526 & 528 Boston Post Road Redevelopment

Sudbury, MA

PREPARED FOR

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c/o National Development
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PREPARED BY

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March 30, 2016

Table of Contents

1

Project Summary

On behalf of the applicants, BPR Sudbury, LLC and Sudbury Avalon Inc, VHB has prepared this Water Impact Report for the proposed 526 & 528 Boston Post Road Redevelopment Project (the Project) in Sudbury Massachusetts. This report has been prepared in accordance with the Sudbury Water District Rules and Regulations, updated October 2015.

Based on the information presented herein, the project is expected to have sufficient water supply, flow and pressure for both fire and domestic needs, with limited impact on the Sudbury Water District's system.

Project Name: 526 & 528 Boston Post Road Redevelopment

Applicants: BPR Development LLC c/o National Development, and Sudbury Avalon Inc, c/o Avalon Bay Communities

Estimated Project Start / End Dates: Spring 2016 – Year End 2018

Existing Uses: 563,000 sf office, R&D and manufacturing space

Proposed Uses:
45,000 sf grocery store
250-500 restaurant seats
25,000 sf retail
60 age-restricted condos
48 memory care / senior housing
250 apartment homes with ancillary clubhouse

Refer to the sections below for a detailed analysis regarding the Project's water demand and impact on the Town System.

2

Water Demand

Existing Water Usage

If the buildings were to re-occupy with a typical office user, the anticipated water usage based on Title 5 estimates would be approximately 42,000 gpd.

Existing water usage data was compiled from the 2006 to 2008 water meter reading data supplied by the Sudbury Water District. The data indicates an average daily water usage of approximately 15,800 gpd (See Appendix A); this is from a time when the Raytheon operations were already downsizing and the existing buildings were not fully occupied. As a result, the water meter readings are not a full representation of the historical maximum water usage on the site.

Proposed Water Conservation Measures and Water Usage

The projected unadjusted water consumption rates assume water use to be equivalent to wastewater flows calculated in accordance with the DEP Wastewater Design Flow Guidelines in 310 CMR 15.203 (Title 5), as presented in Appendix A.

The MassDEP wastewater design flows are considered conservative in relation to actual flow volumes, therefore, no increase in water consumptive rates have been applied to these figures. Furthermore, potable water use will be minimized by a minimum of a 20% reduction implementing the following water conservation measures:

- Installing low-flow plumbing fixtures and high efficiency appliances;
- Metering and sub-metering of water usage for multi-family, for example, residents will be responsible for their own water usage;
- Serving multi-family units with efficient water heating systems which utilize less water;
- Selecting drought-tolerant plants and optimizing irrigation through the use of water efficient irrigation systems including rain sensors; and
- Limiting the use of potable water for irrigation.

The projected water demand adjusted to account for the aforementioned water conservation commitments is anticipated to lower the maximum unadjusted water demand by approximately a minimum of 20%. Accordingly, the Project water demand is anticipated to be approximately 58,500- 65,600 gpd, depending on the final mix of retail and restaurant tenants. See Appendix A for calculations.

Net Change in Water Demand / Impact on the Town System

If compared to the typical Title 5 rates for re-occupancy of the existing buildings on the site as an office use, the net increase in demand would be estimated at 16,000 – 23,000 gpd – with an average increase of approximately 20,000 gpd.

In addition to providing a comparison to the potential to re-occupy the site with an office user, these estimates are likely more representative of the historical water usage on the site when the buildings were fully occupied. Compared to the 2006-2008 water meter readings, which reflect a partially occupied site, the net change in water demand is estimated to be approximately 42,700 to 49,700 gpd.

As indicated in the Water Modeling Section below (and the associated Exhibits attached hereto), the increase the amount of domestic water needed for this project will not have a significant impact on the pressure or performance of the Town or Sudbury owned 12 inch main in Boston Post Road.

3

Water Supply

Existing Water Supply System

The Town of Sudbury is served by the Sudbury Water District, an independent municipal entity established by an Act of the Massachusetts Legislature in 1934, responsible for the water supply system and water distribution through the Town of Sudbury municipal water system. The Site is serviced by two existing 8" water mains and one 3" connection connected to a recently constructed 12" water main located within the Boston Post Road right-of-way. Raytheon has historically been a consumer of water on the Site.

Proposed Water Supply System

In the proposed conditions, the Site will continue to rely upon water as supplied by the Sudbury Water District, via the 12" water main located within Boston Post Road. The Project proposes to construct a network of new looped 8" water mains and fire hydrants throughout the Site, which will be adequately sized for the domestic and fire flows associated with the Project. Water usage will be reduced through the use of low flow water fixtures and other water conservation measures.

In October of 2015, VHB performed flow tests on hydrants served by the Boston Post Road water main, to confirm available water flows and pressures. The test indicated static water pressure in the 12" main of approximately 100 pounds per square inch and flows near 1,700 gpm at the hydrant. Based on these results of these tests, the available flow and pressure of water in the system is sufficient to support the project. See Appendix B for Hydrant Flow Test Results.

4

Water Flow Rates

The following summarizes the estimated Domestic and Fire Flow Rates anticipated for the Project.

Domestic Flows

Peak Domestic Flow Rates

The total project average daily wastewater flow is estimated between 73,000 and 82,000 gpd depending on the final mix of units and uses. The larger demand equates to approximately 57 gpm. For approximating the maximum day demand a peaking factor of 1.75 is applied to the Title 5 generation rate estimates. The maximum day demand is therefore conservatively estimated at 100 gallons per minute (gpm).
The water system hydraulic analysis presented herein is designed without the implementation of any water conservation measures so the possible impact on the existing infrastructure is shown conservatively and not underestimated.

Velocity in the Town Main

The velocity in the town water main for the domestic maximum day demand of 100 gpm is 0.28 feet/sec in the 12 inch main. This additional amount of flow will not have an impact on the town main.

Fire Flows

Fire Flow and Design Requirements

The existing town water system in the proposed project area provides both domestic and fire flow water supply to the existing project site. The Town's existing water distribution network within this area has fire hydrants located 750 feet apart across the project site frontage. Additional hydrants will be located on-site in consultation with the Sudbury Fire Department.

The minimum Needed Fire Flow (NFF) and maximum Insurance Services Office (ISO) requirements for a Community are:

- Estimated minimum NFF requirements 2,000 gpm
- Maximum NFF* 3,500 gpm

* The maximum NFF requirements a community is required to supply according to ISO.

The required minimum residual pressure at any location within the distribution system during a fire flow situation is 20 psi.

The Massachusetts DEP "2014 Guidelines and Policies for Public Water Systems" states that water systems should be designed for 60 psi, but not less than 35 psi, and shall be designed to maintain a minimum of 20 psi at ground level under all flows.

VHB is relying on the ISO requirements to support the preliminary water system model for the overall project as a conservative estimate of what will be needed for the project. It is likely that the particular needed fire flow for individual buildings will be significantly lower than the ISO requirements noted above.

5

New Water System Hydraulic Analysis

Hydraulic Analysis

VHB performed computer hydraulic analysis of the proposed full build out conditions utilizing information obtained from the Sudbury Water District and hydrant flow test information to further explore the availability of water flow at the higher flow rate set by the ISO. The computer model was calibrated based on hydrant flow tests performed by VHB on October 29, 2015 on Boston Post Road at the front of the project site. The hydrants are connected to the 12-inch water main in Boston Post Road adjacent to the site. The hydrant flow test computation converted to a base of 20 psi resulted in a flow of 9,916 gpm. Two additional hydrants were observed during the hydrant flow test. Refer to Appendix "B" for the Hydrant Flow Test Results and Appendix C for Fire Flow Report and Pipe Report.

The hydraulic analysis was performed for future demands on the existing/proposed water distribution systems. The analysis includes utilizing the future conditions model and performing several scenarios including:

- Future Average Day Demand - 57 gpm
- Future Maximum Day Demand - 100 gpm
- Future Maximum Day Demand Plus 2,000 gpm Fire Flow- 2,100 gpm
- Future Maximum Day Demand Plus 3,500 gpm Fire Flow - 3,600 gpm

A fire flow of 3,500 gpm is the maximum requirement a community is required to supply according to the ISO standards.

Full build out Maximum Day Demand plus Fire Demand

The calculations show that all of the nodes in the fire flow hydraulic analysis are capable of providing greater than the 2,100 gpm fire and domestic flow combined at greater than the 35 psi residual design requirement.

The analysis also indicated that the full build out distribution system has sufficient capacity for maximum day demand of 100 gpm plus 3,500 gpm fire demand throughout the distribution system. The water pressure does not fall below the minimum required range of 35 to 60 psi during the simulations. One exception is the service line near the wastewater treatment plant, where more than 3,200 gpm is available. This is anticipated to be sufficient to serve the buildings. Should the wastewater treatment plant require more than 3,200 gpm, the routing of the mains can be adjusted to provide additional available flow.

Full Build Project System Demand	Total Flow 3,600 gpm
Minimum Requirements	Pressure Range 35 – 100 psi
Hydraulic Model Results	Pressure Range 35 – 65 psi

Refer to Appendix "C" for the Fire Flow Report and Pipe Report

Based on the information presented herein, the project is expected to have sufficient water supply, flow and pressure for both fire and domestic needs, with limited impact on the Sudbury Water District's system.

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Appendix A:
Water Usage Summary

Water Usage Summary

Project Name: 526/528 Boston Post Road
Project Location: Sudbury, MA

Proj. No.: 13125.00
Date: 3/10/2016
Calculated by: RPM
Checked by: KFS

Meter No.	Measured Start	Measured End		Total Usage	Unit
B5001170.1F	02/01/2006	02/01/2008		338,000	Gallons
B5001180	02/01/2006	02/08/2008		317,000	Gallons
B5001190.1	02/01/2006	02/08/2008		1,374,000	Gallons
B5001200	08/01/2006	08/01/2008		7,489,000	Gallons
B5001210.1F	02/01/2006	02/08/2008		2,029,000	Gallons
		Total Measured Usage		11,547,000	Gallons
		Total Measured Days		730	Days
		Usage Rate		15,818	GPD

Re-use of Existing Buildings as an Office Use:

563,300sf x 75gpd/1,000 sf = 42,250 gpd

Excerpt from 526 and 528 Boston Post Road Redevelopment
Utility Infrastructure Memorandum by VHB dated February 8, 2016

Anticipated Wastewater Flows According to Title V Regulations*

Retail Development	Quantity	Unit	GPD/Unit (310 CMR 15)	Estimated Total Flow (GPD)*
Grocery Store	45,000	SF	0.097	4,365
Restaurant	250-500	SEATS	35	8,750-17,500
Retail Store	25,000	SF	0.05	1,250
			Subtotal	14,365 - 23,115
Age Restricted Condos	Quantity	Unit	GPD/Unit (310 CMR 15))	Estimated Total Flow (GPD)*
Housing for the Elderly		1-BED UNIT	110	0
	60	2-BED UNIT	150	9,000
			Subtotal	9,000
Senior Housing Use	Quantity	Unit	GPD/Unit (310 CMR 15)	Estimated Total Flow (GPD)*
Housing for the Elderly	42	1-BED UNIT	110	4,620
	6	2-BED UNIT	150	900
			Subtotal	5,520
Avalon 40B Housing	Quantity	Unit	GPD/Unit (310 CMR 15)	Estimated Total Flow (GPD)*
Family Dwelling, Multiple	124	1-BED UNIT	110	13,640
	101	2-BED UNIT	220	22,220
	25	3-BED UNIT	330	8,250
Club House	2000	SF	0.075	150
			Subtotal	44,260
			Project Total*	**73,145 - 81,895***

** Note: The estimated wastewater flows for the Project listed above are based on Title V guidelines even though for certain uses, the wastewater flow anticipated by Title V have been empirically demonstrated to be greater than actual flows. Furthermore, the estimated flows for the Project that are listed above are at the high end of the range that is expected from the retail development tenant mix and residential unit mix (for example, less than 10,000 sf of restaurants would result in substantially less flow than anticipated above). The Applicant will finalize estimates for these program elements prior to filing for the modification to the existing MassDEP Wastewater Discharge Permit.*

Estimated water usage = minimum 20% reduction from Title 5 rates = 58,500 to 65,500 gpd

Estimated net change in water usage compared to re-occupied site: = 58,500 to 65,500 - 42,250 =16,250 to 23,250

Estimated net change in water usage compared to 2006-2008 water meter readings
= (58,500-15,800) to (65,500-15,800) gpd
= 42,700 to 49,700 gpd

Appendix B:
Hydrant Flow Test Results

Flow Test Information Sheet

VHB Project Number: 13125

VHB Project Name: Raytheon Development

Location of Test: Boston Post Road

Fire hydrant No., if any: _____

Date & Time of Test: Date: 10/29/15 Time: 10:00 (**AM**) (PM)

Temperature _____ (F)

Test conducted by: Craig Finn, Wes Mize, Jon Ralphs

Test witnessed by: Pat Carrol, Foreman, Sudbury Water District

Name of Water District: Sudbury Water District

Name of Fire District: Sudbury Fire

Source of Water Supply: ***Gravity** ☐ Pump ☒ Other

Is water supply provided by: PRV STA's ☐ Yes ☐ No ☐ Other

Area Map: (Draw sketch showing property location: bounding streets and names, north arrow, hydrant location and identification numbers, distances from hydrants to property, elevations of hydrants and building floors & grade, all water mains and sizes interconnection valves, etc.)

See Attached Map

Flow Test Data

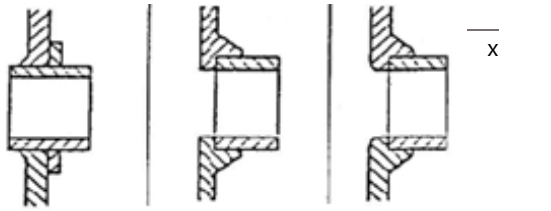
Flow at Hydr. No.	Elevation at Hydr.	Static at Hydr. No.	Static PSIG	Residual PSIG	Flow PSIG	Outlet size and coefficient		GPM
2	161				60	2 7/8"	0.9	1,719
	167	1	97	94				
	134	4	106	106				

Miscellaneous Comments: * At time of test, water was in a pumped condition. System is usually under gravity condition. See attached Q20 calcs

Signed: _____

Witness: _____

x



Outlet Square End Projecting Into Barrel Coef = 0.70

Outlet Square And Sharp Coef = 0.80

Outlet Smooth And Rounded Coef = 0.90

Project Raytheon
Location Sudbury, MA
Calculated by CWF
Checked by
Title Hydrant Flow Test Calculations

Project # 13125.00
Sheet of
Date 10/30/15
Date

vhb Computations

$$Q = 29.83\, c d^2 \sqrt{P}$$

$c = 0.9$

$d = 2.875$

$P = 60$

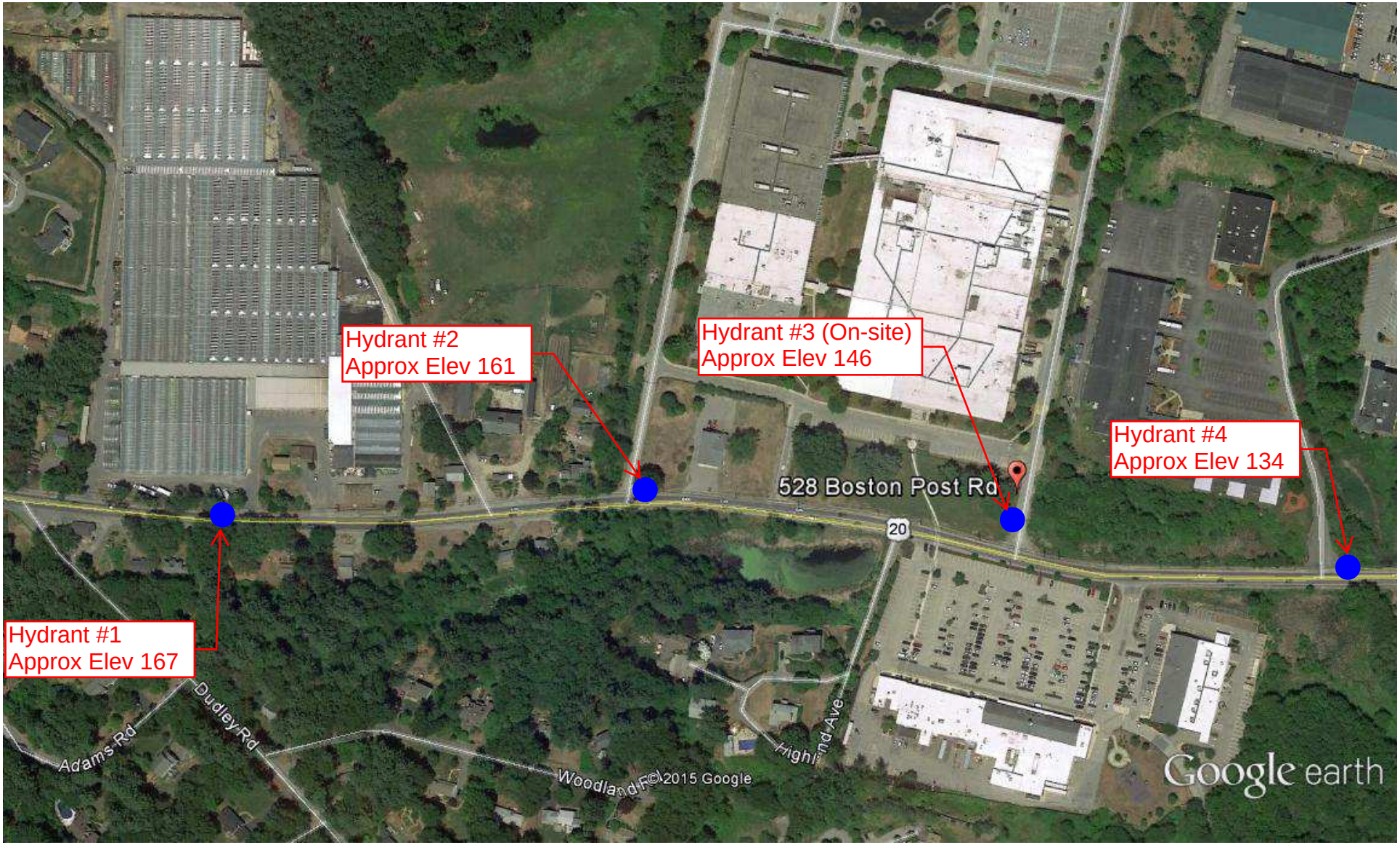
$$Q = 29.83(0.9)(2.875)^2\sqrt{60}$$

$$= 1719 \text{ GPM}$$

$$Q_{20} = Q\left(hr^{0.54} / hs^{0.54}\right)$$

$$= 1719\left[\frac{(97-20)^{0.54}}{(97-94)^{0.54}}\right]$$

$$= 9,916 \text{ GPM @ } 20 \text{ psi}$$



Google earth

feet 1000

meters 500

Appendix C:
Fire Flow Report and Pipe Report

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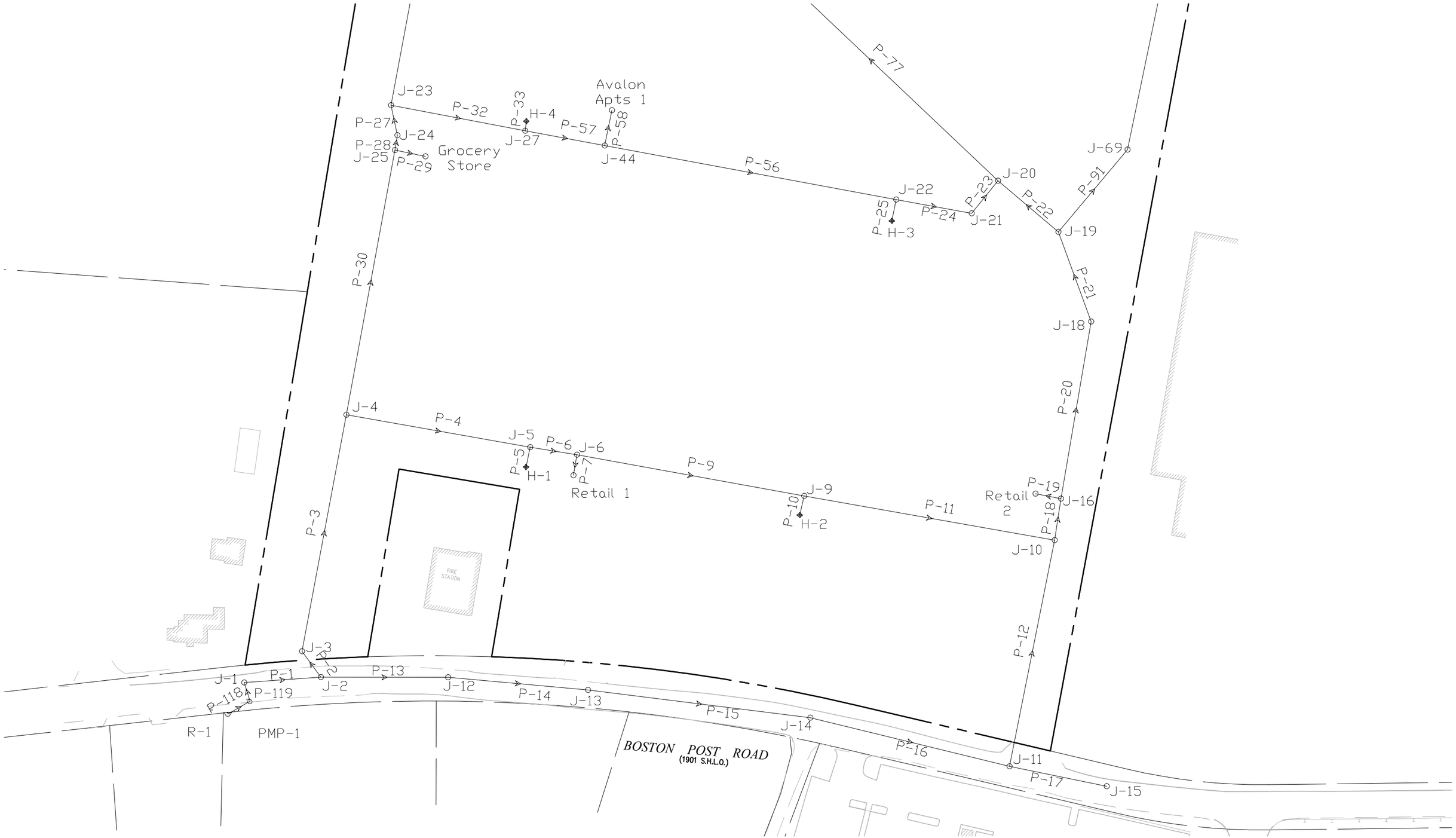
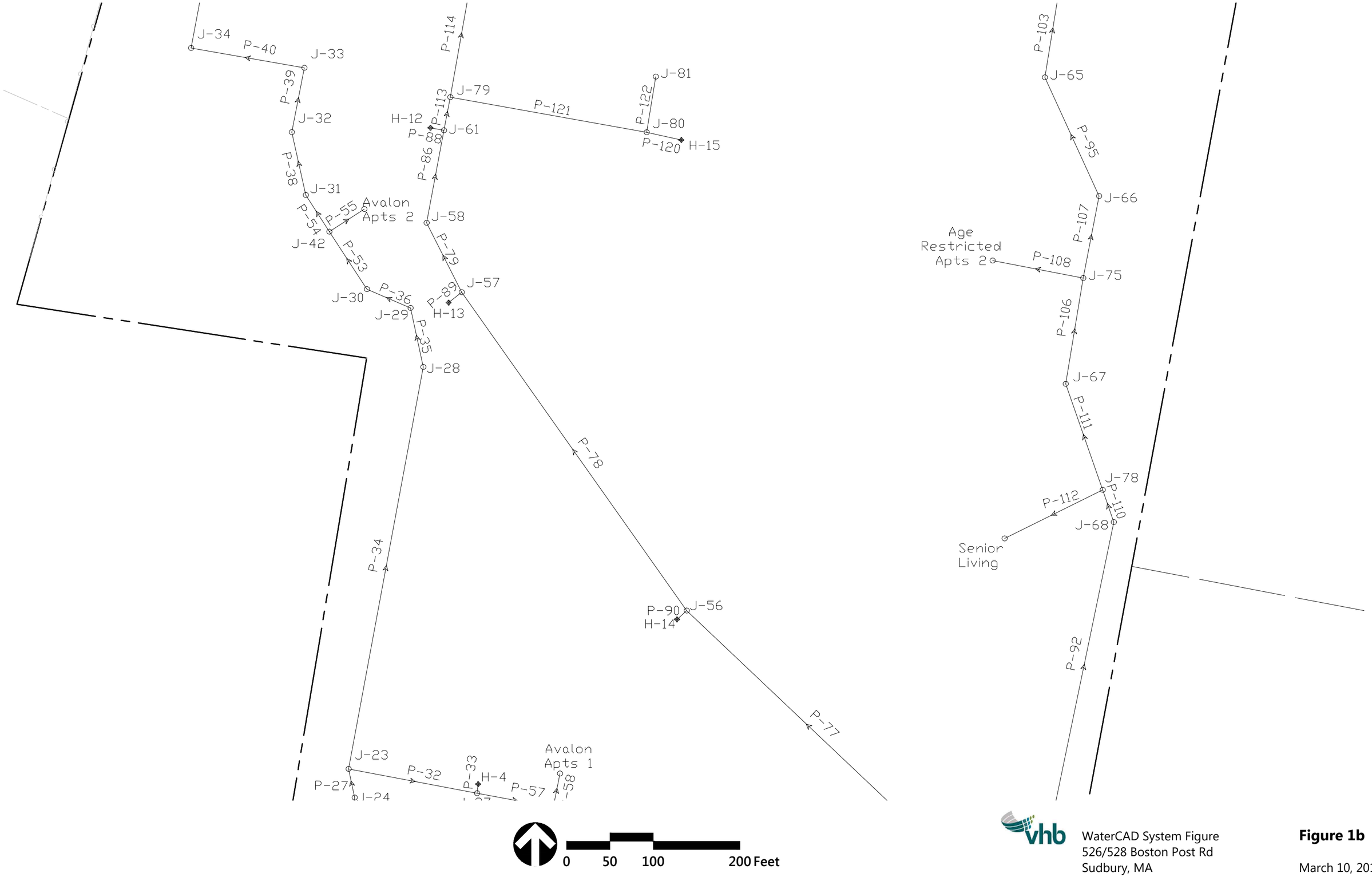


WaterCAD System Figure
526/528 Boston Post Rd
Sudbury, MA

Figure 1a

March 10, 2016



WaterCAD System Figure
526/528 Boston Post Rd
Sudbury, MA

Figure 1b

March 10, 2016

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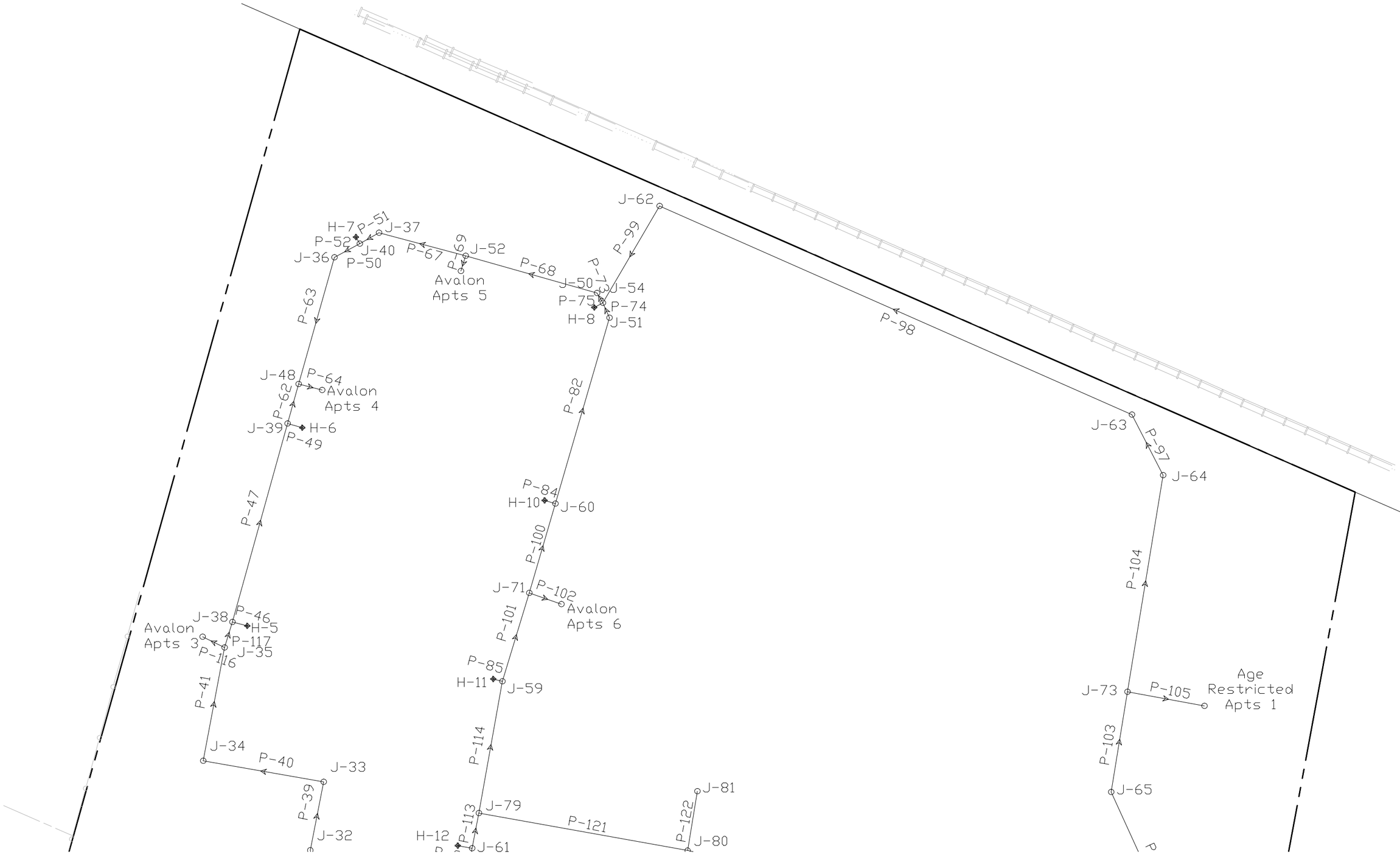

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WaterCAD System Figure
526/528 Boston Post Rd
Sudbury, MA

Figure 1c

March 10, 2016

Scenario: Base
Current Time Step: 0.000 Hr
Fire Flow Node FlexTable: Fire Flow Report

Label	Zone	Fire Flow Iterations	Satisfies Fire Flow Constraints?	Fire Flow (Needed) (gpm)	Fire Flow (Available) (gpm)	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Pressure (Residual Lower Limit) (psi)	Pressure (Calculated Residual) (psi)	Pressure (Zone Lower Limit) (psi)	Pressure (Calculated Zone Lower Limit) (psi)	Junction w/ Minimum Pressure (Zone)	Pressure (System Lower Limit) (psi)	Pressure (Calculated System Lower Limit) (psi)	Junction w/ Minimum Pressure (System)	Is Fire Flow Run Balanced?
J-1	Zone - 1	2	True	3,500	6,000	3,500	6,000	35.0	64.6	20.0	63.3	139	(N/A)	63.3	139	True
J-2	Zone - 1	2	True	3,500	6,000	3,500	6,000	35.0	62.8	20.0	60.6	139	(N/A)	60.6	139	True
J-3	Zone - 1	2	True	3,500	6,000	3,500	6,000	35.0	56.6	20.0	57.0	101	(N/A)	57.0	101	True
J-4	Zone - 1	3	True	3,500	6,000	3,500	6,000	35.0	38.8	20.0	39.3	101	(N/A)	39.3	101	True
J-5	Zone - 1	4	True	3,500	5,523	3,500	5,523	35.0	35.0	20.0	34.6	34	(N/A)	34.6	34	True
H-1	Zone - 1	4	True	3,500	4,844	3,500	4,844	35.0	35.0	20.0	48.7	32	(N/A)	48.7	32	True
J-6	Zone - 1	4	True	3,500	5,445	3,500	5,445	35.0	35.0	20.0	35.0	38	(N/A)	35.0	38	True
Retail 1	Zone - 1	4	True	3,500	5,261	3,511	5,272	35.0	35.0	20.0	38.9	36	(N/A)	38.9	36	True
J-9	Zone - 1	4	True	3,500	5,513	3,500	5,513	35.0	35.0	20.0	35.0	44	(N/A)	35.0	44	True
H-2	Zone - 1	4	True	3,500	4,888	3,500	4,888	35.0	35.0	20.0	48.2	42	(N/A)	48.2	42	True
J-10	Zone - 1	2	True	3,500	6,000	3,500	6,000	35.0	41.5	20.0	37.8	191	(N/A)	37.8	191	True
J-11	Zone - 1	2	True	3,500	6,000	3,500	6,000	35.0	55.4	20.0	52.3	191	(N/A)	52.3	191	True
J-12	Zone - 1	2	True	3,500	6,000	3,500	6,000	35.0	60.6	20.0	58.6	191	(N/A)	58.6	191	True
J-13	Zone - 1	2	True	3,500	6,000	3,500	6,000	35.0	59.3	20.0	56.9	191	(N/A)	56.9	191	True
J-14	Zone - 1	2	True	3,500	6,000	3,500	6,000	35.0	57.3	20.0	54.4	191	(N/A)	54.4	191	True
J-15	Zone - 1	2	True	3,500	6,000	3,500	6,000	35.0	53.0	20.0	52.3	191	(N/A)	52.3	191	True
J-16	Zone - 1	3	True	3,500	6,000	3,500	6,000	35.0	36.4	20.0	34.0	191	(N/A)	34.0	191	True
Retail 2	Zone - 1	4	True	3,500	5,763	3,511	5,775	35.0	35.0	20.0	38.2	191	(N/A)	38.2	191	True
J-18	Zone - 1	4	True	3,500	5,410	3,500	5,410	35.0	35.0	20.0	32.7	191	(N/A)	32.7	191	True
J-19	Zone - 1	4	True	3,500	5,241	3,500	5,241	35.0	35.0	20.0	30.7	191	(N/A)	30.7	191	True
J-20	Zone - 1	4	True	3,500	5,110	3,500	5,110	35.0	35.0	20.0	33.8	179	(N/A)	33.8	179	True
J-21	Zone - 1	4	True	3,500	5,012	3,500	5,012	35.0	35.0	20.0	36.6	71	(N/A)	36.6	71	True
J-22	Zone - 1	4	True	3,500	4,887	3,500	4,887	35.0	35.0	20.0	35.0	73	(N/A)	35.0	73	True
H-3	Zone - 1	3	True	3,500	4,384	3,500	4,384	35.0	35.0	20.0	47.0	71	(N/A)	47.0	71	True
J-23	Zone - 1	4	True	3,500	5,149	3,500	5,149	35.0	35.0	20.0	35.1	101	(N/A)	35.1	101	True
J-24	Zone - 1	4	True	3,500	5,201	3,500	5,201	35.0	35.0	20.0	35.6	101	(N/A)	35.6	101	True
J-25	Zone - 1	4	True	3,500	5,224	3,500	5,224	35.0	35.0	20.0	35.0	81	(N/A)	35.0	81	True
Grocery Store	Zone - 1	4	True	3,500	4,983	3,505	4,988	35.0	35.0	20.0	40.3	79	(N/A)	40.3	79	True
H-4	Zone - 1	4	True	3,500	4,592	3,500	4,592	35.0	35.0	20.0	40.7	85	(N/A)	40.7	85	True
J-27	Zone - 1	4	True	3,500	4,831	3,500	4,831	35.0	35.0	20.0	35.0	84	(N/A)	35.0	84	True
J-28	Zone - 1	3	True	3,500	4,095	3,500	4,095	35.0	35.0	20.0	35.9	91	(N/A)	35.9	91	True
J-29	Zone - 1	3	True	3,500	4,028	3,500	4,028	35.0	35.0	20.0	35.4	93	(N/A)	35.4	93	True
J-30	Zone - 1	3	True	3,500	3,968	3,500	3,968	35.0	35.0	20.0	35.3	124	(N/A)	35.3	124	True
J-31	Zone - 1	3	True	3,500	3,868	3,500	3,868	35.0	35.0	20.0	35.2	97	(N/A)	35.2	97	True
J-32	Zone - 1	3	True	3,500	3,796	3,500	3,796	35.0	35.0	20.0	35.5	99	(N/A)	35.5	99	True
J-33	Zone - 1	3	True	3,500	3,738	3,500	3,738	35.0	35.0	20.0	36.4	101	(N/A)	36.4	101	True
J-34	Zone - 1	3	True	3,500	3,666	3,500	3,666	35.0	35.0	20.0	37.6	134	(N/A)	37.6	134	True
J-35	Zone - 1	3	True	3,500	3,678	3,500	3,678	35.0	35.0	20.0	34.1	134	(N/A)	34.1	134	True
J-36	Zone - 1	3	True	3,500	3,750	3,500	3,750	35.0	35.0	20.0	36.1	119	(N/A)	36.1	119	True
J-37	Zone - 1	3	True	3,500	3,774	3,500	3,774	35.0	35.0	20.0	35.4	119	(N/A)	35.4	119	True
H-5	Zone - 1	3	True	3,500	3,549	3,500	3,549	35.0	35.0	20.0	38.7	134	(N/A)	38.7	134	True
J-38	Zone - 1	3	True	3,500	3,677	3,500	3,677	35.0	35.0	20.0	34.9	134	(N/A)	34.9	134	True
H-6	Zone - 1	3	True	3,500	3,544	3,500	3,544	35.0	35.0	20.0	38.6	115	(N/A)	38.6	115	True
J-39	Zone - 1	3	True	3,500	3,665	3,500	3,665	35.0	35.0	20.0	35.0	114	(N/A)	35.0	114	True
H-7	Zone - 1	3	True	3,500	3,665	3,500	3,665	35.0	35.0	20.0	37.9	120	(N/A)	37.9	120	True
J-40	Zone - 1	3	True	3,500	3,763	3,500	3,763	35.0	35.0	20.0	35.0	119	(N/A)	35.0	119	True
Avalon Apts 2	Zone - 1	3	True	3,500	3,735	3,509	3,744	35.0	35.0	20.0	40.0	125	(N/A)	40.0	125	True
J-42	Zone - 1	3	True	3,500	3,905	3,500	3,905	35.0	35.0	20.0	34.4	124	(N/A)	34.4	124	True
Avalon Apts 1	Zone - 1	4	True	3,500	4,536	3,509	4,545	35.0	35.0	20.0	40.2	130	(N/A)	40.2	130	True
J-44	Zone - 1	4	True	3,500	4,750	3,500	4,750	35.0	35.0	20.0	35.0	129	(N/A)	35.0	129	True
Avalon Apts 3	Zone - 1	3	True	3,500	3,576	3,509	3,585	35.0	35.0	20.0	38.1	103	(N/A)	38.1	103	True
Avalon Apts 4	Zone - 1	3	True	3,500	3,601	3,509	3,610	35.0	35.0	20.0	37.2	140	(N/A)	37.2	140	True
J-48	Zone - 1	3	True	3,500	3,675	3,500	3,675	35.0	35.0	20.0	35.0	139	(N/A)	35.0	139	True

Avalon Apts 5	Zone - 1	3	True	3,500	3,618	3,509	3,627	35.0	35.0	20.0	42.3	149	(N/A)	42.3	149	True
J-50	Zone - 1	3	True	3,500	3,991	3,500	3,991	35.0	35.0	20.0	35.5	144	(N/A)	35.5	144	True
J-51	Zone - 1	3	True	3,500	3,988	3,500	3,988	35.0	35.0	20.0	35.8	155	(N/A)	35.8	155	True
J-52	Zone - 1	3	True	3,500	3,871	3,500	3,871	35.0	35.0	20.0	33.7	144	(N/A)	33.7	144	True
H-8	Zone - 1	3	True	3,500	3,860	3,500	3,860	35.0	35.0	20.0	39.1	159	(N/A)	39.1	159	True
J-54	Zone - 1	3	True	3,500	4,003	3,500	4,003	35.0	35.0	20.0	35.0	155	(N/A)	35.0	155	True
J-56	Zone - 1	3	True	3,500	4,201	3,500	4,201	35.0	35.0	20.0	35.0	188	(N/A)	35.0	188	True
J-57	Zone - 1	3	True	3,500	3,864	3,500	3,864	35.0	35.0	20.0	35.0	186	(N/A)	35.0	186	True
J-58	Zone - 1	3	True	3,500	3,833	3,500	3,833	35.0	35.0	20.0	36.9	181	(N/A)	36.9	181	True
J-59	Zone - 1	3	True	3,500	3,762	3,500	3,762	35.0	35.0	20.0	35.0	179	(N/A)	35.0	179	True
H-10	Zone - 1	3	True	3,500	3,731	3,500	3,731	35.0	35.0	20.0	39.4	175	(N/A)	39.4	175	True
J-60	Zone - 1	3	True	3,500	3,880	3,500	3,880	35.0	35.0	20.0	35.0	174	(N/A)	35.0	174	True
H-11	Zone - 1	3	True	3,500	3,643	3,500	3,643	35.0	35.0	20.0	38.6	171	(N/A)	38.6	171	True
H-12	Zone - 1	2	True	3,500	3,507	3,500	3,507	35.0	35.0	20.0	43.5	182	(N/A)	43.5	182	True
J-61	Zone - 1	3	True	3,500	3,792	3,500	3,792	35.0	35.0	20.0	35.0	181	(N/A)	35.0	181	True
H-13	Zone - 1	3	True	3,500	3,639	3,500	3,639	35.0	35.0	20.0	41.8	167	(N/A)	41.8	167	True
H-14	Zone - 1	3	True	3,500	3,982	3,500	3,982	35.0	35.0	20.0	41.2	165	(N/A)	41.2	165	True
J-62	Zone - 1	3	True	3,500	3,908	3,500	3,908	35.0	35.0	20.0	39.6	191	(N/A)	39.6	191	True
J-63	Zone - 1	3	True	3,500	3,567	3,500	3,567	35.0	35.0	20.0	40.4	192	(N/A)	40.4	192	True
J-64	Zone - 1	3	True	3,500	3,681	3,500	3,681	35.0	35.0	20.0	33.0	191	(N/A)	33.0	191	True
J-65	Zone - 1	3	True	3,500	3,771	3,500	3,771	35.0	35.0	20.0	37.0	212	(N/A)	37.0	212	True
J-66	Zone - 1	3	True	3,500	3,821	3,500	3,821	35.0	35.0	20.0	37.7	193	(N/A)	37.7	193	True
J-67	Zone - 1	3	True	3,500	3,953	3,500	3,953	35.0	35.0	20.0	36.0	218	(N/A)	36.0	218	True
J-68	Zone - 1	3	True	3,500	4,106	3,500	4,106	35.0	35.0	20.0	35.5	225	(N/A)	35.5	225	True
J-69	Zone - 1	4	True	3,500	4,830	3,500	4,830	35.0	35.0	20.0	34.5	191	(N/A)	34.5	191	True
Avalon Apts 6	Zone - 1	3	True	3,500	3,676	3,509	3,685	35.0	35.0	20.0	38.3	208	(N/A)	38.3	208	True
J-71	Zone - 1	3	True	3,500	3,785	3,500	3,785	35.0	35.0	20.0	35.0	207	(N/A)	35.0	207	True
Age Restricted Apts 1	Zone - 1	3	True	3,500	3,525	3,505	3,531	35.0	35.0	20.0	42.4	213	(N/A)	42.4	213	True
J-73	Zone - 1	3	True	3,500	3,756	3,500	3,756	35.0	35.0	20.0	34.6	212	(N/A)	34.6	212	True
Age Restricted Apts 2	Zone - 1	3	True	3,500	3,583	3,505	3,588	35.0	35.0	20.0	43.1	218	(N/A)	43.1	218	True
J-75	Zone - 1	3	True	3,500	3,847	3,500	3,847	35.0	35.0	20.0	35.9	217	(N/A)	35.9	217	True
Senior Living	Zone - 1	3	True	3,500	3,692	3,507	3,699	35.0	35.0	20.0	45.8	225	(N/A)	45.8	225	True
J-78	Zone - 1	3	True	3,500	4,064	3,500	4,064	35.0	35.0	20.0	35.4	224	(N/A)	35.4	224	True
H-15	Zone - 1	3	False	3,500	3,252	3,500	3,252	35.0	35.0	20.0	39.2	244	(N/A)	39.2	244	True
J-79	Zone - 1	3	True	3,500	3,784	3,500	3,784	35.0	35.0	20.0	36.1	244	(N/A)	36.1	244	True
J-80	Zone - 1	3	False	3,500	3,373	3,500	3,373	35.0	35.0	20.0	35.0	247	(N/A)	35.0	247	True
J-81	Zone - 1	3	False	3,500	3,251	3,500	3,251	35.0	35.0	20.0	39.2	229	(N/A)	39.2	229	True

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Scenario: Base
Current Time Step: 0.000 Hr
FlexTable: Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Has Check Valve?	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Has User Defined Length?	Length (User Defined) (ft)
27	P-1	84.93	J-1	J-2	12.0	Ductile Iron	130.0	False	0.000	99	0.28	0.000	False	0.00
29	P-2	35.28	J-2	J-3	8.0	Ductile Iron	130.0	False	0.000	51	0.33	0.000	False	0.00
31	P-3	265.78	J-3	J-4	8.0	Ductile Iron	130.0	False	0.000	51	0.33	0.000	False	0.00
33	P-4	206.02	J-4	J-5	8.0	Ductile Iron	130.0	False	0.000	12	0.07	0.000	False	0.00
35	P-5	22.34	J-5	H-1	6.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
37	P-6	52.40	J-5	J-6	8.0	Ductile Iron	130.0	False	0.000	12	0.07	0.000	False	0.00
39	P-7	22.89	J-6	Retail 1	8.0	Ductile Iron	130.0	False	0.000	11	0.07	0.000	False	0.00
43	P-9	255.11	J-6	J-9	8.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
45	P-10	21.72	J-9	H-2	6.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
47	P-11	280.97	J-9	J-10	8.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
49	P-12	254.54	J-11	J-10	8.0	Ductile Iron	130.0	False	0.000	48	0.31	0.000	False	0.00
51	P-13	140.42	J-2	J-12	12.0	Ductile Iron	130.0	False	0.000	48	0.14	0.000	False	0.00
53	P-14	155.14	J-12	J-13	12.0	Ductile Iron	130.0	False	0.000	48	0.14	0.000	False	0.00
55	P-15	247.59	J-13	J-14	12.0	Ductile Iron	130.0	False	0.000	48	0.14	0.000	False	0.00
56	P-16	226.49	J-14	J-11	12.0	Ductile Iron	130.0	False	0.000	48	0.14	0.000	False	0.00
58	P-17	109.42	J-11	J-15	12.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
60	P-18	46.41	J-10	J-16	8.0	Ductile Iron	130.0	False	0.000	48	0.31	0.000	False	0.00
62	P-19	28.67	J-16	Retail 2	8.0	Ductile Iron	130.0	False	0.000	11	0.07	0.000	False	0.00
64	P-20	198.31	J-16	J-18	8.0	Ductile Iron	130.0	False	0.000	37	0.23	0.000	False	0.00
66	P-21	105.34	J-18	J-19	8.0	Ductile Iron	130.0	False	0.000	37	0.23	0.000	False	0.00
68	P-22	87.45	J-19	J-20	8.0	Ductile Iron	130.0	False	0.000	14	0.09	0.000	False	0.00
70	P-23	46.42	J-20	J-21	8.0	Ductile Iron	130.0	False	0.000	-3	0.02	0.000	False	0.00
72	P-24	84.72	J-21	J-22	8.0	Ductile Iron	130.0	False	0.000	-3	0.02	0.000	False	0.00
74	P-25	24.11	J-22	H-3	6.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
78	P-27	33.84	J-24	J-23	8.0	Ductile Iron	130.0	False	0.000	35	0.22	0.000	False	0.00
80	P-28	16.50	J-25	J-24	8.0	Ductile Iron	130.0	False	0.000	35	0.22	0.000	False	0.00
82	P-29	34.37	J-25	Grocery Store	8.0	Ductile Iron	130.0	False	0.000	5	0.03	0.000	False	0.00
83	P-30	297.09	J-4	J-25	8.0	Ductile Iron	130.0	False	0.000	40	0.25	0.000	False	0.00
87	P-32	150.86	J-23	J-27	8.0	Ductile Iron	130.0	False	0.000	12	0.07	0.000	False	0.00
88	P-33	10.53	H-4	J-27	6.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
90	P-34	471.19	J-23	J-28	8.0	Ductile Iron	130.0	False	0.000	23	0.15	0.000	False	0.00
92	P-35	69.57	J-28	J-29	8.0	Ductile Iron	130.0	False	0.000	23	0.15	0.000	False	0.00
94	P-36	54.80	J-29	J-30	8.0	Ductile Iron	130.0	False	0.000	23	0.15	0.000	False	0.00
98	P-38	74.29	J-31	J-32	8.0	Ductile Iron	130.0	False	0.000	14	0.09	0.000	False	0.00
100	P-39	75.56	J-32	J-33	8.0	Ductile Iron	130.0	False	0.000	14	0.09	0.000	False	0.00
102	P-40	132.65	J-33	J-34	8.0	Ductile Iron	130.0	False	0.000	14	0.09	0.000	False	0.00
104	P-41	125.03	J-34	J-35	8.0	Ductile Iron	130.0	False	0.000	14	0.09	0.000	False	0.00
113	P-46	11.58	H-5	J-38	6.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
116	P-47	222.50	J-38	J-39	8.0	Ductile Iron	130.0	False	0.000	5	0.03	0.000	False	0.00
118	P-49	10.91	H-6	J-39	6.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
121	P-50	31.33	J-40	J-36	8.0	Ductile Iron	130.0	False	0.000	4	0.02	0.000	False	0.00
122	P-51	23.94	J-37	J-40	8.0	Ductile Iron	130.0	False	0.000	4	0.02	0.000	False	0.00
123	P-52	8.25	H-7	J-40	6.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
126	P-53	79.33	J-30	J-42	8.0	Ductile Iron	130.0	False	0.000	23	0.15	0.000	False	0.00
127	P-54	50.18	J-42	J-31	8.0	Ductile Iron	130.0	False	0.000	14	0.09	0.000	False	0.00
128	P-55	47.97	J-42	Avalon Apts 2	8.0	Ductile Iron	130.0	False	0.000	9	0.06	0.000	False	0.00
131	P-56	327.47	J-22	J-44	8.0	Ductile Iron	130.0	False	0.000	-3	0.02	0.000	False	0.00
132	P-57	89.32	J-27	J-44	8.0	Ductile Iron	130.0	False	0.000	12	0.07	0.000	False	0.00
133	P-58	39.84	J-44	Avalon Apts 1	8.0	Ductile Iron	130.0	False	0.000	9	0.06	0.000	False	0.00
141	P-62	45.36	J-39	J-48	8.0	Ductile Iron	130.0	False	0.000	5	0.03	0.000	False	0.00
142	P-63	142.70	J-48	J-36	8.0	Ductile Iron	130.0	False	0.000	-4	0.02	0.000	False	0.00
143	P-64	26.22	J-48	Avalon Apts 4	8.0	Ductile Iron	130.0	False	0.000	9	0.06	0.000	False	0.00
150	P-67	97.16	J-37	J-52	8.0	Ductile Iron	130.0	False	0.000	-4	0.02	0.000	False	0.00
151	P-68	148.12	J-52	J-50	8.0	Ductile Iron	130.0	False	0.000	-13	0.08	0.000	False	0.00

152	P-69	17.32	J-52	Avalon Apts 5	6.0	Ductile Iron	130.0	False	0.000	9	0.10	0.000	False	0.00
160	P-73	12.47	J-50	J-54	8.0	Ductile Iron	130.0	False	0.000	-13	0.08	0.000	False	0.00
161	P-74	17.67	J-51	J-54	8.0	Ductile Iron	130.0	False	0.000	7	0.05	0.000	False	0.00
162	P-75	10.45	H-8	J-54	6.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
166	P-77	386.36	J-20	J-56	8.0	Ductile Iron	130.0	False	0.000	16	0.10	0.000	False	0.00
168	P-78	449.56	J-56	J-57	8.0	Ductile Iron	130.0	False	0.000	16	0.10	0.000	False	0.00
170	P-79	72.09	J-57	J-58	8.0	Ductile Iron	130.0	False	0.000	16	0.10	0.000	False	0.00
176	P-82	209.81	J-51	J-60	8.0	Ductile Iron	130.0	False	0.000	-7	0.05	0.000	False	0.00
178	P-84	12.07	H-10	J-60	6.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
180	P-85	10.15	H-11	J-59	6.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
183	P-86	123.73	J-58	J-61	8.0	Ductile Iron	130.0	False	0.000	16	0.10	0.000	False	0.00
185	P-88	25.94	H-12	J-61	6.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
187	P-89	19.31	H-13	J-57	6.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
189	P-90	14.99	H-14	J-56	6.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
198	P-91	118.63	J-19	J-69	8.0	Ductile Iron	130.0	False	0.000	23	0.15	0.000	False	0.00
199	P-92	340.40	J-69	J-68	8.0	Ductile Iron	130.0	False	0.000	23	0.15	0.000	False	0.00
202	P-95	150.52	J-66	J-65	8.0	Ductile Iron	130.0	False	0.000	11	0.07	0.000	False	0.00
204	P-97	73.84	J-64	J-63	8.0	Ductile Iron	130.0	False	0.000	5	0.03	0.000	False	0.00
205	P-98	560.11	J-63	J-62	8.0	Ductile Iron	130.0	False	0.000	5	0.03	0.000	False	0.00
206	P-99	121.76	J-62	J-54	8.0	Ductile Iron	130.0	False	0.000	5	0.03	0.000	False	0.00
209	P-100	100.92	J-60	J-71	8.0	Ductile Iron	130.0	False	0.000	-7	0.05	0.000	False	0.00
210	P-101	100.18	J-71	J-59	8.0	Ductile Iron	130.0	False	0.000	-16	0.10	0.000	False	0.00
211	P-102	36.90	J-71	Avalon Apts 6	8.0	Ductile Iron	130.0	False	0.000	9	0.06	0.000	False	0.00
214	P-103	110.05	J-65	J-73	8.0	Ductile Iron	130.0	False	0.000	11	0.07	0.000	False	0.00
215	P-104	238.09	J-73	J-64	8.0	Ductile Iron	130.0	False	0.000	5	0.03	0.000	False	0.00
216	P-105	84.85	J-73	Age Restricted Apts 1	8.0	Ductile Iron	130.0	False	0.000	5	0.03	0.000	False	0.00
219	P-106	123.53	J-67	J-75	8.0	Ductile Iron	130.0	False	0.000	16	0.10	0.000	False	0.00
220	P-107	96.26	J-75	J-66	8.0	Ductile Iron	130.0	False	0.000	11	0.07	0.000	False	0.00
221	P-108	106.40	J-75	Age Restricted Apts 2	8.0	Ductile Iron	130.0	False	0.000	5	0.03	0.000	False	0.00
226	P-110	39.41	J-68	J-78	8.0	Ductile Iron	130.0	False	0.000	23	0.15	0.000	False	0.00
227	P-111	129.40	J-78	J-67	8.0	Ductile Iron	130.0	False	0.000	16	0.10	0.000	False	0.00
228	P-112	126.32	J-78	Senior Living	8.0	Ductile Iron	130.0	False	0.000	7	0.04	0.000	False	0.00
231	P-113	40.01	J-61	J-79	8.0	Ductile Iron	130.0	False	0.000	16	0.10	0.000	False	0.00
232	P-114	145.15	J-79	J-59	8.0	Ductile Iron	130.0	False	0.000	16	0.10	0.000	False	0.00
234	P-116	26.57	J-35	Avalon Apts 3	8.0	Ductile Iron	130.0	False	0.000	9	0.06	0.000	False	0.00
235	P-117	28.92	J-35	J-38	8.0	Ductile Iron	130.0	False	0.000	5	0.03	0.000	False	0.00
238	P-118	28.59	R-1	PMP-1	16.0	Ductile Iron	130.0	False	0.000	99	0.16	0.000	False	0.00
239	P-119	21.66	PMP-1	J-1	16.0	Ductile Iron	130.0	False	0.000	99	0.16	0.000	False	0.00
245	P-120	14.79	H-15	J-80	6.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
246	P-121	175.37	J-80	J-79	8.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00
248	P-122	60.42	J-80	J-81	8.0	Ductile Iron	130.0	False	0.000	0	0.00	0.000	False	0.00

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