

*Engineer's Report for Water and Wastewater
Management
for
The Seventy-Six
Redevelopment Project*



**City of Albany
Albany County, New York**

Issued: September 22, 2020

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Chazen Project No. 32019.00

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1.0 INTRODUCTION

This report documents the investigation, analysis and schematic design that has been completed for the water and wastewater infrastructure of the proposed Seventy-Six Development. This project is the first of its kind and will set a new standard for water conservation, wastewater re-use and overall sustainability. This report is intended to convey the wholistic approach to water management, with a focus on how these systems and the project will impact the City and its municipal infrastructure. Detailed design of the onsite water and wastewater systems will be advanced as our team works towards Building Permit application later this fall.

The systems outlined in this report have been designed to push the limits of what is permitted within our current building codes and referenced standards. Despite this innovative approach to water management, our design was done in conformance with and in consideration of the following references:

- Great Lakes Upper Mississippi River Board of State Public Health & Environmental Managers (10 States-Standards), "Recommended Standards for Wastewater Facilities," 2014
- New York State Department of Environmental Conservation, "Design Standards for Intermediate Sized Wastewater Treatment Systems," 2014
- The 2020 New York State Uniform Building and Fire Code

Engineering drawings of the proposed site development, including the proposed sanitary sewer/storm sewer system offsite improvements have been submitted as an accompanying site plan set. References made to "the plans" or to specific "sheets" are in reference to these drawings. Schematic design details of the onsite wastewater treatment systems and rainwater harvesting systems are included in this report for reference.

This report is intended to be part of the application made for a mixed-use Development Plan completed on behalf of South End Development, LLC (SED).

2.0 PROJECT DESCRIPTION

The proposed project site consists of 32 parcels of land and the Scott Street right of way totaling approximately 2.39 acres. The project site is bordered by Krank Street, Seymour Street, Leonard Street and Second Avenue. A Site Location Map is included as Appendix A.

The proposed mixed-use development will consist of four modular buildings between six and eight stories in height that will be constructed over a podium that will include subsurface parking and at grade commercial space. The buildings will accommodate a total of 239 units divided into 46 studio, 79 one-bedroom, 76 two-bedroom, 33 three-bedroom and 5 two-bedroom penthouse apartments. The ground floor of each building will be reserved for commercial mixed-uses including a community center, restaurants, office space, retail, a supermarket and a daycare center. In total there is 43,499 square feet of commercial space between the four proposed buildings.

The project is being designed to the International Living Future Institute (ILFI) Net Zero Water standard. To achieve this ambitious goal the project will consider overall environmental stewardship by reducing the overall pre-development impact on Albany's water, sanitary system and storm sewer systems. One of

the areas of greatest impact will be to the City of Albany's combined sewer system. The project will collect and treat rainwater, stormwater, greywater and blackwater on site for re-use; offsetting water use by investing in efficiency equivalent to the quantity of annual water intake from the City's water system; and managing and storing stormwater on site to prevent discharge to the storm sewer system during peak flow times and not exceeding pre-development runoff volumes.

The Seventy-Six development has been designed to be a catalyst for a sustainable future and culture in the South End of Albany and the City as a whole.

3.0 EXISTING WATER SUPPLY AND DISTRIBUTION SYSTEM

3.1 Water District Service Area

The entire project site is located within the Albany Water District which produces 19 to 20 million gallons of water per day. The primary raw water source to this district is the Alcove Reservoir located on the Hannacroix Creek. The Basic Creek Reservoir and Loudonville Reservoir provide additional water volume when necessary. The raw water is treated at the Feura Bush Water Treatment Facility which has a maximum daily capacity of 32 million gallons.

Treatment including pre-oxidation, disinfection, coagulation, sedimentation, filtration and corrosion control through pH and alkalinity adjustment is provided at the treatment plant. Chlorine is added to the treated water as a residual disinfectant and ultraviolet light is a supplemental disinfectant for the water sourced from the Loudonville Reservoir.

3.2 Fire Protection

Hydrant flow testing data, dated June 19, 2020, is included in Appendix B. Three separate hydrant locations were tested. Theoretical fire flow calculations were performed based on the hydrant flow testing data the results of which are listed below in Table 1. Based upon the hydrant flow testing data, the projected available fire flow at Seventy-Six service area is calculated between 2,304 gpm and 3,774 gpm at a 20-psi residual. In addition to hydrant hose coverage, the building design includes an NFPA 13 sprinkler system. This system will require a fire pump to provide pressure and flow. Details of the fire pump and fire suppression system will be provided under separate cover.

Table 1: Hydrant Flow Test Results

Flow Hydrant (#)	Location	Static Pressure (psi)	Residual Pressure (psi)	Projected Fire Flow at 20 psi
1	85 Second Ave	62	59	3,774
2	17 Leonard St	60	50	2,304
3	58 Second Ave	56	50	3,131

4.0 EXISTING SANITARY SEWER FACILITIES

4.1 Sewer Collection System

The project site is located within the Bouck sewershed. This sewershed is approximately 599 acres in size and discharges to outfall CSO 013. According to the 2011 Albany Pool CSO Long Term Control Plan, outfall

13 discharged 94.1 MG of combined sewer overflow directly to the Hudson River over the course of 58 overflow events during the last recorded calendar year. Under normal conditions, the wastewater in this sewershed is directed to the Albany County South Plant for high level treatment.

4.2 South Plant Treatment

The Albany County Water Purification District provides sewer services to more than 200,000 customers by collecting wastewater at two wastewater treatment plants. The South Plant treats 90% of The City of Albany's wastewater as well as wastewater from the Port of Albany. The plant is designed to treat 19 MGD and is permitted for 29 MGD.

The South Plant utilizes screening and grit chambers, primary clarifiers, an aeration tank and a final clarifier for treatment. Between May 1 and October 31, the water is also disinfected using a UV system.

The County's systems meet or exceed the standards set by the Department of Environmental Conservation (DEC) and the New York State Department of Health (DOH). Based on conversations and records received from the City of Albany Department of Water and Water Supply, Albany County Department of Health and Albany County Water Purification District, the project site has the ability to discharge to the municipal system. Existing municipal sanitary sewer infrastructure is located on the project site.

5.0 PROPOSED WATER SUPPLY AND DISTRIBUTION SYSTEM

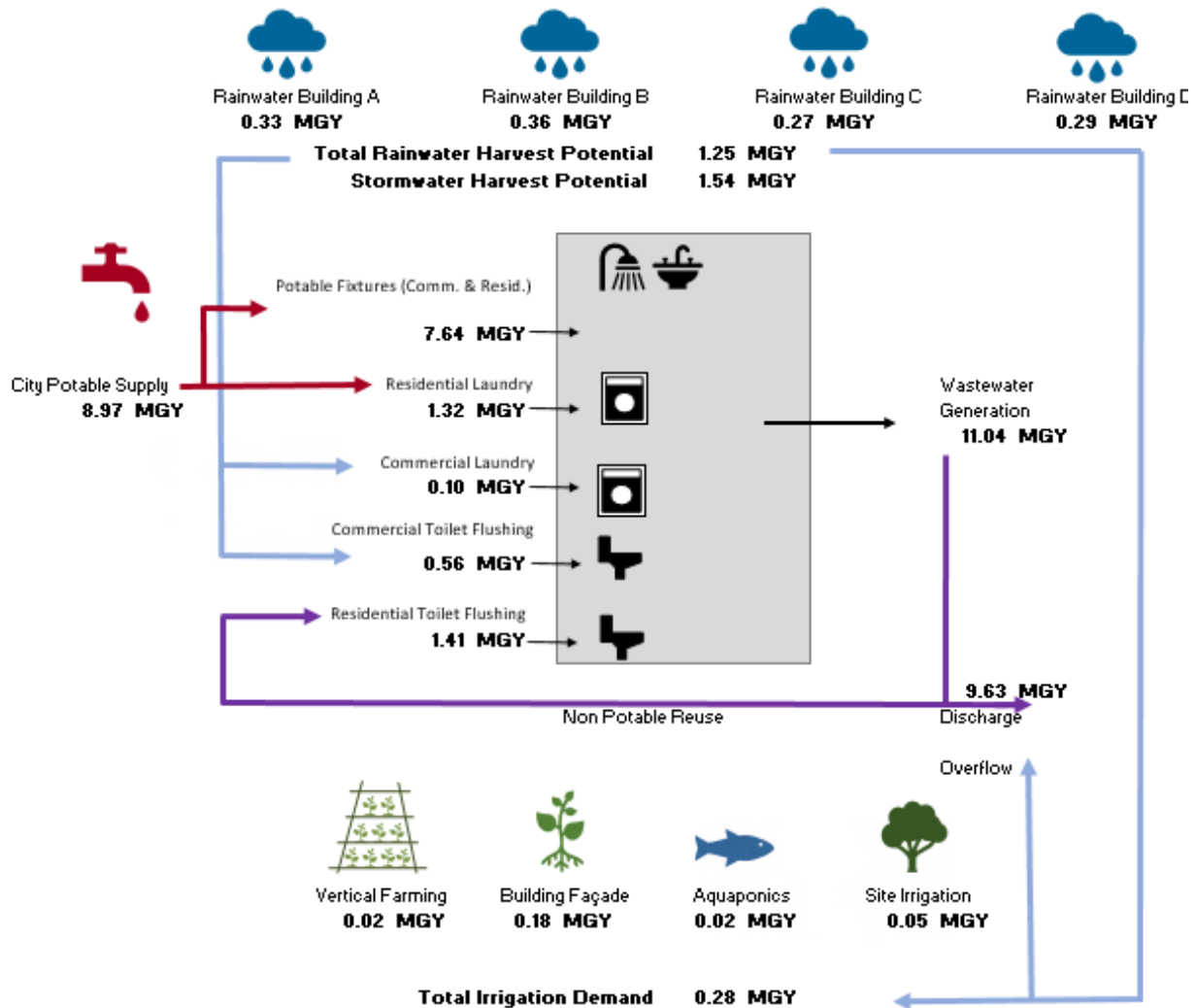
5.1 Anticipated Water Demand

To achieve Net Zero Water, this project will utilize the following strategies:

1. Use municipal potable supply only for uses that are required by current code, including domestic water use, residential laundry and fire suppression.
2. Utilize water efficient fixtures throughout both residential and commercial spaces to achieve a minimum of 50% reduction in water demand as required by ILFI.
3. Harvest rain and stormwater to supply all site and greenhouse irrigation, commercial laundry and commercial toilet flushing.
4. Treat 100% of wastewater generated on site and reuse a portion of it to supply non-potable water for residential toilet flushing.

Based on this overall approach, the total potable water supply demand from the City of Albany is 8.97 million gallons per year (MGY), or 24,575 gallons per day (gpd). This includes approximately 3,238 gpd from the 43,499 square feet of commercial tenant space, and 21,563 gpd from the residential potable demand. Tables that were used to calculate the water demand have been included in Appendix C. Additional detail on the water management program for the project, including what percentage of the total demand is made up with potable water, is shown in Figure 1 below.

**Figure 1:
 Water Management Schematic**



In order to meet the ILFI requirements for Net Zero Water, our project will need to offset the use of domestic water. This can be achieved through ‘handprinting’ for a positive benefit within the community. We are pursuing alternatives to meet this requirement, including developing a partnership where the excess treated wastewater will be used to reduce current demands in the community. Additional details will be provided when they are available.

5.2 Proposed Water System Improvements

5.2.1 On-site Improvements

The project proposes to install a water service lateral and dedicated fire protection water service as shown on the Utility Plan, sheet C-160. The remainder of water infrastructure to support the project will be designed and located within the limits of the buildings and therefore reviewed and permitted under the Building Permit Application.

5.2.2 Off-site Improvements

The City of Albany's water distribution systems in the vicinity of the project have adequate system pressures exceeding the minimum recommended system pressures for potable water service and have sufficient available fire flow to meet demands imposed by the proposed development. Therefore, no improvements are planned or proposed for these existing water distribution systems.

The proposed development, upon completion, will represent a small percentage of the total water demand imposed by existing users within the City. The existing water treatment plant (WTP) has adequate reserve treatment capacity and the demands imposed by the proposed development will not adversely impact the plant's operations. Therefore, no improvements are planned or proposed for the current treatment facility.

6.0 PROPOSED SANITARY SEWER SYSTEM

6.1 Anticipated Hydraulic Loading

The proposed project is unique in that despite the scale and density, the project will actually reduce the sanitary sewer loading on the City's infrastructure. As detailed in Figure 1 above, 100% of sanitary sewage generated by the Project will be collected and treated in an onsite wastewater treatment facility. This treated effluent will be utilized to flush residential toilets and support irrigation.

6.2 Proposed Sanitary Sewer System Improvements

6.2.1 On-site Improvements

The proposed development for the Seventy-Six includes an onsite wastewater treatment facility. The wastewater will be treated to tertiary standards in order to use the treated wastewater for non-potable water supply to the proposed development. Treatment elements will include a primary treatment tank, an equalization tank with anoxic moving bed biofilm reactor (MBBR), trickling filters with integrated clarifiers and an aerobic MBBR with settling tank. The water that will be reused will also be filtered and disinfected. The system will have a capacity of 30,000 GPD of treatment and 6,000 GPD of polishing.

The system will maintain connections to the municipal sanitary sewer to be able to discharge effluent in the event of maintenance, failure or for water quality concerns. The total volume of sewer discharge for regular maintenance will be approximately 500 gallons per day, discharged once a week during off-peak hours, resulting in a decrease over the existing single family and vacant lots that makeup the project site. A detailed schematic of this design is included in Appendix D.

6.3 Off-site Improvements

The Seventy-Six project will treat wastewater to tertiary standards for re-use, however, the total volume of treated wastewater is significantly more than can be used onsite. Our team is working with local partners to use more of this water in the neighborhood to further reduce potable water demand. We are also advancing offsite improvements to convey excess water to municipal infrastructure.

The South End currently does not have dedicated stormwater and sanitary sewer infrastructure. As part of the project, SED proposed to install a separate stormwater collection system from the project site to

the intersection of Seymour and Benjamin Street where it will connect to the City's partially separate stormwater main. This offsite improvement is detailed on plan sheet C-190. Additional improvements to the City's infrastructure, including a bypass of the Bouck regulator in South Pearl Street, have been discussed with the City. These improvements, in combination with the work proposed by SED, will eliminate 2.95 million gallons of stormwater each year from the City's combined sewer system.

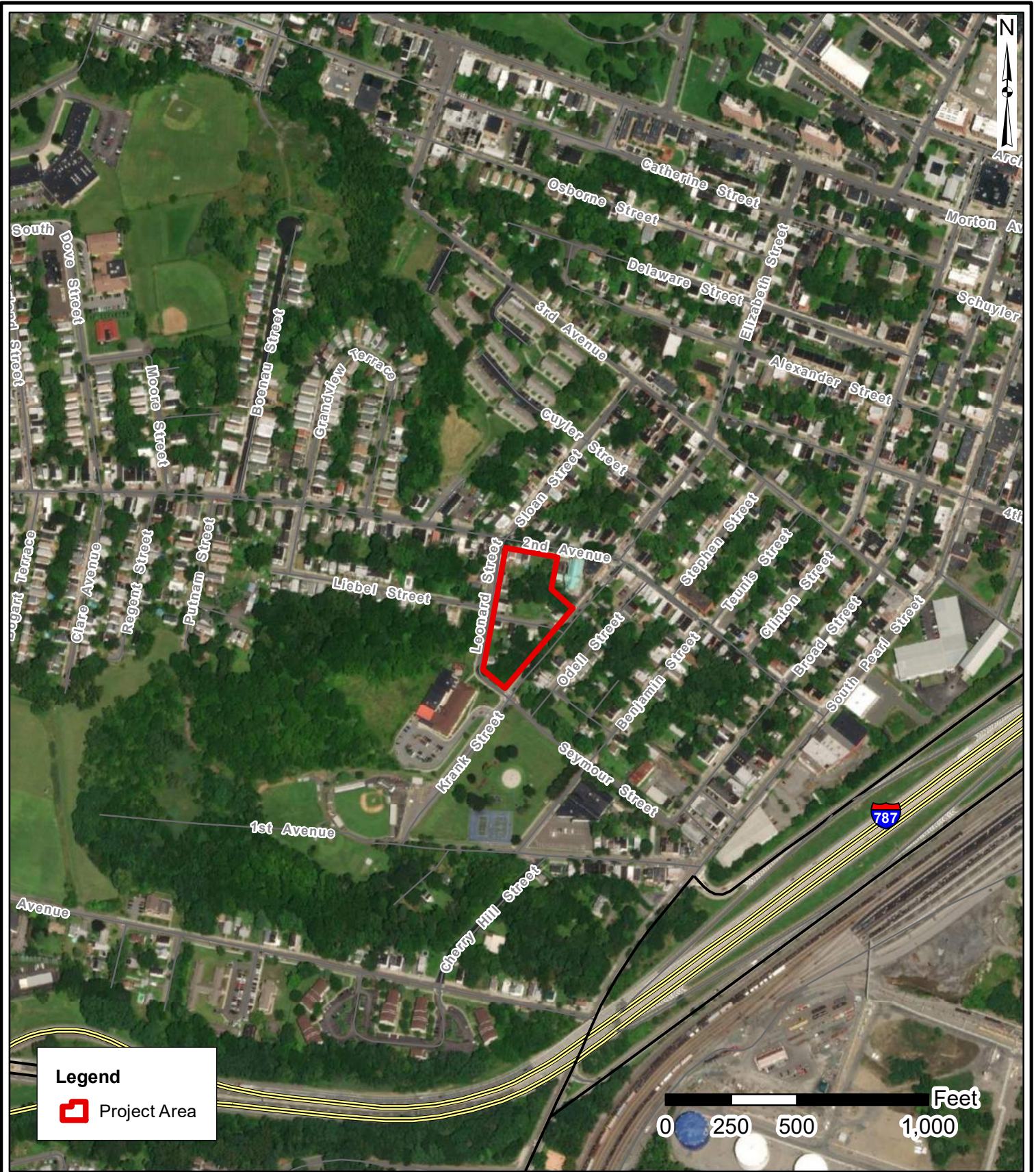
A detailed summary of these proposed improvements, as well as additional improvements that would increase the reduction of flow to the Combined Sewer system to nearly 35 MGY was submitted to the City Water and Sewer Departments in an August 7, 2020 report titled *"Combined Sewer System Off-Site Improvement Evaluation for South End Development."*

7.0 CONCLUSIONS


The Seventy-Six development is a groundbreaking project that will be the first Triple Net Zero mixed-use development in the United States. Despite the scale and density of this large mixed-use development, its innovative, sustainability focused design will reduce impacts to utilities in the South End neighborhood. Therefore, the project will not require any improvements to the City of Albany's water or sewer infrastructure.

As detailed in this report, the goals for this project and SED's vision for the South End neighborhood extend beyond "no impact." We look forward to building on the work from previous meetings with City staff and collaboratively advancing the proposed transformational improvements to the combined sewer system in and around Krank Park. We are committed to leveraging our project to be a catalyst for positive change not only in the South End neighborhood, but the City as a whole.

Appendix A: Site Location Map



Legend

 Project Area

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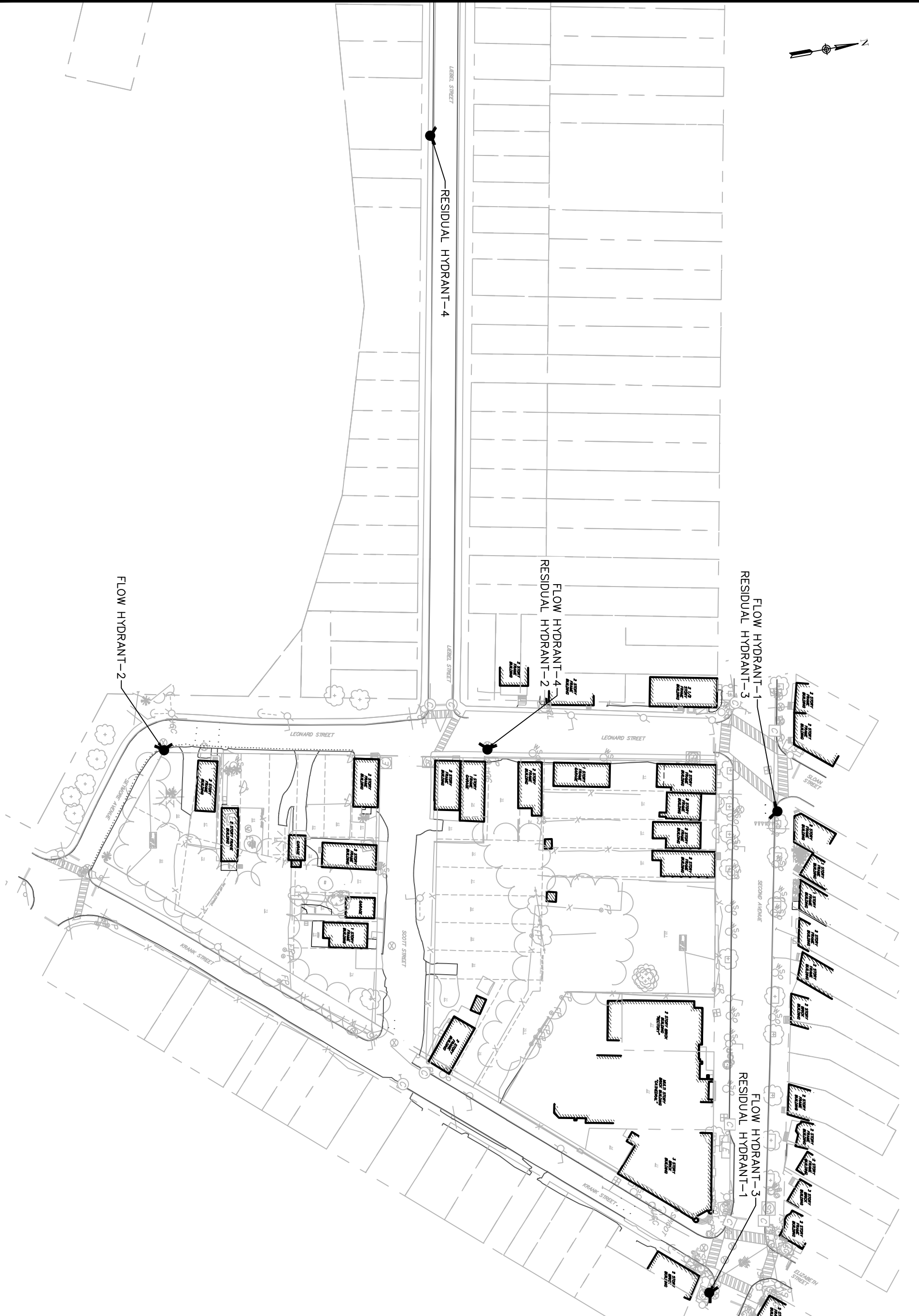
The Seventy-Six, South End Development LLC

Site Location Map

City of Albany - Albany County, NY

Drawn:	JC
Date:	04/29/2020
Scale:	1 inch = 500 feet
Project:	32019.00
Figure:	1

Appendix B: Hydrant Flow Test Data



ALTERATION OF THIS DRAWING, EXCEPT BY A LICENSED P.E. IS ILLEGAL. ANY ALTERATION BY A P.E. MUST BE INDICATED AND BEAR THE APPROPRIATE SEAL, SIGNATURE AND DATE OF ALTERATION.

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THE SEVENTY SIX
HYDRANT FLOW TESTING
LOCATION PLAN

CITY OF ALBANY, ALBANY COUNTY, NEW YORK

drawn TCC	checked
date 05/31/20	scale 1"=80'
project no. 32019.00	
sheet no. HYD-1	

Albany Water Department Fire Hydrant Flow Test

ID			
352			
Location			
85 Second Avenue			
Date	By	Representing	Witnessed By
6/19/2020	Peter Siciliano	AWD	Tom Romand
Purpose of Test		System Demand MGD	
Requested by Chazen		24 million	
Pumps In Operation			
N/A			
Pressure Regulated Zone			
<input checked="" type="checkbox"/>			
Flow Hydrant Location			
85 Second Avenue			
Nozzle Size	Number of Nozzles	Pitot Pressure	Pitot Flow GPM
2.5"	1	40	1060
Total Flow GPM			
1060			
Residual Hydrant Location			
58 Second Avenue			
Static Pressure PSI	Residual Pressure PSI	Fire Flow at 20 psi	
62	59	3774	
Remarks			
Both hydrants are fed off of the 1996 12" water main on Second Avenue.			

Albany Water Department Fire Hydrant Flow Test

ID			
353			
Location			
17 Leonard Street			
Date	By	Representing	Witnessed By
6/19/2020	Pete Siciliano	AWD	Tom Romand
Purpose of Test		System Demand MGD	
Requested by Chazen		24 MGD	
Pumps In Operation			
N/A			
Pressure Regulated Zone			
<input checked="" type="checkbox"/>			
Flow Hydrant Location			
17 Leonard Street			
Nozzle Size	Number of Nozzles	Pitot Pressure	Pitot Flow GPM
2.5"	1	42.5	1090
Total Flow GPM			
1090			
Residual Hydrant Location			
Leonard Street just north of Scott Street			
Static Pressure PSI	Residual Pressure PSI	Fire Flow at 20 psi	
60	50	2304	
Remarks			
Both water mains are fed off of the 6" 1893 water main on Leonard Street			

Albany Water Department Fire Hydrant Flow Test

ID			
351			
Location			
58 Second Avenue			
Date	By	Representing	Witnessed By
6/19/2020	Peter Siciliano	AWD	Tom Romand
Purpose of Test		System Demand MGD	
Requested by Chazen		24 MGD	
Pumps In Operation			
N/A			
Pressure Regulated Zone			
<input checked="" type="checkbox"/>			
Flow Hydrant Location			
58 Second Avenue			
Nozzle Size	Number of Nozzles	Pitot Pressure	Pitot Flow GPM
2.5	1	50	1190
Total Flow GPM			
1190			
Residual Hydrant Location			
58 Second Avenue			
Static Pressure PSI	Residual Pressure PSI	Fire Flow at 20 psi	
56psi	50psi	3131	
Remarks			
Both hydrants are fed off of the 1996 12" water main on Second Avenue			

Albany Water Department Fire Hydrant Flow Test

ID			
355			
Location			
Leonard Street just north of Scott Street			
Date	By	Representing	Witnessed By
6/19/2020	L. Di Nardo	AWD	Pete Siciliano
Purpose of Test		System Demand MGD	
Requested by Chazen		24 MGD	
Pumps In Operation			
N/A			
Pressure Regulated Zone			
<input checked="" type="checkbox"/>			
Flow Hydrant Location			
Leonard Street just north of Scott Street			
Nozzle Size	Number of Nozzles	Pitot Pressure	Pitot Flow GPM
2.5	1	32.5	960
Total Flow GPM			
960			
Residual Hydrant Location			
38 Liebel Street			
Static Pressure PSI	Residual Pressure PSI	Fire Flow at 20 psi	
32	?	?	
Remarks			

Appendix C: Water Demand

Table 1 Potable Baseline Demand & 50% Reduction Goal

Occupant Type	Potable Water Use (gal/unit)	Unit	Total Units	Average Total GPD	Days per Year	Gallons per Year
Food Sales & Service [‡]	0.35 [^]	square foot	31,543	11,040	312	3,444,496
Co-Working Office	10.61 [^]	employee	100	1,061	260	275,860
Retail/Public Space	0.03 [^]	square foot	11,956	498	312	111,908
Multi-Family	170 [*]	unit	239	40,630	365	14,829,950
		Sub-Total Commercial		12,460		3,832,264
		Sub-Total Residential		40,630		14,829,950
		Total		53,090		18,662,214
				Baseline Demand (MGY)		18.86
				I05 Goal (MGY)		9.33

[^]From: LBC Water Petal 4.0, Table 5-1 Baseline Potable Water Use by Occupancy Type

^{*}From: Kiefer, J.C. and L.R. Krentz. 2018. Water Use in the Multi-Family Housing Sector. Project 4554. Denver, Colo.: The Water Research Foundation

Table 2 Potable Design Demand & Comparison to 50% Reduction Goal

Occupant Type	Potable Water Use (gal/unit)	Unit	Total Units	Average Total GPD	Days per Year	Gallons per Year
Food Sales & Service	<i>see Section 3.1.3 for additional calcs</i>			3,127	312	975,632
Co-Working Office	2.53	person	100	253	260	65,650
Retail/Public Space	<i>see Section 3.1.3 for additional calcs</i>			267	312	83,386
Multi-Family	35.7	person	604	21,563	365	7,870,422
Swimming Pool	<i>see description below for calcs</i>			742.9	365	271,161
		Sub-Total Commercial		4,390		1,395,830
		Sub-Total Residential		21,563		7,870,422
		Total		25,952		9,266,252
				Design Demand (MGY)		9.27
				I05 Goal (MGY)		9.33
				Difference (MGY)		-0.06

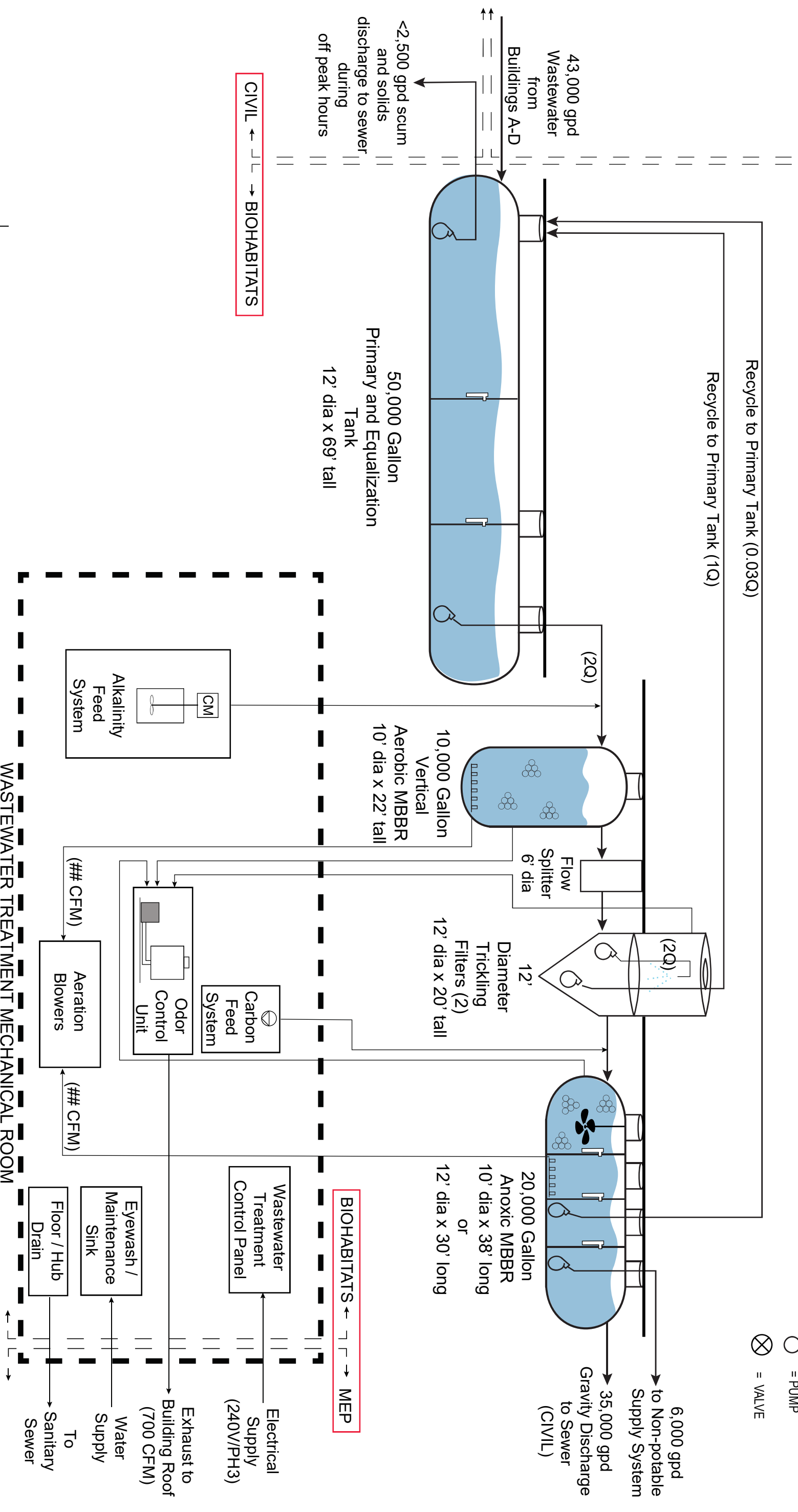
Table 3: Percent Reduction between the Potable Baseline & Demand

Occupant Type	Potable Baseline Demand - Avg. GPD	Potable Design Demand - Avg. GPD	% Reduction from Baseline
Food Sales & Service	11,040	3,127	72%
Office	1,061	253	76%
Retail/Pubic Space	359	267	25%
Multi-Family	40,630	21,563	47%
Swimming Pool	<i>*included in category above</i>	743	N/A
Sub-total Commercial	12,460	4,390	65%
Sub-total Residential	40,630	21,563	47%
Annual Total (365 days)	18,662,214	9,266,252	50%

Appendix D: Wastewater Treatment Schematic Design





MEP ← → BIOHABITATS

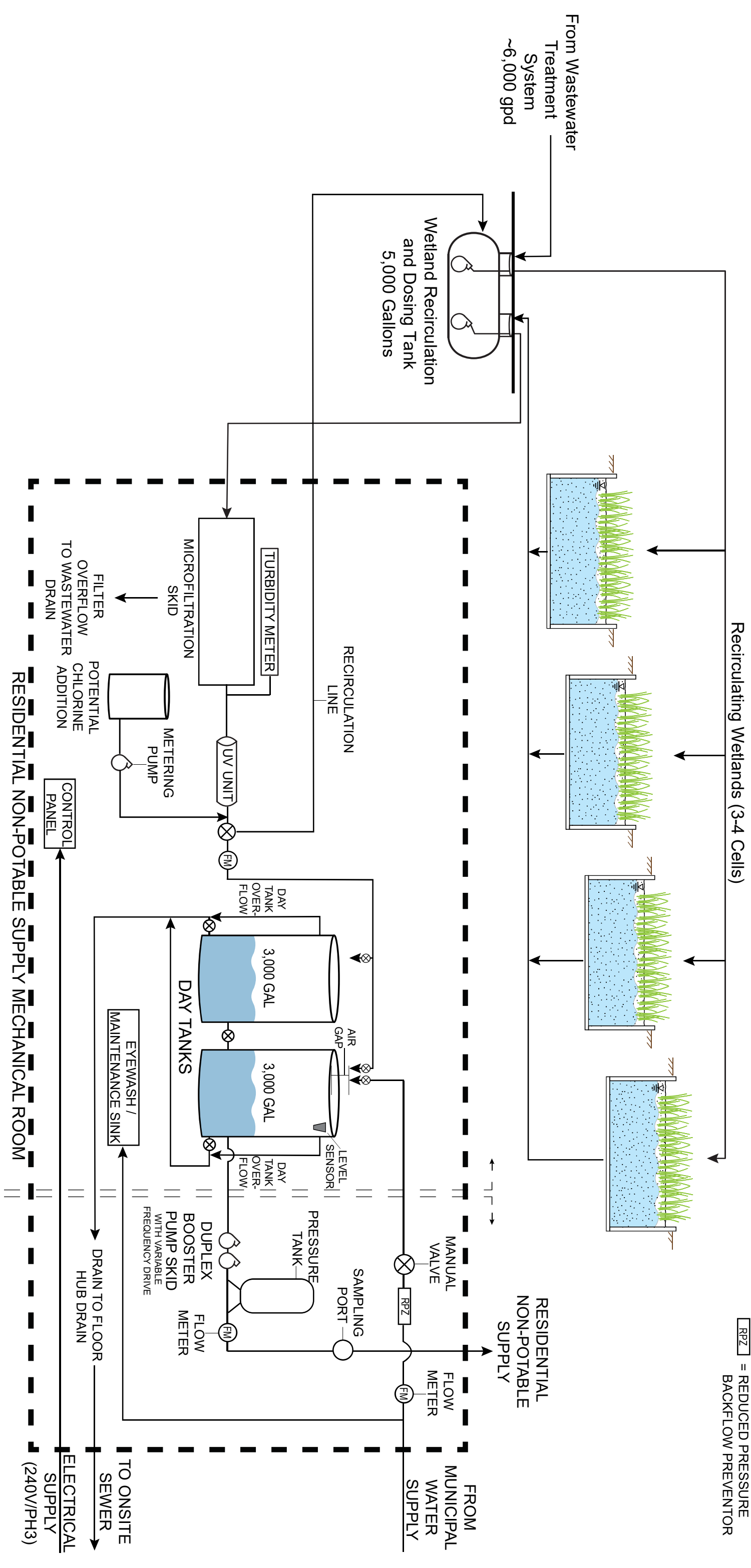
CIVIL ← → BIOHABITATS

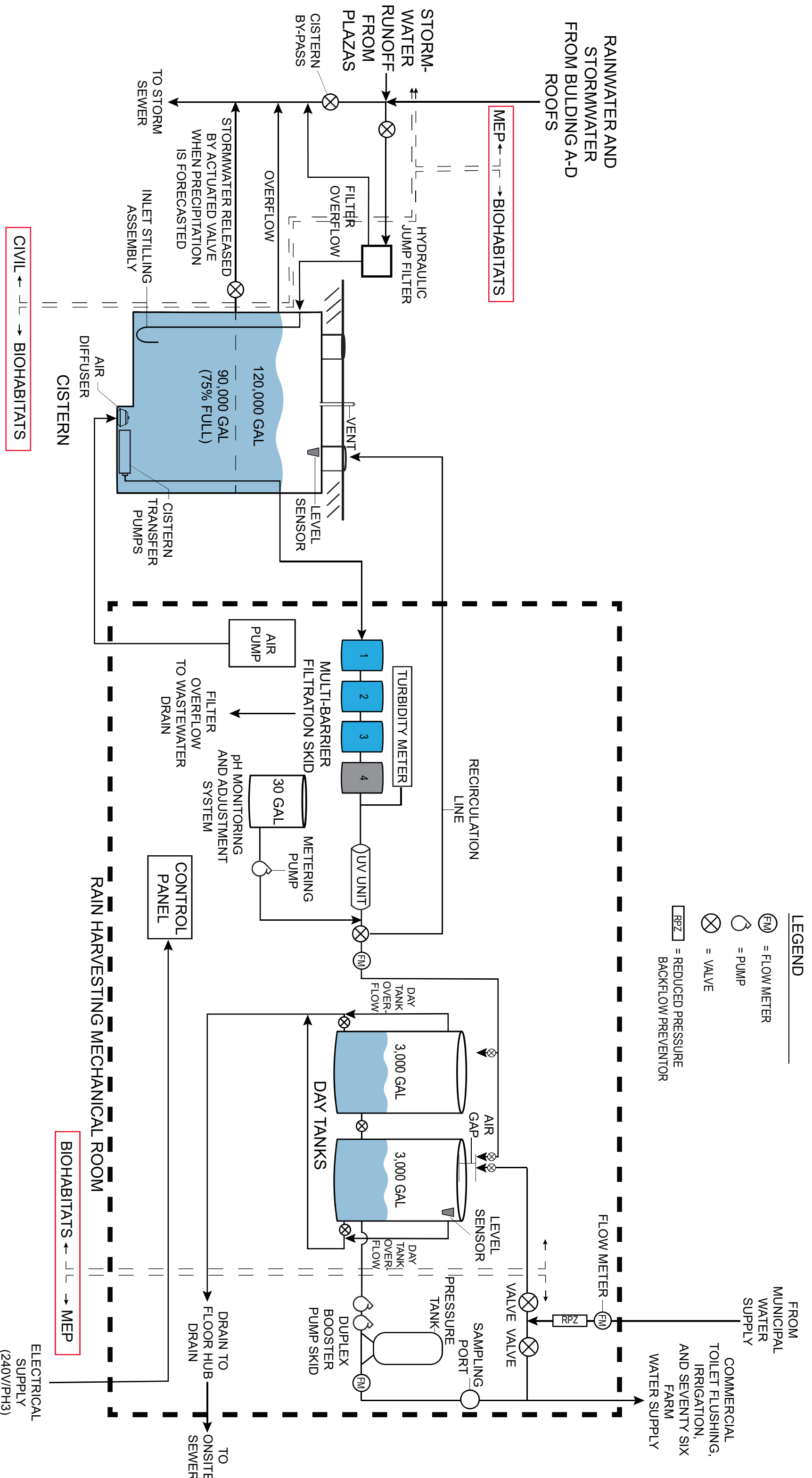


LEGEND

- G = GRAVITY LINE
- P = PRESSURIZED LINE
- FM = FLOW METER
- P = PUMP
- ⊗ = VALVE

- LEGEND**
-  = FLOW METER
 -  = PUMP
 -  = VALVE
 -  = REDUCED PRESSURE BACKFLOW PREVENTOR





THE SEVENTY-SIX
ALBANY, NY
SCHEMATIC DESIGN

Rainwater Treatment Flow Schematic

