	88
J-12	199.00	0	422.54	Fixed	223.54	97
J-13	199.00	0	423.95	Fixed	224.95	97
J-14	199.00	0	424.37	Fixed	225.37	98
J-15	199.00	0	424.44	Fixed	225.44	98
J-16	196.70	0	424.87	Fixed	228.17	99
J-17	195.40	0	425.20	Fixed	229.80	99
J-18	186.00	0	425.64	Fixed	239.64	104
J-19	186.00	0	426.07	Fixed	240.07	104
J-20	185.50	540	426.15	Water Domestic	240.65	104
J-21	184.50	0	426.63	Fire Hydrant	242.13	105
J-22	177.90	1,500	428.75	Fire Hydrant	250.85	109

Scenario: FH J-16, J-21 & Fire sprinkler J-4, Domestic Water J-20, Flow Simultaneously Scenario IH:



FlexTable: Pipe Table

Current Time: 0.000 hours

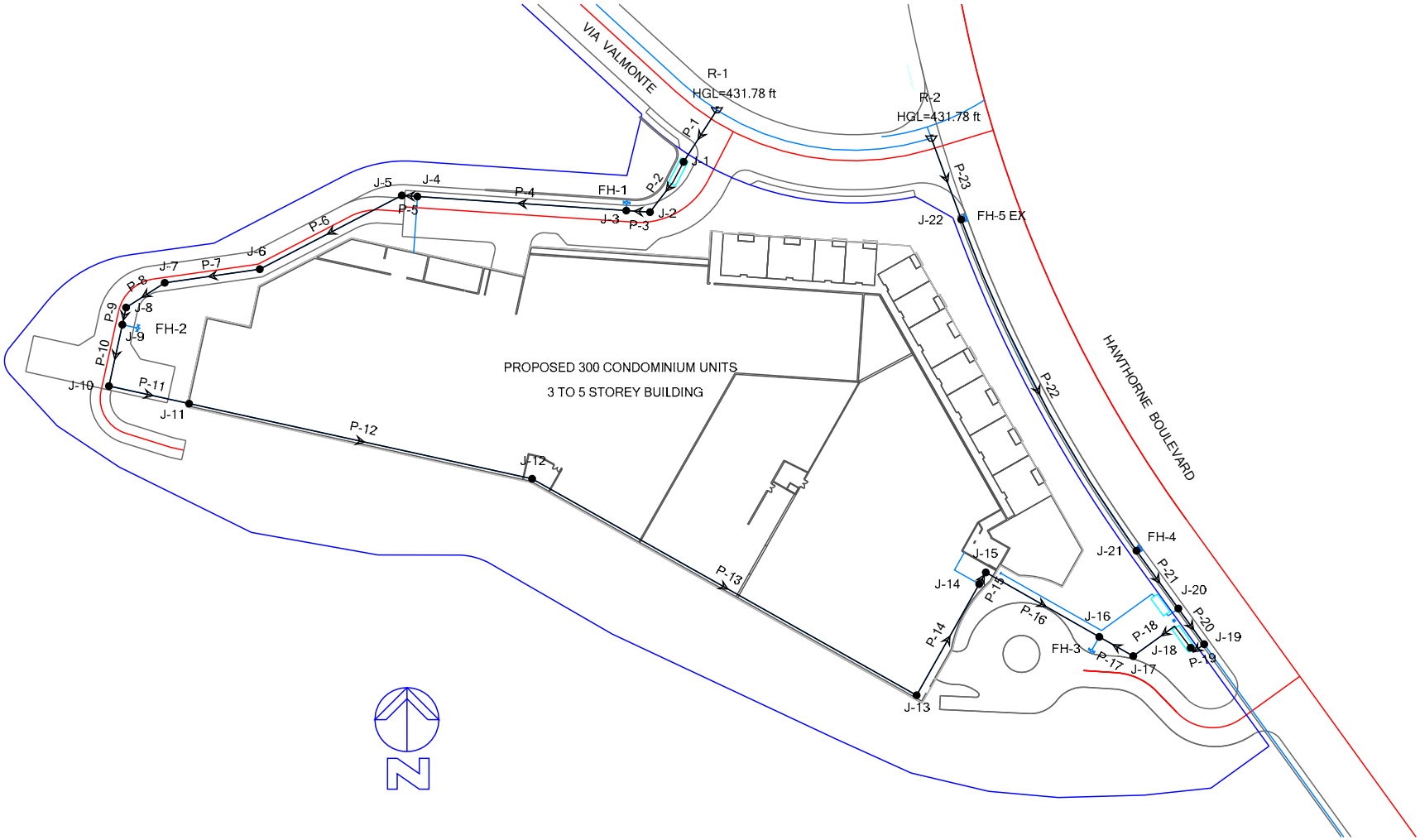
Label	Start Node	Stop Node	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Headloss Gradient (ft/ft)	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)
P-1	R-1	J-1	47	10.0	PVC	150.0	0.024	2.500	1,144	4.67
P-2	J-1	J-2	46	10.0	PVC	150.0	0.024	2.500	1,144	4.67
P-3	J-2	J-3	18	10.0	PVC	150.0	0.053	2.500	1,144	4.67
P-4	J-3	J-4	159	10.0	PVC	150.0	0.012	2.650	1,144	4.67
P-5	J-4	J-5	12	8.0	PVC	150.0	0.024	0.350	844	5.39
P-6	J-5	J-6	122	8.0	PVC	150.0	0.011	0.200	844	5.39
P-7	J-6	J-7	73	8.0	PVC	150.0	0.011	0.100	844	5.39
P-8	J-7	J-8	35	8.0	PVC	150.0	0.012	0.100	844	5.39
P-9	J-8	J-9	13	8.0	PVC	150.0	0.022	0.350	844	5.39
P-10	J-9	J-10	48	8.0	PVC	150.0	0.018	0.800	844	5.39
P-11	J-10	J-11	62	8.0	PVC	150.0	0.011	0.050	844	5.39
P-12	J-11	J-12	267	8.0	PVC	150.0	0.010	0.100	844	5.39
P-13	J-12	J-13	335	8.0	PVC	150.0	0.011	0.800	844	5.39
P-14	J-13	J-14	97	8.0	PVC	150.0	0.012	0.350	844	5.39
P-15	J-14	J-15	10	8.0	PVC	150.0	0.018	0.170	844	5.39
P-16	J-15	J-16	99	8.0	PVC	150.0	0.012	0.350	844	5.39
P-17	J-16	J-17	30	8.0	PVC	150.0	0.019	1.380	-656	4.19
P-18	J-17	J-18	59	8.0	PVC	150.0	0.013	1.380	-656	4.19
P-19	J-18	J-19	14	8.0	PVC	150.0	0.053	2.380	-656	4.19
P-20	J-19	J-20	33	10.0	Ductile Iron	125.0	0.004	0.350	-656	2.68
P-21	J-20	J-21	54	10.0	Ductile Iron	125.0	0.012	0.350	-1,196	4.89
P-22	J-21	J-22	285	10.0	Ductile Iron	125.0	0.044	0.350	-2,696	11.01
P-23	J-22	R-2	66	10.0	Ductile Iron	125.0	0.052	0.350	-2,696	11.01

FlexTable: Junction Table

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pattern (Constituent)	Pressure Head (ft)	Pressure (psi)
J-1	188.26	0	430.65	Fixed	242.39	105
J-2	193.00	0	429.52	Fixed	236.52	102
J-3	193.33	0	428.56	Fixed	235.23	102
J-4	201.00	300	426.70	Fire Sprinkler	225.70	98
J-5	201.33	0	426.42	Fixed	225.09	97
J-6	208.33	0	425.09	Fixed	216.76	94
J-7	214.00	0	424.30	Fixed	210.30	91
J-8	215.77	0	423.90	Fixed	208.13	90
J-9	216.90	0	423.60	Fixed	206.70	89
J-10	217.50	0	422.75	Fixed	205.25	89
J-11	217.50	0	422.09	Fixed	204.59	89
J-12	199.00	0	419.32	Fixed	220.32	95
J-13	199.00	0	415.53	Fixed	216.53	94
J-14	199.00	0	414.38	Fixed	215.38	93
J-15	199.00	0	414.20	Fixed	215.20	93
J-16	196.70	1,500	413.03	Fixed	216.33	94
J-17	195.40	0	413.60	Fixed	218.20	94
J-18	186.00	0	414.35	Fixed	228.35	99
J-19	186.00	0	415.09	Fixed	229.09	99
J-20	185.50	540	415.23	Water Domestic	229.73	99
J-21	184.50	1,500	415.86	Fire Hydrant	231.36	100
J-22	177.90	0	428.38	Fire Hydrant	250.48	108

Scenario: FH J-16, J-22 & Fire sprinkler J-4, Domestic Water J-20, Flow Simultaneously Scenario IJ:



FlexTable: Pipe Table

Current Time: 0.000 hours

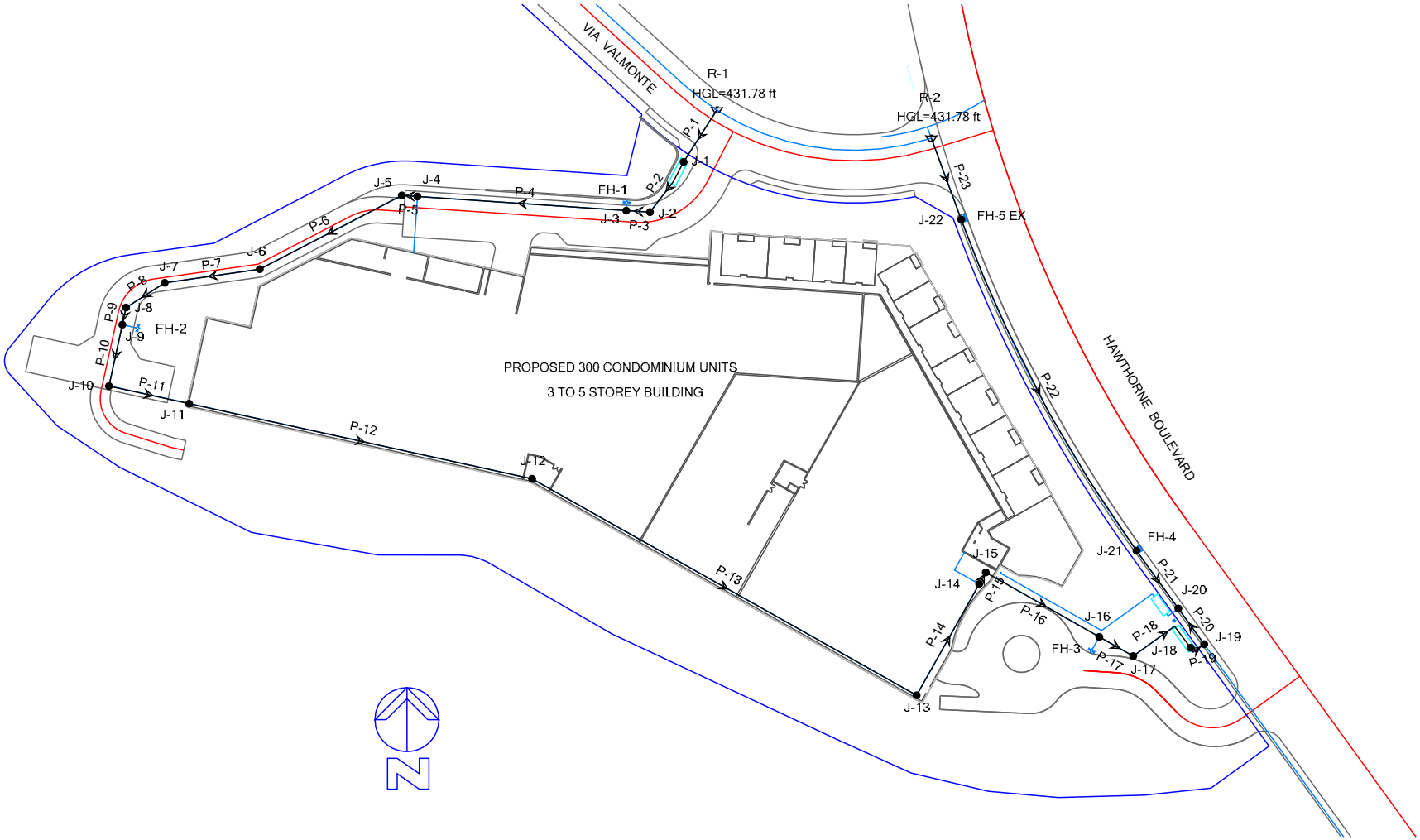
Label	Start Node	Stop Node	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Headloss Gradient (ft/ft)	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)
P-1	R-1	J-1	47	10.0	PVC	150.0	0.017	2.500	952	3.89
P-2	J-1	J-2	46	10.0	PVC	150.0	0.017	2.500	952	3.89
P-3	J-2	J-3	18	10.0	PVC	150.0	0.037	2.500	952	3.89
P-4	J-3	J-4	159	10.0	PVC	150.0	0.008	2.650	952	3.89
P-5	J-4	J-5	12	8.0	PVC	150.0	0.014	0.350	652	4.16
P-6	J-5	J-6	122	8.0	PVC	150.0	0.007	0.200	652	4.16
P-7	J-6	J-7	73	8.0	PVC	150.0	0.007	0.100	652	4.16
P-8	J-7	J-8	35	8.0	PVC	150.0	0.007	0.100	652	4.16
P-9	J-8	J-9	13	8.0	PVC	150.0	0.013	0.350	652	4.16
P-10	J-9	J-10	48	8.0	PVC	150.0	0.011	0.800	652	4.16
P-11	J-10	J-11	62	8.0	PVC	150.0	0.007	0.050	652	4.16
P-12	J-11	J-12	267	8.0	PVC	150.0	0.006	0.100	652	4.16
P-13	J-12	J-13	335	8.0	PVC	150.0	0.007	0.800	652	4.16
P-14	J-13	J-14	97	8.0	PVC	150.0	0.007	0.350	652	4.16
P-15	J-14	J-15	10	8.0	PVC	150.0	0.011	0.170	652	4.16
P-16	J-15	J-16	99	8.0	PVC	150.0	0.007	0.350	652	4.16
P-17	J-16	J-17	30	8.0	PVC	150.0	0.032	1.380	-848	5.41
P-18	J-17	J-18	59	8.0	PVC	150.0	0.021	1.380	-848	5.41
P-19	J-18	J-19	14	8.0	PVC	150.0	0.088	2.380	-848	5.41
P-20	J-19	J-20	33	10.0	Ductile Iron	125.0	0.007	0.350	-848	3.47
P-21	J-20	J-21	54	10.0	Ductile Iron	125.0	0.015	0.350	-1,388	5.67
P-22	J-21	J-22	285	10.0	Ductile Iron	125.0	0.013	0.350	-1,388	5.67
P-23	J-22	R-2	66	10.0	Ductile Iron	125.0	0.059	0.350	-2,888	11.80

FlexTable: Junction Table

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pattern (Constituent)	Pressure Head (ft)	Pressure (psi)
J-1	188.26	0	430.99	Fixed	242.73	105
J-2	193.00	0	430.21	Fixed	237.21	103
J-3	193.33	0	429.54	Fixed	236.21	102
J-4	201.00	300	428.23	Fire Sprinkler	227.23	98
J-5	201.33	0	428.07	Fixed	226.74	98
J-6	208.33	0	427.24	Fixed	218.91	95
J-7	214.00	0	426.75	Fixed	212.75	92
J-8	215.77	0	426.50	Fixed	210.73	91
J-9	216.90	0	426.33	Fixed	209.43	91
J-10	217.50	0	425.81	Fixed	208.31	90
J-11	217.50	0	425.40	Fixed	207.90	90
J-12	199.00	0	423.68	Fixed	224.68	97
J-13	199.00	0	421.35	Fixed	222.35	96
J-14	199.00	0	420.64	Fixed	221.64	96
J-15	199.00	0	420.53	Fixed	221.53	96
J-16	196.70	1,500	419.80	Fixed	223.10	97
J-17	195.40	0	420.74	Fixed	225.34	97
J-18	186.00	0	421.98	Fixed	235.98	102
J-19	186.00	0	423.20	Fixed	237.20	103
J-20	185.50	540	423.43	Water Domestic	237.93	103
J-21	184.50	0	424.27	Fire Hydrant	239.77	104
J-22	177.90	1,500	427.91	Fire Hydrant	250.01	108

Scenario: FH J-21, J-22 & Fire sprinkler J-4, Domestic Water J-20, Flow Simultaneously Scenario IK:



FlexTable: Pipe Table

Current Time: 0.000 hours

Label	Start Node	Stop Node	Length (Scaled) (ft)	Diameter (in)	Material	Hazen-Williams C	Headloss Gradient (ft/ft)	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)
P-1	R-1	J-1	47	10.0	PVC	150.0	0.012	2.500	793	3.24
P-2	J-1	J-2	46	10.0	PVC	150.0	0.012	2.500	793	3.24
P-3	J-2	J-3	18	10.0	PVC	150.0	0.026	2.500	793	3.24
P-4	J-3	J-4	159	10.0	PVC	150.0	0.006	2.650	793	3.24
P-5	J-4	J-5	12	8.0	PVC	150.0	0.008	0.350	493	3.14
P-6	J-5	J-6	122	8.0	PVC	150.0	0.004	0.200	493	3.14
P-7	J-6	J-7	73	8.0	PVC	150.0	0.004	0.100	493	3.14
P-8	J-7	J-8	35	8.0	PVC	150.0	0.004	0.100	493	3.14
P-9	J-8	J-9	13	8.0	PVC	150.0	0.008	0.350	493	3.14
P-10	J-9	J-10	48	8.0	PVC	150.0	0.006	0.800	493	3.14
P-11	J-10	J-11	62	8.0	PVC	150.0	0.004	0.050	493	3.14
P-12	J-11	J-12	267	8.0	PVC	150.0	0.004	0.100	493	3.14
P-13	J-12	J-13	335	8.0	PVC	150.0	0.004	0.800	493	3.14
P-14	J-13	J-14	97	8.0	PVC	150.0	0.004	0.350	493	3.14
P-15	J-14	J-15	10	8.0	PVC	150.0	0.006	0.170	493	3.14
P-16	J-15	J-16	99	8.0	PVC	150.0	0.004	0.350	493	3.14
P-17	J-16	J-17	30	8.0	PVC	150.0	0.011	1.380	493	3.14
P-18	J-17	J-18	59	8.0	PVC	150.0	0.007	1.380	493	3.14
P-19	J-18	J-19	14	8.0	PVC	150.0	0.030	2.380	493	3.14
P-20	J-19	J-20	33	10.0	Ductile Iron	125.0	0.002	0.350	493	2.01
P-21	J-20	J-21	54	10.0	Ductile Iron	125.0	0.000	0.350	-47	0.19
P-22	J-21	J-22	285	10.0	Ductile Iron	125.0	0.016	0.350	-1,547	6.32
P-23	J-22	R-2	66	10.0	Ductile Iron	125.0	0.065	0.350	-3,047	12.45

FlexTable: Junction Table

Current Time: 0.000 hours

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pattern (Constituent)	Pressure Head (ft)	Pressure (psi)
J-1	188.26	0	431.23	Fixed	242.97	105
J-2	193.00	0	430.68	Fixed	237.68	103
J-3	193.33	0	430.22	Fixed	236.89	102
J-4	201.00	300	429.30	Fire Sprinkler	228.30	99
J-5	201.33	0	429.20	Fixed	227.87	99
J-6	208.33	0	428.71	Fixed	220.38	95
J-7	214.00	0	428.42	Fixed	214.42	93
J-8	215.77	0	428.27	Fixed	212.50	92
J-9	216.90	0	428.17	Fixed	211.27	91
J-10	217.50	0	427.87	Fixed	210.37	91
J-11	217.50	0	427.62	Fixed	210.12	91
J-12	199.00	0	426.60	Fixed	227.60	98
J-13	199.00	0	425.21	Fixed	226.21	98
J-14	199.00	0	424.79	Fixed	225.79	98
J-15	199.00	0	424.73	Fixed	225.73	98
J-16	196.70	0	424.30	Fixed	227.60	98
J-17	195.40	0	423.98	Fixed	228.58	99
J-18	186.00	0	423.54	Fixed	237.54	103
J-19	186.00	0	423.12	Fixed	237.12	103
J-20	185.50	540	423.04	Water Domestic	237.54	103
J-21	184.50	1,500	423.04	Fire Hydrant	238.54	103
J-22	177.90	1,500	427.50	Fire Hydrant	249.60	108