Town of Plainville, Massachusetts

Turnpike Lake Water Treatment Plant

January 2022

FEASIBILITY STUDY

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Town of Plainville, Massachusetts

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Prepared by: BETA GROUP, INC.
Prepared for: Town of Plainville

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1.0 Executive Summary

1.1 Purpose of Report

The Town of Plainville, through the Department of Public Works, retained the services of BETA Group to provide design services for Turnpike Lake Water Treatment Plant Improvements project. Phase I includes a Feasibility Study and a Schematic Design. Design upgrades will include upgrades to all major systems in the treatment plant, including mechanical, HVAC, plumbing, fire protection, electrical, instrumentation and controls, architectural, structural and site improvements. The purpose of this report is to identify a preferred solution for an expansion of the existing treatment plant, or construction of a new plant adjacent to the existing, and to serve as a basis of the design moving forward. A site map of the existing treatment plant is provided in Appendix B.

1.2 Report Approach

BETA and its sub-consultants reviewed existing information made available by the Town, conducted several visits to the site, and met with the Project Working Group in order to determine needs for the plant.

Two Options were developed and for each, pros and cons, costs and schedules were examined. In addition, a vehicle storage area, architectural finishes, electrical systems, instrumentation and controls, structural elements, site improvements and pumping system were also analyzed.

BETA then developed a program of spaces, analyzed the plant's systems, developed alternative options for the plant's upgrade, and developed anticipated costs of construction. A Preferred Solution was recommended based on these efforts in concert with input by the Working Group.

This report, and the option selected by the DPW, will form the basis of the schematic design that will further refine the treatment plant upgrades and provide the basis for a cost estimate to be presented at a Select Board Meeting in January 2022.

1.3 Summary of Station Options

This report outlines two major options for the expansion or replacement of the Turnpike Lake Treatment Plant. The options encompass the rehabilitation and expansion of the existing plant superstructure, or the construction of a new treatment facility.

1.4 Option Construction Cost

The total costs for each option are summarized in Table 1.1.

Table 1.1 – Total Construction Costs

Option	Description	Cost
A	Renovate/Expand Existing Plant	$10,585,100
B	New Water Treatment Plant	$10,625,000

The least expensive option is to renovate and expand the water treatment plant. The difference in estimated cost is less than 0.4%. A new slab on grade station would be easier to construct, less complicated to design, will minimize the use of bypass during construction, and is not bound by the existing footprint of the building. Rehabilitation of the existing plant is the least favorable non-cost operator factor. For these reasons, the identified preferred solution would be a new plant adjacent to the existing plant. A more detailed breakdown of costs is discussed in Section 12.

2.0 INTRODUCTION

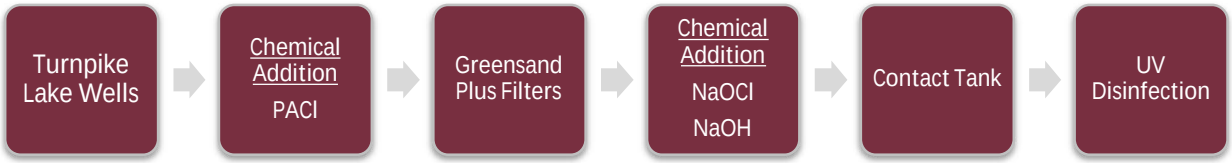
2.1 BACKGROUND

Plainville's water distribution system consists of the Mirimichi Wellfields; Lake Mirimichi Pump Station; Turnpike Lake Wellfields; Turnpike Lake Water Treatment Plant; Highway Wellfields, where the water is treated at the North Attleboro Water Treatment Plant and then boosted back into town with the Everett Street Booster Station and Kelley Boulevard Booster Station; Maple Hill Booster Station; Watery Hill Booster Station; Walnut Hill Booster Station. In addition, Sharlene Tank and East Bacon Tank Road provide water storage and a distribution network consisting of pipes ranging in size from 6" to 12" exists throughout town. Pressures in the system typically range between 45 psi and 107 psi. Pressure at the Turnpike Lake Water Treatment Plant typically range between 50 and 60 psi.

The Town is supplied water by a combination of the Lake Mirimichi, Turnpike Lake, and Highway Wellfields. The Lake Mirimichi Wellfield consists of three wells supplying potentially up to 288,000 gallons per day (gpd) of water to the system, but is currently offline due to water quality issues with high levels of manganese. Turnpike Lake Wellfield consists of 5 wells providing approximately 500,000 gpd of water on average and upwards of 1,000,000 gpd (1 MGD). A new well was installed at the Turnpike Lake Wellfield, but has not been authorized for use by MassDEP. It is likely that additional well locations will be explored at the Turnpike Wellfield as the existing wells are now dated and not recovering efficiently after cleanings. Highway Wellfield contains two wells supplying 230,000 gpd of water to the town and the Everett Booster Station pumps on average 234,000 gpd. Historical flow data for the Turnpike Lake Water Treatment Plant is discussed in Section 11.

Turnpike Lake Water Treatment Plant was built in 1990 and located at 171 East Bacon Street in the southeast portion of Town. The plant consists of two separate buildings. The first building contains three parallel vertical greensand plus vessels, chemical storage and day tanks for sodium hypochlorite, polyaluminum chloride, and sodium hydroxide, while the second building houses three pumps, two of which are used for distributing finished water from the chlorine contact tank out to the system, and the remaining pump is used for backwash. The second facility also houses the UV unit, where treated water passes through prior to leaving the plant. Finish water pumps each operate at a capacity of 435 gpm at 150 feet of total dynamic head (TDH). Backwash pump has a capacity of 430 gpm. A schematic of the treatment process is shown below.

Figure 2.1 – Turnpike Lake Water Treatment Process



The Turnpike Lake Water Treatment Plant operates automatically based on water levels at either the Sharlene Tank or East Bacon Road storage tank. Typically, the levels at the East Bacon Road Tank are used for operation. As demand increases, water levels within the East Bacon Road Tank drop until a preset elevation is hit and one pump (Pump No. 1) is activated. If water levels continue to drop, a second pump (Pump No. 2) is activated.

Existing plant is at its current hydraulic and treatment capacity during periods of high demand in the summer. During these events, there is no redundance as all vessels are in use. No backwash can be accomplished and if there was a mechanical issue with any of the vessels, the supply would be compromised in terms of volume. Expansion of the capacity at this facility is required to handle existing demands without even factoring future growth within the town.

2.2 PURPOSE

The Town intends to upgrade the Turnpike Lake Water Treatment Plant to better serve the Town by increasing capacity, positioning for potential need to treat PFAS, and provide needed redundancy. The purpose of this report is to examine options for the upgrade of the plant, determine relative costs for each option, and recommend a preferred solution. Costs will be further refined in the Schematic Design phase. This report will also serve as the basis for the Schematic Design. The Preferred Solution selected by the DPW will be further expanded in the schematic design, where more detailed analysis of the facility will be conducted.

2.3 TASKS

Tasks undertaken for the Feasibility Study were:

- Review of Available Information
- Site Visits
- Input from Project Working Group
- Program of Spaces
- Alternative Solutions
- Cost Analysis
- Report Preparation

2.4 REPORT ORGANIZATION

This report is divided into the following major categories:

- Section 3 – Code Compliance
- Section 4 – Discussion Summary for Utilities
- Section 5 – Summary of Working Group Needs and Program of Spaces
- Section 6 – Plant Options
- Section 7 – Innovative Opportunities (Green/LEED)
- Section 8 – Analysis of Alternative Architectural Systems
- Section 9 – Analysis of Structural Systems
- Section 10 – MEP/FP and Instrumentation/Control Systems
- Section 11 – Analysis of Process System
- Section 12 – Anticipated Cost of Construction

3.0 CODE COMPLIANCE

The following table lists the codes that the new station will be required to meet.

Applicable Ordinances, Codes and Standards			
Building Code	Massachusetts State Building Code, 9th Edition		
Fire / Life Safety Code	Massachusetts Fire Prevention Regulations, 527 CMR 21		
Accessibility Code	Architectural Access Regulations, CMR 521		
Energy Code	ANSI/ASHRAE 90.1 (Massachusetts State Building Code, Article 13 (780 CMR)		
Use and Occupancy Classification			
Mixed Use			
Section 304	Business Group B	Group B	DPW Administration
Section 306	Factory and Industrial	Group F-2	Water Treatment
	High Hazard - Health	Group H-4	Chemical storage
General Building Heights and Areas			
Use Groups B and F-2 – Construction Type VB – Fully Sprinklered			
	Height		Area
Tabular value (IBC Tables 504.3, 504.4 & 506.2)	3 St. (60 ft)		36,000 sf
Frontage Increase IBC Section 506.2 100% Open Perimeter	-		+ 6750sf
Total Allowed	3 Stories (60 ft)		42,750 sf
Use Group H-4 / Construction Type VB			
	Height		Area
Tabular value (IBC Tables 504.3, 504.4 & 506.2)	2 Stories (40 ft)		6500 sf
Frontage Increase IBC Section 506.2 100% Open Perimeter	-		4875 sf
Total Allowed	2 Stories (40 ft)		
508.1	Mixed Occupancies		
506.3.2	Non-Separated Occupancies	YES (B and F-2)	
506.3.3	Separated Occupancies	YES H-4	

Sprinklers are required throughout the building due to the Use Group H occupancy classification. Only the H-4 space requires a 1-hour rating, none of the other rooms or occupancies have to be fire-separated.

Type of Construction			
	Minimum Construction Type VB (combustible, unprotected)		
Table 601	Fire Resistance Rating Requirements for Building Elements		
	Building Element	Required Rating	Remarks
	Primary Structural Frame	0	
	Bearing Walls Exterior	0	
	Bearing Walls Interior	0	
	Non Bearing Exterior Walls and Partitions	0 Fire separation distance is greater than 10 feet. (Table 602)	
	Non Bearing Interior Walls and Partitions	0	
	Floor Construction	0	
	Roof Construction	0	
Interior Finishes			
Section 803	Wall and Ceiling Finishes		
Table 803.11 Interior Wall and Ceiling Finish Requirements by Occupancy – Sprinklered			
Group	Corridors	Rooms and Enclosed Spaces	
GROUP B and F-2	C	C	
GROUP H-4	N.A.	C	

Required Fire Protection Systems	
NFPA 13 Sprinkler System	(780 CMR Table 903.2)
Fire Alarm System	(780 CMR 903.4.2)
Automatic Fire Detection System	(780 CMR 415.3)
Fire Extinguishers	(780 CMR 906.1)

Means of Egress			
Section 1003	General Means of Egress		
Section 1003.2	Ceiling Height	7’ – 6”	
Section 1003.3	Protruding Objects	6’ – 8”	
Section 1004	Occupant Load		
Table 1004.1.1	Max. Floor Area Allowances per Occupant		
	Function of Space (and Area in Sq. Feet)	Floor Area Per Occupant	Total Occupants
	Business Area (XXXX sf)	100 gross	TBD
	Industrial Area (XXXX sf)	100 gross	TBD
	H-4 Storage (xx sf)	300 gross	TBD
Section 1006	Number of Exits and Exit Access Doorways		

Table 1006.3.1	Occupancy	Max. Occ. Load	Max. Path of Egress (ft) without Sprinklers	Max. Path of Egress (ft) with Sprinklers	Min. No. of Exits
	Business Area (XXXX sf)	49	100	100	2
	Industrial Area (XXXX sf)	49	75	100	2
Section 1008	Means of Egress Illumination				
Section 1008.2.1	Illumination Level Under Normal Power	Not less than 1 footcandle (11 lux) at walking surface			
Section 1009	Accessible Means of Egress				
Section 1009.3	Stairways	Minimum Distance Between Handrails of 48-inches			
Section 1010	Doors, Gates, and Turnstiles				
Section 1010.1.1	Size of Doors	Minimum Clear Width of 32-inches			
1010.1.10	Panic Hardware	All egress doors serving Use Group H require panic hardware and must swing in the direction of egress.			
Section 1011	Stairways				
Section 1011.2	Width and Capacity	Minimum Width of 44-inches			
Section 1200	Ramps				
Section 1012.2		Slope			
	As Means of Egress	8-percent			
	Pedestrian Ramp	12.5-percent			
Section 1017	Max Travel Distance				
Table 1017.2	Use Group H-4	175 ft			
	Use Groups B & F-2	300 ft			
Section 1020.4	Dead Ends	20 feet			
Section 1024	Exit Passageways				
1024.2	Width	44-inches			

Hazard Materials requirements at the Chemical Storage Room	
Ventilation (IBC 414.3)	Rooms where corrosive mists, fumes or vapors may be emitted due to the use, handling or storage of the corrosive material must be provided with a mechanical ventilation system in accordance with the International Mechanical Code. If mechanical ventilation is required, a manual shutoff control for the system must be provided outside the room adjacent to the entrance door. If required, the ventilation system must also have standby or emergency power unless an approved fail-safeengineered system is installed (IBC 414.5.4)
Spill Control (IBC 414.5.3)	Spill control is required in accordance with the International Fire Code (IFC). The IFC requires spill containment in rooms storing hazardous

	materials in individual vessels larger than 55 gallons or in which the aggregate capacity of vessels exceeds 1,000 gallons (IFC 5004.2.1). The containment system must be capable of containing a spill from the largest single storage vessel plus 20 minutes of sprinkler water in the roof or area in which the storage vessel is located (IFC 5004.2.2.3)
Emergency Alarms (780 CMR 415.5)	A manual emergency alarm system must be provided outside the area where hazardous materials are stored to activate a local alarm throughout the building in an emergency situation (non-fire).

Code Type	Applicable Code	Code Requirements
Plumbing	• 248 CMR: Massachusetts Plumbing Code	Low flow fixtures
		Separate male/female bathrooms (waiver possible)
		Emergency shower/eyewash station
		Water heater to temper water
HVAC	• 2009 International Mechanical Code	Needs to meet proper air exchange rates
Electrical	• 527 CMR 12.00: Massachusetts Electrical Code (2020 NFPA 70)	Locally mounted power disconnect switches
		Power distribution and motor control engraved nameplates
		Electrical shock and OSHA arc flash warning labels
		High efficiency lighting
		Long lasting emergency lighting
		Emergency exit light fixtures

4.0 Discussion Summary for Utilities

4.1 Massachusetts Department of Environmental Protection

The Working Group began discussions with Jim McLaughlin, the MassDEP's designated liaison for this project. This discussion included a brief overview of the project and introduced BETA as the designer. Andy Dennehy of BETA followed up with Mr. McLaughlin and the following items were discussed:

1. Project Schedule (completion of feasibility study prior to design phase)
2. Existing treatment plant processes and possible future options
3. Schematic design phase (input from MassDEP)
4. Permitting process

Mr. McLaughlin indicated that he did not see any issues regarding the project schedule from MassDEP's standpoint. He also stated there would be concern about whether the Town would need to complete pilot testing or if the Town chooses to forgo by only adding Granular Activated Carbon GAC to existing treatment. Further discussion is required during the design phase of the project.

On the topic of moving the project through final design, Mr. McLaughlin indicated that once the project is in the schematic design phase, Designer should contact MassDEP to further refine the final treatment process, pilot testing, and necessary permitting. A more detailed summary of the conversation with MassDEP is provided in Appendix E.

4.2 Liberty Utilities Gas

Chris Brainard of BETA exchanged emails with Benjamin Phillips of Liberty Utilities Gas to introduce the project and discuss requirements regarding use of natural gas for both the plant's proposed engine generator and the heating system.

Mr. Phillips provided a record drawing illustrating a gas main on George Street behind the water treatment building that connects directly to the facility. Liberty Utilities Gas would require the load information for the generator and heating equipment, meter location with a site plan, and required delivery pressure for equipment associated with a new facility.

Mr. Phillips then directed further inquiries to the Sales and Marketing Team, Chris Ferri and Rachel Aguiar. Ms. Aguiar responded to Chris's request and noted that they would require a site plan and gas loads to provide further assistance with the project. Chris explained that this information could be made available once completed with the design phase, which would likely be Fall 2022.

Pressure requirements were discussed. Mr. Phillips indicated that Liberty Utilities Gas has established standard delivery pressures that they provide to their customers and these are based on the manufacturer specifications of the gas equipment. The "standard" delivery pressure is 7" water column (w.c.) with an option to supply higher pressure where needed. Chris clarified that specific pressure levels would be examined during the design phase of the project. If the equipment requires inlet pressures of more than 10" w.c., Liberty Utilities will require the customer to file a special application for elevated gas pressure with both Liberty Utilities Gas Company and the Massachusetts State Board of Plumbing Examiners.

4.3 National Grid Electric

Murli Gupta of National Grid Electric was contacted by Chris Brainard of BETA. The purpose was to determine what coordination and permitting might be required for the new plant. Mr. Gupta directed Chris to Ann Malley, Community and Customer Manager at National Grid who stated that the Town would need to get a work request number that requires additional forms to be completed including a National Grid Load Sheet, Easement Information Form and copy of deed, Site Plan, Approved Plans, Order of

Conditions, and Meter Socket Labeling. Coordination with respect to electrical service could be done during the schematic design. Once the design phase is complete, a work request number could be opened at that time.

4.4 Comcast

Chris Brainard exchanged emails with Renaye LaFrenier from Comcast. The purpose of the exchange was to provide an overview of the project and discuss any potential impacts on the cable/internet service at the water treatment plant. LaFrenier noted that comcast does not have any underground infrastructure in the project area.

4.5 Verizon

Chris Brainard exchanged emails with Danette of Verizon. The purpose of the exchange was to obtain record drawings of existing telephone poles at the site and to provide an overview of the project and discuss any potential impacts on the telephone service at the treatment plant, and what permitting and coordination requirements exist. Chris was advised to contact the engineering department at 866-686-1195.

Chris spoke with John Sidhu who indicated that if the telephone service needed to be relocated and if service needed to be maintained during the work, or if a new path would be created for a new building, coordination would be required during design.

4.6 Water & Sewer

The Town owns and operates both the water and sewer systems within the Town. Representatives from the Department of Public Works, including Water, Sewer and Drains Division, are included in the Working Group and have provided input throughout Phase I of the project.

5.0 Summary of Working Group Needs & Program of Spaces

5.1 Summary of Working Group Needs

The following is a summary of the needs and desires outlined during discussions with the Project Working Group.

5.1.1 Plant Conditions

Treatment plant requires expansion to meet the additional demand expected in Town over the course of the next 50 years. Currently, the plant produces roughly 500,000 gpd of finished water but strives to double that volume to 1,000,000 gpd (1 MGD) to meet future demand in town. A more detailed discussion of demand conditions is provided in Section 11.

5.1.2 Controls

Project Working Group has determined that the controls at the Turnpike Lake Water Treatment Plant will be updated to allow wells and other mechanical equipment on-site to communicate with one central Programmable Logic Controller (PLC) system. The following features have been identified as being necessary for the controls at the Turnpike Lake Water Treatment plant:

- Dual-redundant PLC processor controls communicating with the system network over the integral Ethernet port
- Both processors connected to a shared remote input/output (RIO) hardware
- NEMA 12 enclosure

For operator control, Turnpike Lake's PLC and local Human Machine Interface (HMI) node will communicate with the system network via Ethernet over a leased Digital Data Service (DDS) phone link operating at 56kbaud (digital) to the water treatment plant. An iFix Supervisory Control And Data Acquisition (SCADA) server in the Turnpike Lake Water Treatment plant will provide supervisory control and monitoring of the plant.

5.1.3 CHEMICAL FEED SYSTEM

Project Working Group would like to also update the chemical feed facilities at the Turnpike Lake Water Treatment Plant to adjust pH of the well water and to disinfect per MassDEP distribution system regulations. Chemical feed systems include poly-aluminum chloride (PACL) for coagulation, sodium hydroxide (NaOH) for pH control, and sodium hypochlorite (NaOCl) for disinfection and space for a future undefined fourth chemical. Each system will consist of two metering pumps, chemical feed piping, storage tank, day tank and chemical fill lines. Containment in case of chemical spill/release would be provided in accordance with MassDEP requirements. Based on typical feed, pumping rates and typical delivery volumes, approximately 2 gallons of PACL, 75 gallons of NaOH, 35 gallons of NaOCl, and 30 gallons for a future chemical may be required per day. Delivery volumes and current code requirements dictate the need to classify the area as hazardous. As a result, additional systems including sprinkler systems, eye wash stations, shower stations, and plumbing and HVAC changes would be required. Based on the above, adequate space will need to be provided to accommodate these processes.

5.1.4 UPGRADE SYSTEMS

Project Working Group desires to have all plant systems (HVAC, plumbing, electrical, fire protection, etc.) code compliant and would utilize any new technology or innovative opportunities to prolong the useful life of the plant and minimize operating costs. The selected HVAC systems will be efficient and cost-effective.

5.1.5 OFFICE AND STORAGE

New interior layout of the plant needs to accommodate new operator spaces and storage needs, including a new office space with operator workstations and a meter workshop. Final storage sizing will be determined in Schematic Design.

In addition, the new plant will house space for offices, billing personnel, and a conference room for public meetings and project bidding.

5.1.6 ELECTRICAL ROOM

A dedicated electrical room is desired. This room will consist of a Main Circuit Breaker, Automatic Transfer Switch, Main Distribution Panel, Motor Control Center, Variable Frequency Drives (VFD's), SCADA Main Control Panel, etc.

5.1.7 CODE COMPLAINT RESTROOM

Current bathrooms are not code compliant. New renovation requires bathrooms that meets code requirements, which typically requires separate male and female facilities unless a unisex waiver is secured. Locker and Shower facilities for DPW workers are also needed. Currently the proposal is for one locker room. The Town should consider whether to add a Women's locker room for future hiring.

5.1.8 BACK-UP ENGINE/GENERATOR

A standby engine/generator is desired to provide backup in the event of loss of utility power. Diesel and natural gas driven engines are the available options. The generator will be natural gas driven. The generator will be housed in a separate enclosure. Options for the generator enclosure include a separate building or a manufacturer supplied sound attenuated enclosure.

5.1.9 CONTROLLED ACCESS TO TREATMENT AREAS

Treatment area of building needs to be easily accessed for service and repair. Project Working Group desires this area to have a controlled access system requiring security codes or fobs for entry by licensed operators. An access door and monorail system would be supplied for the easy removal and reinstallation of pumps, filter media, chemical tanks, and associated equipment. Project Working Group desires an access door and monorail system towards the rear of the building near Granular Activated Carbon (GAC) vessels or pump room to allow for easy loading of pumps or GAC vessels onto a truck bed.

5.1.10 VEHICLE STORAGE FACILITY

The Project Working Group does not have interest in developing a vehicle storage facility but may decide in the future to add a sloped roof off a side of the building, to protect vehicles from snow and other weather events. The vehicle storage area could potentially fit two "F-150" sized water department vehicles.

5.1.11 ARCHITECTURAL CHANGES

Project Working Group would like to keep the plant's exterior as existing and would design any addition to complement the existing masonry building if Option A were selected. There is no architectural reason to change the exterior to reflect or match the neighborhood to the west. If a new building is proposed, depending on location, the same will likely hold true. Design of a new building would complement the existing structure, to create a tightknit DPW 'campus'.

5.1.12 HVAC

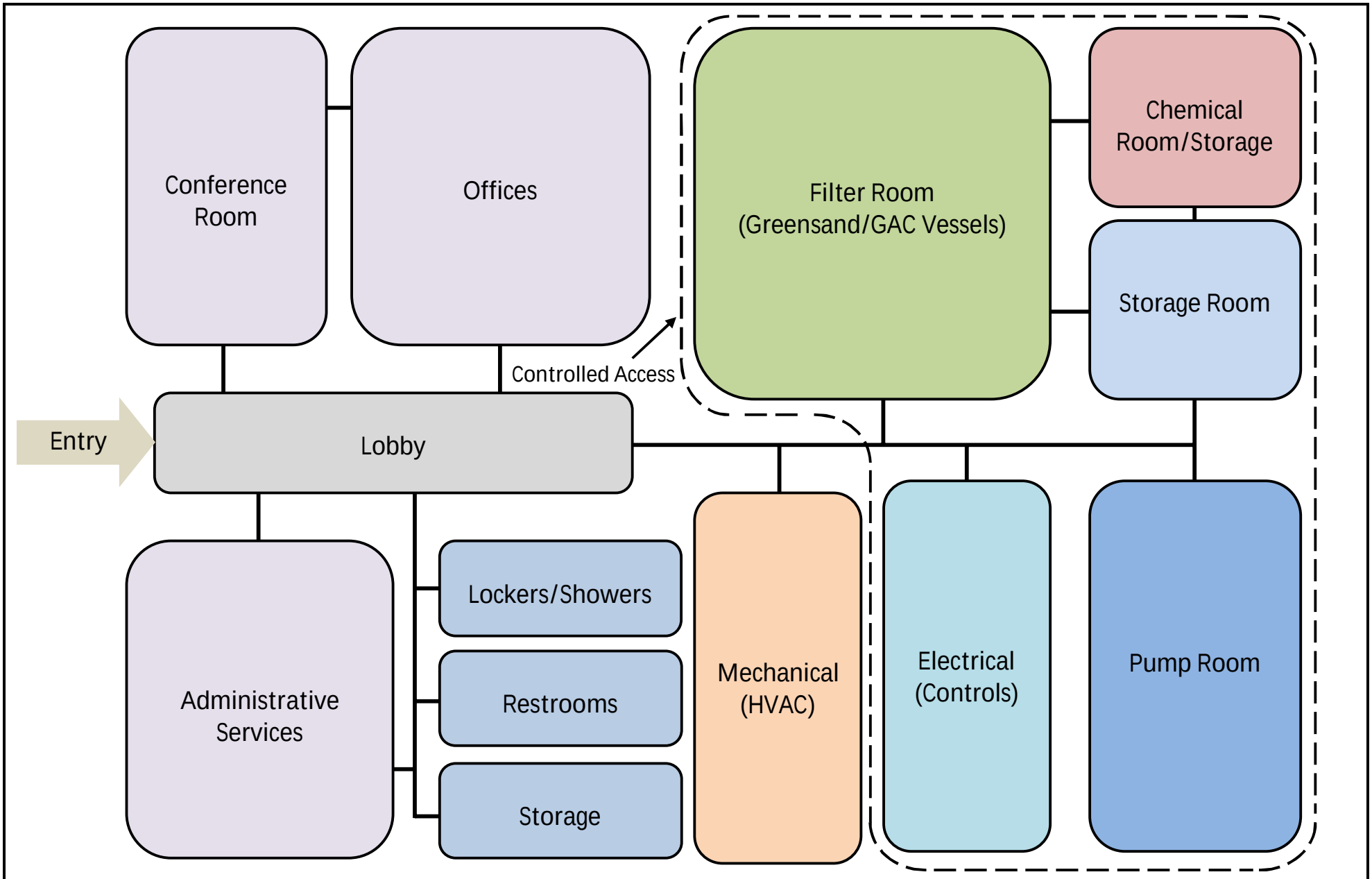
The desired HVAC system will be chosen during the design phase.

5.1.13 STORAGE

The building should provide enough storage room for meters and miscellaneous DPW storage needs. Storage area sizing will be finalized in the schematic design.

5.2 PROGRAM OF SPACES

The following is a program of spaces developed from discussions with the Project Working Group regarding their needs and desires for the plant. Figure 5.1 shows a bubble diagram of this program of spaces, including each of the identified spaces and points of entry. Figure 5.2 depicts possible floor plan layouts of the new treatment plant. A final layout will be chosen during the schematic design phase.
Table 5.1 and Table 5.2 include dimensional information for the existing and proposed spaces for the water treatment plant.



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Plainville, Massachusetts

Figure 5.1
Proposed Program of Spaces
Bubble Diagram

Spatial Relationships Diagrams

During Schematic Design, variations like these layouts will be tested to optimize program relationships

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Figure 5.2
Spatial Relationships Diagrams

Table 5.1 – Existing Water Treatment Plant Spaces

Level	Room	Item	Size	Area
	*Treatment Plant Building			
Ground Level	Lobby/Hall		16'-4" L x 6'-6" W & 14'-3" L x 4'-0" W	163.2 sf
	Lab/Office		13'-0" L x 11"-2" W	145.2 sf
	Storage Closet		6'-4" L x 3'-0" W	19.0 sf
	Electrical Area		16'-8" L x 2'-0" W & 17'-4" L x 4'-0" W & 13'-0" L x 2'-0" W	128.7 sf
	Women Restroom		8'-0" L x 6'-0" W	48 sf
	Men Restroom		8'-0" L x 6'-0" W	48 sf
	Emergency Generator Room		20'-6" L x 13'-0" W	266.5 sf
	Misc. Space		20'-6" L x 9'-4" W	191.3 sf
	Greensand Vessel Area		41'-11" L x 20'-6" W	859.3 sf
	Service Sink		8'-4" L x 7'-3" W	60.4 sf
	Chemical Area		25'-4" L x 20'-7" W	521.4 sf
	Chemical Storage		13'-3" L x 8'-4" W	110.4 sf
	**Pump and UV Building			
	Lab/Office		26'-10" L x 10"-11" W	294 sf
	Pump Room		26'-11" L x 20'-11" W	563 sf
			Total Footage	3,418.4 sf

*Based on CDM Smith Floor and Roof Plan Drawing, 1989

**Based on Dufresne-Henry Floor and Roof Plans, and Sections Drawing, 2004

Table 5.2 – Proposed Water Treatment Plant Spaces

Level	Room	Item	Size	Area
Ground Level	Entry Lobby		9'-3" L x 8'-3" W & 44'-7" L x 6'-5" W	348.5 sf
	Conference Room		32'-0" L x 15'-0" W	480 sf
		Table	48" x 296" (4' x 22')	
		Chairs (x18)		
	Administrative Services & DPW Offices		34'-0" L x 15'-10" W	538 sf
		Desk (x3)		
		Chair (x3)		
		Task Lighting (x3)		
	Restrooms		14'-5" L x 9'-3" W	134 sf
		Sink / lavatory		
		Faucet and soap dispenser		

		Mirror		
		Toilet and Flush Valve		
		Paper towel dispenser / waste / hand-dryer		
		Floor Drain		
		Exhaust Fan		
	Lockers/Showers		22'-9" L x 8'-5" W	191.5 sf
		Full Height Lockers	8 persons	
		Seating Bench	6' long	
		Full Length Mirror		
		Showers		
	Misc. Storage		15'-10" L x 8'-6" W	135 sf
		Mop sink		
		Supply Storage Shelves	12" x 3' x 6' tall	
	Meter/Storage Room			
		Test Bench (and tanks)	3' x 12'	
		Work Bench	3' x 12'	
		Meter and Brass Storage (x4)	1'-6" x 3'	
		Overhead Door (1)	8'-0"W x 10'-0"H	
	Pump Room		34'-11" L x 22'-9" W	793 sf
		3 pumps + 1 future		
		Rolling Crane / Pump Lift		
	Filter Room			
		Greensand Filters (x6)	*45'-0" L x 45'-0" W	2,025 sf
		GAC Vessels (x6)	*45'-0" L x 35'-0" W	1,575 sf
	Chemical Room		*25'-0" L x 25'-0" W	625 sf
		Day Tanks (x3)		
		Storage Tanks (x3)		
		Dosage Pumps (x6)		
	Lab Room		15'-10" L x 14'-4" W	228 sf
		Testing Equipment		
		Sink		
	**Electrical (MCC / Controls/Instrumentation)		25'-0" L x 10'-0" W	250 sf
	**Mechanical (HVAC, Water heater, etc.) & Storage Room		27'-0" L x 25'-0" W	675 sf
Site	Parking	20 Spaces	**	
	**Generator	Exterior enclosure	**	
			Total Footage	7,998 sf

*Per Designer Preliminary Sizing

**Space size will be finalized in the Schematic Design phase.

6.0 Water Treatment Plant Options

6.1 Option A – Rehabilitation and Expansion of Existing Superstructure

6.1.1 Description

Option A includes reinforcing the existing unreinforced masonry, installing insulation, and updating masonry facing to the existing plant. Windows and exterior doors to be replaced, and a new sliding door will be added where the building is to be expanded. Existing internal mechanical, electrical, HVAC, plumbing and instrumentation and controls will be demolished. New plant piping, Greensand filter media vessels, chemical storage day tanks and pumps with floor drain to sump pump, continuous analyzers to monitor water quality, Granular Activated Carbon (GAC) vessels, and three new vertical pumps will be installed (one primary distribution pump, one secondary distribution pump, and one backwashing pump). Water treatment process schematics are provided in Appendix A for both existing and proposed conditions. Space for a future fourth pump will be provided for future demand increases. For the chemical storage area, the installation of an emergency shower/eyewash system is required, which requires tempered water (70°F to 90°F). An instantaneous water heater is used for providing the tempered water. This water heater would then be used for all of the plumbing fixtures within the plant as a replacement for the instantaneous heaters to ensure that it does not fail prematurely from non-use. As well, the chemical area is deemed as hazardous materials and therefore must contain an automatic sprinkler system. This will be installed throughout the new facility.

Refer to Section 10.2 for HVAC, Electrical, Plumbing, Fire Protection, and Instrumentation/Controls system improvements.

The renovation and expansion of the existing building will impact the roof. It may be possible to tie in the new roof to the existing, but likely the existing roofing membrane and insulation will need to be removed and replaced. This will provide a continuous roof over the existing portion of the building and the proposed.

The site work will include a new driveway for access to the plant and equipment access door, yard piping as required for connection to distribution system, gas service, lighting, security, fencing, landscaping and drainage.

A layout of Option A is shown in Figure 6.1.

6.1.2 Bypass Requirements

Bypass is required for Option A. Potential bypass protocols include:

- The use of existing pumps and/or the new pumps to set up a temporary bypass system while construction on superstructure and unrelated plant systems are constructed.
- Full time on-site bypass pumps consisting of two electrical pumps and two backup diesel pumps.

For the purposes of this report, it is assumed that bypass operations supplied by an outside vendor will be necessary for a minimum of six months.

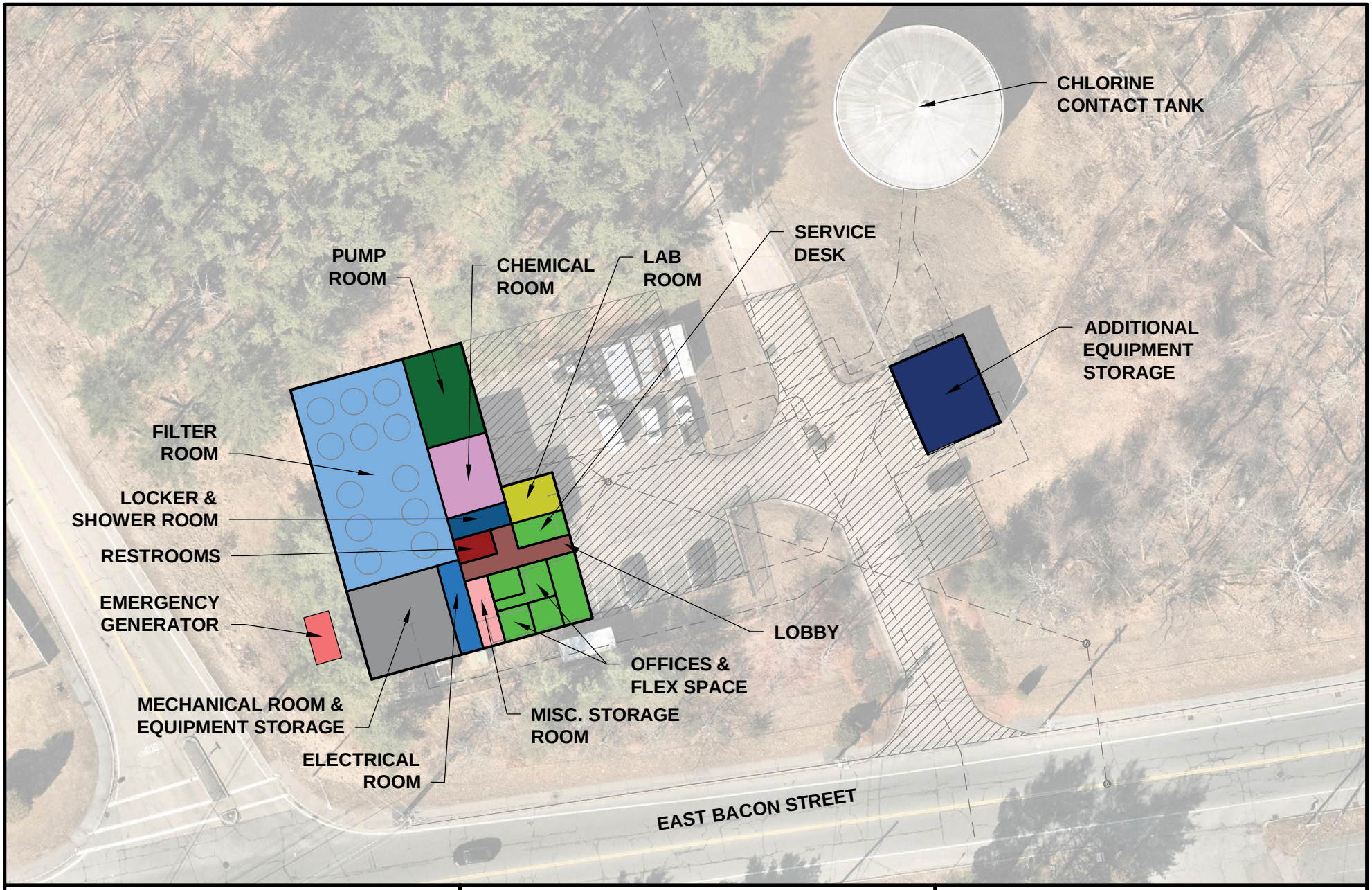

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Figure 6.1

Option A

Water Treatment Plant Layout

6.1.3 SCHEDULE

Phase	Task	Completion Date
Phase 1	Present Feasibility Report to Working Group	January 25, 2022
Phase 1	Schematic Design/Cost Estimate	June 1, 2022
Phase 2	Design Development/Permitting Process	September 1, 2022
Phase 2	Final Design (Bid Documents)	April 3, 2023
Approval	Town Meeting Approval	May 2023
Phase 2	Bid Process	June 1, 2023
Phase 2	Award – Construction Contract	July 1, 2023
Phase 2	Substantial Completion	December 31, 2024
Phase 2	Close-Out	March 21, 2026

6.1.4 PROS/CONS

6.1.4.1 PROS

- Minimal excavation
- Minimal dewatering
- Reuse of materials

6.1.4.2 CONS

- Need for bypass
- Difficult to phase the project
- Significant effort to make building shell code compliant
- Inherent difficulties of rehabilitating on existing structure
- New pumps, GAC vessels, and portion of Greensand filters would be located in expanded section of building

6.1.5 CHECKLIST OF APPROVALS

The following is a list of Committees, Boards, Departments and Utilities that will require approvals of the station's design:

- Project Working Group Committee
- Building Department
- MassDEP
- Liberty Utilities
- National Grid

6.1.6 CODE COMPLIANCE

6.1.6.1 GENERAL

A Code Summary for the rehabilitation of the plant conducted by Hastings Consulting is in Appendix C.

6.1.6.2 PLUMBING

Fixtures need to be water saving low flow type as required by current codes. Emergency showers/eyewash stations are required to have tempered water.

6.1.6.3 HVAC

Existing ventilation system needs to be replaced to ensure compliance with code and regulations with regards to proper air change rates.

6.1.6.4 ELECTRICAL

Normal lighting needs to be high efficiency to be compliant with the Mass State Energy Code.

Emergency (battery operated) exit lighting fixtures is required by the Massachusetts State Building Code (MSBC) for egress paths.

6.1.6.5 MEANS OF EGRESS

The means of egress including the number of exits and egress capacity must be sufficient for the number of occupants on all floors (IEBC MA Amendment Section 102.2.2.1). Note that the building is permitted to have a two exits in accordance with 780 CMR Table 1006.3.1.

6.1.6.6 FIRE PROTECTION SYSTEMS

Fire extinguishers are required per 780 CMR 906.1. Sprinkler system required as chemical storage will be upgraded within the treatment plant.

6.1.6.7 ENERGY CODE PROVISIONS

The building must comply with the 2018 International Energy Conservation Code (IECC) including the amendments contained in 780 CMR Chapter 13. Alternatively, the provisions of ASHRAE 90.1-2016 can be met in lieu of the IECC. All new or altered systems or portions thereof within the existing building must comply with the code requirements applicable to new construction without requiring the unaltered portions to be upgraded (IECC 101.4.3). Plainville is a Green Community and adopted the Stretch Code in 2017.

6.1.6.8 ACCESSIBILITY FOR PERSONS WITH DISABILITIES

Since the building is open to the general public, the MAAB requirements do apply. The ADA requires that employee only work spaces must be designed to allow employees to approach, enter, and exit the work area. However, the work areas are not required to be provided with accessible features (i.e. shelves, etc.).

Note that machinery spaces will be restricted to operators and frequented only by service personnel for maintenance, repair, or occasional monitoring of equipment are not required to be accessible or be on an accessible route (ADA 203.5).

6.1.6.9 STRUCTURAL

See Section 9 for Structural Code requirements.

6.1.6.10 APPLICABLE CODES

The following are the applicable codes that will need to be met for the upgrade of the water treatment plant.

Building	780 CMR: Massachusetts State Building Code, 9th Edition (2015 International Building Code) (2015 International Existing Building Code)
Fire Prevention	527 CMR: Massachusetts Fire Prevention Regulations (2015 NFPA 1) MGL Chapter 148 Section 26G – Sprinkler Protection
Accessibility	521 CMR: Massachusetts Architectural Access Board Regulations
Electrical	527 CMR 12.00: Massachusetts Electrical Code (2020 National Electrical Code)
Mechanical	2009 International Mechanical Code (IMC)
Plumbing	248 CMR Massachusetts Plumbing Code
Energy Conservation	2018 International Energy Conservation Code (IECC)

6.2 OPTION B – NEW PLANT

6.2.1 DESCRIPTION

Option B includes the complete demolition of equipment in the existing superstructure of both treatment buildings, excluding exterior and interior walls, roof, windows/doors, and electrical systems. The new plant will be located on-site. The new building will follow all state building codes to date. This option would include construction of a lobby, four offices, conference room, administrative services area (front desk reception and billing), new locker/shower room, restrooms, miscellaneous shelf storage, new pump room, new filter room, new chemical storage area, electrical room, mechanical space, and meter/storage room.

Refer to Section 10.3 for HVAC, Electrical, Plumbing, Fire Protection, and Instrumentation/Controls system improvements.

A layout of Option B and Option C are shown in Figure 6.2 and Figure 6.3, respectively. The only difference is the location and orientation of the plant. Otherwise, size and treatment processes are all the same. Orientation of the building is subject to change during schematic design.

6.2.2 BYPASS REQUIREMENTS

Bypass is required for Option B. Potential bypass protocols include:

- The use of existing treatment plant while construction of new facility is constructed.
- There will be minor interruptions for piping connections. For the purposes of this report, it is assumed that bypass operations supplied by an outside vendor will be necessary for a minimum of two weeks.

6.2.3 SCHEDULE

Phase	Task	Completion Date
Phase 1	Present Feasibility Report to PPBC	January 25, 2022
Phase 1	Schematic Design/Cost Estimate	June 1, 2022
Approval	Town Meeting Approval	September 1, 2022
Phase 2	Design Development/Permitting Process	April 3, 2023
Phase 2	Final Design (Bid Documents)	May 2023

Phase 2	Bid Process	June 1, 2023
Phase 2	Award – Construction Contract	July 1, 2023
Phase 2	Construction Administration	December 31, 2024
Phase 2	Substantial Completion	June 1, 2025
Phase 2	Close-Out	September 1, 2025

6.2.4 PROS/CONS

6.2.4.1 PROS

- Minimal bypass
- Less difficult phasing
- Not held to current footprint
- Completely new building with office space
- Better operation and maintenance

6.2.4.2 CONS

- Additional yard piping is required
- Larger footprint on-site
- No recycled materials

6.2.5 CHECKLIST OF APPROVALS

The following is a list of Committees, Boards, Departments and Utilities that will require approvals of the station's design:

- Project Working Group Committee
- MassDEP
- Liberty Utilities Gas
- National Grid

6.2.6 CODE COMPLIANCE

Construction of a new pump station would meet all applicable code requirements. The following are the applicable codes that will need to be met.

Building	780 CMR: Massachusetts State Building Code, 9th Edition (2015 International Building Code) (2015 International Existing Building Code)
Fire Prevention	527 CMR: Massachusetts Fire Prevention Regulations
Accessibility	521 CMR: Massachusetts Architectural Access Board Regulations
Electrical	527 CMR 12.00: Massachusetts Electrical Code (2020 National Electrical Code)
Mechanical	2009 International Mechanical Code (IMC)
Plumbing	248 CMR 10.00: Uniform State Plumbing Code
Energy Conservation	2018 International Energy Conservation Code

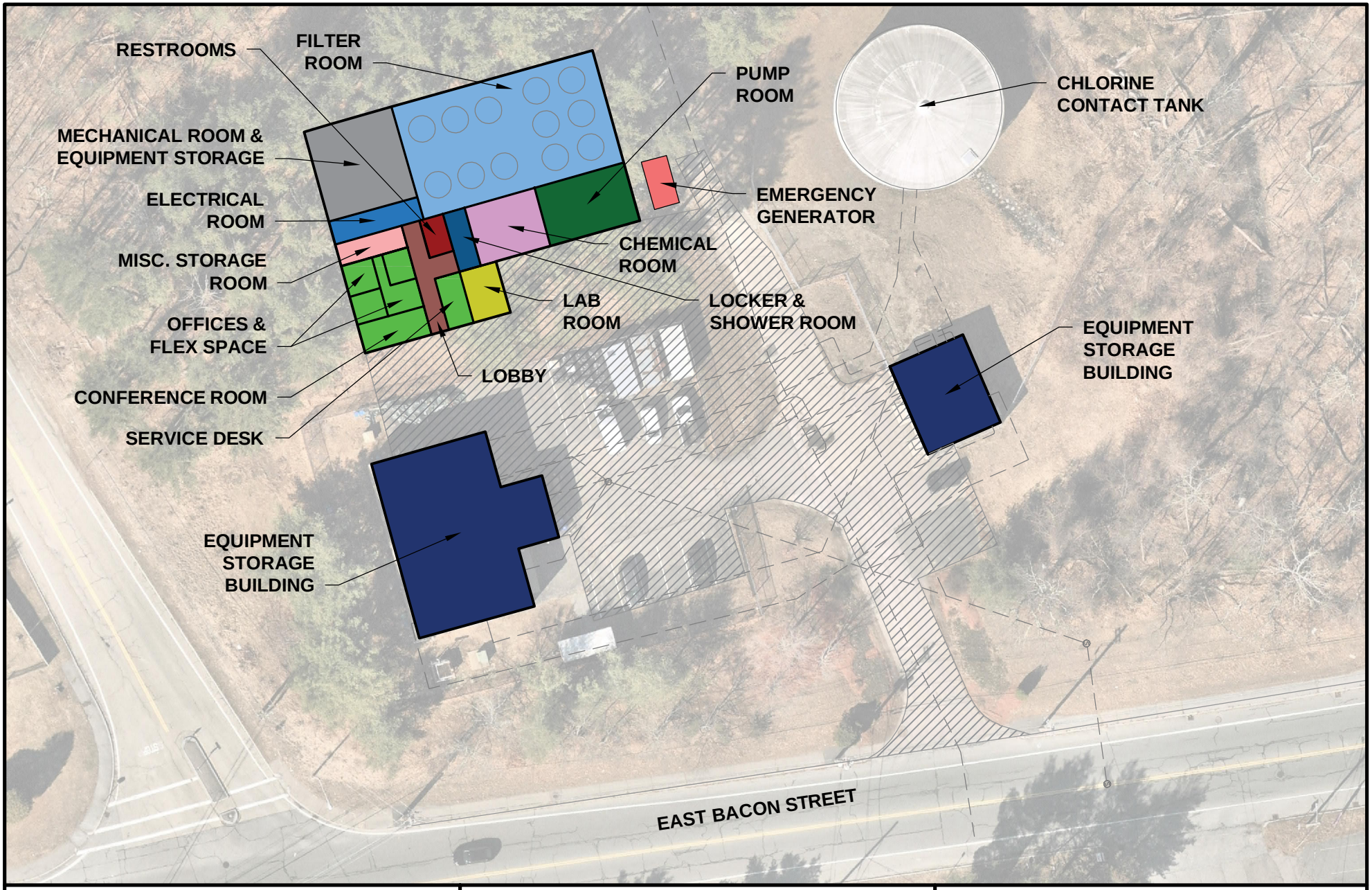

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Figure 6.2
Option B
Water Treatment Plant Layout

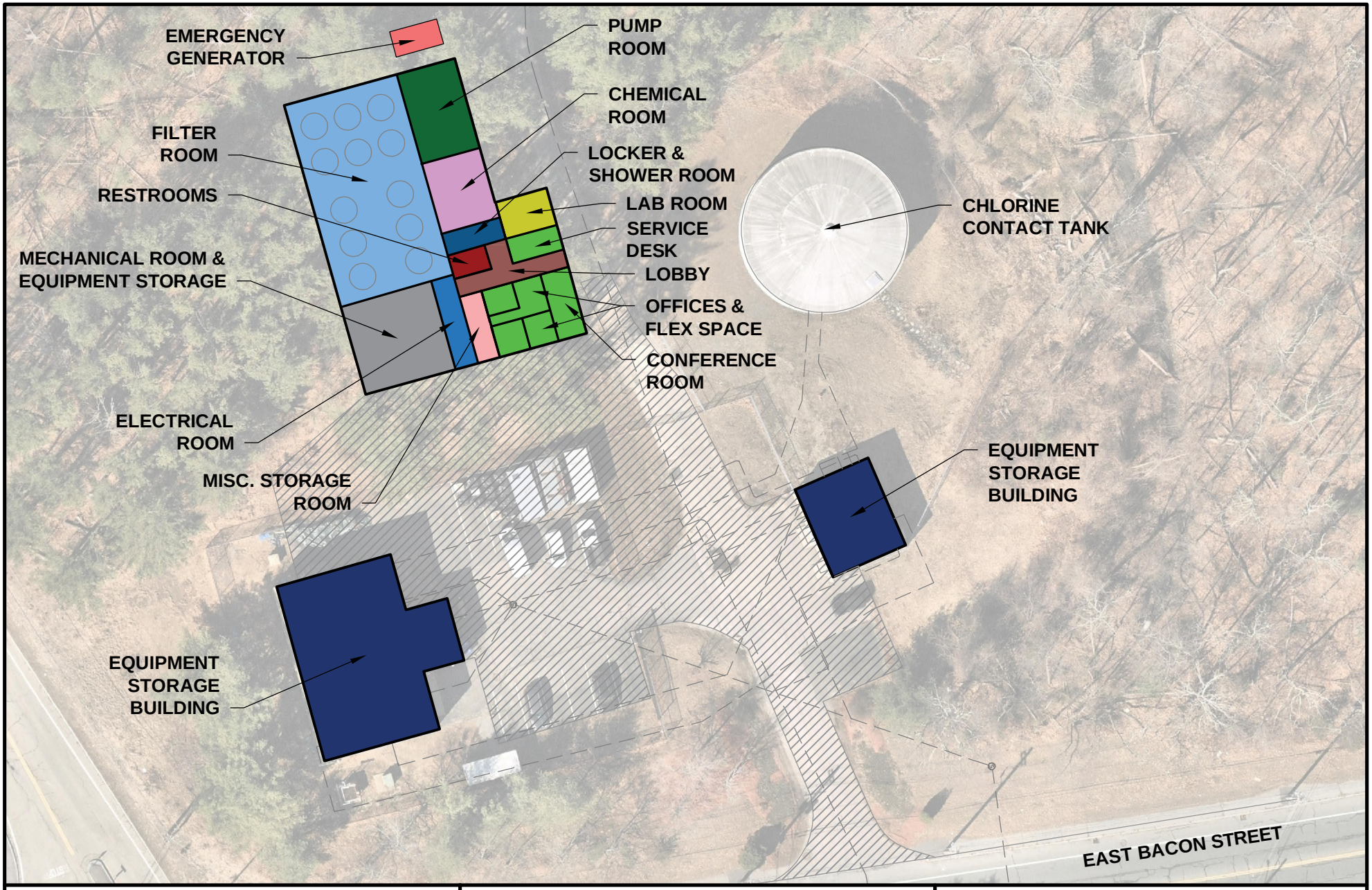

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Figure 6.3

Option C

Water Treatment Plant Layout

7.0 Energy Efficient Components

It should be noted that there is no requirement to have this facility be LEED certified. However, in keeping with the Town's desire to utilize more energy efficient component and design methods, the design of the facility should incorporate an energy and operating cost-efficient system.

7.1 Structural

The use of solar panels was examined for this project. It was determined that solar would not be included in the project at this time, however, the roof's structural system would be designed in such a way as to support the weight load for future solar panels.

7.2 Civil/Site

The collection of roof drainage and the use of rains gardens are proposed for use in stormwater management on the site. Landscaping will include drought resistant and indigenous plants.

7.3 Architectural

Architectural improvements will include a building envelope with improved insulation, natural day lighting, and increased natural ventilation. Low VOC materials such as sealants, paints and coatings, adhesives, and resilient and membrane flooring will be utilized. If the existing building is reused, existing windows may need to be replaced with ones that will include thermal break window frames and insulated glazing.

7.4 HVAC & Plumbing

The design of the HVAC and plumbing systems shall incorporate the most energy efficient system components to reduce the energy used at the facility. This shall include, but not be limited to, the use of energy recovery in the Office area HVAC system to capture as much of the energy wasted through exhaust system, highly efficient components in the HVAC system, instantaneous water heaters, ultra-low flow plumbing fixtures.

7.5 Electrical, Instrumentation & Controls

The station will include new LED low-energy consumption, long-life lamps. Office area lighting controls will have occupancy sensors and exterior light controls include astronomical clocks. The facility will also have low energy EXIT signs.

8.0 Analysis of Alternative Architectural Systems

8.1 Architectural Context

The locale is mixed-use area, including both commercial developments along East Main Street/Route 106 and single-family home with 1 story wood-framed homes on George Street. Commercial buildings are a mix of wood and steel framed structures with pitched or sloped roofs. The residential home claddings are typically wood (clapboard and shingle) and vinyl siding, along with brick masonry and some field stone. Roofs are typically pitched / sloped, either as gable ended, or hipped; many roof lines have dormers.

For Option B, the new building could be of masonry construction, similar to what is existing, or it could be a premanufactured 'metal building'. The first of the two would be what is often referred to as a metal building. This building would be less expensive to build than the latter.

- A perimeter insulated concrete knee wall, with insulated metal panels above.
- A steel structure.
- For the public areas, there could be finer materials at the exterior of the public entrance.
- The public areas and offices could be within the 'big box' of the metal building or could be attached as a lower roof smaller scaled structure.
- Sloped insulated metal roof with gutters and downspouts.
- The utility area has the inside of the insulated metal panels as the exposed interior finish.

For the latter new building the proposed building would have the features that both building types share and:

- A masonry rainscreen building assembly with textured finish.
- Open web bar joist structural framing for the roof.
- Flat roof with parapet or single slope metal roof with gutters and downspouts for the main space.
- The offices can be within the main massing or similarly attaches as a lower roof smaller scaled structure.

8.2 Roof Form

The program, function and character of the Water Treatment Plant suggest a building with rectilinear surfaces/walls, and a functional roof. The form and shape of the roof are important. Options include:

- Flat roof
- Slope / pitched roof (either single slope, double slope ie. gable ended or fully sloped, ie. hipped)

8.2.1 Flat Roof

Benefits of a flat roof include:

- Compact and low profile
- Accessible
- Allows water collection
- Best commercial appearance
- PV panels can be mounted on racks

Drawbacks of a flat roof include:

- Snow loading
- Boxy appearance
- Most maintenance and potential for leaks

8.2.2 Sloped Roof

Benefits of a sloped roof include:

- Allows water collection
- Sheds snow
- Creates an "attic" space for HVAC and equipment
- Allows for ventilation
- Sloped surface for PV array mounting

Drawbacks of a sloped roof include:

- Requires additional structure
- Increases overall height of building

8.2.3 Recommendation

A recommendation will be determined in the schematic design.

8.3 Envelope Cladding

The envelope relates to the contextual appearance, the thermal performance and how the envelope is used for views, day lighting and ventilation. Maintenance, longevity and durability are also criteria in the selection of the envelope cladding. Options include:

- Brick Veneer
- Masonry Cladding
- Siding Systems
- Metal Panels

8.3.1 Brick Cladding

Benefits of a brick cladding include:

- Ease of installation
- Durability
- Variety in style and type
- Appropriate for recladding application
- Common to local vernacular styles
- Low maintenance

Drawbacks of a brick cladding include:

- Generally porous (depending upon type selected)
- Does not blend with neighborhood

8.3.2 Masonry Cladding

Options for masonry unit cladding include:

- CMU (Concrete Masonry Unit ie., concrete block)
    - Normal face
    - Ground face
    - Split face
- Terra-cotta or Clay Block
- Stone
    - Dimensional stone
    - Rough, quarry stone

Benefits of a masonry cladding include:

- Ease of installation
- Durability
- Variety in style and type
- Appropriate for recladding application

Drawbacks of a masonry cladding include:

- Generally porous (depending upon type selected)
- Industrial character. This is the aesthetic of the current building, which is generally screened with pine trees on George Street.

8.4 METAL PANEL

Options for metal panels include:

- Un-insulated metal panel rain screen
- Insulated sandwich panels
- Composite, phenolic-core metal panels

Benefits of metal panels include:

- Rain-screen application
- Variety in style and type
- Low maintenance
- Appropriate for recladding application

Drawbacks of metal panels include:

- Panels can be dented
- Industrial character

9.0 Analysis of Structural Systems

9.1 General – Option A (Renovation & Expansion)

Alternative A involves more than 50% of the work area and are therefore classified as a Level 3 Alteration per Section 405.1 of the International Existing Building Code (IEBC).

9.2 General – Option B (New Water Treatment Plant)

For Option B, all structural elements are required to comply with the 2015 International Building Code (IBC) and 780 CMR Massachusetts Amendments to the International Building Code 2015 Ninth Edition.

9.3 New Structural Elements

In accordance with a Level 3 Alteration per IEBC Section 807.2, all new structural elements must comply with the 2015 International Building Code (IBC) and 780 CMR Massachusetts Amendments to the International Building Code 2015 Ninth Edition.

9.4 Existing Structural Elements

Per IEBC Section 807.3, existing structural components carrying gravity loads must be reviewed to ensure that the proposed alterations do not reduce the capacity of the existing structural elements unless such elements have the capacity to carry the applicable design gravity loads as required by the IBC. However, any existing structural elements supporting additional gravity loads, including the effects of snow drift, must comply with the IBC unless it is found that the resulting stresses are not increased by more than 5%.

9.5 Lateral-Force Resisting Systems

Any existing lateral load-resisting structural element whose demand-capacity ratio with the alteration considered is more than 10% greater than its demand-capacity ratio with the alteration ignored shall be subject to an evaluation and analysis per IEBC Section 807.4. In addition, whereas more than 30% of the total floor and roof areas are proposed to be involved, the alterations are classified as a Substantial Structural Alteration per IEBC Section 807.4.2.

Section 807.4.2 requires that an evaluation and analysis be performed to demonstrate that the altered building complies with the IBC for wind loading and with reduced IBC level seismic forces as specified under IEBC Section 101.5.4.2 for seismic loading.

10.0 MEP/FP and Instrumentation/Control Systems

10.1 Assessment of Existing Conditions

10.1.1 HVAC

Heating

The existing heating systems are in varying degrees of deterioration. This ranges from electric heating units in the Office spaces to a completely nonfunctional ducted gas furnace in the Filter Room. Due to the lack of dehumidification, the gas-fired unit heaters in the spaces have short service lives and require frequent replacement.

Cooling/Dehumidification

The building does not have mechanical cooling or dehumidification. Among the consequences of this are accelerated corrosion of equipment and need for replacement at intervals shorter than the normal expected life. NOTE: Due to the small size of the Filter Room, addition of Dehumidification unit(s) and supply ductwork will require careful design.

Ventilation

The building ventilation is served by wall mounted louvers with motor operated dampers in combination with exhaust fans. The dampers, actuator motors, and exhaust fans are at the end of their expected life.

General

Equipment in the spaces is at the end of the expected life and in need of replacement. This condition has been exacerbated by the lack of dehumidification which has allowed moisture in the spaces to accelerate the corrosion of metallic surfaces and the deterioration of absorbent surfaces such as gaskets and sealants. This lack of dehumidification results in expensive frequent replacement of heating units and vent piping.

10.1.2 Electrical

Power System

The Water Treatment Plant receives 480/277 Volt, 3-phase, 4-wire, 400 Amp utility power from a pad mounted transformer located next to the Water Treatment Facility. The transformer's secondary power feeds into the facility via an underground duct bank which connects into the facility's main circuit breaker (MCB). The main circuit breaker feeds into a normal side of an automatic transfer switch.

A 200KW natural gas generator located in a generator room within the building provide standby power to facility and feeds into the emergency side of the automatic transfer switch. The automatic transfer switch provides power to a Main Motor Control Center.

The Main Motor Control Center provides power to the Well #1, Well #2, Well #5, the UV Building Motor Control Center, a 120/208 Volt panelboard LP via a 30KVA transformer, and

the facility 480V equipment. The LP panelboard provides power to the facility's lighting, receptacles, and smaller equipment.

The UV Building Motor Control Center provides power to Well #2, a 120/208 Volt panelboard LP via a 30KVA transformer, and the UV Building's 480V equipment. The LP panelboard provides power to the UV Building's lighting, receptacles, and smaller equipment.

The MCB, Transfer Switch, and Main Motor Control Center are located off the facility's main corridor in an electrical corridor and are not in a dedicated electrical room. The facility's power system equipment is original to the facility and have surpassed their useful life period.

The UV Building Motor Control Center are located in the process area of the building and are not in a dedicated electrical room. The UV Building's power system equipment is approximately 17 years old, is still within their useful life period.

Lighting System

The Water Treatment Plant lighting appears to be original to the building, does not utilize high energy, and is in fair condition.

Egress paths do not appear to have any emergency power lighting as required by code.

Exit doorways do not appear to have illuminated exit signa as required by code.

Fire Alarm System

The Water Treatment Plant fire alarm system is a conventional type, appears to be original to the building and has surpassed its useful life.

10.1.3 Plumbing

There are two main issues with the plumbing systems:

1. The installed fixtures have reached the end of their expected service life.
2. The installed water heater and piping system does not appear to have sufficient capacity to supply a safety shower which will be required as part of the renovation upgrades.

10.1.4 Fire Protection

The facility is not protected with a Fire Protection system.

10.1.5 Instrumentation/Controls

The existing SCADA system is a PLC based system that utilizes an Allen Bradley SLC PLC platform with a main control panel located in the Water Treatment Facility's electrical corridor and a control panel located in the UV building. The two control panels are networked together via a fiber optic link.

The Allen Bradley SLC is no longer being manufactured or supported by Allen Bradley and the system requires complete replacement.

10.2 Option A – Rehab and Expand Existing Buildings

10.2.1 HVAC

Demolish and remove existing HVAC equipment and ductwork.

Heating

Filter Room:
Gas Fired ceiling hung unit heaters with ducted combustion air and gas vents.

Control Room/Offices/Break Room/Electrical Room:
VRV Ductless Split System Heat Pump Fan Coil Units; associated outdoor Air-Cooled Condensing Unit.

Chemical Storage Rooms and Additional Rooms:
Electric ceiling hung unit heaters.

Bathroom:
Electric wall mounted heater.

Cooling/Dehumidification

Filter Room:
Ceiling hung dehumidification unit with outdoor air-cooled condensing unit. (Multiple indoor units may be required to fit in the available space.) Refrigerant monitoring system.

Control Room/Offices/Break Room/Electrical Room:
VRV ductless split system heat pump fan coil units; associated outdoor air-cooled condensing unit.

Chemical Storage Rooms and Additional Rooms:
No mechanical cooling.

Bathroom:
No mechanical cooling.

Ventilation

Filter Room:
Wall mounted inlet louver with motor operated damper. Associated wall mounted exhaust fan.

Control Room/Offices/Break Room/Electrical Room:
Wall cap and ventilation duct into spaces. Wall mounted exhaust fans in each space.

Chemical Storage Rooms and Additional Rooms:
Wall cap and ventilation duct into spaces. Wall mounted exhaust fans in each space.

Bathrooms:
Door louver for inlet air. Ceiling mounted exhaust fan ducted to outdoors.

10.2.2 ELECTRICAL

POWER SYSTEM

All of the existing power distribution equipment shall be demolished.

A new exterior gas fire generator with weatherproof sound attenuated enclosure shall be provided and installed in the initial stage of the construction to allow the existing interior generator to be removed and the generator room converted to an electrical room.

New Main Circuit Breaker, Automatic Transfer Switch, Main Distribution Panel, Motor Control Center, Variable Frequency Drives, 120/208V panelboards, and transformers shall be located in the electric room.

New branch circuiting and receptacles shall be provided.

LIGHTING SYSTEM

The existing lighting system shall be demolished.

Vapor tight enclosed linear LED fixtures shall be provided for all of process areas and electric room. The light shall have manual wall switch control.

Recessed 2x2 and 2x4 architectural LED light fixtures shall be provided for all of the office areas, corridors, and bathrooms. The lights shall have occupancy controls with wall mounted override switch control.

LED wall packs shall be provided at exit doors and around the perimeter of the building. The lights shall have astronomical switch control.

LED exit signs shall be provided to indicate the egress paths, LED emergency battery lighting units shall be provided to illuminate the egress paths with code required emergency lighting.

New lighting branch circuiting shall be provided.

FIRE ALARM SYSTEM

The existing fire alarm system shall be demolished.

A new addressable type of fire alarm system shall be provided consisting of a Fire Alarm Panel located in the electric room, an annunciator located at the entrance door, horn/strobes located through the building, smoke/heat detectors as required by code, and manual pull stations at exit doors.

10.2.3 PLUMBING

Demolish and remove existing hot and cold-water plumbing systems, including backflow preventer, water meter and water heater. Demolish existing gas piping.

New natural gas service and supply piping to gas fired HVAC equipment, the domestic water heater and generator.

New water supply including water meter, backflow preventer and instantaneous water heater with recirculating pump.

Filter Room:
New water supply piping and hose bibbs. Reuse floor drains.

Control Room/Offices/Break Room/Electrical Room:
Process sink with process water taps and sample piping, stainless steel sink in Break Room.

Chemical area:
Safety Shower/Eyewash with hot/cold water supply piping and mixing valve.

Bathrooms:
New toilet and lavatory.

Provide additional space for a single shower stall with hot/cold water and sanitary, and vent piping.

10.2.4 Fire Protection

If required by total building space or amount of chemical storage the entire building will be protected with a wet sprinkler system per NFPA 13.

10.2.5 Instrumentation/Controls

The existing Instrumentation/Controls shall be demolished.

A new SCADA Main Control Panel (MCP) shall be provided and shall utilize a new Allen Bradley Control Logix PLC platform with (2) CPU processors with a redundant hot swap configuration and I/O modules. The control panel shall be located in the electrical room.

A new SCADA computer with the latest version of Microsoft operation system, IFIX HMI software, Autodialer software, and remote access login shall be provided and located in the existing main office.

New flow meters, pressure transmitters, level transmitters, and level switches shall be provided.

10.3 Option B – New Water Treatment Facility

10.3.1 Mechanical

Heating

Filter Room/Pipe Gallery:
Gas fired ceiling hung unit heaters with ducted combustion air and gas vents.

Control Room/Offices/Conference/Break Room:
Ductless split system heat pump fan coil units; associated outdoor air-cooled condensing unit.

Chemical Storage Rooms/ Other Storage Rooms:
Electric ceiling hung unit heaters.

Electrical and Mechanical Spaces:
Electric ceiling hung unit heaters.

Locker/Shower Rooms:
Rooftop ERV with gas burner and ductwork.

Bathrooms:
Electric wall mounted heater.

COOLING/DEHUMIDIFICATION

Filter Room/Pipe Gallery:
Ceiling hung dehumidification unit with outdoor air-cooled condensing unit. Refrigerant monitoring system.

Control Room/Offices/Conference/Break Room:
Ductless split system heat pump fan coil units; associated outdoor air-cooled condensing unit.

Chemical Storage Rooms/ Other Storage Rooms:
No mechanical cooling.

Electrical and Mechanical Spaces:
No mechanical cooling.

Locker/Shower Rooms:
No mechanical cooling.

Bathrooms:
No mechanical cooling.

VENTILATION

Filter Room/Pipe Gallery:
Wall mounted inlet louver with motor operated damper. Associated wall mounted exhaust fan.

Control Room/Offices/Conference/Break Room:
Rooftop ERV with DX coil, gas burner and ductwork to spaces.

Chemical Storage Rooms/ Other Storage Rooms:
Wall mounted inlet louver with motor operated damper. Associated wall mounted exhaust fan.

Electrical and Mechanical Spaces:
Wall mounted inlet louver with motor operated damper. Associated wall mounted exhaust fan.

Locker/Shower Rooms:
Rooftop ERV with gas burner and ductwork.

Bathrooms:
Door louver for inlet air. Ceiling mounted exhaust fan ducted to outdoors.

10.3.2 ELECTRICAL

POWER SYSTEM

New Main Circuit Breaker, Automatic Transfer Switch, Main Distribution Panel, Motor Control Center, Variable Frequency Drives, 120/208V panelboards, and transformers shall be located in the electric room.

A new exterior gas fire generator with weatherproof sound attenuated enclosure shall be provided.

New branch circuiting and receptacles shall be provided.

LIGHTING SYSTEM

Vapor tight enclosed linear LED fixtures shall be provided for all of process areas and electric room. The light shall have manual wall switch control.

Recessed 2x2 and 2x4 architectural LED light fixtures shall be provided for all of the office areas, corridors, and bathrooms. The lights shall have occupancy controls with wall mounted override switch control.

LED wall packs shall be provided at exit doors and around the perimeter of the building. The lights shall have astronomical switch control.

LED exit signs shall be provided to indicate the egress paths, LED emergency battery lighting units shall be provided to illuminate the egress paths with code required emergency lighting.

New lighting branch circuiting shall be provided.

FIRE ALARM SYSTEM

The existing fire alarm system shall be demolished.

A new addressable type of fire alarm system shall be provided consisting of a Fire Alarm Panel located in the electric room, an annunciator located at the entrance door, horn/strobes located through the building, smoke/heat detectors as required by code, and manual pull stations at exit doors.

10.3.3 PLUMBING

New natural gas service and supply piping to gas fired HVAC equipment, the domestic water heater and generator.

New cold/hot water system including all piping, water meter, backflow preventer, instantaneous water heater with recirculating pump and connection to sinks, toilets, lavatories, and showers.

New waste and vent system including all piping and connections to the water closet, the lavatory, lab sink and floor drains shall be provided.

Filter Room:
New hose bibbs and floor drains.

Control Room/Offices/Break Room/Electrical Room:
Process sink with process water taps and sample piping, stainless steel sink in Break Room.

Chemical Area:
Safety Shower/Eyewash with dedicated mixing valve.

Locker/Shower Rooms:
Single shower stall(s).

Bathrooms:
New toilet and lavatory.

10.3.4 FIRE PROTECTION

If required by total building space or amount of chemical storage the entire building will be protected with a wet sprinkler system per NFPA 13.

10.3.5 INSTRUMENTATION/CONTROLS

A new SCADA Main Control Panel (MCP) shall be provided and shall utilize a new Allen Bradley Control Logix PLC platform with (2) CPU processors with a redundant hot swap configuration and I/O modules. The control panel shall be located in the electrical or control room.

A new SCADA computer with the latest version of Microsoft operation system, IFIX HMI software, Autodialer software, and remote access login shall be provided and located in the control room.

New flow meters, pressure transmitters, level transmitters, and level switches shall be provided.

11.0 Analysis of Water Treatment System

11.1 Historical Flow Data

Table 11.1 shows the historical flow data for the demand of the entire water distribution system, including Average Daily flow in million gallons per day (MGD), Maximum Day flow in MGD and a peaking factor from Average Day to Maximum Day from 2016 through 2019.

Table 11.1 – Historical Flow Data

Year	Average Flow (MGD)	Max. Day Flow (MGD)	Peaking Factor
2016	1,072,290	1,681,006	1.57
2017	991,447	1,480,127	1.49
2018	1,100,511	1,717,190	1.56
2019	1,014,422	1,448,757	1.43

Table 11.2 shows more detailed flow data from 2016 through 2019, including Average Daily flow in MGD from the Turnpike Lake Water Treatment Plant, contribution to Maximum Day from the treatment facility, Maximum Day flow in MGD, the date of the Maximum Day flow, and a peaking factor from Average Day to Maximum Day.

Table 11.2 – Detailed Flow Data

Year	Average Daily Demand (MGD)	Max. Day Flow - WTP Contribution (MGD)	Combined Total Max. Day Flow (MGD)	Max. Day Demand Date	Peaking Factor
2016	330,733	554,806	1,681,006	7/13/2016	3.03
2017	447,120	700,888	1,480,127	6/17/2017	2.11
2018	566,955	972,990	1,717,190	9/9/2018	1.76
2019	631,354	821,557	1,448,757	6/11/2019	1.76

The average Max Day flow contribution from the Turnpike Lake Water Treatment Plant was 0.761 MGD. The average combined Max Day flow from the water distribution system was 1.542 MGD, and the largest flow from the treatment plant between 2016 and 2019 was 0.973 MGD on September 9, 2018.

Figure 11.1 highlights the Turnpike Lake Water Treatment Plant average water output in gallons per day (gpd) per month for the past 4 years. In 2018, over 50% of the plant's output was above the 500,000 gpd design capacity while in 2019 the average treated volume per month exceeded the threshold for the entire year. Overall, the plant surpassed 0.5 MGD 28 out of the 60 months (47% of the time).

Figure 11.1 - Turnpike Lake WTP Output

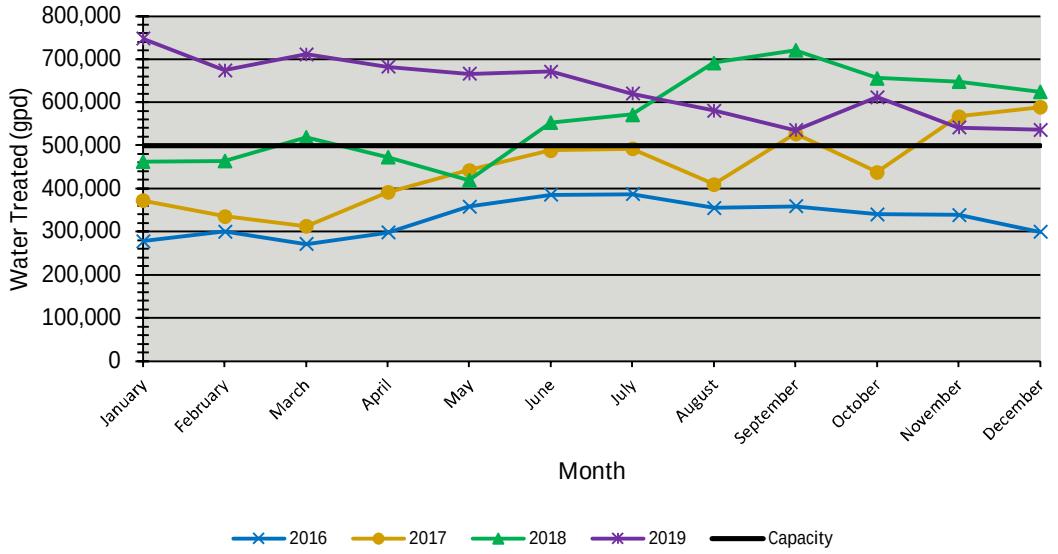
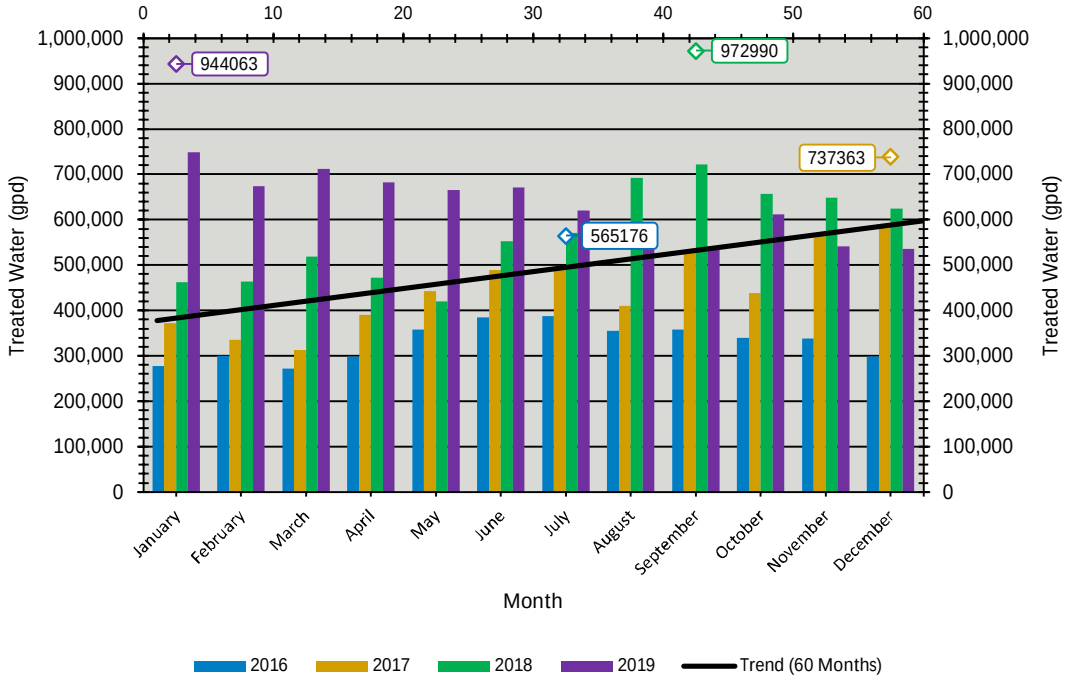


Figure 11.2 illustrates the average treated water per month over the last 4 years. As shown, the trend over the past 48 months for water usage has increased from roughly 400,000 gpd in January of 2016 to 600,000 gpd in December of 2019. This is a 50% rise in water usage at the Turnpike Lake Water Treatment Plant (TLWTP). If this trend continues, it is anticipated that the TLWTP will need to treat on average 1 MGD by 2030. As such, it is recommended the new facility be designed for an average daily demand of 1 MGD with a capacity for peak flows at 1.5 MGD and the ability to expand volume of treated water in the future.

Figure 11.2 - Turnpike Lake WTP - Average Treated Water Per Month



11.2 "What If" Analysis

The Project Working Group considered a number of factors when developing the basis of design for the proposed water treatment system. The following "What If" questions were developed:

1) What if the Town experiences increased demand from commercial properties?
2) What if future demands increase beyond current projections?
3) What if the Turnpike Lake Water Treatment Plant were not operational for an extended period of time?
4) What if the Turnpike Lake Water Treatment Plant were not operational on the day of maximum demand?

These questions, and their effect on the design of the water treatment system, were used in determining the design criteria for the future water treatment facility. The following criteria provided solutions to the "What If" questions:

1) The proposed treatment system must have the ability to expand if necessary. Space for future unknown treatment applications and pumps need to be included in the layout of the plant.
2) The proposed Water Treatment System will be designed keeping in mind increased demand over the next 50 years.
3) There would need to be a bypass valve within the pump room to allow raw water into the distribution in the event that the Turnpike Water Treatment Plant is not operational.

11.3 Water Treatment Plant Basis of Design

The Project Working Group, in concert with the designer, determined that based on historical flow data and the "What If" questions, it is desirable that the new system be sized to provide the following conditions:

1) Number of Greensand Plus Vessels to increase from three to six
2) Incorporate Per- and Polyfluoroalkyl Substances (PFAS) removal to new plant design
3) Two pumps provide 1 MGD into distribution system (Max Day in past 5 years)
4) One pump designed for backwash of greensand filter media sized at 430 gpm
5) Space for a future fourth pump and associated piping for when demand in system increases

These design points were upper level design points that the treatment plant would need to satisfy based on data analysis. Reviewing historical flow data indicated that over the course of operating the plant for 5 years (2016 through 2020), the average treated water was approximately 0.488 MGD with peak treatment at 0.972 MGD. The development of a new water treatment plant would double treated water to 1 MGD. If the high head pumps would need to run continuously, 8 hours a day, the average flow rate would be approximately 1500 gpm. At this pumping rate, the pumps are required to be as efficient as possible.

If the design points and efficiency of the pumps can be met with two identical pumps, this is preferable, however, obtaining pumps that operate at the highest efficiency for a majority of the time, is paramount.

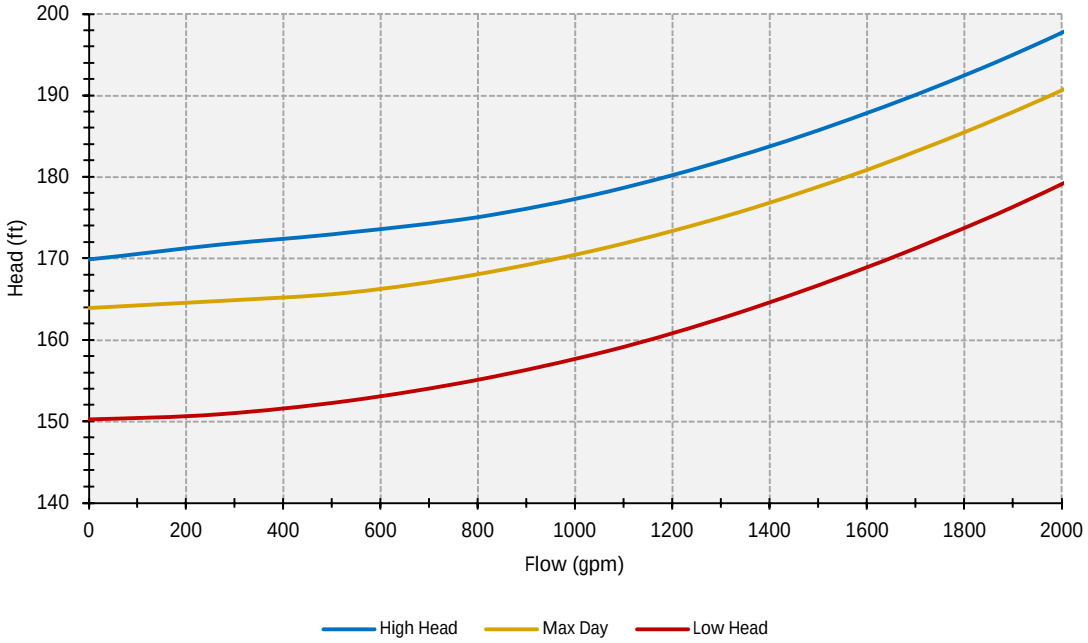
11.4 System Analysis

A hydraulic model was developed for the Town's water distribution system that included mains of 6 – 12 inches, two water storage tanks, the Turnpike Water Treatment Plant and well pumps. Figure 11.3 is a graph of the system curves for the Turnpike Lake Water Treatment Plant distribution pumps under different operating conditions.

The blue curve represents the system curve for the conditions when the Turnpike Lake Water Treatment Plant is operating and system demands are low. The red curve represents the system curve when the

Treatment Plant is offline and system demands are at Max Day demand. The orange line indicates the system curve when Turnpike Treatment Plant is operational and system demands are at Max Day.

Figure 11.3 - System Head Curves



11.5 Pump Selection

Using the basis of design and the system curves described above, the following design criteria was identified:

1. 1,370 gpm at 176' of total dynamic head (WTP On – 1 Pump)
2. 2,134 gpm at 196.5' of total dynamic head (WTP On – 2 Pumps)

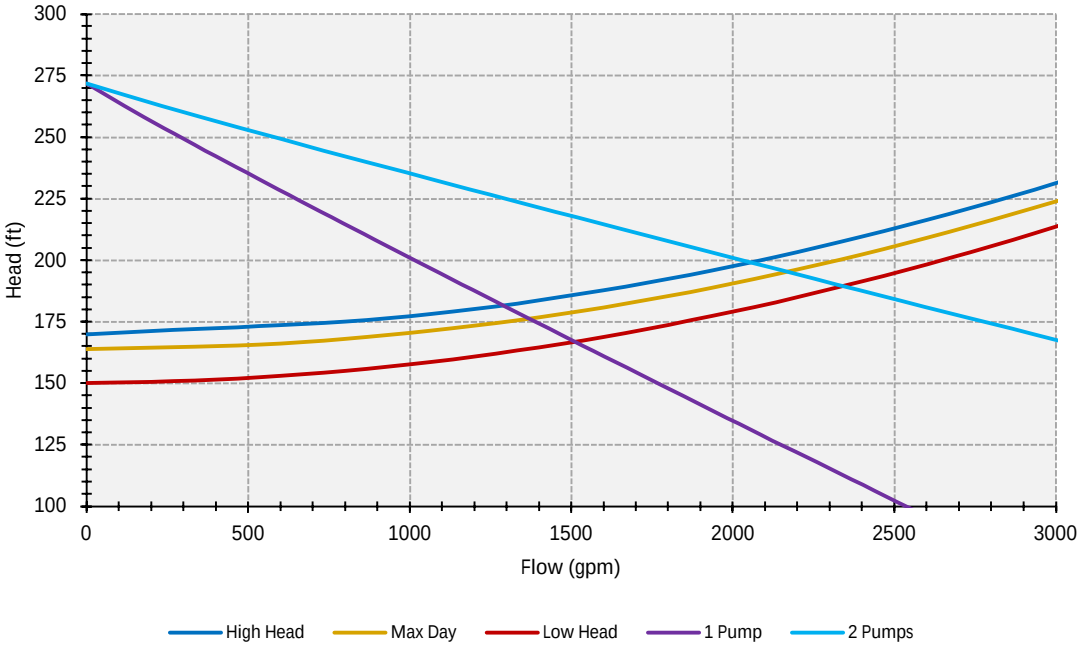
This first condition was met with one pump running, while the second condition was met with two pumps running during a max day scenario.

Figure 11.4 depicts the system curves and the pump curves for 85-105 Hp, 5-7/8" Flygt high head vertical case pumps, running as a single pump and two pumps in parallel. This particular pump would meet or exceed all the design conditions identified by the Project Working Group and at the normal operating rate of 1,370 gpm provides the peak efficiency for the motor. Schematic Design will verify that three pump vendors can supply a pump with the design criteria identified.

A review of net positive suction head requirements for the pumps used in the analysis and the pressure provided at the WTP connection indicates that the incoming pressure satisfies the required net positive suction head of the pump.

An identical third pump would be used to provide adequate redundancy in case of a pump being out of service or being repaired.

Figure 11.4 - System Head Curves



11.6 Surge Control & Protection

The use of VFD's for acceleration and deceleration of pumps would be used for surge control. Pressure relief valve and drain would be utilized for surge protection. Parco valves could be used as an alternative but was screened out by the working group. Schematic Design will review size of the relief valve and piping.

11.7 Further Analysis

Schematic design will include a more detailed analysis of the plant treatment processes and hydraulics, including system curves for pumping scenarios at the Turnpike Lake Water Treatment Plant. In addition, schematic design will also include a final pump selection and plant pipe sizing, including model of pumps, impeller size, and motor information.

12.0 Anticipated Cost of Construction

12.1 Basis of Cost Analysis

The following summarizes the basis for the cost estimates/life cycle costs.

- Costs were done on a square foot/cubic foot basis
- Costs are presented on a add/deduct basis for alternatives
- Unit rates include subcontractor markup
- General contractor general conditions (20% includes, general requirements, insurance, bonds, permits, overhead and profit)
- Design contingency (30%/20% depending on rehap or new)
- Escalation per annum to midpoint of construction (4%)
- O&M costs presented as annual costs by utility

12.2 Construction Costs

The total costs for each option are summarized in Table 12.1. The construction costs for each option, with applicable contingencies, additives, and escalation are outlined in Tables 12.2 and 12.3.

Table 12.1 – Total Construction Costs

Option	Description	Cost
A	Rehabilitate & Expand Plant Superstructure	$10,585,100
B	New Water Treatment Plant	$10,625,000

12.3 Option Construction Cost

The least expensive option is the renovation and expansion of the existing water treatment plant construction. The difference in estimated cost is less than 0.4%. A new facility is the slightly more expensive option, but would be easier to construct, less expensive to design, will not require the use of bypass during construction, and is not bound by the existing footprint of the building. For these reasons, the identified preferred solution would be an entirely new treatment plant.

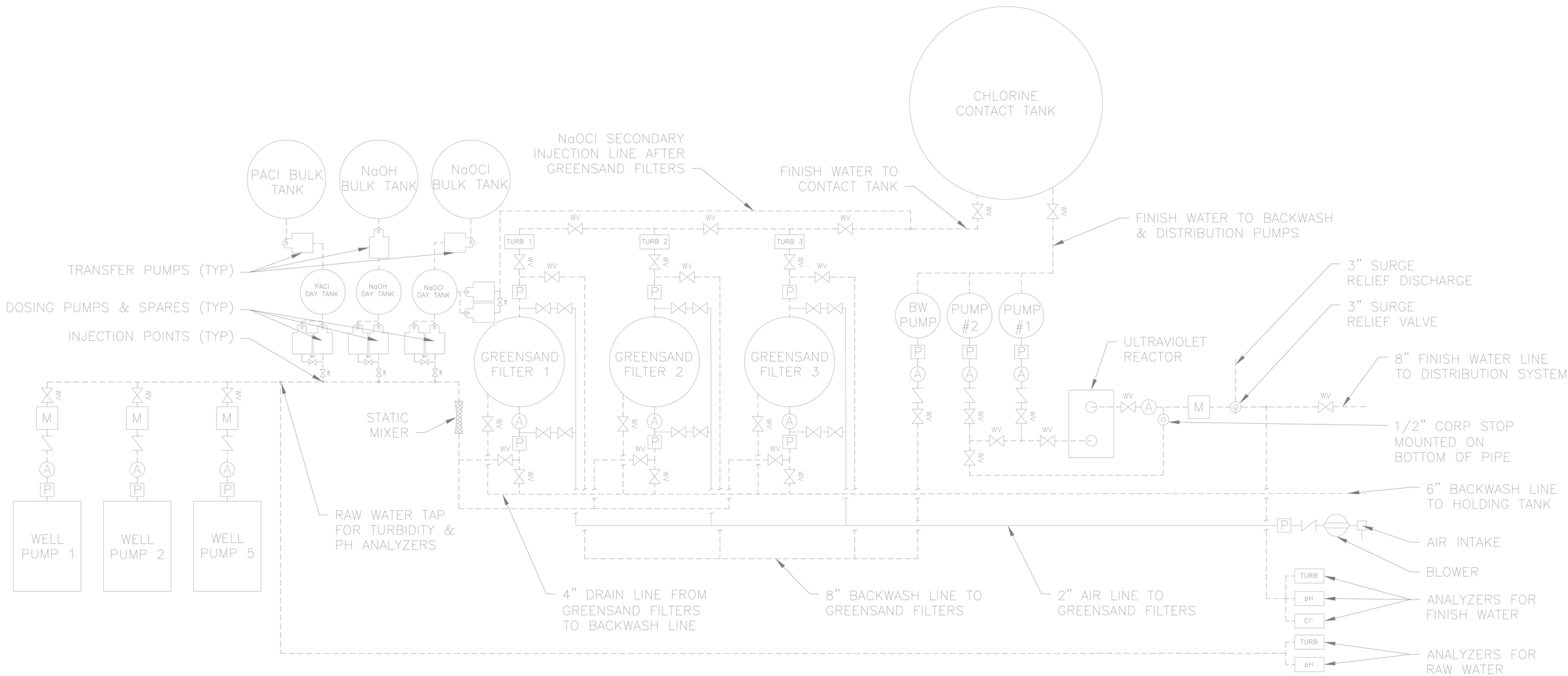
Table 12.2 - Turnpike Lake Water Treatment Plant
Feasibility Study
Option A Cost Break Down

Discipline/Item	Unit	Unit Cost	Quantity	Subtotal
Renovation				
Structural				
Foundation Rehab	SF	$20	3,420	$68,400
Superstructure	SF	$45	3,420	$153,900
Exterior Enclosure	LF	$180	1,000	$180,000
Roofing	SF	$135	3,420	$461,700
Architectural				
Interior Construction	SF	$65	3,420	$222,300
Interior Finishes	SF	$40	3,420	$136,800
Plumbing	LS	$500,000	1	$500,000
HVAC	LS	$275,000	1	$275,000
Electrical System	LS	$900,000	1	$900,000
Instrumentation and Controls	LS	$275,000	1	$275,000
Equipment				
Pumps	EA	$100,000	3	$300,000
Piping	LF	$550	500	$275,000
Monorail	EA	$55,000	1	$55,000
Green Sand Filters	LS	$1,000,000	1	$1,000,000
Granular Activated Carbon	LS	$2,000,000	1	$2,000,000
Furnishings	LS	$30,000	1	$30,000
Demo/Refill	LS	$65,000	1	$20,000
Hazardous Remediation	LS	$30,000	1	$30,000
Renovation Subtotal				$6,883,100
Expansion of Plant	SF	$650	4,580	$2,977,000
Bypass Pumping	LS	$375,000	1	$375,000
Sitework				
Utility Allowance	LS	$300,000	1	$300,000
Landscaping	LS	$50,000	1	$50,000
Sitework Subtotal				$350,000
			Total Cost Option A	$10,585,100

Table 12.3 - Turnpike Lake Water Treatment Plant
Feasibility Study
Option B Cost Break Down

Discipline/Item	Unit	Unit Cost	Quantity	Subtotal
Demolition				
Demo/Refill	LS	$100,000	1	$70,000
Hazardous Remediation	LS	$30,000	1	$30,000
Demolition Subtotal				$100,000
New Construction				
Structural				
Foundation	SF	$90	8,000	$720,000
Superstructure	SF	$80	8,000	$640,000
Exterior Enclosure	SF	$205	8,000	$1,640,000
Roofing	SF	$135	8,000	$1,080,000
Architectural				
Interior Construction	SF	$35	8,000	$280,000
Interior Finishes	SF	$20	8,000	$160,000
Plumbing	LS	$500,000	1	$500,000
HVAC	LS	$275,000	1	$275,000
Furnishings	LS	$30,000	1	$30,000
Electrical System	LS	$900,000	1	$900,000
Instrumentation and Controls	LS	$275,000	1	$275,000
Equipment				
Pumps	EA	$100,000	3	$300,000
Piping	LF	$550	500	$275,000
Monorail	EA	$55,000	1	$55,000
Green Sand Filters	LS	$1,000,000	1	$1,000,000
Granular Activated Carbon	LS	$2,000,000	1	$2,000,000
New Construction Subtotal				$10,130,000
Bypass Pumping	LS	$45,000	1	$45,000
Sitework				
Utility Allowance	LS	$300,000	1	$300,000
Landscaping	LS	$50,000	1	$50,000
Sitework Subtotal				$350,000
			Total Cost Option C	$10,625,000

APPENDIX A – Water Treatment Schematics



NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY:

DESIGNED BY:

CHECKED BY:

REGISTERED PROFESSIONAL

For Review Only

PREPARED BY

BETA
www.BETA-Inc.com

SUBCONSULTANT

SCALE

NONE

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

TITLE

Turnpike Lake Water Treatment Plant
Town of Plainville, Massachusetts

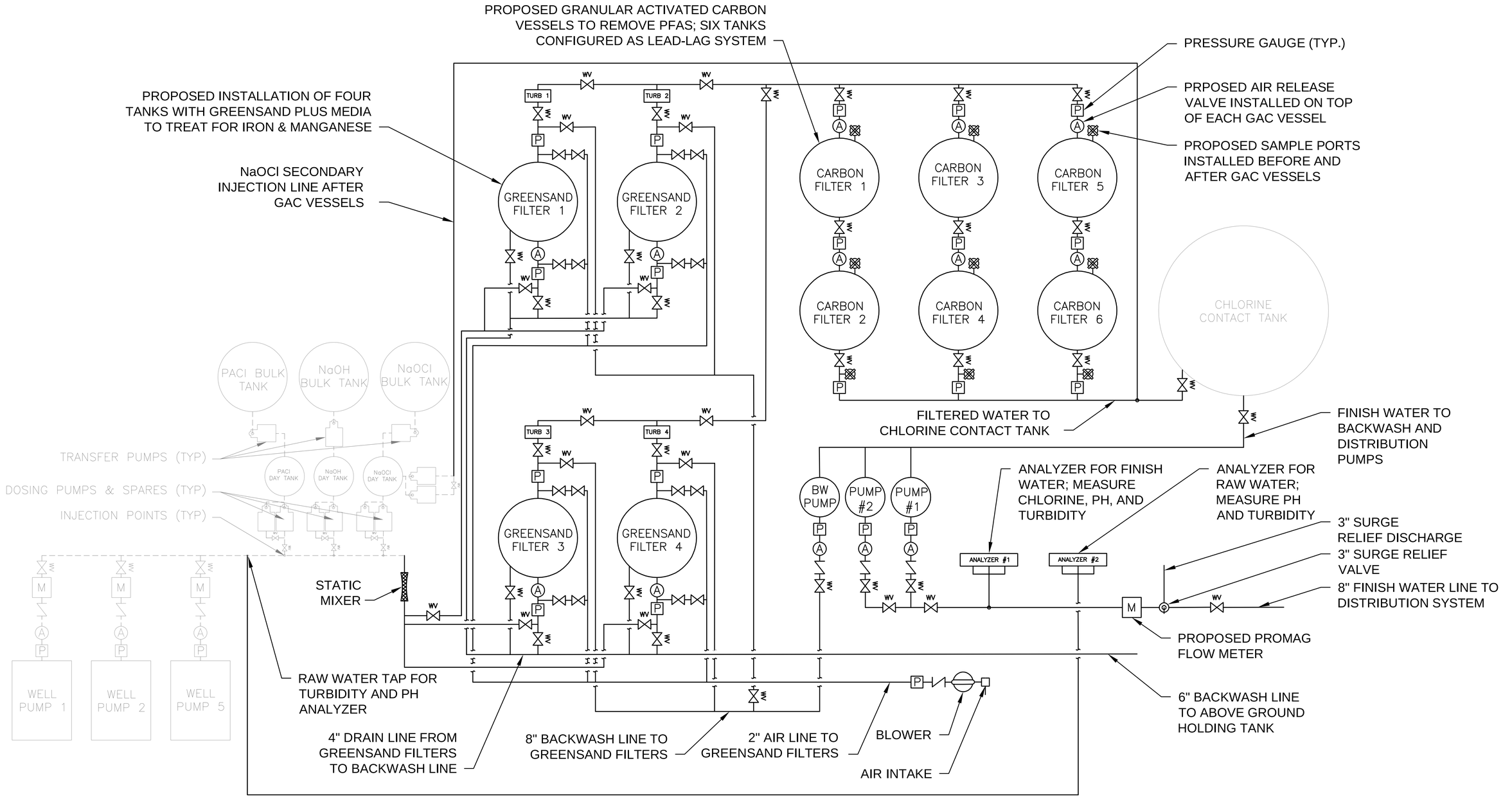
Existing Treatment Schematic

BETA JOB NO. 5342-025

ISSUE DATE 11/16/2021 3:54 PM

SHEET NO.

11/16/2021 4:23 PM K:\PLAINVILLE\5342 - MASTER SERVICES AGREEMENT\TASK ORDER 25 - WATER TREATMENT PLANT DESIGN\DRAWING FILES\PLAN SET\EXISTING TREATMENT PROCESS.DWG (BETA STB BW.STB)



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TITLE

Turnpike Lake Water Treatment Plant
Town of Plainville, Massachusetts

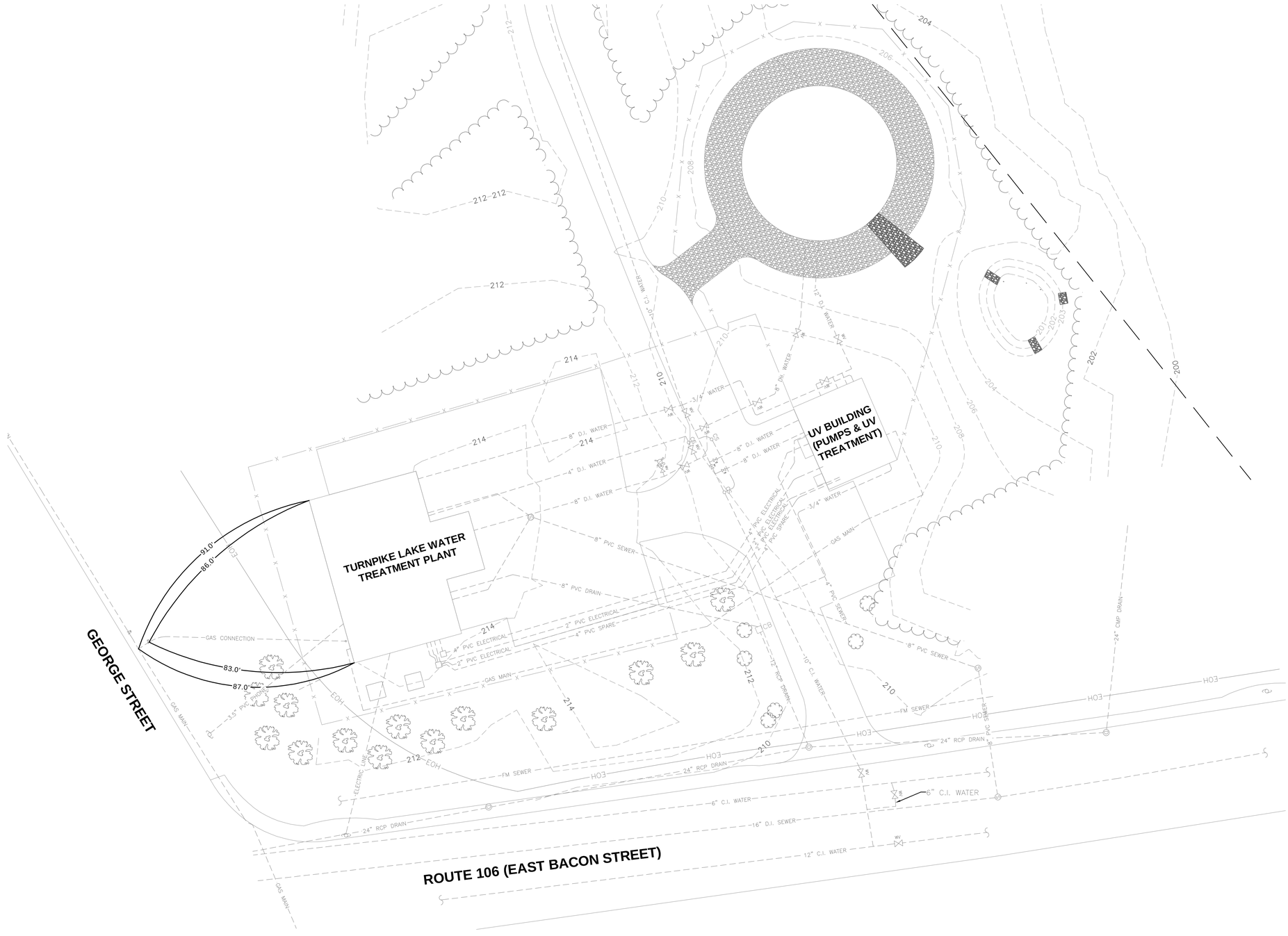
Proposed Treatment Schematic

BETA JOB NO. 5342-025

ISSUE DATE 12/20/2021 2:21 PM

SHEET NO. Appendix A

APPENDIX B – Existing Site Plan



NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY:

DESIGNED BY:

CHECKED BY:

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BETA

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SCALE

20 0 20 40

SCALE IN FEET: 1"=20'

TITLE

Turnpike Lake Water Treatment Plant
Town of Plainville, Massachusetts

Existing Site Plan

BETA JOB NO. 5342-025

ISSUE DATE 11/17/2021 3:52 PM

SHEET NO. Appendix B

APPENDIX C – Code Summary

CODE SUMMARY

Turnpike Lake Water Treatment Plant
Plainville, Massachusetts

January 18, 2022

Prepared by: Kevin S. Hastings, P.E., LEED AP

Code Type	Applicable Code (Model Code Basis)
Building	780 CMR: Massachusetts State Building Code, 9th Edition (2015 International Building Code) (2015 International Existing Building Code
Fire Prevention	527 CMR: Massachusetts Fire Prevention Regulations (2015 NFPA 1) M.G.L. Chapter 148 Section 26G – Sprinkler Protection
Accessibility	521 CMR: Massachusetts Architectural Access Board Regulations Americans with Disabilities Act
Electrical	527 CMR 12.00: Massachusetts Electrical Code (2020 National Electrical Code)
Mechanical	2009 International Mechanical Code (IMC)
Plumbing	248 CMR: Massachusetts Plumbing Code
Energy Conservation	2018 International Energy Conservation Code (IECC)

1. Use Group Classification

Use Group B (Offices) – Non-Separated Mixed Use
Use Group F-2 (Water Treatment) – Non-Separated Mixed Use
Use Group H-4 (High-Hazard- Health) – Separated Mixed Use

As summarized in the table below, since the Chemical Storage Room will contain corrosive chemicals above the exempt limits in IBC Table 307.1(2) it must be classified as a Use Group H-4 occupancy and separated from the remainder of the building by 1-hour fire barriers (IBC 508.2.4).

Chemical Name	Building Code Classification	Proposed Storage Quantity	Building Code Exempt Storage Limit
Sodium Hypochlorite	Corrosive	1,500 gallons	500 gallons 1000 gallons w/sprinklers
Sodium Hydroxide	Corrosive	1,800 gallons	500 gallons 1000 gallons w/sprinklers

2. Minimum Construction Type

Type VB (combustible, unprotected)

3. Height and Area Limitations

Use Groups B & F-2 / Construction Type VB – Fully Sprinklered

	Height	Area
Tabular Value (IBC Tables 504.3, 504.4 & 506.2)	3 St. (60 ft)	36,000 ft^2
Frontage Increase IBC Section 506.2 100% Open Perimeter	-	+6,750 ft^2
Total Allowed	3 St. (60 ft)	42,750 ft^2

Use Group H-4 / Construction Type VB – Fully Sprinklered

	Height	Area
Tabular Value (IBC Tables 504.3, 504.4 & 506.2)	2 St. (40 ft)	6,500 ft^2
Frontage Increase IBC Section 506.2 100% Open Perimeter	-	+4,875 ft^2
Total Allowed	2 St. (40 ft)	11,375 ft^2

4. Fire Ratings

Building Element (IBC Table 601)	Type VB
	Ratings in Hours
Primary Structural Frame	0
Exterior Bearing Walls including columns along the exterior wall	0
Exterior Non-Bearing Walls (IBC Table 602)	0 Fire separation distance is greater than 10 feet.
Interior Bearing Walls	0
Floor Construction	0
Roof Construction	0
Use Group H-4 (Chemical Storage Room) Separation	1

5. Interior Finishes

IBC Table 803.11	Use Groups B & F-2	Use Group H-4
Corridors	Class C	N/A
Rooms & Enclosed Spaces	Class C	Class C

6. Means of Egress

Building Minimum # of Exits (IBC Table 1006.3.1): Two means of egress are required from the building.

Room or Space Minimum # of Exits (IBC Table 1006.2.1): Use Group B and F-2 spaces with an occupant load not exceeding 49 people and a common path of travel not exceeding 100 feet only require a single means of egress. A single means of egress is also permitted from Use Group H-4 spaces with an occupant load not exceeding 10 people and common path of travel not exceeding 75 feet.

Max. Travel Distance: (IBC Table 1017.2)	Use Group H-4 – 175 feet. Use Groups B & F-2 – 300 feet.
Panic Hardware (IBC 1010.1.10)	All egress doors serving Use Group H areas require panic hardware and must swing in the direction of egress.

7. Required Fire Protection Systems

NFPA 13 Sprinkler System (780 CMR Table 903.2)
Fire Alarm System (780 CMR 903.4.2)
Automatic Fire Detection System (780 CMR 415.3)
Fire Extinguishers (780 CMR 906.1)

8. Accessibility for Persons with Disabilities

Massachusetts Architectural Access Board Regulations

Only portions of the building where a good or service is offered to the public and into which a member of the public may enter are required to comply with the Massachusetts Architectural Access Board's Regulations (521 CMR Section 11.1). Employee-only areas are not required to comply, but are subject to ADA compliance.

American's with Disabilities Act

The ADA Guidelines are not enforced by the Commonwealth of Massachusetts, they can only be enforced through a civil lawsuit or complaint filed with the U.S. Department of Justice. The ADA does require that employee work spaces are designed to allow employees to approach, enter, and exit the work area (ADA Section 203.9). However, the work areas are not required be provided with accessible features (i.e. work sinks, shelves, etc.). Spaces frequented only by service personnel for maintenance, repair, or occasional monitoring of equipment arenot be required to comply with these requirements or to be on an accessible route (ADA Section 203.5).

8. Hazardous Material Requirements

Since the Chemical Storage Room will utilize hazardous materials, the following additional protection features are required:

Ventilation (IBC 414.3)	Rooms where corrosive mists, fumes or vapors may be emitted due to the use, handling or storage of the corrosive material must be provided with a mechanical ventilation system in accordance with the International Mechanical Code. If mechanical ventilation is required,

	a manual shutoff control for the system must be provided outside the room adjacent to the entrance door. If required, the ventilation system must also have standby or emergency power unless an approved fail-safe engineered system is installed (IBC 414.5.4).
Spill Control (IBC 414.5.3)	Spill control is required in accordance with the International Fire Code (IFC). The IFC requires spill containment in rooms storing hazardous materials in individual vessels larger than 55 gallons or in which the aggregate capacity of vessels exceeds 1,000 gallons (IFC 5004.2.1). The containment system must be capable of containing a spill from the largest single storage vessel plus 20 minutes of sprinkler water in the roof or area in which the storage vessel is located (IFC 5004.2.2.3).
Emergency Alarms (780 CMR 415.5)	A manual emergency alarm system must be provided outside the area where hazardous materials are stored to activate a local alarm throughout the building in an emergency situation (non-fire).

APPENDIX D – Utility Correspondence

Christopher Brainard

From: Brown, Wendy <Wendy_Brown@comcast.com>
Sent: Wednesday, December 1, 2021 3:20 PM
To: Quint, Ted
Cc: Christopher Brainard
Subject: FW: Plainville, MA Utility Request
Attachments: Locus Map.pdf; COMCAST BETA Utility Letter.pdf

From: Christopher Brainard <CBrainard@BETA-Inc.com>
Sent: Wednesday, December 1, 2021 2:58 PM
To: Brown, Wendy <Wendy_Brown@cable.comcast.com>
Cc: Andrew Dennehy <ADennehy@BETA-Inc.com>
Subject: [EXTERNAL] Plainville, MA Utility Request

Dear Ms. Wendy Brown,

BETA Group, Inc. is requesting any underground utility plans on or near the intersection of East Bacon Street and George Street in Plainville, MA.

Attached is a map of the proposed work locations and a letter requesting utility information.

If you have any questions, please contact me at 844-800-2382 ext. 7139. Thank you for your assistance!

Best regards,
Chris

Christopher Brainard, EIT
Engineering Designer

IMPROVING COMMUNITIES TOGETHER

BETA Group, Inc.
781.255.1982

Links contained in this email have been replaced. If you click on a link in the email above, the link will be analyzed for known threats. If a known threat is found, you will not be able to proceed to the destination. If suspicious content is detected, you will see a warning.

Christopher Brainard

From: Rachel Aguiar <Rachel.Aguiar@libertyutilities.com>
Sent: Friday, December 17, 2021 10:24 AM
To: Christopher Brainard
Subject: RE: Plainville, MA Utility Request

Okay, sounds good Christopher. Happy Holidays!

Thank you.

Rachel Aguiar | Liberty Utilities (Massachusetts) **|** Manager II-Gas, Business and Community Development
P: 774-627-2891 | C: 508-525-5237 | E: Rachel.Aguiar@LibertyUtilities.com

From: Christopher Brainard <CBrainard@BETA-Inc.com>
Sent: Thursday, December 16, 2021 4:16 PM
To: Rachel Aguiar <Rachel.Aguiar@libertyutilities.com>
Cc: Andrew Dennehy <ADennehy@BETA-Inc.com>
Subject: RE: Plainville, MA Utility Request

Hi Rachel,

When the time comes we can provide those items. We are just wanted to get an idea of what Liberty would require from us.

Thank you,
Chris

Christopher Brainard, EIT
Engineering Designer

BETA Group, Inc. | 781.255.1982
Twitter | LinkedIn | Facebook | Instagram

From: Rachel Aguiar <Rachel.Aguiar@libertyutilities.com>
Sent: Thursday, December 16, 2021 4:13 PM
To: Christopher Brainard <CBrainard@BETA-Inc.com>
Cc: Andrew Dennehy <ADennehy@BETA-Inc.com>
Subject: RE: Plainville, MA Utility Request

Hello Chris,

Can you please provide me a site plan and the gas loads for this project?

Thank you.

Rachel Aguiar | Liberty Utilities (Massachusetts) **|** Manager II-Gas, Business and Community Development
P: 774-627-2891 | C: 508-525-5237 | E: Rachel.Aguiar@LibertyUtilities.com

From: Benjamin Phillips <Benjamin.Phillips@libertyutilities.com>
Sent: Tuesday, December 14, 2021 9:03 AM
To: Christopher Brainard <CBrainard@BETA-Inc.com>
Cc: Andrew Dennehy <ADennehy@BETA-Inc.com>; Chris Ferri <Chris.Ferri@libertyutilities.com>; Rachel Aguiar <Rachel.Aguiar@libertyutilities.com>; Reginaldo Lopes <Reginaldo.Lopes@libertyutilities.com>
Subject: RE: Plainville, MA Utility Request

Morning Chris,

Yes we would need the load information for the equipment planned to be installed, meter location with a site plan, and delivery pressure for the equipment. Our "standard" delivery pressure is 7" but we can supply higher as needed. As for the cost, I will refer to our Sales and Marketing Team Chris and Rachel who are cc'd on this email. The costs depends on meter location and the load.

Chris and Rachel, please see the email below. Please let Chris and Andrew from BETA know what they will need to submit to get an estimate for a gas service. They are creating a plan on a new water tower for Plainville at 171 E. Bacon St, Plainville MA.

Thank you,

Benjamin Phillips | Liberty Utilities (Massachusetts) **|** Engineer II
P: 508-468-7759 | C: 508-468-7759 | E: Benjamin.Phillips@libertyutilities.com

From: Christopher Brainard <CBrainard@BETA-Inc.com>
Sent: Monday, December 13, 2021 12:39 PM
To: Benjamin Phillips <Benjamin.Phillips@libertyutilities.com>
Cc: Andrew Dennehy <ADennehy@BETA-Inc.com>
Subject: RE: Plainville, MA Utility Request

Good afternoon Benjamin,

The Town of Plainville is looking at potentially building a new water treatment plant within the project area I had sent to you previously. As such, we are wondering what information you require from us? (i.e. load information for heat and generator, etc). As for the design, we would need to know typical gas service installation cost per linear foot, pressure/flow requirements (what are the "standard" delivery pressures for gas in town?)

Any help with these questions would be greatly appreciated.

Regards,
Chris

Christopher Brainard, EIT
Engineering Designer

BETA Group, Inc. | 781.255.1982

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From: Benjamin Phillips <Benjamin.Phillips@libertyutilities.com>
Sent: Thursday, December 9, 2021 11:30 AM
To: Christopher Brainard <CBrainard@BETA-Inc.com>
Cc: Andrew Dennehy <ADennehy@BETA-Inc.com>
Subject: RE: Plainville, MA Utility Request

Good afternoon Chris,

Attached is your utility request for E. Bacon St. Please note that this does not take place of a digsafe. Let me know if you have any questions.

Thank you,

Benjamin Phillips | Liberty Utilities (Massachusetts) **|** Engineer II
P: 508-468-7759 | C: 508-468-7759 | E: Benjamin.Phillips@libertyutilities.com

From: Christopher Brainard <CBrainard@BETA-Inc.com>
Sent: Wednesday, December 1, 2021 3:17 PM
To: Benjamin Phillips <Benjamin.Phillips@libertyutilities.com>
Cc: Andrew Dennehy <ADennehy@BETA-Inc.com>
Subject: Plainville, MA Utility Request

Dear Mr. Benjamin Phillips,

BETA Group, Inc. is requesting any underground utility plans on or near the intersection of East Bacon Street and George Street in Plainville, MA.

Attached is a map of the proposed work locations and a letter requesting utility information.

If you have any questions, please contact me at 844-800-2382 ext. 7139. Thank you for your assistance!

Best regards,
Chris

Christopher Brainard, EIT
Engineering Designer

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781.255.1982

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Christopher Brainard

From: Malley, Ann V. <Ann.Malley@nationalgrid.com>
Sent: Monday, December 27, 2021 9:03 AM
To: Gupta, Murli; Christopher Brainard
Cc: Andrew Dennehy
Subject: RE: EXT || Plainville, MA Utility Request
Attachments: Information Needed for Work Request # ; New-electric-service-request-form.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Good Morning
The Town first needs to get a work request number. Have them complete the service request form attached and email to workrequest@nationalgrid.com.
Then they will need to submit all the information on the other attachment. I can help them through the process so if anyone has any questions please email me.
Thank you,
Ann

From: Gupta, Murli <Murli.Gupta@nationalgrid.com>
Sent: Tuesday, December 21, 2021 1:59 PM
To: Christopher Brainard <CBrainard@BETA-Inc.com>; Malley, Ann V. <Ann.Malley@nationalgrid.com>
Cc: Andrew Dennehy <ADennehy@BETA-Inc.com>
Subject: RE: EXT || Plainville, MA Utility Request

Hi Ann,

I was hoping you would be able to help with a town project request below, or otherwise point me in the right direction of who I can contact? I recently started as a DOT program manager but not exactly sure how town projects are coordinated.

Thanks,
Murli

From: Christopher Brainard <CBrainard@BETA-Inc.com>
Sent: Monday, December 13, 2021 1:20 PM
To: Gupta, Murli <Murli.Gupta@nationalgrid.com>
Cc: Andrew Dennehy <ADennehy@BETA-Inc.com>
Subject: RE: EXT || Plainville, MA Utility Request

Hi Murli,

The Town of Plainville is looking at the potential development of a new water treatment plant. It is likely the location of the plant will move from existing conditions. As such, we are reaching out to see what is required from National Grid as we begin phasing of this project (permitting, work order, etc.). This is only a preliminary discussion, we still need to complete the design phase of this project before more formal involvement with NGrid, but just wanted to open it up sooner rather than later.

Please let me know if you have any questions.

Kind regards,
Chris

Christopher Brainard, EIT
Engineering Designer

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From: Gupta, Murli <Murli.Gupta@nationalgrid.com>
Sent: Wednesday, December 1, 2021 3:31 PM
To: Christopher Brainard <CBrainard@BETA-Inc.com>
Cc: Andrew Dennehy <ADennehy@BETA-Inc.com>
Subject: RE: EXT || Plainville, MA Utility Request

Hi Chris,

I am not able to provide the maps/info myself but please email the following depending on what you are looking for (also in case of any future requests):

For National Grid Maps & Records Requests:

- Electric utility map requests: Please submit to: Maps & Records-NE@nationalgrid.com
  - (First.Last416f2@nationalgrid.com)
- Gas utility map requests, please submit to: GasDataReq@nationalgrid.com

Regards,
Murli

Murli Gupta
Pronouns used: he/him
Lead Program Manager
MassDOT, Resource Planning NE
nationalgrid
Murli.Gupta@nationalgrid.com
781-296-6483

From: Christopher Brainard <CBrainard@BETA-Inc.com>
Sent: Wednesday, December 1, 2021 3:28 PM
To: Gupta, Murli <Murli.Gupta@nationalgrid.com>
Cc: Andrew Dennehy <ADennehy@BETA-Inc.com>
Subject: EXT || Plainville, MA Utility Request

Dear Murli Gupta,

BETA Group, Inc. is requesting any underground utility plans on or near the intersection of East Bacon Street and George Street in Plainville, MA.

Attached is a map of the proposed work locations and a letter requesting utility information.

If you have any questions, please contact me at 844-800-2382 ext. 7139. Thank you for your assistance!

Best regards,
Chris

Christopher Brainard, EIT
Engineering Designer

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link: https://link.edgepilot.com/s/78972200/7rl01xLaC0e-Aof7m2wljQ?u=https://www.nationalgrid.com/group/about-us/corporate-registrations

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Christopher Brainard

From: mari-ugrecordrequest@verizon.com
Sent: Friday, December 3, 2021 11:42 AM
To: Christopher Brainard
Subject: Re: Plainville, MA Utility Request
Attachments: 114.TIF; 18.TIF

See attached. Thank you.

From: Christopher Brainard <CBrainard@BETA-Inc.com>
Sent: Friday, December 3, 2021 11:28 AM
To: MARI-UGRecordRequest
Subject: RE: Plainville, MA Utility Request

Hello,

Please see the attached copy of check and NDA.

Thanks,
Chris

Christopher Brainard, EIT
Engineering Designer

BETA Group, Inc. | 781.255.1982
Twitter | LinkedIn | Facebook | Instagram

From: mari-ugrecordrequest@verizon.com <mari-ugrecordrequest@verizon.com>
Sent: Thursday, December 2, 2021 9:16 AM
To: Christopher Brainard <CBrainard@BETA-Inc.com>
Subject: Re: Plainville, MA Utility Request

If you can email me a copy of the NDA and check, I can email the plats to you and you can send the originals to Verizon, Attn: Sharon Connell, 275 Wildwood Avenue, Woburn, MA, 01801. Thank you.

From: Christopher Brainard <CBrainard@BETA-Inc.com>
Sent: Wednesday, December 1, 2021 3:46 PM

To: MARI-UGRecordRequest
Cc: Andrew Dennehy
Subject: Plainville, MA Utility Request

To Whom it May Concern,

BETA Group, Inc. is requesting any underground utility plans on or near the intersection of East Bacon Street and George Street in Plainville, MA.

Attached is a map of the proposed work locations and a letter requesting utility information.

If you have any questions, please contact me at 844-800-2382 ext. 7139. Thank you for your assistance!

Best regards,
Chris

Christopher Brainard, EIT
Engineering Designer

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APPENDIX E – Meeting Minutes with MassDEP

MEMORANDUM

Date:	1/19/2022	Job No.:	5342
To:	Jim McLaughlin		
Cc:	Bob Mackie, Andy Dennehy, Giliane Tardieu, Dennis Morton, Dennis Marcure		
From:	Chris Brainard		
Subject:	Discussion with MassDEP on Turnpike Lake Water Treatment Plant		

Meeting commenced at 3:00 PM

MassDEP and BETA began introductions. BETA continued the conversation by noting the Town of Plainville's task of either renovating and expanding or constructing a new treatment plant at the existing Turnpike Lake Water Treatment Plant site. The following summary of discussion is included for each subject.

1. Project Schedule
    a. BETA highlighted its involvement with the Town of Plainville in conducting a Feasibility Study to compare costs between treatment plant renovation and expansion or a completely new treatment plant. BETA will be presenting to the board next Monday, January 24th with findings.
    b. DEP noted that this is an important first step.
    c. BETA would likely want to reconvene with MassDEP during design phase of project.

2. Existing Treatment Processes & Possible Future Options
    a. BETA mentioned that the Town is looking to move away from UV treatment and is set on adding GAC to process as they anticipate concentrations in wells to increase and stricter treatment regulations to follow in the near future.
    b. MassDEP acknowledged that the Town does not receive log removal credit for UV and does not see an issue with omitting that treatment step. As for PFAS removal, there are a number of options, but there would need to be further discussion of whether pilot testing is necessary. If Town sticks with existing treatment processes and only adds GAC to the new plant, DEP would likely not require pilot testing.
        i. Items to think about:
            1. Well currently under influence – does town want to stay with greensand or classify new system as surface water?
            2. New well exploration – Town and BETA seeking new groundwater source and abandoning well that is under influence.
            3. Connect Mirimichi Lake to treatment plant – this has been discussed but would likely be 10 years down the road in terms of planning.
    c. BETA asked DEP for municipalities that followed a similar treatment process to what Plainville is following. DEP noted that Mansfield, Norton, and Stoughton are all locations with comparable systems to Plainville that are worth visiting.
    d. Discussion of backwash waste recycling was included, and DEP stated that this is not necessary – depends on Town's water management.

e. DEP recommended planning for additional space with emerging data about PFAS and the need for further treatment processes as regulations change per EPA.
f. BETA is anticipating a design for a new treatment plant adjacent to existing conditions. The old plant buildings would become space for storage.
    i. There would be plenty of space for expansion and treatment processes (piping and chemical station area), which is a concern that DEP brought up.
g. BETA wondered when to circle back to DEP?
    i. DEP thought it best to reach out again when finalizing treatment options. Biggest discussion will be about pilot testing – changing processes or if the Town chooses to follow existing treatment steps.
h. MassDEP recommended that BETA and Town be aware of EPA Optimal Corrosion Control Treatment Evaluation Technical Recommendations for Primacy Agencies and Public Water Systems manual as this will be an essential tool for ensuring the DPW know its distribution system well and is able to monitor impacts when a new treatment plant is brought on-line. This is needed if forgoing pilot testing for the Town will need to prove the new plant is not negatively impacting conditions of the water system. A report will be required following start-up and likely to be some modification of the WS21 permit (used for pilot testing).
i. DEP noted the concern with retrofitting the existing system to meet EPA and DEP regulations with required space and code compliance, etc. They were satisfied to learn that the Town was gearing towards design of a new water treatment plant.

Meeting adjourned at 4:00 PM.