PRELIMINARY WATER ENGINEERING REPORT

425 S. RIVERSIDE AVENUE

CROTON-ON-HUDSON

WESTCHESTER COUNTY, NEW YORK

DATE: DECEMBER 23, 2025

Prepared By

Cronin Engineering, P.E., P.C.
39 Arlo Lane
Cortlandt Manor, New ork 10567

1.0 INTRODUCTION

1.1 Project Description

The project consists of a proposed 49-unit rental development consisting of 25 one-bedroom and 24 two-bedroom units in a to be constructed 3-story building with requisite parking and amenities (the "Development") to be located on lands fronting on South Riverside Avenue on Tax Map Parcel 79.13-2-91 owned by Carmel Riverside LLC. The site is currently improved with a 12,600 square foot, 1-story brick and block building and associated asphalt parking lot, which is proposed to be removed for the Development.

The proposed building will be served by 79 parking spaces. 56 spaces located in a below grade parking level and 23 in an outdoor parking area in front of the building, including five (5) Level 2 EV charging stations. Amenities within the building will include a community room, a fitness center, a co-working lounge, E-bike & bike storage rooms and a roof-top deck providing expansive scenic views overlooking Croton Point Bay and the Hudson River.

Sustainable building design features will likely include full electrification, solar readiness, high efficiency HVAC equipment (cold climate air source heat pumps) and appliances (Energy Star Multifamily New Construction Program) and low-flow water fixtures.

In total the property consists of 83,891 square feet (1.9 ± acres) and is located in the C-2 (Commercial) Zoning District and the HSRG (Harmon/South Riverside Gateway) Gateway Overlay Zoning District, the Village of Corton-on-Hudson Water District and the Ossining Sanitary Sewer District.

1.2 Existing Site Conditions

The subject project is located on South Riverside Avenue across from the ShopRite Plaza in the Village of Croton-On-Hudson. As previously stated, the site currently exists as a commercial development with one 12,600 sf brick and block building and associated asphalt parking lot and other appurtenances.

1.3 Proposed Site Conditions

It is proposed to construct a 24,200 sf ± (footprint area) affordable condominium development with associated parking and various site appurtenances. The new three-story building will contain 49 units. There will be 25 one-bedroom apartments and 24 two-bedroom apartments. Amenity spaces will also be constructed which will be used by the residents of the building. As part of the proposed development, there will be a new domestic water and fire service connection to the building. The new service lines will exit the building on the west side and will tie into the existing water main on South Riverside Avenue. See **Appendix A** for Water Main & Service mapping.

2.0 PROJECT DESIGN FLOWS

The project domestic maximum daily water demand used for design is anticipated to be the same as the maximum daily wastewater demand. As such the design maximum daily water flows for the proposed project, are based on the hydraulic loading rates given in the **New York State Department of Environmental Conservation (NYSDEC) publication *Design Standards for Intermediate Sized Wastewater Treatment Works – 2014* (DEC 2014)**. The design maximum daily water demand is a conservative design flow on which the water infrastructure will be designed. This value does not represent the average daily demand, which is expected to be less, or the peak demand.

The design flow rates for the residential units are based on the number of bedrooms per the tables below. The following table calculates the hydraulic loading rates, and the design flow rates (gallons per day or gpd) for the proposed project.

Proposed Use	# of Units	Hydraulic Loading Rate	Design Maximum Daily Flow (gpd)
One Bedroom Units	25 Units	110 gpd/bedroom	2,750
Two Bedroom Units	24 Units	110 gpd/bedroom	5,280
Total			**8,030**

The anticipated design average daily flows for the project are expected to be significantly less than the design maximum daily flow rate. The design maximum daily flows represent conservative flows to ensure that the proposed sewer works are designed with an ample factor of safety. The anticipated actual flows are based on anticipated occupancy rates and measured data for water use. Statistical data (obtained from *Rutgers University, Center for Urban Policy Research*, *Residential Demographic Multipliers*, June 2006) for the average number of occupants in rental units (based on number of bedrooms) was used to calculate the expected number of residents anticipated for the project as shown in the table below. Data from the **American Water Works Association ("AWWA") Water Conservation Division Subcommittee Report, Water Conservation Measurement Metrics Guidance Report, dated January 2010** shows that the average in home water use is 69.3 gpd per person. This number is reduced to 43.5 gpd per person when water saving fixtures are used, which is the case for this project. The following table below will be used to calculate flow to the existing sewer main. The 45 gpd per person was used to calculate the proposed anticipated average daily design as water saving fixtures will be used. See the table below for the calculation of the design average daily flow rates in the existing and proposed conditions.

Table 2.3: 425 S. Riverside Ave - Proposed Design Average Daily Flow Rate

Proposed Use	Occupancy Rate	Total Anticipated Residents	Water Use Per Resident (gpd)	Water Use (gpd)
25 – One Bedroom Units	1.206 people/unit	30	43.5	1,305
24 – Two Bedroom Units	1.689 people/unit	41	43.5	3,523
Total Anticipated Water Use (gpd)				**4,828**

As demonstrated above, through the use of water saving fixtures as required by current building code, a design maximum flow of 8,030 gpd is proposed for the project, with the actual anticipated flows being 4,828 gpd.

The peak hourly flow is calculated using a peaking factor that is based on the population of the subject project. A peaking factor of four (4) will be used for the project based on Figure 1 from Recommended Standards for Wastewater Facilities.

Peak Hourly Domestic Flow

8,030 gpd ÷ (24 hr/day) ÷ (60 min/hr) = 5.6 gallons per minute (gpm)

Peak Hourly Flow = 5.6 gpm x 4 = 22 gpm

Although the anticipated flows (average daily design flow) for the project is significantly lower than the design maximum daily flows, the Peak Hourly Flow based on the design maximum daily flows are used for the design of the system. This provides a factor of safety in the proposed design.

The new building is required to have fire sprinklers. The requirements for fire sprinkler systems were preliminarily established for the project based on review by the Fire System Design engineer. The fire sprinkler demand for the building is dictated by the required flow for the project and was provided 750 gpm for 60 minutes. The final fire sprinkler system will meet NFPA requirements and be designed by the Fire System Design engineer during the building permit process.

3.0 PROPOSED CONNECTION TO VILLAGE OF CROTON-ON-HUDSON SYSTEM

3.1 System Characteristics

Based on mapping provided of the existing system there is an existing 6-inch main in South Riverside Avenue that services the existing structure on the subject property. There is also an existing 10-inch main in Wayne Street. See **Appendix A** for Water Main mapping and **Appendix B** for Hydrant Flow Test results.

3.2 Proposed Water Service Connection and Hydrant

The existing water main that the project proposes to connect to is the 6-inch in South Riverside Avenue. As previously discussed, two separate service lines, domestic and fire, are proposed. Based on the available mapping provided in **Appendix A** the existing watermain is a 6-inch diameter pipe in South Riverside Avenue.

All water service piping 4-inch and greater will be Class 52 DIP. Restrained joint connections will be provided at all pipe bends through the use of Mega-lug fittings or approved equal. In addition, thrust blocks will be provided at all bends. Upon completion of the water service installation pressure testing, disinfection, and flushing will be performed in accordance with AWWA standards.

In addition to the water service connections proposed, an existing fire hydrant will need to be relocated to accommodate the proposed retaining wall along South Riverside Avenue. The hydrant will need to be moved closer to the road and will be ultimately located between the proposed sidewalk and retaining wall.

Recommended Standards for Water Works ("RSWW") recommends that the normal working pressure not be below 35 psi, and both the RSWW and the **American Water Works Association ("AWWA") M 31** recommend that a minimum of 20 psi be maintained at all points in the water distribution system during fire flows.

Hydrant flow tests were completed on March 27, 2025. Two (2) hydrant flow tests were performed including Hydrant H-371 on Young Avenue and Hydrant H-30 on South Riverside Avenue. See **Appendix B** for additional information regarding hydrant flow testing. The results are summarized in the following table.

Location	Flow (gpm)	Static Pressure (psi)	Residual Pressure (psi)
Young Avenue (Hydrant H-371)	604	116	90
South Riverside Avenue (Hydrant H-30)	400	138	40

Based on this testing the existing 6-inch water main in South Riverside Avenue can supply the domestic needs for the project. However, for fire flow, the 6-inch water main in South Riverside Avenue provides less than 500 gal/min at 20 psi thus not meeting the project fire flow demand. Improvements would be required to provide the 750 gpm sprinkler demand. Two (2) alternatives are discussed below including:

1. Improvements to the distribution system via a connection between the existing South Riverside Avenue Water Main and the Wayne Street Water Main for the Croton Point Avenue Project (see calculations in **Section 3.4** below).

2. Onsite water storage and pump system (see discussion in **Section 3.5** below).

3.3 Calculation for Residual Pressure at Service Connection for Peak Domestic Flow

The following calculations determine the residual pressure at the service connection to ensure that the minimum pressure of 35 psi is met at the highest service connection as required by RSWW. The calculations assume no distribution system improvements (i.e. Croton Point Ave Project Wayne Street Extension or improvements to be determined on South Riverside Avenue). The residual pressure will be calculated for peak domestic demand of 103 gpm as calculated in section 2.0:

1. **Calculate Static Pressure at First Floor Elevation ("FFE")**

Static Pressure at Hydrant (South Riverside Avenue)		=	138 psi
Elevation at Hydrant (South Riverside Avenue)		=	45 ft
Elevation of Proposed Service Connection		=	42 ft
Difference in Elevation of FFE & Hydrant	(57.5 ft – 45 ft)	=	+12.5 ft
Equivalent pressure Associated with Change in Elev.	(12.5 ft / 2.31psi)	=	-5.4 psi
Static Pressure at FFE	(138 psi – 5.4 psi)	=	132.6 psi

2. **Calculate Head Loss in System to Residual Pressure Hydrant at Peak Domestic Flow**

The equation below is taken from AWWA M17. The equation is used to calculate flow available at different pressures or differences in the residual pressure that would result from different flow rates. Here the equation is used to calculate the residual pressure (at the observation hydrant) for the domestic design flow of the building, using the pressures and flow rates measured during the flow test. The proposed domestic water service lines will be sized for a flow of 103 gpm.

Domestic Flow Calculation:

$$Q_R = Q_F * h_r^{0.54} / h_f^{0.54}$$

Where:

- Q_R = peak flow (103 gpm)
- Q_F = flow from hydrant during test (400 gpm)
- h_r = the difference in pressure between the static pressure measured at the observation hydrant and the residual pressure at the total combined flow
- h_f = the difference between the static pressure and residual pressure measured at the observation hydrant during the flow test, (98 psi)

$$103 \text{ gpm} = 400 \text{ gpm} * h_r^{0.54} / 98 \text{ psi}^{0.54}$$

$$h_r = 2 \text{ psi}$$

3. **Calculate Head Loss at Peak Domestic Flow from Residual Hydrant to Building**

Total Head Loss Due to Friction (See Spreadsheets in **Appendix C**) = 4 psi

Domestic Flow Calculation:

As noted above the static pressure at the FFE is 132 psi. A head loss of 2 psi was calculated in the system at peak domestic flow to the residual hydrant. An additional 4 psi of head loss was calculated in the existing water main from the residual hydrant to the proposed service line and in the proposed service line to the building. This results in a calculated pressure at FFE of:

132 psi – 2 psi -4 psi = 126 psi

As noted above the 126 psi pressure under peak hourly flow conditions exceeds the RSWW requirement of 35 psi for peak hourly domestic flow conditions. The existing system can supply the peak hourly domestic flow without distribution system improvements. As the pressure exceeds 100 psi, a pressure reduction valve should be provided on the domestic plumbing entering the building.

3.4 Calculation for Residual Pressure at Service Connection for Combined Peak Domestic Flow Plus Fire Flow (with Wayne Street Connection)

It is understood the Village installed a 10-inch water line in Wayne Street with a stub to South Riverside Avenue to allow the extension of the 10-inch line in Wayne Street to South Riverside Avenue. The following flow and pressure calculations assume that connection is made.

The equation below is taken from AWWA M17. The equation is used to calculate flow available at different pressures or differences in the residual pressure that would result from different flow rates. Here the equation is used to calculate the residual pressure (at the observation hydrant) for the domestic design flow of the building, using the pressures and flow rates measured during the flow test. The proposed domestic water service lines will be sized for a flow of 103 gpm. The fire service line will be sized for a flow of 750 gpm.

Head Loss in System at Fire Flow Calculation:

$Q_R = Q_F * h_r^{0.54} / h_f^{0.54}$

Where:

- Q_R = peak flow (853 gpm)
- Q_F = flow from hydrant during test (400 gpm)
- h_r = the difference in pressure between the static pressure measured at the observation hydrant and the residual pressure at the total combined flow
- h_f = the difference between the static pressure and residual pressure measured at the observation hydrant during the flow test, (30 psi)

$853 \text{ gpm} = 400 \text{ gpm} * h_r^{0.54} / 30 \text{ psi}^{0.54}$

$h_r = 54 \text{ psi}$

Fire Flow Calculation:

As shown in **Appendix C**, a head loss of 7-ft (3 psi) is calculated in the fire service line, 52 ft (22 psi) in the existing 6-inch diameter water main and 4-ft (2 psi) in the existing and proposed 10-inch diameter water main. The static pressure of 144 psi and system head loss of 44 psi to the Wayne Street Hydrant are calculated above. This results in a calculated pressure at building FFE of:

144 psi – 3 psi- 22 psi- 2 psi -54 psi = 63 psi

As noted above the 63 psi pressure under combined domestic and fire flow conditions exceeds the RSWW requirement for 20 psi throughout the system. The project MEP engineer will complete design of the fire sprinkler system as part of the building permit process.

3.5 Water Storage Tank Alternate for Fire Protection

As noted above, with an extension of the 10-inch watermain from Wayne Street to South Riverside Avenue, the existing system can supply the required water flow for the fire sprinkler system. While this connection has long been envisioned and desired by the Village the Wayne Street extension requires an easement from a private property owner. Should the easement not be able to be secured, and the Wayne Street extension cannot be completed, an onsite water storage tank and pump system would be used to supplement the available flows from the existing 6-inch watermain in South Riverside Avenue to meet the fire sprinkler requirements.

The MEP engineer has determined that a 60-minute duration is required for the 750 gpm sprinkler flow. For this flow rate and duration, a water use of 45,000 gallons is calculated. This water volume would be provided by a combination of the available flows from the existing system, the ability to supply the proposed hydrant, and supplemental onsite storage. Through the site plan process the applicant will work with the Village to determine the required size of the supplemental storage tank. The tank would be buried below grade in the parking garage.

Pump(s) would be provided to deliver the required supplemental flow from the storage tank to the sprinkler system. The pump(s) would be in the building mechanical room. A back-up generator will be provided to power the pump(s) in case of utility power failure. All water tanks would be buried below grade.

APPENDICES

APPENDIX A Croton-On-Hudson Water Main Mapping

APPENDIX B Hydrant Flow Test Data

APPENDIX C Head Loss Calculation Worksheets

APPENDIX A

Croton-on-Hudson Water Main Mapping


Static / Residual
Hydrant Test 1
Flow Hydrant
Test 1
Static / Residual
Hydrant Test 2 &
Flow Hydrant Test 3
Static / Residual
Hydrant Test 3
Flow Hydrant
Test 2

APPENDIX B

Hydrant Flow Test Data

FIRE FLOW TEST REPORT

DATE 3/27/2025
TIME 10:30 AM
FILE

LOCATION (STREET and any intersection) South Riverside Dr.
TEST MADE BY Jim Annicchiarico
REPRESENTATIVE OF Cronin Engineering
WITNESS Dan O'Connor, John Spatta and Ron Wegner
STATE PURPOSE OF TEST Fire Sprinkler design for proposed building
Well PUMPS OPERATING and flow rate Wells 3 and 4
North Highland Booster Pumps Operating Booster Pumps ON

FLOW HYDRANT (HYDRANT #)	H-30	A1	A2	A3	
Nozzle Size	2 1/4"				
Pitot Reading					Total GPM
GPM		400			400
Elevation (USGS datum)		ft.	ft.	ft.	

RESIDUAL HYDRANT (HYDRANT #) H-30
STATIC B 138 psi RESIDUAL 40 psi
Elevation (USGS datum) ft.

PROJECTED RESULTS 442 gpm @ 20 psi or 442 gpm @ 20 psi

Boundary Conditions:
Well 3 and 4 Flow Rate (gpm): 800
North Highland Above Ground Tank Level (ft) 19.6
North Highland Below Ground Tank Level (ft)
Hessian Hills Tank Level (ft)

REMARKS Hydrant date is 1967 with a 4" valve
Hose Monster 2" Pitotless nozzle used for test
reading on nozzle was 5 psi
handheld pitot was used with reading of 1 or 2 psi
the reading of 5 was below the lowest value on the chart for the
2" Pitotless nozzle of 10 psi which is indicated on the chart to
result in a flow of 493 gpm

FIRE FLOW TEST REPORT

DATE 3/27/2025
TIME 11:00 AM
FILE

LOCATION (STREET and any intersection)	Young Ave hydrant in front of 16 Young Ave
TEST MADE BY	Jim Annicchiarico
REPRESENTATIVE OF	Cronin Engineering
WITNESS	Dan O'Connor, John Spatta and Ron Wegner
STATE PURPOSE OF TEST	Fire Sprinkler design for proposed building
Well PUMPS OPERATING and flow rate	Wells 3 and 4
North Highland Booster Pumps Operating	Booster Pumps ON

FLOW HYDRANT (HYDRANT #)	H-371	A1	A2	A3	
Nozzle Size	2 1/4"				
Pitot Reading					Total GPM
GPM		604			604
Elevation (USGS datum)		ft.	ft.	ft.	

RESIDUAL HYDRANT (HYDRANT #) H-371
STATIC B 116 psi RESIDUAL 90 psi
Elevation (USGS datum) ft.

PROJECTED RESULTS 1223 gpm @ 20 psi or 1223 gpm @ 20 psi

Boundary Conditions:

Well 3 and 4 Flow Rate (gpm):	800
North Highland Above Ground Tank Level (ft)	19.6
North Highland Below Ground Tank Level (ft)	
Hessian Hills Tank Level (ft)	

REMARKS Hydrant date is 2005 with a 5.25" valve
Hose Monster 2" Pitotless nozzle used for test
reading on nozzle was 15 psi
2" Pitotless nozzle at 15 psi which is indicated on the chart to
result in a flow of 604 gpm

APPENDIX C

Head Loss Calculation Worksheets

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DEMAND LOAD OF FIXTURES

Owner Carmel Riverside LLC
Address 425 S. Riverside Avenue
Town, State, Zip Code Croton-on-Hudson, New York
Type of Occupancy Residential Condo Building - Domestic Service

Fixture	Occupancy	Type	Load in Fixture Units		No. of Fixtures		Total Fixture Unit Load
Water Closet	Public	Flush Valve	10	x		=	**0**
Water Closet	Public	Flush Tank	5	x		=	**0**
Urinal	Public	1" Flush Valve	10	x		=	**0**
Urinal	Public	3/4" Flush Valve	5	x		=	**0**
Urinal	Public	Flush Tank	3	x		=	**0**
Lavatory	Public	Faucet	2	x		=	**0**
Mop Sink	Public	Faucet	4	x		=	**0**
Shower Head	Public	Mixing Valve	4	x		=	**0**
Drinking Fountain	Public	Faucet	2	x		=	**0**
Service Sink	Office, etc.	Faucet	3	x		=	**0**
Ice Machine	Hotel, Restaurant	Faucet	4	x		=	**0**
Kitchen Sink	Hotel, Restaurant	Faucet	4	x		=	**0**
Dishwasher	Hotel, Restaurant	Faucet	3	x		=	**0**
Laundry Traps (20 lb)	Hotel	Faucet	3	x	**49**	=	**147**
Laundry Traps (30 lb)	Hotel	Faucet	5	x		=	**0**
Laundry Traps (60 lb)	Hotel	Faucet	8	x		=	**0**
Water Closet	Private	Flush Valve	6	x		=	**0**
Water Closet	Private	Flush Tank	3	x	**98**	=	**294**
Lavatory	Private	Faucet	1	x	**98**	=	**98**
Bathtub	Private	Faucet	2	x	**98**	=	**196**
Shower Head	Private	Mixing Valve	2	x	**98**	=	**196**
Bathroom Group	Private	Flush Valve for closet	8	x		=	**0**
Bathroom Group	Private	Flush Tank for closet	6	x		=	**0**
Separate Shower	Private	Mixing Valve	2	x		=	**0**
Kitchen Sink	Public	Faucet	2	x	**49**	=	**98**
Utility Sink	Private	Faucet	2	x		=	**0**
Hose Connection	Public	Faucet	3	x	**4**	=	**12**
Dishwasher	Private	Faucet	2	x	**49**	=	**98**

Combined Fixture Load - Total **1139** **F.U.**

Peak Demand (gpm) **223** **gpm**

Peak Demand (gpm) x Factor of 0.5 = **112** **gpm**

Add Irrigation - **5** Spray System x 1.0 = **0** **gpm**
Add Irrigation - **0** Rotary System x 0.04 = **0** **gpm**
Add Irrigation - **1** Hose Bibs x 10.00 = **0** **gpm**

Additional Fixed Load (If Applicable) = **gpm**

TOTAL PEAK DEMAND **112** **gpm**

Note: For fixtures not listed loads should be assumed by comparing the fixture to one listed using water in similar quantities and at similar rates. The given loads are for total demand. For fixtures with both hot and cold water suplies, the loads for separate demands may be taken as three fourths of the loads listed.

HEAD LOSS DATA

Owner	**Carmel Riverside LLC**
Address	**425 S. Riverside Avenue**
Town, State, Zip Code	**Croton-on-Hudson, New York**
Type of Occupancy	**Residential Condo Building - Domestic Service**

	PIPE DIAMETER	**4**	in	
	PIPE C FACTOR	110		
	ESTIMATED FLOW	**112**	gpm	
	PIPE LENGTH	90	ft	(Incl. Misc. Fittings/Valves)
HAZEN WILLIAMS FORMULA				
	VELOCITY	2.85	fps	
	FLOW	0.25	cfs	
	AREA	0.09	ft^2	
	HYDRAULIC RAD.	0.08	ft	
	HEAD LOSS AT PEAK DEMAND	**0.5**	**psi**	
	HEAD LOSS THROUGH METERS	**2**	**psi**	Water Meter
	HEAD LOSS THROUGH FILTERS	**0**	**psi**	N/A
	HEAD LOSS THROUGH BACKFLOW PREVENTER	**12**	**psi**	Watts LF009 RPZ
	TOTAL ANTICIPATED HEAD LOSS AT PEAK DEMAND	**14.5**	**psi**	
	Typical Max. System Static Pressure	75	psi	
	Typical Min. System Static Pressure	75	psi	
	Elevation of Backflow Preventor in Building	105	ft.	
	Elevation at Water Connection	100	ft.	
	Total Elevation Change	5	ft.	
	HEAD LOSS DUE TO ELEVATION	**2.2**	**psi**	
	Anticipated Max. Static Pressure at Backflow Preventor	72.8	psi	
	Anticipated Min. Static Pressure at Backflow Preventor	72.8	psi	
	ANTICIPATED MAX. PRESSURE AT BACKFLOW PREVENTOR DURING PEAK DEMAND	**58.3**	**psi**	
	ANTICIPATED MIN. PRESSURE AT BACKFLOW PREVENTOR DURING PEAK DEMAND	**58.3**	**psi**	

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DEMAND LOAD OF FIXTURES

Owner	Carmel Riverside LLC
Address	425 S. Riverside Avenue
Town, State, Zip Code	Croton-on-Hudson, New York
Type of Occupancy	Residential Cooperative Building - Fire Service

Fixture	Occupancy	Type	Load in Fixture Units		No. of Fixtures		Total Fixture Unit Load
Water Closet	Public	Flush Valve	10	x		=	**0**
Water Closet	Public	Flush Tank	5	x		=	**0**
Urinal	Public	1" Flush Valve	10	x		=	**0**
Urinal	Public	3/4" Flush Valve	5	x		=	**0**
Urinal	Public	Flush Tank	3	x		=	**0**
Lavatory	Public	Faucet	2	x		=	**0**
Mop Sink	Public	Faucet	4	x		=	**0**
Shower Head	Public	Mixing Valve	4	x		=	**0**
Drinking Fountain	Public	Faucet	2	x		=	**0**
Service Sink	Office, etc.	Faucet	3	x		=	**0**
Ice Machine	Hotel, Restaurant	Faucet	4	x		=	**0**
Kitchen Sink	Hotel, Restaurant	Faucet	4	x		=	**0**
Dishwasher	Hotel, Restaurant	Faucet	3	x		=	**0**
Laundry Traps (20 lb)	Hotel	Faucet	3	x		=	**0**
Laundry Traps (30 lb)	Hotel	Faucet	5	x		=	**0**
Laundry Traps (60 lb)	Hotel	Faucet	8	x		=	**0**
Water Closet	Private	Flush Valve	6	x		=	**0**
Water Closet	Private	Flush Tank	3	x		=	**0**
Lavatory	Private	Faucet	1	x		=	**0**
Bathtub	Private	Faucet	2	x		=	**0**
Shower Head	Private	Mixing Valve	2	x		=	**0**
Bathroom Group	Private	Flush Valve for closet	8	x		=	**0**
Bathroom Group	Private	Flush Tank for closet	6	x		=	**0**
Separate Shower	Private	Mixing Valve	2	x		=	**0**
Kitchen Sink	Public	Faucet	2	x		=	**0**
Utility Sink	Private	Faucet	2	x		=	**0**
Hose Connection	Public	Faucet	3	x		=	**0**
Dishwasher	Private	Faucet	2	x		=	**0**

Combined Fixture Load - Total **0** **F.U.**

FIRE FLOW Peak Demand (gpm) **750** **gpm**

Peak Demand (gpm) x Factor of 1.00 = **750** **gpm**

Additional Fixed Load (If Applicable) = **0** **gpm**

TOTAL PEAK DEMAND **750** **gpm**

Note: For fixtures not listed loads should be assumed by comparing the fixture to one listed using water in similar quantities and at similar rates. The given loads are for total demand. For fixtures with both hot and cold water suplies, the loads for separate demands may be taken as three fourths of the loads listed.

HEAD LOSS DATA

Owner	**Carmel Riverside LLC**
Address	**425 S. Riverside Avenue**
Town, State, Zip Code	**Croton-on-Hudson, New York**
Type of Occupancy	**Residential Condo Building - Domestic Service**

	PIPE DIAMETER	**6**	in	
	PIPE C FACTOR	110		
	ESTIMATED FLOW	**750**	gpm	
	PIPE LENGTH	90	ft	(Incl. Misc. Fittings/Valves)
HAZEN WILLIAMS FORMULA				
	VELOCITY	8.51	fps	
	FLOW	1.67	cfs	
	AREA	0.20	ft^2	
	HYDRAULIC RAD.	0.13	ft	
	HEAD LOSS AT PEAK DEMAND	**2.3**	**psi**	
	HEAD LOSS THROUGH METERS	**0**	**psi**	N/A
	HEAD LOSS THROUGH FILTERS	**0**	**psi**	N/A
	HEAD LOSS THROUGH BACKFLOW PREVENTER	**15**	**psi**	DCDA
	TOTAL ANTICIPATED HEAD LOSS AT PEAK DEMAND	**17.3**	**psi**	
	Typical Max. System Static Pressure	135	psi	
	Typical Min. System Static Pressure	135	psi	
	Elevation of Backflow Preventor in Building	105	ft.	
	Elevation at Water Connection	100	ft.	
	Total Elevation Change	5	ft.	
	HEAD LOSS DUE TO ELEVATION	**2.2**	**psi**	
	Anticipated Max. Static Pressure at Backflow Preventor	132.8	psi	
	Anticipated Min. Static Pressure at Backflow Preventor	132.8	psi	
	ANTICIPATED MAX. PRESSURE AT BACKFLOW PREVENTOR DURING PEAK DEMAND	**115.5**	**psi**	
	ANTICIPATED MIN. PRESSURE AT BACKFLOW PREVENTOR DURING PEAK DEMAND	**115.5**	**psi**	