

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Patriot Properties CAMA Upgrade \$29,500 General Fund

Assessing Department

Conversion to current Patriot Computer Assisted Mass Appraisal (CAMA) Software System

First considered in Fiscal Year 2019; upgrade the existing CAMA system to a more efficient system in providing valuation services for the City; analogous to planned upgrade to MUNIS financial system. The proposal is recommended as part of the FY23 CIP. There will be a request to the City Council to approve an FY22 budget transfer from available salary to the operating budget for the purchase of this upgrade and if approved this project will come off of the FY23 CIP.



**Patriot Properties, Inc.**  
 123 Pleasant Street, Marblehead, MA 01945  
 Ph: (781) 586-9670 // Fax: (781) 586-9667  
[www.patriotproperties.com](http://www.patriotproperties.com)

## AP5 – UPGRADE PROPOSAL

<b>Framingham, MA</b> 150 Concord St. Rm. 101, Framingham, MA 01702  John Neas Ph: (508) 532-5417 <a href="mailto:jneas@framinghamma.gov">jneas@framinghamma.gov</a>	Date: 8/18/2021  Contact: Jeff Leone Phone: (781) 586-9670 x2035  E-Mail: <a href="mailto:jeff@patriotproperties.com">jeff@patriotproperties.com</a>
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SOFTWARE / SERVICES	EXPIRATION DATE	DATE
AssessPro AP5 Upgrade (RE/PP/GIS/WEB/ARCH) APPROX. 20,500 Parcels	90 DAYS	Date: 8/18/2021

Item	Description	Initial Cost	Annual
AssessPro AP5	AP5 Client Server Upgrade, RE, PP & GISPRO	\$29,500.00	\$11,200.00
Conversion	8 Years of data / (8) Databases	Included	N/A
Conversion	(0) Additional Database(s) \$750.00 each	\$0.00	N/A
WebPro AP5	WebPro AP5 - Hosted	Included	Included
Training	AssessPro AP5 Training	Included	N/A
Set-Up	Installation and Set-up	Included	N/A
SUBTOTAL		\$29,500.00	\$11,200.00
TOTAL		<b>\$29,500.00</b>	<b>\$11,200.00</b>

**Server (Recommended) Requirements:** Windows Server 2016 or Greater, SQL Server 2016 or Greater, Intel XEON Quad Core 3.0 GHz or better, OS Partition – 2x 256 GB Drives on Raid 1, Data Partition – 6x 512 GB SSD Drives on Raid 5 (2TB of Usable Disk Space), 32GB RAM

**Workstation (Recommended) Requirements:** Windows 10 (or Greater) 64 bit, Intel i5 Core 2.0 GHz or better, 256 GB SSD, 8 GB RAM Minimum, 1024 x 768 monitor resolution (96dpi), 512 MB RAM video card to run GIS Viewer

**ESRI Licensing and Maintenance:** ESRI ArcGIS Engine Single Use License is required for every workstation using “GISPRO” the AssessPro GIS Viewer. Additional ESRI ArcGIS Engine SU license(s) can be purchased for \$400.00 each. ESRI charges an annual fee of \$100.00 for each ArcGIS Engine license(s) purchased. “GISPPRO Online” requires an Esri ArcGIS Server license and (1) ArcGIS Desktop license to publish map layers to the server. All ESRI maintenance fees will be invoiced directly from ESRI, not Patriot Properties

**WebPro Customers** – If you are currently using WebPro (Hosted), the AP5 version is included. **WebPro Source Code customers** hosting their own versions of WebPro will need to purchase the source code for the AP5 version of WebPro.

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Voting Machines and Booths \$115,000 General Fund

City Clerk

Voting Machines and Booths for 9 new precincts and for handicapped accessibility

According to the 2020 Federal Census, the population increased from 68,318 to 72,362. On September 2, 2021, City Council voted to add 9 additional precincts to the existing 18 precincts. Each of the nine precincts requires a separate vote tabulator.

New voting booths are required for the 9 additional precincts added as well as replacing the current booths. Also, adding more booths designed for persons with disabilities. The current voting booths need replacement due to shelf-life, conditions, and storage/set-up issues. This purchase will standardize the voting booths used by the City of Framingham. In addition, new voting booths for persons with disabilities can be placed at each precinct as opposed to one at each voting location.



City of Framingham, Massachusetts  
 Purchase Proposal Quote  
 Submitted by LHS Associates, Inc.  
 July 30, 2021



<u>Quantity</u>	<u>Description</u>	<u>Price</u>
<b>HARDWARE</b>		
9	<b>ICP Tabulator Bundle includes:</b> <input type="checkbox"/> One (1) Tabulator with a padded carrying case, two (2) memory cards, one (1) power cord, one (1) key two (2) thermal paper rolls, one (1) dozen marking pens, six (6) security seals and an internal battery back up. <input type="checkbox"/> One (1) plastic ballot box with three (3) compartments, casters and a built in power supply. Ballot boxes able to nest for ease of storage.	\$54,000.00
<b>SERVICES</b>		
	<b>Two Year Hardware &amp; Software Warranty:</b> <input type="checkbox"/> All parts, labor, travel and shipping costs included. <input type="checkbox"/> Unlimited access to the LHS Help Desk for Pre-Election, Election Day and Post Election questions. <input checked="" type="checkbox"/> An annual maintenance visit to the City of Framingham to inspect, calibrate and service all equipment. <input checked="" type="checkbox"/> Any necessary repairs will take place in the City of Framingham. If onsite repair is not possible loaner equipment will be left in the customer's possession until all equipment can be repaired and returned. <input type="checkbox"/> An employee of LHS, not a subcontractor, will conduct all maintenance work. <input type="checkbox"/> Local service center with parts and technicians trained in repairing and servicing voting equipment.	<i>Included</i>
	<b>Documentation, including but not limited to:</b> <input checked="" type="checkbox"/> One (1) Pre Election Testing Guide, nine (9) Poll Worker Training Guides, One (1) Voter Tutorial Video and One (1) Instructions to Voter Poster.	<i>Included</i>
	<b>Two Training sessions exclusively for the City of Framingham.</b> <input checked="" type="checkbox"/> Two hours of training for the City Clerk and office staff. This training will cover basic use of the machine, pre-election testing and Election Day procedures. <input checked="" type="checkbox"/> Two hours of training for Poll Workers. This training will cover Election day procedures and basic troubleshooting. <input checked="" type="checkbox"/> Both trainings will be conducted in the City of Framingham and scheduled by the City Clerk.	<i>Included</i>
	<b>Onsite coverage by an employee of LHS for the first election.</b> <input checked="" type="checkbox"/> A member of the LHS team will work with the City Clerk from one (1) hour prior to opening the polls until two (2) hours after the polls close on Election Day. <input checked="" type="checkbox"/> The representative will NOT be a subcontracted employee from another company.	<i>Included</i>
	<b>Onsite acceptance testing of all equipment.</b>	<i>Included</i>
<b>SHIPPING &amp; DISCOUNTS</b>		
	Shipping & Handling	<i>Included</i>
	Tabulator Trade-In Credit	\$0.00
	<b>TOTAL PURCHASE</b>	<b>\$54,000.00</b>
<b>POST WARRANTY FEES</b>		
9	Annual Post Warranty Maintenance Fee	\$1,800.00
	<input checked="" type="checkbox"/> LHS Top Tier Coverage (Annual Maintenance Plan)	
9	Annual Post Warranty Firmware License	<i>Included</i>
	<input checked="" type="checkbox"/> Tabulator Firmware License	
	<b>TOTAL POST WARRANTY FEES</b>	<b>\$1,800.00</b>

- This quote is an estimate and is subject to final approval by LHS and the Customer
- Rate valid for 90 days and thereafter may change
- This quote does not include coding or ballot printing charges

If you would like to move forward with the purchase of the above equipment, please sign, scan, and email the proposal to [bcm@lhsassociates.com](mailto:bcm@lhsassociates.com) to initiate the fulfillment process.

Signature:

Date:

Date of anticipated first use of new equipment:



Quote

Account Name MAMiddlesexCoFraminghamCity  
 Opportunity Name Framingham PollMaster

Created Date 9/20/2021  
 Expiration Date 10/18/2021  
 Quote Number 00001411

Prepared By Donna Brinkman  
 Phone (630) 241-4290  
 Email dbrinkman@gbsvote.com

Bill To Name MAMiddlesexCoFraminghamCity  
 Bill To 150 CONCORD STREET  
 FRAMINGHAM, MA 01702

Ship To Name MAMiddlesexCoFraminghamCity  
 Ship To CITY OF FRAMINGHAM  
 150 CONCORD STREET  
 FRAMINGHAM, MA 01702

Quantity	Product Code	Product	Sales Price	Total Price
300.00	PollmasterIIBooth	Pollmaster II Voting Booth - no light	\$192.00	\$57,600.00

Description	Quote does not include shipping and handling.	Subtotal	\$57,600.00
		Total Price	\$57,600.00
		Grand Total	\$57,600.00

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Climate Action Plan \$138,075 General Fund

Capital Projects & Facilities Management

Climate Action Plan Development of Blueprint to Establish Actions

The requested funding will support the development of a comprehensive and holistic blueprint that establishes clear actions that Framingham can take to reduce its emissions and improve local resiliency built on detailed best practices research, analysis and integration of existing plans in Framingham, and strong community engagement with a focus on members of our community most impacted by climate change.

Framingham's 2020 Strategic Plan sets a clear objective to align with the Commonwealth's target of Net Zero greenhouse gas (GHG) emissions by 2050. To achieve this sizable objective, an actionable blueprint for Framingham to tackle greenhouse gas emissions, both from municipal and community sources, is critical. With the implementation of the City's first Sustainability Committee and multiple ongoing supporting climate planning efforts, it is an advantageous time for the community to begin development of comprehensive climate action planning. Additionally, development of a comprehensive climate action plan would help provide further definition to priority items identified in Framingham's Community Resiliency Building (CRB) Workshop Report on climate change. The proposed climate action plan will utilize community engagement and best practices to identify the critical measures Framingham should adopt to improve its sustainability, reduce greenhouse gas emissions, and support local climate resiliency. Development of this plan is important to supporting the Sustainability Committee as it seeks to make long-term improvements in local sustainability.



# Framingham Climate Action Planning

## **FY 2023 Capital Budget Capital Projects & Facilities Management Proposed Scope of Climate Action Planning**

### **Overview**

With the increasing regularity of extreme weather and natural and climate-related hazards across the MetroWest, the City of Framingham recognizes the escalating threat that climate change poses locally and the dire need for it to reduce its greenhouse gas emissions as part of a global effort. To this end, the City was designated through the Commonwealth's Municipal Vulnerability Preparedness Program in 2019 for completing a community-wide baseline climate change and natural hazard vulnerability assessment that drew upon the knowledge and experience of municipal officials and members of the community. Developed in 2020, the City of Framingham's Strategic Plan sets a clear objective to align with the Commonwealth's Net Zero greenhouse gas (GHG) emissions by 2050. Additionally, alongside the implementation of the community's first Sustainability Committee, the City is working on a number of climate planning initiatives centered on enhancing on energy resiliency and better understanding the impacts of climate change on its Environmental Justice neighborhoods.

As the City navigates the path to becoming a Net Zero community, the next core step for Framingham is to develop a comprehensive and holistic blueprint that incorporates diverse and representative community-wide perspectives and that establishes clear actions it can take to reduce its emissions and improve local resiliency. Developed from both the close review of existing plans and best practices across the country, the blueprint will prioritize its actions based on their contexts within Framingham – incorporating considerations of their impact, cost, stakeholder support, and resiliency benefits. By also synthesizing its current climate change planning projects and leveraging them into a more comprehensive plan, this holistic blueprint will consider the co-benefits of climate mitigation and work toward a more resilient and equitable future for all of Framingham's residents.

This document provides the proposed Scope of Work through which an experienced consultant such as the MAPC could support the City of Framingham's comprehensive climate action planning process. If approved, elements of the proposed project will be shaped closely by the feedback of the Framingham Sustainability Committee and by criteria of grant funding opportunities that may present opportunities to reduce municipal expenditures toward development of the plan. The proposed plan is currently divided into several phases reflecting the strong focus on the development of an effective engagement strategy leading up to the development of the plan. The currently proposed phases are as follows:

- Phase 1: Stakeholder Mapping, Internal Capacity Building, and Baseline Data Collection
- Phase 2: (A) Community Engagement and (B) Climate Action Plan Development

## Phase 1: Stakeholder Mapping, Internal Capacity Building, and Baseline Data Collection

The first phase of the climate action planning process will involve the development of a community engagement plan and Climate Action Plan (CAP) Working Group to craft effective strategies for the City connect with residents. This phase of the plan would also involve the necessary baseline data collection to inform the mitigation and resiliency measures selected as well as development of branding and outward facing launch materials. Recent and ongoing climate planning efforts such as through the MVP Program and with the MAPC will serve as core components in this phase of plan development.

<b>Stakeholder Mapping, Internal Capacity Building, and Baseline Data Collection \$22,400.00</b>	
Stakeholder Mapping	In-depth interviews with key organizations to understand stakeholders in the City and their primary areas of prioritization, interest, support, and concern. Synthesis of interview notes and prior focus group discussions.
	Interviews with key municipal staff and elected officials to understand their primary areas of prioritization, interest, support, and concern. Synthesis of interview notes and prior focus group discussions.
	Develop and distribute survey of community organizations with focused equity questions (how and where can we reach their audiences, what messages and angles resonate with them).
	Utilizing research obtained through ongoing EJ engagement and research, prepare a stakeholder assessment matrix that IDs vulnerable populations (particularly those not covered in prior and ongoing community research) and primary mediums for communication and outreach.
Engagement Plan	Develop a community engagement plan based on the stakeholder mapping that reaches a broad audience but establishes target stakeholder groups (including vulnerable populations), tactics, and metrics of success.
	Prepare core messages for climate action in Framingham based on preliminary stakeholder input from the mapping process.
	Design and conduct a focus group with the Sustainability Committee and Framingham Public Schools to inform the youth engagement segment of the plan.
Staff Workshops	Review of community and municipal GHG emissions inventory and assessment of current emissions targets.

	Design and facilitate a stakeholder mapping workshop with key municipal staff to inform the stakeholder assessment matrix.
	Integration of data analysis on EJ neighborhoods ascertained through ‘Building Relationships with Environmental Justice Communities’ Project.
Baseline Data Collection	Review of existing plans, policies, ordinances, and data from the City’s prior planning processes. <i>Ex. MVP, OSRP, Strategic Plan, etc.</i>
	Evaluation of MAPC Net Zero Playbook and climate change best practices from across the country for consideration of implementation in Framingham.
	Develop supplemental GIS maps and gather baseline information on Framingham’s climate opportunities and risks.
Launch Material	Development of branding to help facilitate community outreach regarding the development of the plan.
	Prepare and design simple one-page handout for the City to use at outreach events to help make the public more aware of the CAP process.
	Translate one-page handout and core messages from engagement plan into Portuguese and Spanish.
	Develop a landing webpage to host future deliverables (including plan dashboard) and to provide a location for the City to host surveys/other outreach information.
Project Management	Set up working group comprised of a broad selection of stakeholders and hold bi-monthly CAP Working Group Meetings, bi-weekly calls with City and internal coordination, invoicing, project set-up and scope finalization.

**Phase 2A: Community Engagement**

In coordination in plan development, the first component of the second phase of the proposed project involves the launch and execution of the community engagement plan. The City’s CAP Working Group would coordinate with the consultant to organize a community input survey, public events, and more to collect data from a broad group of stakeholders that will inform the CAP.

<b>Engagement Launch and Execution</b>		<b>\$46,025.00</b>
Community Input Survey	Develop a community wide input survey using Qualtrics, analyze survey results, and develop a summary of survey results and present to the CAP Working Group. Synthesize results of the survey with data collected from community liaisons employed in ongoing <i>'Building Relationships with Environmental Justice Communities'</i> project.	
Public Events	Coordination of youth engagement launch event/community-wide visioning session and CAP arts installation.	
	Community-wide strategy development workshop or other community-wide engagement activity based on the engagement plan findings.	
	Flexible budget for additional engagement activities.	
Staff and Volunteer Workshop	Design and facilitate an engagement tactics training with key municipal staff and volunteers to expand the on-the-ground task force for implementing the engagement plan.	
	Develop talking points and presentation materials for stakeholder engagement "road show".	
	Meet with committees, boards, community groups, and other stakeholders to discuss the CAP and gather input.	
Focus Groups	Design and execute up to 2 focus groups with identified in the community engagement plan. Synthesize input from the focus groups.	
Internal Outreach	Meet with key municipal staff to collect information on existing efforts and new ideas for the CAP.	
	Gather feedback on the goals and recommended actions from City leadership and departmental staff.	
Project Management	Bi-monthly CAP Working Group Meetings, bi weekly calls with City and internal coordination, and invoicing and project management.	

**Phase 2B: Climate Action Plan Development**

The second part of Phase 2 will be centered on the development of the climate action plan by the MAPC in close coordination with the CAP Working Group, with a focus on the core team comprised of the Sustainability Coordinator and Framingham Sustainability Committee. Based on community input and feedback, the CAP Working Group will identify and rank actions on climate change adaptation and mitigation for Framingham. After selection of priority actions, the consultant will assist the CAP Working Group in developing implementation contexts to help provide detail on the 'who, what, where, when and how' involved with the priority actions.

Once complete, the final version of the plan will be presented to the public and also uploaded in an interactive format online that can be updated over time for the City and residents to track progress toward priority actions identified in the plan.

<b>Plan Development</b>		<b>\$69,650.00</b>
Action Identification	Develop initial list of CAP actions for input based on results from initial community engagement, MAPC Net Zero Playbook, and best practices from across the country based on experience and evidence.	
Action Prioritization	Development of a strategy to evaluate and prioritize actions identified and utilization of this framework to rank actions.	
Action Implementation Contexts	Provide further implementation contexts for priority actions, including basic estimates of cost to implement, timelines, involved parties, adaptation and mitigation impacts, and beneficiaries.	
Action List and Pathway Draft	Revised action list and pathways for first 5 years of mitigation measures (including recommendations for buildings, energy supply, mobility/transportation, resiliency, and social equity). First draft of plan.	
Revision of the Plan	Collect feedback from municipal staff, key stakeholders, and revise the plan.	
Design and Templating	Final graphic design of the plan and implementation of interactive dashboard showcasing the plan with uploaded metrics and actions that can be updated in the future as progress towards plan is completed.	
Presentation of Plan	Final presentation of the plan to members of the public in community event.	
Project Management	Bi-monthly CAP Working Group Meetings, bi weekly calls with town and internal coordination, and invoicing and project management	

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Green Communities Projects \$200,000 Grant

Capital Projects & Facilities Management

Green Communities Projects for Efficient and Clean Energy Measures

The requested funding will support the City's application for the next Green Communities Competitive Grant round in 2022 and assist the City in accelerating its implementation of cost-effective energy efficiency and clean energy measures.

CPFM requests funding for Green Communities annually to support the implementation of energy efficiency and clean energy measures across its municipal facilities. Requested funding is important to not only backing the City's grant request from the Department of Energy Resources, but also to enable CPFM to continue making progress towards energy goals if it is not awarded funding through the program given increasing annual competition from across the state as more communities enroll in the program. As in prior years, CPFM will seek for the most cost-effective and highest-impact projects to maximize use of this funding. Proposals attached represent the types of projects that CPFM intends to move forward, however, they may be supplemented or replaced by more cost effective or more impactful projects identified through ongoing energy analysis of municipal facilities and the municipal fleet.

# CAMERON MIDDLE SCHOOL

CITY OF FRAMINGHAM

215 ELM ST

FRAMINGHAM, MA



Turnkey Occupancy Sensor Upgrade



Prepared by:

***B2Q Associates  
100 Burtt Rd. Ste. 212  
Andover, MA***

***Revision Date:  
9/13/2021***



September 13, 2021

B2Q Associates  
100 Burt Rd. Suite 212  
Andover, MA 01810  
(978) 208 – 0609  
www.b2qassociates.com

Mr. Shawn Luz  
Sustainability Coordinator  
City of Framingham  
150 Concord Street, B14  
Framingham, MA 01702

**RE: Proposal for Turnkey Occupancy Sensor Upgrade at Cameron Middle School**

Dear Shawn,

B2Q is pleased to provide you with this proposal to add occupancy sensors and off-hours HVAC override buttons at Cameron Middle School located at 215 Elm St in Framingham, MA. B2Q has surveyed the facility with the intent of developing projects for which the City can submit requests for Green Communities Act grant funding. Our intent is that this project will help the City meet its energy reduction goals, while still maintaining comfortable conditions for students and staff alike.

**ECONOMICS SUMMARY**

The estimated economics for this project are given in the table below. B2Q intends to submit a custom incentive application to Eversource to reduce the net cost to the City and the Green Communities Act grant may cover up to the remainder of the project cost after utility incentive. Please note that there is no published formula for custom incentives but B2Q’s experience has been that \$0.18/kWh and \$1.50/therm have been reasonable estimates on comparable projects and we have therefore used these values in the tables below.

2	Occupancy Sensors		
Utility	Savings Units	% Savings	Cost Savings
Electricity	31,695 kWh	6.3%	\$ 5,705 /yr
Natural Gas	772 therms	2.9%	\$ 811 /yr
Total Energy	185 MMBtu	4.2%	\$ 6,516 /yr

Implementation First Cost	\$ 56,900
Utility Incentive	\$ 6,864
Net Cost	\$ 50,036

Simple Payback	7.7 yr
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## ENVIRONMENTAL IMPACT

The proposed project would result in net emissions reductions for the City of Framingham. These results are summarized in the table below.

2	Occupancy Sensors						
Equivalent Emissions Reductions							
Utility	Energy Savings	CO <sub>2</sub>	NO <sub>x</sub>	SO <sub>x</sub>	Gasoline	Trees	Homes
-	-	lb <sub>e</sub>	lb <sub>e</sub>	lb <sub>e</sub>	gal	-	-
Electricity	31,695 kWh	22,886	95	272	1,165	266	0.9
Natural Gas	772 therms	9,028	130	9,687	460	105	0.4
<b>Total</b>	<b>185 MMBtu</b>	<b>31,914</b>	<b>225</b>	<b>9,958</b>	<b>1,625</b>	<b>372</b>	<b>1.3</b>

## PROJECT DESCRIPTION

The scope of work of this proposal is a combination of two energy conservation measures identified by City staff and evaluated by B2Q and AEM Controls during our recent site visit. These are summarized below.

- Install HVAC Occupancy Sensors** – according to conversations with City staff, we understand that the HVAC for the classrooms is scheduled to run in occupied mode from 6:00 am to 5:00 pm weekdays based on the times that the earliest teacher arrives and the latest teacher leaves; however, according to staff, we understand that the majority of faculty do not arrive this early or leave this late. Additionally, a number of classrooms are unoccupied during the course of the school day as students move to other spaces for lunch, gym, music class, etc. and teachers have free periods. Based upon potential funding available from the Green Communities program, we have estimated that (10) classrooms could be retrofitted with occupancy sensors as part of this project. Each of these classrooms is served by a dedicated VAV box fed by AHU-1. Our savings estimates are based on the following typical occupancy profile. Note that the percentage values represent the fraction of classrooms with an occupancy sensor that are estimated to be unoccupied during the given hour.

Time	% Occupied	Time	% Occupied
12:00 am to 1:00 am	0%	12:00 pm to 1:00 pm	75%
1:00 am to 2:00 am	0%	1:00 pm to 2:00 pm	90%
2:00 am to 3:00 am	0%	2:00 pm to 3:00 pm	90%
3:00 am to 4:00 am	0%	3:00 pm to 4:00 pm	50%
4:00 am to 5:00 am	0%	4:00 pm to 5:00 pm	10%
5:00 am to 6:00 am	0%	5:00 pm to 6:00 pm	0%
6:00 am to 7:00 am	10%	6:00 pm to 7:00 pm	0%
7:00 am to 8:00 am	50%	7:00 pm to 8:00 pm	0%
8:00 am to 9:00 am	90%	8:00 pm to 9:00 pm	0%
9:00 am to 10:00 am	90%	9:00 pm to 10:00 pm	0%
10:00 am to 11:00 am	90%	10:00 pm to 11:00 pm	0%
11:00 am to 12:00 pm	75%	11:00 pm to 12:00 am	0%

- Install Occupancy Override Buttons** – according to conversations with City staff, we understand that the HVAC for several of the larger spaces in the building, such as the gym and auditorium, are scheduled to be occupied on some nights and weekends to accommodate extra-curricular activities; however, these activities often do not occur as often or for as long as the HVAC is occupied. This measure proposes to install occupancy override push buttons for the thermostat in each of these spaces. Once installed, the AHUs serving these spaces would no longer need to be scheduled to run on any nights or weekends and when a group does arrive for an activity, they can push the button to automatically bring the AHU on to run for 2 – 4 hours. If the timer expires and the activity is still on-going, then another occupant can push the button a second time. We propose to deploy this strategy for the auditorium and the two units that serve the gym. For the purposes of estimating energy savings, using the events information provided by the city, we have estimated the following based and proposed case runtime schedules for the applicable AHUs.

Schedule Period	Existing Case	Proposed Case
Gym School Day	6:00 am to 5:00 pm	7:00 am to 3:00 pm
Gym Weekday Nights	5:00 pm to 8:00 pm for 2 nights per week	5:00 pm to 8:00 pm for 2 nights per week only during basketball season (November to March)
Gym Weekends	12:00 pm to 6:00 pm for 1 day per weekend	12:00 pm to 6:00 pm for 1 day per weekend only during basketball season (November to March)
Auditorium School Day	6:00 am to 5:00 pm with VFD modulating based on space temperature for approximately 3,000 daytime hours	6:00 am to 5:00 pm with VFD modulating based on space temperature for approximately 500 occupied hours and running at minimum speed for the remaining 2,500 daytime hours

The proposed structure of the project is that B2Q would deliver this project to the City of Framingham via a turnkey project delivery model. This means that the City would only need to have one contract and write one purchase order for this project. B2Q would hire the controls contractor as a subcontractor and would pay them out of the single purchase order provided by the City. B2Q proposes to work with AEM Solutions (Marlborough, MA) for controls and electrical contracting work. In addition to hiring and managing the subcontractors, B2Q would provide the following services.

- Energy savings analysis and calculations to a level of detail and accuracy that is typically required by Eversource.
- Eversource utility incentive applications.
- Contractor observation during programming.
- Green Communities Act grant applications.
- Commissioning of the newly-programmed sequences and new equipment to verify proper operation
- Project management throughout construction, including construction schedule, and coordination with the City
- Training of City staff, by B2Q and our subcontractor, on how to use the new system
- Record documentation, including warranty letter

## SCHEDULE

- B2Q and its subcontractors shall begin work within (2) week of receiving a purchase order from the City of Framingham.
- Installation of occupancy sensors and modifications to the programming shall be complete within approximately (4) weeks.
- Commissioning functional testing and owner training shall be complete within (3) weeks of completing the programming.

We thank you for the opportunity to provide you with this proposal and look forward to working with you on this project if selected.

Thank you,

*Joseph Bliss*

Joseph Bliss, PE  
Project Manager  
B2Q Associates

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# APPENDICES

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## ASSUMPTIONS AND EXCLUSIONS

1. The above schedule and price are contingent upon B2Q and its subcontractors having consistent access to the facility. B2Q is not responsible for delays caused by restricted access to specific areas of the building and/or the building as a whole.
2. All work is assumed to be during normal business hours (6:00 am – 3:00 pm).
3. This proposal does not include any work associated with correction of existing code violations or abatement of hazardous materials.
4. The cost included in this proposal assumes no sales tax. We assume that the City will provide signed sales tax exemption forms upon project commencement. Delays in receiving these forms may result in schedule delays.
5. This proposal does not include payment or performance bonds.
6. All trade labor shall be at prevailing wages.
7. The cost of this proposal assumes that B2Q will contract to perform the work via Hobart Energy Services as the prime contract holder.

## ENERGY CONSUMPTION ESTIMATES

B2Q's energy cost savings estimates above are based on an average billing rate of \$0.18/kWh and \$1.05/therm, based on B2Q estimates from experience with similar buildings. If necessary, B2Q can update the above analysis based on additional information provided by the City.

B2Q has no control of the actual building and equipment operation or over other variables which may affect energy consumption and/or associated costs or savings. Accordingly, B2Q does not expressly or implicitly warrant or represent that energy consumption savings and cost savings estimates of the building or equipment operation will be the actual operation energy and cost savings.

## UTILITY INCENTIVES AND GREEN COMMUNITIES ACT GRANTS

B2Q Associates has no control over the decisions of utility companies or state agencies to provide incentives or grants. Since incentives and grants are entirely at the discretion of the utility or state agency, B2Q does not expressly or implicitly warrant or represent that incentives will be awarded. However, B2Q will work within the framework of the existing programs to apply for available incentives for the City of Framingham in accordance with the methods prescribed by Eversource and Commonwealth of Massachusetts. B2Q will prepare application forms on the City's behalf and work with utility representatives and state agencies to help determine the funding levels to be provided. Eversource and the Commonwealth of Massachusetts conduct pre- and post-installation site inspections to verify existing equipment and to ensure that the installed equipment meets program specifications.

## **CONTRACT TERMS**

This proposal is valid for thirty days.

If this proposal is accepted by the City, B2Q and the City of Framingham will develop a mutually agreeable contract for the work.

## **GENERAL FIRM DESCRIPTION**

B2Q provides engineering and turn-key energy efficiency project delivery, energy audits and screening studies, commissioning and retro-commissioning, technical training, project management, design, engineering, design reviews, troubleshooting, testing, measurement and verification, metering, building simulation, building automation, cogeneration, and utility demand side management program consulting.

## **KEY PERSONNEL**

Paul Banks, PE will be the principal in charge for this project. Mr. Banks will be responsible for the overall project staffing and quality reviews. Mr. Banks will review project deliverables prior to submission for quality assurance.

Joe Bliss, PE will be the Project Manager. Mr. Bliss will be responsible for project specifications, installation management, coordination with the City, and quality control.

# POTTER ROAD ELEMENTARY SCHOOL

CITY OF FRAMINGHAM

492 POTTER RD

FRAMINGHAM, MA



Prepared by:



***B2Q Associates  
100 Burtt Rd. Ste. 212  
Andover, MA***

***Revision Date:  
9/13/2021***

Turnkey Occupancy Sensor Upgrade



September 13, 2021

B2Q Associates  
100 Burt Rd. Suite 212  
Andover, MA 01810  
(978) 208 – 0609  
www.b2qassociates.com

Mr. Shawn Luz  
Sustainability Coordinator  
City of Framingham  
150 Concord Street, B14  
Framingham, MA 01702

**RE: Proposal for Turnkey Occupancy Sensor Upgrade at Potter Road Elementary School**

Dear Shawn,

B2Q is pleased to provide you with this proposal to add HVAC occupancy sensors at Potter Road Elementary School located at 492 Potter Rd in Framingham, MA. B2Q has surveyed the facility with the intent of developing projects for which the City can submit requests for Green Communities Act grant funding. Our intent is that this project will help the City meet its energy reduction goals, while still maintaining comfortable conditions for students and staff alike.

**ECONOMICS SUMMARY**

The estimated economics for this project are given in the table below. B2Q intends to submit a custom incentive application to Eversource to reduce the net cost to the City and the Green Communities Act grant may cover up to the remainder of the project cost after utility incentive. Please note that there is no published formula for custom incentives but B2Q’s experience has been that \$0.18/kWh and \$1.50/therm have been reasonable estimates on comparable projects and we have therefore used these values in the tables below.

2	Occupancy Sensors			
Utility	Savings Units	% Savings	Cost Savings	
Electricity	1,458 kWh	1.0%	\$ 262	/yr
Natural Gas	408 therms	1.7%	\$ 428	/yr
Total Energy	46 MMBtu	1.6%	\$ 691	/yr

Implementation First Cost	\$ 11,900
Utility Incentive	\$ 875
Net Cost	\$ 11,025

Simple Payback	16.0 yr
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## ENVIRONMENTAL IMPACT

The proposed project would result in net emissions reductions for the City of Framingham. These results are summarized in the table below.

2	Occupancy Sensors							
Equivalent Emissions Reductions								
Utility	Energy Savings	CO <sub>2</sub>	NO <sub>x</sub>	SO <sub>x</sub>	Gasoline	Trees	Homes	
-	-	-	lb <sub>e</sub>	lb <sub>e</sub>	lb <sub>e</sub>	gal	-	-
Electricity	1,458 kWh	1,053	4	12	54	12	0.0	
Natural Gas	408 therms	4,770	69	5,118	243	56	0.2	
<b>Total</b>	<b>46 MMBtu</b>	<b>5,823</b>	<b>73</b>	<b>5,131</b>	<b>296</b>	<b>68</b>	<b>0.2</b>	

## PROJECT DESCRIPTION

The scope of work of this proposal is a combination of two energy conservation measures identified by City staff and evaluated by B2Q and AEM Controls during our recent site visit. These are summarized below.

- Install HVAC Occupancy Sensors** – according to conversations with City staff, we understand that the HVAC for the cafetorium is scheduled to run in occupied mode from 6:00 am to 6:00 pm weekdays based on the times that the earliest staff arrives and the latest staff leaves; however, according to staff, we understand that on most days, the space is only occupied for lunch periods during the middle of the day and for occasional program events in the afternoon. Based on the size of the room, we estimate that two sensors would be needed to achieve full coverage and the sensors would be wired in parallel so that the whole space is occupied if any one sensor reads occupied and the whole space would be unoccupied only if both sensors read unoccupied. Our savings estimates are based on the following typical occupancy profile.

Time	Occupancy	Time	Occupancy
12:00 am to 1:00 am	OFF	12:00 pm to 1:00 pm	OCC
1:00 am to 2:00 am	OFF	1:00 pm to 2:00 pm	OCC
2:00 am to 3:00 am	OFF	2:00 pm to 3:00 pm	OCC
3:00 am to 4:00 am	OFF	3:00 pm to 4:00 pm	UNOCC
4:00 am to 5:00 am	OFF	4:00 pm to 5:00 pm	UNOCC
5:00 am to 6:00 am	OFF	5:00 pm to 6:00 pm	UNOCC
6:00 am to 7:00 am	UNOCC	6:00 pm to 7:00 pm	OFF
7:00 am to 8:00 am	UNOCC	7:00 pm to 8:00 pm	OFF
8:00 am to 9:00 am	UNOCC	8:00 pm to 9:00 pm	OFF
9:00 am to 10:00 am	OCC	9:00 pm to 10:00 pm	OFF
10:00 am to 11:00 am	OCC	10:00 pm to 11:00 pm	OFF
11:00 am to 12:00 pm	OCC	11:00 pm to 12:00 am	OFF

The proposed structure of the project is that B2Q would deliver this project to the City of Framingham via a turnkey project delivery model. This means that the City would only need to have one contract and write one purchase order for this project. B2Q would hire the controls contractor as a subcontractor and would pay them out of the single purchase order provided by the City. B2Q proposes to work with AEM Solutions (Marlborough, MA) for controls and electrical contracting work. In addition to hiring and managing the subcontractors, B2Q would provide the following services.

- Energy savings analysis and calculations to a level of detail and accuracy that is typically required by Eversource.
- Eversource utility incentive applications.
- Contractor observation during programming.
- Green Communities Act grant applications.
- Commissioning of the newly-programmed sequences and new equipment to verify proper operation
- Project management throughout construction, including construction schedule, and coordination with the City
- Training of City staff, by B2Q and our subcontractor, on how to use the new system
- Record documentation, including warranty letter

## SCHEDULE

- B2Q and its subcontractors shall begin work within (2) week of receiving a purchase order from the City of Framingham.
- Installation of occupancy sensors and modifications to the programming shall be complete within approximately (3) weeks.
- Commissioning functional testing and owner training shall be complete within (2) weeks of completing the programming.

We thank you for the opportunity to provide you with this proposal and look forward to working with you on this project if selected.

Thank you,

*Joseph Bliss*

Joseph Bliss, PE  
Project Manager  
B2Q Associates

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# APPENDICES

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## ASSUMPTIONS AND EXCLUSIONS

1. The above schedule and price are contingent upon B2Q and its subcontractors having consistent access to the facility. B2Q is not responsible for delays caused by restricted access to specific areas of the building and/or the building as a whole.
2. All work is assumed to be during normal business hours (6:00 am – 3:00 pm).
3. This proposal does not include any work associated with correction of existing code violations or abatement of hazardous materials.
4. The cost included in this proposal assumes no sales tax. We assume that the City will provide signed sales tax exemption forms upon project commencement. Delays in receiving these forms may result in schedule delays.
5. This proposal does not include payment or performance bonds.
6. All trade labor shall be at prevailing wages.
7. The cost of this proposal assumes that B2Q will contract to perform the work via Hobart Energy Services as the prime contract holder.

## ENERGY CONSUMPTION ESTIMATES

B2Q's energy cost savings estimates above are based on an average billing rate of \$0.18/kWh and \$1.05/therm, based on B2Q estimates from experience with similar buildings. If necessary, B2Q can update the above analysis based on additional information provided by the City.

B2Q has no control of the actual building and equipment operation or over other variables which may affect energy consumption and/or associated costs or savings. Accordingly, B2Q does not expressly or implicitly warrant or represent that energy consumption savings and cost savings estimates of the building or equipment operation will be the actual operation energy and cost savings.

## UTILITY INCENTIVES AND GREEN COMMUNITIES ACT GRANTS

B2Q Associates has no control over the decisions of utility companies or state agencies to provide incentives or grants. Since incentives and grants are entirely at the discretion of the utility or state agency, B2Q does not expressly or implicitly warrant or represent that incentives will be awarded. However, B2Q will work within the framework of the existing programs to apply for available incentives for the City of Framingham in accordance with the methods prescribed by Eversource and Commonwealth of Massachusetts. B2Q will prepare application forms on the City's behalf and work with utility representatives and state agencies to help determine the funding levels to be provided. Eversource and the Commonwealth of Massachusetts conduct pre- and post-installation site inspections to verify existing equipment and to ensure that the installed equipment meets program specifications.

## **CONTRACT TERMS**

This proposal is valid for thirty days.

If this proposal is accepted by the City, B2Q and the City of Framingham will develop a mutually agreeable contract for the work.

## **GENERAL FIRM DESCRIPTION**

B2Q provides engineering and turn-key energy efficiency project delivery, energy audits and screening studies, commissioning and retro-commissioning, technical training, project management, design, engineering, design reviews, troubleshooting, testing, measurement and verification, metering, building simulation, building automation, cogeneration, and utility demand side management program consulting.

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## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Engine 3 Fire Truck Replacement \$816,844 General Fund

Fire Department

Replacement of 2008 Pierce Engine 3

Engine 3 was built in 2008 by Pierce, is the oldest primary response truck serving the City, and will be approximately 14 years old if replacement is funded in FY23. Engine 3 covers the South side of the City, having the greatest density of occupancies, and large share of the Fire Department's calls. The emergency-vehicle certified mechanics have suggested that the current Engine 3 now has a useful life of 1 year or less. This project would address the need to get primary response fire trucks on a standardized replacement cycle. The Department finds that firefighter safety risks and maintenance costs accelerate when the apparatus have reached 10-12 years of service. This project also includes the cost to equip the new truck with the required firefighter tools and hose that a fire engine needs to meet national fire service standards.



August 30, 2021

City of Framingham  
Attn: Chief Dutcher  
10 Loring Drive  
Framingham, MA 01702

RE: Budget Letter for One Pierce Enforcer 1500 GPM Pumper and One Pierce Enforcer HDR

Chief Dutcher,

Please accept this letter outlining what I will forecast as a budget number for the purchase of a Pierce Enforcer® 1500 GPM Pumper and a Pierce Enforcer® Heavy-Duty Rescue Truck for the fiscal year 2023.

Using the 2021 Framingham Pumper offering unit that is currently in production as a basis for this design, with a five percent annual forecasted increase rate year over year, I will forecast the cost of a pumper unit in FY23 to be seven hundred sixty thousand, one hundred and -forty five dollars. (\$760,145.00) This budget price reflects a price increase if this purchase is made after January 15<sup>th</sup>, 2022.

As for the request of a budget number to support the potential purchase of a new Heavy-Duty Rescue Truck, I would forecast this at a price of eight hundred ninety-five thousand, five hundred and forty-five dollars. (\$895,545.00)

Please keep in mind this number does not yet reflect any pre-payment discounts. It is however an HGAC estimated quote. Which also includes two factory trips for three FFD personal, a performance bond and four days of training on each unit.

Chief, as you well know many factors can come into play between now and the next twelve months as to cost drivers or even savings. Obviously if the cost is favorable this would be reflected in our bid presentation and the same if the market adjusted upward greater than five percent. The market has been extremely volatile thus far in 2021

We are grateful that we have had the opportunity to serve the City of Framingham Fire Department, its Membership and the City. We look forward to a continued relationship and the opportunity to earn your future business. You are a valued customer to Allegiance Fire & Rescue and Pierce Manufacturing.

If there is anything else that I can assist you with regarding this matter, please feel free to contact me.

William K. O'Connor, Allegiance Fire & Rescue

  
\_\_\_\_\_  
VP of Sales & Marketing

**STANDARD NFPA FIRE ENGINE EQUIPMENT/TOOLS  
PRICING OBTAINED FROM ON-LINE CATALOGS SEPTEMBER**

**TOTAL**

**\$ 56,699**

DESCRIPTION	QTY	UNIT COST	LINE COST	SOURCE
RUBBER MALLETS	2	\$ 37.99	\$ 75.98	Home Depot
BOLT CUTTERS	1	\$ 192.77	\$ 192.77	Home Depot
2.5 GALLON WATER EXTINGUISHER	1	\$ 296.00	\$ 296.00	FireStore.com
80 B:C EXTINGUISHER	1	\$ 347.40	\$ 347.40	FireStore.com
TOOL BOX	1	\$ 199.56	\$ 199.56	Home Depot
WHEEL CHOCKS	2	\$ 88.11	\$ 176.22	Home Depot
TRAFFIC CONES/CHAIN PACKAGE	1	\$ 194.35	\$ 194.35	Home Depot
SPADE SHOVEL	2	\$ 54.62	\$ 109.24	Home Depot
FLAT SHOVEL	2	\$ 54.62	\$ 109.24	Home Depot
EMS BAG	1	\$ 365.00	\$ 365.00	TheEMSstore.com
AED	1	\$ 2,995.00	\$ 2,995.00	AEDsuperstore.com
K12 SAW	1	\$ 4,165.99	\$ 4,165.99	FireStore.com
K12 SAW BLADES SPARE	2	\$ 422.00	\$ 844.00	FireStore.com
VENTILATION CHAIN SAW WITH SPARE CHAIN	1	\$ 3,890.00	\$ 3,890.00	FireStore.com
16' x 20' TARPS - HEAVY DUTY	6	\$ 54.98	\$ 329.88	Home Depot
CRIBBING SET B	1	\$ 3,199.99	\$ 3,199.99	FireStore.com
THERMAL IMAGER	1	\$ 7,694.00	\$ 7,694.00	FireStore.com
RADIATION METER	1	\$ 3,299.00	\$ 3,299.00	ValueTronics.com
STOKES BASKET	1	\$ 803.59	\$ 803.59	FireStore.com
1000' 5" LDH SUPPLY HOSE	1	\$ 7,659.90	\$ 7,659.90	FireStore.com
50' & 25' 5" LDH HYDRANT CONNECTORS ("SNAKES")	2	\$ 325.00	\$ 650.00	FireStore.com
500' 2" ATTACK HOSE	2	\$ 2,014.95	\$ 4,029.90	FireStore.com
2" TFT NOZZLE	2	\$ 918.75	\$ 1,837.50	FireStore.com
2.5" AUTOMATIC NOZZLE	1	\$ 967.50	\$ 967.50	FireStore.com
2.5" SMOOTH BORE NOZZLE	1	\$ 506.25	\$ 506.25	FireStore.com
GATED WYE	1	\$ 1,110.00	\$ 1,110.00	FireStore.com
HYDRANT WRENCH	2	\$ 47.39	\$ 94.78	FireStore.com
2.5" DOUBLE MALE ADAPTER	2	\$ 38.00	\$ 76.00	FireStore.com
2.5" DOUBLE FEMALE ADAPTER	2	\$ 52.00	\$ 104.00	FireStore.com
2.5" x 1.5" ADPTER	2	\$ 188.59	\$ 377.18	FireStore.com
HALIGAN TOOL	2	\$ 193.99	\$ 387.98	FireStore.com
HAND LIGHTS	4	\$ 121.49	\$ 485.96	FireStore.com
8' PIKE POLE	2	\$ 139.59	\$ 279.18	FireStore.com
12' PIKE POLE	2	\$ 168.99	\$ 337.98	FireStore.com
4' PLASTER HOOKS	2	\$ 142.39	\$ 284.78	FireStore.com
FLAT HEAD AXE	2	\$ 69.99	\$ 139.98	Home Depot
PICK HEAD AXE	2	\$ 47.77	\$ 95.54	Home Depot
TNT TOOL	2	\$ 279.99	\$ 559.98	FireStore.com
LOCK-OUT KIT	1	\$ 46.99	\$ 46.99	FireStore.com
6" x 5" GATED INTAKE FITTING	1	\$ 2,150.50	\$ 2,150.50	FireStore.com
5" x 4" STORZ REDUCER	1	\$ 332.99	\$ 332.99	FireStore.com

DESCRIPTION	QTY	UNIT COST	LINE COST	SOURCE
5" STORZ x 2.5" HOSE REDUCER	1	\$ 133.59	\$ 133.59	FireStore.com
LDH SPANNER WRENCHES	4	\$ 24.39	\$ 97.56	FireStore.com
STANDARD SPANNER WRENCHES	4	\$ 17.80	\$ 71.20	FireStore.com
ELECTRIC-POWERED SMOKE REMOVAL FAN	1	\$ 4,295.00	\$ 4,295.00	FireSafetyUSA.com
RAPID INTERVENTION TEAM BAG	1	\$ 299.95	\$ 299.95	FireStore.com

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Fire Shift Commander (Car 2) Replacement \$61,827 General Fund

Fire Department

Replacement of 2015 Ford Expedition

Car 2 is used by the on-duty Shift Commander (Deputy Chief) on a 24/7 basis. Replacement has been deferred for four consecutive years (FY19, FY20, FY21, FY22). This vehicle responds with the Deputy to all Fire Department calls when multiple resources are activated. The rear compartment contains incident command post equipment including 2 additional radios, command boards and command equipment. The current Car 2 is a 2015 Ford Expedition. The vehicle utilizes older technology electronics that draws a huge power demand, and must remain running in idle for long durations at activations, leading to increasing frequency of taking the vehicle out of service for repairs. The current Car 2 would be repurposed within the Fire Department fleet to replace a fleet vehicle with the highest mileage/hours.



# QUOTE

## Framingham, MA

Contact Name: Ken Cassidy  
 Company/Dept: Fire Department  
 Street Address: 10 Loring Dr.  
 City, State, Zip: Framingham, MA 01702  
 Phone: 508-889-2502  
 E-Mail: [KSC@framinghamma.gov](mailto:KSC@framinghamma.gov)

Date: 7.22.2021  
 Valid for: 60 Days\*  
 Customer #: \_\_\_\_\_  
 Contract: PCC-Ford  
 Sales Rep: Steven Anderson

CONTRACT LINE REFERENCE	LINE DESCRIPTION	UNIT PRICE	QTY.	EXTENDED PRICE
X2B/600A	[Fleet] 2022 Ford Super Duty F-250 SRW (X2B) XL 4WD SuperCab 8' Box	\$29,200.00	1	\$29,200.00
99N	Engine: 7.3L 2V DECVT NA PFI V8 Gas	\$2,004.10	1	\$2,004.10
AS	Transmission: TorqShift 10-Speed Automatic	inc.		
E4	Exterior 1:Vermillion Red	\$646.80	1	\$646.80
996/44S	Interior:Medium Earth Gray, HD Vinyl 40/20/40 Split Bench Seat	Inc.		
17S	STX Appearance Package	\$1,788.50	1	\$1,788.50
18B	Platform Running Boards	\$436.10	1	\$436.10
41P	Transfer Case & Fuel Tank Skid Plates	\$98.00	1	\$98.00
43B	Fixed Rear-Window w/Defrost	\$58.80	1	\$58.80
43C	110V/400W Outlet	Inc.		
473	Snow Plow Prep Package	\$245.00	1	\$245.00
61S/62S	Front/rear Splash Guards/Mud Flaps	\$127.40	1	\$127.40
648	Wheels: 18" Sparkle Silver Painted Cast Aluminum	Inc.		
66B	BoxLink	\$73.50	1	\$73.50
66L	LED Box Lighting	\$58.80	1	\$58.80
66S	Upfitter Switches (6)	\$161.70	1	\$161.70
76C	Exterior Backup Alarm (Pre-Installed)	\$137.20	1	\$137.20
76R	Reverse Sensing System	\$240.10	1	\$240.10
85S	Tough Bed Spray-In Bedliner	\$583.10	1	\$583.10
873	Rear CHMSL Camera	\$196.00	1	\$196.00
90L	Power Equipment Group	\$847.70	1	\$847.70
913	SYNC 3 Communications & Entertainment System	\$441.00	1	\$441.00
924	Privacy Glass	\$29.40	1	\$29.40
TDX	Tires: LT275/70Rx18E BSW A/T (4)	\$259.70	1	\$259.70
	<b>PCC Ford Vehicle Total:</b>			<b>\$37,632.90</b>
PAINT	Paint roof from tops of doors up-Black	\$795.00	1	\$795.00
GR	Graphics package C	\$595.00	1	\$595.00
GR	Graphics package A (rear chevron)	\$395.00	1	\$395.00
	Whelen Wig Wag	\$125.00	1	\$125.00
	Whelen TION DUO (front/rear fenders)	\$230.00	4	\$920.00
	Tough Country front HD Bumper w/winch mount-Rhino Coated	\$2,825.00	1	\$2,825.00
	Whelen M4 DUO (front pushbar)	\$255.00	4	\$1,020.00
	Whelen Liberty 2 DUO Lightbar 54" LED Fully Populated	\$2,460.00	1	\$2,460.00
	Whelen ION DUO (2nd row glass)	\$180.00	2	\$360.00

	Whelen TION DUO (under rear gate)	\$180.00	2	\$360.00
	Whelen Vertex 4 lamp system	\$535.00	1	\$535.00
	Whelen ION DUO (rear upper cap)	\$180.00	2	\$360.00
	Whelen ION Pedestal Mount (rear upper cap)	\$41.00	2	\$82.00
	Whelen Core intelligent siren/light control "6" head w/OBD Connection	\$1,395.00	1	\$1,595.00
	Whelen 100W siren speaker w/bracket	\$225.00	2	\$450.00
	Whelen 16 outlet expansion for Core	\$195.00	1	\$195.00
	Whelen dome light R/W ea. front cab ceiling/rear bed	\$94.00	6	\$564.00
	Havis C2410 console w/mount	\$525.00	1	\$525.00
	Havis side mount armrest	\$70.00	2	\$140.00
	Dual internal cupholder	\$45.00	1	\$45.00
	Havis dual 12v w/dual USB	\$105.00	1	\$105.00
	Install outlets	\$52.50	1	\$52.50
	Supplied Radio	\$235.00	1	\$235.00
1902	LEER Fiberglass cap- w/lift gate	\$2,250.00	1	\$2,250.00
	Paint cap UA black	\$295.00	1	\$295.00
1905	Bed slide-1000lb capacity	\$1,695.00	1	\$1,695.00
	<b>PCC A/M Equipment Total:</b>			<b>\$18,978.50</b>
			QY	1
			<b>TOTAL:</b>	<b>\$56,611.40</b>

### TERMS AND CONDITIONS

\*This quote is valid for 60 days from the date of quote. Any purchase orders or approved quotes received outside of the 60 day quote period will be subject to price adjustments. By signing this quote, the customer is agreeing to pay, in full, for all items listed above. Any requests for changes, modifications, replacements, removals or additional items may be subject to additional fees and/or adjusted delivery dates.

M.G.L c. 30B applies to the procurement of all commodities quoted. Contract items have been collectively purchased pursuant to M.G.L c 30B sec 1c and M.G.L c.7 sec 22B. The government body is responsible to determine the applicability of M.G.L. c30B to off contract items, but not limited to, off contract items that have already been properly procured under M.G.L. c30B sec 1c and M.G.L. c7 sec 22A (purchases from a vendor on contract with the Commonwealth), other contracts procured under M.G.L. c30B sec 1c and M.G.L. c. 30B contract between the vendor and the jurisdiction. All off contract items must be procured under M.G.L. c. 30B.

The terms and conditions stated herein and the provisions of any agreement between MHQ and Buyer, if applicable, shall constitute the complete and only terms and conditions applicable to any and all purchases by Buyer from MHQ. Any additional and/or different terms and/or conditions printed anywhere including on, or with, Buyer's order shall be inapplicable in regard to any purchase by Buyer from MHQ.

### ORDER ACKNOWLEDGEMENT

**By signing this document you are agreeing to the above terms and conditions of this order from MHQ, Inc.**

x \_\_\_\_\_

**PRINT NAME**

x \_\_\_\_\_

**TITLE**

x \_\_\_\_\_

**SIGNATURE**

Quote provided by Steven Anderson, Equipment Sales Manager at MHQ  
Office: (508) 573-2677 Cell: (508) 726-1962 Email: sanderson@mhq.com

22101459

REG 22001344



### ORIGINAL INVOICE

**Motorola Solutions, Inc.**  
500 West Monroe  
Chicago IL 60661  
United States  
Federal Tax ID: 36-1115800

<b>Transaction Number</b> 8281208583	<b>Transaction Date</b> 14-JUL-2021	<b>Transaction Total</b> <b>2,607.64 USD</b>	
<b>P.O. Number</b> 21108678-00		<b>P.O. Date</b> 02-JUN-2021	<b>Customer Account No</b> 1012734986
<b>Payment Terms</b> Net Due in 45 Days			<b>Payment Due Date</b> 28-AUG-2021

Visit our website at [www.motorolasolutions.com](http://www.motorolasolutions.com)

<b>Bill To Address</b> FRAMINGHAM FIRE DEPT ATTN: Accounts Payable 10 LORING DR FRAMINGHAM MA 01702 United States	<b>Ship To Address</b> FRAMINGHAM FIRE DEPT 10 LORING DR FRAMINGHAM MA 01702 United States
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<b>IMPORTANT INFORMATION</b> <b>Ultimate Destination</b> United States	<b>Freight Terms:</b> FREIGHT PREPAID <b>Inco Term:</b> CPT NEAREST PORT OF IMPORT	<b>For all invoice payment inquiries contact</b> SLT2EB@motorolasolutions.com Telephone: 800-247-2346 Fax: +1(631)883-4238
<b>Sales Order(s):</b> 3202168187 <b>Delivery Number(s):</b> 9105111311		

**SPECIAL INSTRUCTIONS / COMMENTS**

Line Item #	Item Number	Description	Qty.	Unit Price (USD)	Amount (USD)
1	M25SSS9PW1AN	APX6500 UHF R2 MID POWER MOBILE SO Line #: 1.1 Ship Date: 13-JUL-2021 SERIAL NUMBERS 527CXP0190	1	1,352.88	1,352.88
1.1	GA01670AA	ADD: APX E5 CONTROL HEAD	1	434.72	434.72
1.2	G444AE	ADD: APX CONTROL HEAD SOFTWARE	1	0.00	0.00
1.3	W22BA	ADD: STD PALM MICROPHONE APX	1	54.72	54.72
1.4	GA00345AB	ADD: UHF R2 MP BAND	1	0.00	0.00

Please detach here and return the bottom portion with your payment

**Payment Coupon**

<b>Transaction Number</b> 8281208583	<b>Customer Account No</b> 1012734986	<b>Payment Due Date</b> 28-AUG-2021	<b>Transaction Total</b> <b>2,607.64 USD</b>	<b>Amount Paid</b>
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Please put your Transaction Number and your Customer Account Number on your payment for prompt processing.

FRAMINGHAM FIRE DEPT  
ATTN: Accounts Payable  
10 LORING DR  
FRAMINGHAM MA 01702  
United States

**Payment Transfer Details**

CHICAGO  
WIRE Routing Transit Number: 026009593  
ACH/EFT Routing Transit Number: 111000012  
SWIFT: BOFAUS3N  
Bank Account No: 3756319819

**Send Payments To:**

**MOTOROLA SOLUTIONS**  
Motorola Solutions, Inc.  
13104 Collections Center Drive  
Chicago IL 60693  
United States  
Please provide your remittance details to:  
[US.remittance@motorolasolutions.com](mailto:US.remittance@motorolasolutions.com)

DIVERSION CONTRARY TO EXPORT CONTROL LAW IS PROHIBITED

100000 02 03 000139 000358 P



**Motorola Solutions, Inc.**  
 500 West Monroe  
 Chicago IL 60661  
 United States  
**Federal Tax ID: 36-1115800**

# ORIGINAL INVOICE

<b>Transaction Number</b> 8281208583	<b>Transaction Date</b> 14-JUL-2021	<b>Transaction Total</b> <b>2,607.64 USD</b>	
<b>P.O. Number</b> 21108678-00		<b>P.O. Date</b> 02-JUN-2021	<b>Customer Account No</b> 1012734986
<b>Payment Terms</b> Net Due in 45 Days			<b>Payment Due Date</b> 28-AUG-2021

Visit our website at [www.motorolasolutions.com](http://www.motorolasolutions.com)

Line Item #	Item Number	Description	Qty.	Unit Price (USD)	Amount (USD)
1.5	B18CR	ADD: AUXILIARY SPKR 7.5 WATT APX	1	45.60	45.60
1.6	GA00235AA	ADD: NO GPS ANTENNA NEEDED APX	1	0.00	0.00
1.7	G89AC	ADD: NO RF ANTENNA NEEDED	1	0.00	0.00
1.8	GA05100AA	ADD: STD WARRANTY - NO ESSENTIAL	1	0.00	0.00
1.9	G193AK	ADD: ADP ONLY (NON-P25 CAP COMPLIANT) (US ONLY)	1	0.00	0.00
1.10	Q811BS	ENH: DIGITAL CONVENTIONAL	1	494.00	494.00
1.11	G67EG	ADD: REMOTE MOUNT E5 MID POWER	1	225.72	225.72
				<b>USD Subtotal</b>	<b>2,607.64</b>
				<b>USD Total Tax</b>	<b>0.00</b>
				<b>USD Total</b>	<b>2,607.64</b>
				<b>USD Amount Due</b>	<b>2,607.64</b>



\* \*

**NEED TWO RADIOS x2**

100000 03 03 000139 0000359 P

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Firefighters Gear Replacement (Phase 1 of 3) \$35,976 General Fund

Fire Department

Replacement of 12 sets of Firefighters Gear (Replacement Cycle Phase 1 of 3)

This request is for the first phase of a three-phase project to replace firefighter gear used by firefighters - including bunker coat/pants, helmet and boots. National fire service standards limit the use of such protective equipment to 10-12 years of service. It is important that firefighter protective gear keep up with the modern technologies of biohazard and chemical resistance, as well as resistance to the higher heat fires caused by the increasing plastic fuel loads found in modern property interiors. The current set of gear was purchased in 2011 or earlier.



280 Milton St Dedham MA 02026

617-325-3993 info@northeastrescue.com

21008785  
21107820

# Invoice

DATE	INVOICE #
4/21/2021	20213984

<b>BILL TO</b>
Framingham Fire Department Accounts Payable 10 Loring Drive Framingham, MA 01702

<b>SHIP TO</b>
Framingham Fire Department Assistant Chief Schultz 10 Loring Drive Framingham, MA 01702

MA State Contract FIR04 VC6000185170

*Any Product Concerns, Fit Issues, or Discrepancies Must Be Reported within Two Weeks for Consideration by Northeast*

TERMS	SHIP	VIA	Cust P.O. #
	4/21/2021	Drop Shipped	

DESCRIPTION	QTY	PRICE EA	AMOUNT
FITZPATRICK; LTO745GTB - LTO 745G Tails Black- LIME LOGO MAFRAM00140 01/14/21 LTOTOS74B LTO Tail Outer Shell -6.6 oz Pioneer - Black	1	1,739.00	1,739.00
FITZPATRICK; MPL745GPB - MPL 745G Pants Black MAFRAM00141 01/14/21 MPLPOS74B MPL PRO FIT -Pants Outer Shell -6.6 oz Pioneer - Black	1	1,259.00	1,259.00

Payment due within terms. Late fees will be assessed at a rate of 1.5% per month (18% per annum) with a minimum charge of \$10.00.

Sales Tax (0.0%)	\$0.00
<b>Total</b>	\$2,998.00
Payments/Credits	\$0.00
<b>Balance Due</b>	\$2,998.00

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Technology Learning and Expanded Homework Center \$150,000 General Fund

Library

Phase 2 of Library Space Plan Technology and Homework Center

Now what would a new teen space look like? Our initial vision involves lots of open space for sitting/working/reading/gaming/hanging out, as well as more shelving for collections, especially the fast growing and very popular manga, graphic novel, anime, and video game collections. We would use new shelving to do more displays (face out books always check out better than spine out), make the shelves look more attractive (not so packed), and leave room for expansion and new formats. We know the glass serpentine wall surrounding the Teen Room at the new Branch Library works exceptionally well to provide a safe, welcoming, and “contained” space for Teens to call their own. We would like to replicate this successful concept for the new Teen Area. The “diner booth” in the current teen area is always popular, so we can envision two of those, as well as dedicated study/group project spaces for teens who need quiet, or for tutors working with students, and groups of students working on projects. If these spaces had monitors/smart boards, even better! We would plan space for 8 computers, and add a gaming station with video game systems to play, and directed sound speakers mounted on the ceiling to mitigate noise. For furniture, we would plan on comfortable, modular seating and tables that could be moved around the room as needed

According to data from the US Census Bureau from 2018, 13% of children under the age of 18 are living in poverty. According to data from the US Department of Housing and Urban Development, we know that most of those children live in South Framingham, where our Main Library is located. Data collected by the Young Adult Services Library Association shows that nationwide, teens as an age group receive the least financial support and that approximately 14,000 middle and high school students are on their own after they leave school for the day. Here in Framingham, we have 3,417 teen Framingham Public Library card holders. This number is growing. We know these kids need a safe, welcoming place for them to go after school, on the weekends, and during the summer--a place designed for them and where they'll find the resources they need to succeed academically, paving a path to success in adulthood. That's why we are starting our space redesign with a new Teen Room, which will better serve this important demographic's needs for new and more discoverable collections, new technology for academic, creative, and recreational pursuits, new comfortable furnishings, and new opportunities for group and individual study, programming, and social connection.

## Main Library Space Plan Description FY22-FY25

Each morning, nearly every day of the year, the Framingham Public Library opens its doors to the public, offering education, enrichment, and access to resources and meeting space for our entire community. We welcome all, regardless of income level, socio-economic status, age, physical ability, religion, race, housing status or immigration status. In a world of growing income disparity, skyrocketing costs of education and housing, and a predominantly technology-based, electronic landscape of resources--often cost prohibitive to access--the library emerges now more than ever as among the most important public institutions in our communities.

No longer exclusively repositories for books, libraries are serving as centers for community. In an increasingly electronic and virtual world, society finds itself more isolated and fragmented, but the library provides a shared space for connection, social engagement, inquiry, civil discourse, and access to trusted, factual information. As the library grows and changes to respond to these needs, we must reassess our physical space to ensure we are meeting patron expectations. Located in the heart of Downtown Framingham, the Main Library was constructed in 1979. Since then, the building has not seen any major interior upgrades or interior design projects, nor have we undertaken a holistic space redesign with modern services and technology in mind. The time has come now to take this on.

Working with the "Framingham Public Library Main Building Needs Re-assessment" report produced from a space study conducted by Patience Jackson in October 2018, the Library will undertake and realize a project-based, section by section, interior redesign plan. The project will proceed as follows:

### **Phase 1 FY22**

#### **Teen Area**

According to data from the US Census Bureau from 2018, 13% of children under the age of 18 are living in poverty. According to data from the US Department of Housing and Urban Development, we know that most of those children live in South Framingham, where our Main Library is located. Data collected by the Young Adult Services Library Association shows that nationwide, teens as an age group receive the least financial support and that approximately 14,000 middle and high school students are on their own after they leave school for the day. Here in Framingham, we have 3,417 teen Framingham Public Library card holders. This number is growing. We know these kids need a safe, welcoming place for them to go after school, on the weekends, and during the summer--a place designed for them and where they'll find the resources they need to succeed academically, paving a path to success in adulthood. That's why we are starting our space redesign with a new Teen Room, which will better serve our this important demographic's needs for new and more discoverable collections, new technology for academic, creative, and recreational pursuits, new comfortable furnishings, and new opportunities for group and individual study, programming, and social connection.

## **Phase 2 FY23**

### **Technology Learning Center and Homework Center**

For nine years, the Homework Center at the Framingham Public Library has been helping students from kindergarten through senior year with homework, projects, skill-building, and test taking. This powerful program has made a tremendous difference in the lives of Framingham students who have benefited from free, drop-in access to excellent tutors in a welcoming space, ready to help them succeed academically. This access can be truly life changing, especially for children and families struggling financially for whom paid tutoring is out of reach. The Homework Center provides not just homework help, but support for test taking, such as SAT prep, which is critical to successful outcomes necessary for college admission. Fees set by commercial SAT prep companies are high and cost prohibitive for many families. The Homework Center program has grown considerably over the past nine years, not only in the numbers it serves but in its activities as well. With special programs like Math Camp, Coding Club, and Robotics Day (among others) the Homework Center is providing skill-building enrichment experiences that require access to the latest technology and a more appropriate instruction area. The Homework Center's current space is often overflowing with tutors and students and there is an insufficient number of computer workstations. Our plan is to create a Computer Lab Classroom where Homework Center students (and all other patrons) can take advantage of computers, presentation equipment and other technology to facilitate instruction and learning. Additionally, locating small, enclosed study rooms nearby equipped with technology and plug-in capability will help our tutors and students find space to do their work.

### **Technology Learning Center**

Libraries have always been about education. Books and expert research help and advice have always been available, but as the skill sets necessary for success in modern life grow in number and complexity, libraries and librarians are engaging in a deeper level of instruction and are providing a bridge over the gap many people experience between those necessary skills and success and fulfilment. Many of our most popular programs involve instruction, whether in computer skills like Microsoft Excel and Word, Facebook and social media and device instruction, to like skills like financial literacy, resume building and job seeking, or workshops on entrepreneurship. Access to this instruction is important in the lives of all our community members, regardless of age and ability, and we are committed to providing it. For example, we are seeking a grant from the Massachusetts Board of Library Commissioners to develop a program in partnership with Framingham State University to create a satellite campus downtown at the Main Library, which would offer access to courses, free to all. Success of the "DowntownU," as we're calling it, depends in large part on having the appropriate materials and space conducive to instruction and learning. Our planned Computer Lab Classroom is essential for the program's success.

## **Phase 3 FY24**

### **Literacy Unlimited Area**

As they acclimate to their new surroundings, it doesn't take long before immigrants new to Framingham and the US find their way to the Framingham Public Library. This is thanks in large

part to the reputation of Literacy Unlimited as a free and readily available resource poised to help provide an important foothold in success in a new country--free English Language Learning opportunities. Despite the fantastic work the program does, its current space is insufficient for its 232 tutors and 332 students and their activities. The program has close to 200 tutor/student pairs, who need space for one-on-one tutoring and instruction. Additionally, Literacy Unlimited conducts 12 drop-in conversation classes per week, which frequently overflow the small conference room available in the current space. Extremely popular and well attended, conversation classes are an alternative to those on the waiting list to be paired with a tutor. They also provide a critical lifeline for people looking for support and connection in a new country.

Also among the goals for the redesign of the Literacy Unlimited Area, is to better integrate one of the most vibrant and popular programs we offer into the larger Library space and activity. We currently have ELL (English Language Learning) materials in our Citizenship Corner on the third floor by the reference desk, far from Literacy Unlimited's space on the first floor. Our new plan will locate the Citizenship Corner, ELL materials and collections with the Literacy Unlimited instruction and office space. Bringing Literacy Unlimited into the central library space and out of its current location off the beaten path, will create a more welcoming environment and increase access and discovery for the patrons it serves, especially those with limited English skills.

#### **Phase 4 FY25**

##### **Magazines and Periodicals Browsing Area:**

Our Periodicals Section with the latest Magazines and Newspapers, is an important browsing collection, well utilized by all but particularly our senior population. According to census data, 40% of Framingham residents fall into the 60-84 age range and 41% fall into the 85 and older range. We are committed to serving our growing senior population with collections, programming, educational opportunities, and with Bookmobile services. Easy access with special attention to accommodating mobility and visual impairments is especially important. Our current Periodicals area is located on the third floor of the Library, which makes access to those with mobility limitations challenging. Bringing the Periodicals area to the first floor, installing comfortable, accessible furniture and shelving will create much better experience for all. Further, the Main Floor of the Library should be an inviting space, one that sends a message to our patrons that they are welcome to sit, spend time, and use the collection and materials at their leisure and convenience. A comfortable, accessible browsing and seating area for seniors (and others) to enjoy is a necessary part of the space redesign.

## **T**echnology & **L**earning **C**enter (Commons?) at Framingham Public Library

The Technology & Learning Center will be a shared composite space with an assortment of technology and furnishings designed to facilitate different types of learning. The purpose of TLC is to provide a state of the art learning environment conducive to lifelong curiosity and exploration. TLC will stimulate the individual exploration of technologies, encourage the advancement of our community's digital literacy, and offer collaborative curriculum and learning opportunities that will improve the quality of life for our community

We envision two distinct areas inside the walls of TLC, with some comfortable seating and tables on the periphery. The first area will be more of a classroom setting with a shared table space where users can spread out laptops, Chromebooks or other devices depending on the content of the presentation or project. There will be plenty of access to power and connectivity, and large, connected monitors for shared viewing and instruction, either on the table itself, on the wall, or both. Individual workspaces will include smaller, more private stations where users can bring their own devices, borrow one from TLC or access one of the full workstations designed for a variety of purposes including tasks ranging from simple word processing and data input to graphics designing and CAD. There will be printing and scanning available inside TLC.

TLC will be staffed with an instructor during classroom hours, offer more freeform drop in hours with tutors available and make-available technologies appropriate for all ages ranging from preschool to senior citizens and every demographic between.

### **Topic Brainstorm List**

**Live Research Lab** - More Effective Searching. Genealogy. Safe shopping. Homebuying. Car buying. Comparative research for major decisions and purchases. Effective research for students etc.

**Internet Basics** - Safety. Using browsers. Dark Web. Using cloud based services like the Google Suite. Chromebooks for seniors. Device advice. What is Cryptocurrency?

**Return to the Workforce Training** - Microsoft Office proficiency. Resume building. Personal Rebranding. Typing refreshers. Job searching.

**Digital Literacy for ESL.** How to navigate the websites most important to new citizens throughout the citizenship process. Help navigating university websites. How to navigate municipal government websites including access to services.

**Technology Classes.** Python. Coding for kids. Deconstructing the PC. Upgrading the PC. Building a home network. Professional certifications.

Digital Creatives. Photography. Graphics. Graphic novels. Art.





## **The Framingham Public Library Homework Center**

For nine years, the Homework Center at the Framingham Public Library has been helping students from kindergarten through senior year with homework, projects, skill-building, and test taking. This powerful program has made a tremendous difference in the lives of Framingham students who have benefited from free, drop-in access to excellent tutors in a welcoming space, ready to help them succeed academically. This access can be truly life changing, especially for children and families struggling financially for whom paid tutoring is out of reach. The Homework Center provides not just homework help, but support for test taking, such as SAT prep, which is critical to successful outcomes necessary for college admission. Fees set by commercial SAT prep companies are high and cost prohibitive for many families. The Homework Center program has grown considerably over the past nine years, not only in the numbers it serves but in its activities as well. With special programs like Math Camp, Coding Club, and Robotics Day (among others) the Homework Center is providing skill-building enrichment experiences that require access to the latest technology and a more appropriate instruction area. The Homework Center's current space is often overflowing with tutors and students and there is an insufficient number of computer workstations. Our plan is to create a Technology Learning Center where Homework Center students (and all other patrons) can take advantage of computers, presentation equipment and other technology to facilitate instruction and learning. Additionally, locating small, enclosed study rooms nearby equipped with technology and plug-in capability will help our tutors and students find space to do their work.

## **Introducing the Technology & Learning Center at Framingham Public Library: A Life-changing Learning Space Free and Open to All**

One of the joys of visiting the public library is the opportunity to roam, browse, and explore the collections, allowing serendipity to be the day's teacher and guide. But with the creation of the Technology & Learning Center, the Framingham Public Library wants to take learning to a next level by creating a formalized classroom environment-- a learning hub, designed to conduct instruction and life-changing learning. Drawing on the resources the library already enjoys-- excellent collections and comfortable, accessible spaces; plus a staff of expert professional librarians joined by a community of first-rate educators and volunteers who are experts in their field, the Framingham Public Library is poised to create a true "Downtown U," free and open to all that can lead to transformative skill-building and learning

Imagine creating a state-of-the-art classroom equipped with workstations, presentation and instruction tools, and collaborative workspaces designed to inspire and facilitate learning, build opportunity, and enrich the lives of visitors with new knowledge, marketable skills and abilities.

What can you learn?  
The sky's the limit!

- **Return to the Workforce Training** Entrepreneurship Workshops and Business Planning. Microsoft Office proficiency. Resume building. Interview skills. Personal Rebranding. Typing refreshers. Job searching.
- **Internet Basics:** Safety. Using browsers. Dark Web. Using cloud based services like the Google Suite. Chromebooks for seniors. Device advice. What is Cryptocurrency?
- **Live Research Lab:** More Effective Searching. Genealogy. Safe shopping. Homebuying. Car buying. Comparative research for major decisions and purchases. Effective research for students etc.
- **Digital Literacy for ESL.** How to navigate the websites most important to new citizens throughout the citizenship process. Help navigating university websites. How to navigate municipal government websites including access to services.
- **Technology Classes.** Python. Coding for kids. Deconstructing the PC. Upgrading the PC. Building a home network. Professional certifications.
- **Digital Creatives.** Photography. Graphics. Graphic novels. Art.

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Parks Equipment and Vehicle Replacements \$213,767 General Fund

Parks & Recreation

Toro Groundmaster Mower \$145,081

F450 4x4 Dump Truck \$68,686

Partial recommendation for request of \$404,031 for two (2) F450 4x4 Dump Trucks, one CAT 906M Loader and one Toro Groundmaster Mower

FY2023 Vehicle and Equipment Replacement Proposal			
Vehicle	Quote	10% Escalation for 2022 Contracts	Total
2022 F450 4x4 Dump Truck	\$ 62,442	\$ 6,244.20	\$ 68,686.20
CAT 906M Loader	\$ 110,525	\$ 11,052.5	\$ 121,577.5
2022 F450 4x4 Dump Truck	\$ 62,442	\$ 6,244.20	\$ 68,686.20
Toro Groundmaster Mower	\$ 131,892	\$ 13,189.2	\$ 145,081.2
<b>FY2023 Project Total</b>			<b>\$ 404,031.10</b>

These funds will be used to replace two trucks, a front-end loader, and a large mower that are well past their useful life expectancy and present life-safety concerns to City staff. The Parks, Recreation & Cultural Affairs Division is respectfully requesting Capital Funding for the Vehicle and Equipment Replacement Program. The FY2023 Replacement Program includes replacement of two trucks that are 14 and 15 years old; a tractor that is 16 years old; and a large mower that is 13 years old. Replacement of these vehicles and equipment would allow the Department to replace the most deficient, and oldest equipment that poses life safety concerns and operational inefficiencies.

This proposal includes replacement of a Ford F450 Crew Cab Dump Truck (truck 11) and a Ford F450 Regular Cab Dump Truck (truck 12). These two trucks are normally used heavily throughout the fleet on a daily basis. These trucks support year-round operational needs including moving equipment and materials throughout the City; supporting mowing operations; providing snow removal and sanding operational support during winter months; and transporting crews from site to site. These trucks are both past their life expectancy, required costly repairs to pass state inspections, require additional funding to repair issues, and have begun to rot out in the cab, allowing for fume infiltration into the cab which creates life safety issues.

Additionally, our proposal includes replacement of our Toro Groundmaster (equipment 37), and Case Loader (equipment 24). These two pieces of equipment are also utilized heavily throughout the year on a daily process and have surpassed its life expectancy. The Toro Groundmaster is a large mower that is used 8-9 months of the year on a daily basis. This mower supports operations at a number of facilities throughout the City and is a unique piece of equipment. The Toro is one of the only pieces of equipment in

fleet that travels throughout the City on roads, instead of being transported by trailer. This leaves the mower susceptible to suspension damage due to pot holes and rough streets. Additionally, this mower is relied upon heavily throughout the year and allows the Department to experience a number of efficiencies while it is operational. The Case Loader is also used heavily in a number of aspects throughout the City. The Loader support field maintenance operations, construction projects, field improvements, snow removal, and support operations at the Maintenance and Operations Facility. Both of these pieces of equipment have experiences costly failures that are lingering and require additional repairs/replacements that will be need to ensure it meets safety standards and remains in fleet. These repairs total more than the current estimated value of each, and require replacement. Without these two pieces of equipment, our Department will experience a decrease in operational efficiencies and large expenditures on continually failing equipment.



# CITY OF FRAMINGHAM

DIVISION OF PARKS, RECREATION AND CULTURAL AFFAIRS

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James C. Snyder, CPRP  
Director

(508) 532-5960  
parks.recreation@framinghamma.gov  
www.framinghamma.gov

BOWDITCH FIELD ATHLETIC &  
CULTURAL COMPLEX  
475 Union Avenue  
Framingham, MA 01702

## Vehicle and Equipment Replacement Program

The Parks, Recreation & Cultural Affairs Division is respectfully requesting Capital Funding for the Vehicle and Equipment Replacement Program. The FY2023 Replacement Program includes replacement of two trucks that are 14 and 15 years old; a tractor that is 16 years old; and a large mower that is 13 years old. Replacement of these vehicles and equipment would allow the Department to replace the most deficient, and oldest equipment that poses life safety concerns and operational inefficiencies.

This proposal includes replacement of a Ford F450 Crew Cab Dump Truck (truck 11) and a Ford F450 Regular Cab Dump Truck (truck 12). These two trucks are normally used heavily throughout the fleet on a daily basis. These trucks support year-round operational needs including moving equipment and materials throughout the City; supporting mowing operations; providing snow removal and sanding operational support during winter months; and transporting crews from site to site. These trucks are both past their life expectancy, required costly repairs to pass state inspections, require additional funding to repair issues, and have begun to rot out in the cab, allowing for fume infiltration into the cab which creates life safety issues.

Additionally, our proposal includes replacement of our Toro Groundsmaster (equipment 37), and Case Loader (equipment 24). These two pieces of equipment are also utilized heavily throughout the year on a daily process and have surpassed its life expectancy. The Toro Groundsmaster is a large mower that is used 8-9 months of the year on a daily basis. This mower supports operations at a number of facilities throughout the City and is a unique piece of equipment. The Toro is one of the only pieces of equipment in fleet that travels throughout the City on roads, instead of being transported by trailer. This leaves the mower susceptible to suspension damage due to pot holes and rough streets. Additionally, this mower is relied upon heavily throughout the year and allows the Department to experience a number of efficiencies while it is operational. The Case Loader is also used heavily in a number of aspects throughout the City. The Loader support field maintenance operations, construction projects, field improvements, snow removal, and support operations at the Maintenance and Operations Facility. Both of these pieces of equipment have experienced costly failures that are lingering and require additional repairs/replacements that will be needed to ensure it meets safety standards and remains in fleet. These repairs total more than the current estimated value of each, and require replacement. Without these two pieces of equipment, our Department will



## CITY OF FRAMINGHAM

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experience a decrease in operational efficiencies and large expenditures on continually failing equipment.

For these many reasons, the Parks, Recreation & Cultural Affairs Division respectfully requests FY23 Capital Budget funding for the Vehicle and Equipment Replacement Program. Division staff will be made available to provide additional information and address any questions, as needed.

<b>FY2023 Vehicle and Equipment Replacement Proposal</b>			
<b>Vehicle</b>	<b>Quote</b>	<b>10% Escalation for 2022 Contracts</b>	<b>Total</b>
<i>2022 F450 4x4 Dump Truck</i>	\$ 62,442	\$ 6,244.20	\$ 68,686.20
<i>CAT 906M Loader</i>	\$ 110,525	\$ 11,052.5	\$ 121,577.5
<i>2022 F450 4x4 Dump Truck</i>	\$ 62,442	\$ 6,244.20	\$ 68,686.20
<i>Toro Groundmaster Mower</i>	\$ 131,892	\$ 13,189.2	\$ 145,081.2
<b>FY2023 Project Total</b>			<b>\$ 404,031.10</b>



**Framingham**  
**Parks and Recreation Department**  
475 Union Avenue • 508 532 5960

---

## Memorandum

From the desk of Donald Capen

August 29, 2021

**RE: Capital Budget Vehicle Replacement – 2006 Ford F450 Crew Cab Dump Truck**

Chris,

As requested, the following is a description of the current issues with the 2006 Ford F450 4x4 Crew Cab Dump Truck. Currently, this vehicle has 71,397 miles on the odometer, which converts to 107,096 engine miles (1 mile equals 1.5 engine miles).

Currently, the usage of this vehicle has been greatly reduced due to its current condition and safety risks. Current issues requiring attention, labor and expense are:

- Repair of engine oil leak at the back of engine;
- Replacement of the oil pan;

Truck 11 is heavily relied upon within the Department throughout the year. This truck provides support to our ballfield maintenance and lining operations that service over 60 lined fields seasonally. This vehicle is heavily used year round and supports maintenance projects throughout the winter when lining operations are completed for the year. As a result of this continued daily usage, this truck has required continued repairs and replacements to ensure it remains on the road and in operations. Specifically, the Department has undertaken a majority of these repairs using in-house staff; however, some repairs have required the vehicle be send to third party mechanics, costing the Department roughly \$1,100 over the past few years. In addition to these mechanical issues, rust has begun infiltrating the rocker panels and bottom of the doors, resulting in staff becoming exposed to fumes and weather while driving the truck.

After 16 years of operational service, the overall physical and mechanical condition of the vehicle is significantly degraded. Based on an overall assessment of the vehicle, I believe it has reached its useful life expectancy and would recommend replacement.

Regards,

*Donald Capen*

Donald Capen  
Mechanic



**Framingham**  
**Parks and Recreation Department**  
475 Union Avenue • 508 532 5960

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## Memorandum

From the desk of Donald Capen

August 18, 2021

**RE: Capital Budget Vehicle Replacement – 2007 Ford F450 Regular Cab Dump Truck**

Chris,

As requested, the following is a description of the current issues with the 2007 Ford F450 4x4 Regular Cab Dump Truck. Currently, this vehicle has 58,410 miles on the odometer, which converts to 87,615 engine miles (1 mile equals 1.5 engine miles).

Currently, the usage of this vehicle has been greatly reduced due to its current condition and safety risks. Current issues requiring attention, labor and expense are:

- Repair of engine oil leak at the back of engine;

During the winter months, Truck 12 has been used in snow removal/treatment operations. As part of this, Truck 12 carries a bed-mounted sander during these months to treat City properties. As a result of operating in support of snow removal efforts during the past 14 years, this vehicle has sustained significant salt erosion to its frame and bed mounts. Over the past five years, the Division has expended \$22,000 on repairs. During 2019-2020, the vehicle required replacement of the tie-rods, ball joint, tires, alternator, and break repairs in an attempt to keep this functioning in fleet, specifically for snow removal operations. There are still significant mechanical and structural issues with this vehicle that will need to be addressed in the coming year.

After 14 years of operational service, the overall physical and mechanical condition of the vehicle is significantly degraded. Based on an overall assessment of the vehicle, I believe it has reached its useful life expectancy and would recommend replacement.

Regards,

*Donald Capen*

Donald Capen  
Mechanic



# Estimate

Date: 8/20/2021  
 Estimate# FPR08202021  
 Customer ID:

To: Framingham Parks & Recreation  
 Attn: Chris McGinty  
 475 Union Street  
 Framingham, MA 01702

## BUDGETARY ESTIMATE

TRUCK 12  
 Salesperson: Paul G King  
 508-918-2210

GBPC/BAPERN Contract

Qty	Item #	Description	Unit Price	Line Total
		2022 Ford Super Duty F-450 DRW (W4H) XL 4WD Crew Cab 179" WB 60" CA		\$ 38,361.00
	W6	EXTERIOR COLOR - VSO Gem Green Metallic	\$ 660.00	\$ 640.20
	99N	Engine: 7.3L 2V DEVCT NA PFI V8 Gas		\$
	44G	Transmission: TorqShift 10-Speed Automatic-inc: 10R140 w/neutral idle and selectable drive modes: normal, tow/haul, eco, deep sand/snow and slippery		\$
	650A	OPTION PACKAGE: Order Code 650A		\$
		Gross Vehicle Weight Rating - 16,500 Lbs		\$
		Gross Combined Weight Rating - 28,000 Lbs		\$
	AS	Medium Earth Gray, HD Vinyl 40/20/40 Split Bench Seat-inc: center armrest, cupholder, storage and driver's side manual lumbar		\$
	X8L	Limited Slip w/4.88 Axle Ratio	\$ 360.00	\$ 349.20
	TGM	Tires: 225/70R19.5G BSW Traction -inc: 4 traction tires on the rear and 2 A/P tires on the front	\$ 190.00	\$ 184.30
	90L	Power Equipment Group -inc: Deletes passenger side lock cylinder, upgraded door-trim panel, Accessory Delay, Advanced Security Pack, SecuriLock Passive Anti-Theft System (PATS) and inclination/intrusion sensors, MyKey, owner controls feature, Power Locks, Remote Keyless Entry, Folding Trailer Tow Mirrors w/Power Heated Glass, manual telescoping, heated convex spotter mirror and integrated clearance lamps/turn signals, Power Front & Rear Side Windows, 1-touch up/down driver/passenger window	\$ 915.00	\$ 887.55
	63A	Utility Lighting System-inc: LED side-mirror spotlights	\$ 160.00	\$ 155.20
	473	Snow Plow Prep Package	\$ 250.00	\$ 242.50
	67B	397 Amp Alternators	\$ 115.00	\$ 111.55
	86M	Dual 78 AH Battery	\$ 210.00	\$ 203.70
	52B	Trailer Brake Controller -inc: smart trailer tow connector, Verified to be compatible w/electronic actuated drum brakes only	\$ 270.00	\$ 261.90
	62R	Transmission Power Take-Off Provision-inc: mobile and stationary PTO modes	\$ 280.00	\$ 271.60
	18B	Platform Running Boards	\$ 445.00	\$ 431.65
	512	Spare Tire, Wheel & Jack	\$ 350.00	\$ 339.50
	61L	Front Wheel Well Liners	\$ 180.00	\$ 174.60

872	Rear View Camera & Prep Kit-inc: Pre-installed content includes cab wiring and frame wiring to the rear most cross member, Upfitters kit includes camera w/mounting bracket, 20' jumper wire and camera mounting/aiming instructions	\$ 415.00	\$ 402.55
	REMAINING STANDARD EQUIPMENT AS SHOWN IN CHROME DATA REPORT		\$ -
10500	Easterner 9 Ft Steel 2 - 3 CuYd Dump Body with Electric Hoist		\$ 19,425.00
5500	Upgrade Dump to Central Hydraulic - Dump Only		\$ -
625	Canvas Cover - Manual		\$ -
775	1/2" Reinforced Plate w/D-Rings and Light Plug - Combo		\$ -
150	6 Pin Trailer Plug		\$ -
300	Mount OEM Factory Rear View Camera		\$ -
375	Two Amber LED Lights Mounted on Grille		\$ -
400	Two Amber LED Lights Mounted on Front of Cabshield		\$ -
400	Two Amber LED Lights Mounted - One on Each Side of Cabshield		\$ -
400	Two Amber LED Lights Mounted on Rear of Dump Body		\$ -
			\$ -
	<b>PLEASE NOTE THAT PRICING IS BASED ON CURRENT CONTRACT PRICING - WE WOULD STRONGLY SUGGEST ADDING 5 - 8% DUE TO THE CURRENT MARKET CONDITIONS RELATING TO THE STEEL, STAINLESS &amp; ALUMINUM MARKETS</b>		\$ -
			\$ -

**Special Instructions:**

Custom or Special Orders are Non-Refundable  
 This Estimate is for Budgetary Purposes and is Not a Guarantee of Cost for Services.  
 Estimate is Based on Current Information From Client About the Project Requirements  
 Actual Cost May Change Once Project Elements are Finalized

**Vehicle Subtotal**

**Upfit Subtotal**

**Grand Total**

\$62,442.00

**Thank You For Choosing The Colonial Way!**



**Framingham**  
**Parks and Recreation Department**  
475 Union Avenue • 508 532 5960

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**Memorandum**

**From the desk of Donald Capen**

August 29, 2021

**RE: Capital Budget Vehicle Replacement – 2005 Case MXT 570 Loader**

Chris,

As requested, the following is a description of the current issues with the 2005 Case MXT 570 Loader. Currently, this vehicle hours tracker is damaged to the point of failure and no longer counts usage hours. The last record we have of usage is from 2019, when the tracker indicated usage of 6,959 hours, which converts to 10,439 engine miles using the industry standard of 1 engine hour equaling 35 miles.

Due to the amount of engine hours accrued by the case loader and the current condition, it has routinely failed over the last year. This has required costly repairs as well as significant setbacks to the daily operational needs of the Parks Maintenance Department. This loader is heavily used at our maintenance building to help with daily operations, but due to its current state we have to limit what we are able to do.

The condition of this tractor has continued to decline to the point of complete failure. Specifically, the cab requires full replacement, and new doors to not only pass inspection but to ensure safety of our staff. Major safety issues have arisen due to the current condition, including inflation of engine fumes, exhaust and weather into the cab during operation. The cab and door replacement costs for just parts is estimated at \$22,000 without labor. Additionally, the Department has expended \$7,700 on repairs during the past 5 years to ensure continued usage. At this point, the estimated cost for parts alone is much higher than the total value of this machine.

After 17 years of operational service, the overall physical and mechanical condition of the tractor is significantly degraded. Based on an overall assessment of the tractor, I believe it has reached its useful daily life expectancy and would recommend immediate replacement.

Regards,

*Donald Capen*

Donald Capen  
Mechanic

# Milton



### Massachusetts & RI Locations:

100 Quarry Dr.  
Milford, Ma. 01757

84 Concord St.  
N. Reading, Ma. 01864

14 Kendrick Rd., Rte 28  
Wareham, Ma. 02571

2158 Plainfield Pike  
Cranston, RI. 02920

**Southworth-Milton, Inc.**  
[www.miltoncat.com](http://www.miltoncat.com)

## Budget Quotation

**DATE:** October 24, 2021

**Framingham Parks**  
Framingham, MA  
Chris Brown

**State Contract:** FAC116

Qty	Description	List Price	State Contract Price
1	<b><u>New Cat 906M compact wheel loader</u></b> 74hp diesel engine w/pre-cleaner, final tier IV, block heater Enclosed cab with heat & AC, radio, heated rear window Standard lift boom, 3rd function hydraulics w/electrical harness Skid steer carrier with electric in-cab control Standard flow hydraulics w/ride control Engine & travel speed control on side console 2 speed hydrostatic transmissions w/inching function Front & rear fenders, rear counterweight with hitch Roof mounted amber strobes (2 front/2 rear), aux. work lights 74", 1.2 yd general purpose bucket, Spare tire & rim included	\$138,947	\$ 102,700.00
<b>Options</b>			
1	8ft hydraulic angle snowplow		\$ 5,800.00
1	48" pallet forks		\$ 2,025.00

**Total State Contract Delivered Price: \$ 110,525.00**

**Ryan Boudreau**

*Governmental and State Sales*

**Mobile Phone: 774-737-3275**

**Fax: 774-907-3062**

[ryan\\_boudreau@miltoncat.com](mailto:ryan_boudreau@miltoncat.com)

# 906M, 907M, 908M

Compact Wheel Loaders



	906M	907M	908M
<b>Engine Model</b>	Cat® C3.3B DIT*	Cat C3.3B DIT*	Cat C3.3B DIT*
<b>Maximum Gross Power:</b>			
DIN ISO 14396	54.6 kW (74.2 hp)	55 kW (74 hp)	55 kW (74 hp)
SAE J1995	55.4 kW (74.3 hp)	55 kW (74 hp)	55 kW (74 hp)
<b>Bucket Capacity</b>	0.75 m <sup>3</sup> -1.5 m <sup>3</sup> (1.0 yd <sup>3</sup> -2.0 yd <sup>3</sup> )	0.75 m <sup>3</sup> -1.5 m <sup>3</sup> (1.0 yd <sup>3</sup> -2.0 yd <sup>3</sup> )	0.75 m <sup>3</sup> -1.5 m <sup>3</sup> (1.0 yd <sup>3</sup> -2.0 yd <sup>3</sup> )
<b>Full Turn Tipping Load</b>	3405 kg (7,507 lb)	3500 kg (7,716 lb)	3770 kg (8,311 lb)
<b>Operating Weight</b>	5600 kg (12,346 lb)	5750 kg (12,677 lb)	6365 kg (14,032 lb)

\*The Cat C3.3B DIT engine meets U.S. EPA Tier 4 Final/EU Stage V (Europe only) or U.S. EPA Tier 4 Final (North America only) emission standards.

# Experience the Difference.

## **Optimized Parallel Lift Z-bar Linkage**

*Combines the digging efficiency of a traditional Z-bar with tool carrier capabilities for superior performance and flexibility.*

## **Cab and Controls**

*Large, spacious cab features excellent visibility to the front and rear, extremely low sound levels and low-effort ergonomic joystick controls so you can concentrate on your work.*

## **Electronic Power Management**

*An electronically controlled hydrostatic transmission provides adjustable power to the ground and superb groundspeed control for fast digging cycles and the flexibility to efficiently perform a multitude of tasks.*

## **Powerful Predictable Hydraulics**

*The system is optimized for fast cycle times while delivering higher breakout forces. Working with buckets, forks and other work tools has never been more efficient.*

## **Work Tools and Attachments**

*Whether using HPL-ISO, HPL-A (competitor compatible) or SSL (Skid Steer Loader) style couplers, combined with standard or high flow hydraulics, the Cat Compact Wheel Loaders can use a large range of attachments. Additional HPL-ISO to SSL converter bracket adds even more versatility to these machines.*

## **Serviceability**

*Extended service intervals and excellent service access make daily checks quick and easy, allowing you to get to work sooner.*

## **Contents**

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**The Cat 906M, 907M and 908M Compact Wheel Loaders deliver high performance with outstanding versatility. On-the-go operator tuned hydraulics and drive train adjust the machine's response to the task at hand. Low sound levels, large spacious cab and intuitive controls keep you working comfortably all day long.**

# M Series Compact Wheel Loaders

A comprehensive range to suit all applications and environments.

## 906M

This low cab machine provides access to more areas on site and applications allowing for low entry machines. It is designed with simplicity and cost effectiveness in mind while still delivering great all-round performance to work in a wide range of applications.

- 0.75 m<sup>3</sup>-1.5 m<sup>3</sup> (1.0 yd<sup>3</sup>-2.0 yd<sup>3</sup>) operating capacity
- Great for rental fleets
- Low height over cab
- 18" rim size



## 907M

With more operating capacity than the 906M and a higher mounted cab, this model can work in applications where clearance is not critical.

- 0.75 m<sup>3</sup>-1.5 m<sup>3</sup> (1.0 yd<sup>3</sup>-2.0 yd<sup>3</sup>) operating capacity
- Standard height over cab
- 18" rim size



## 908M

Boasts higher operating capacity, engine horsepower, breakout forces and hydraulic power allowing it to operate in tougher conditions.

- 0.75 m<sup>3</sup>-1.5 m<sup>3</sup> (1.0 yd<sup>3</sup>-2.0 yd<sup>3</sup>) operating capacity
- Standard height over cab
- 20" rim size



# Parallel Lift Loader Linkage

Cat Optimized Z-bar Loader delivers enhanced visibility with maximum productivity.



## Cat Optimized Z-bar Loader

The Cat Optimized Z-bar Loader combines the digging efficiency of a traditional Z-bar with tool carrying capabilities for great performance and versatility.

- Parallel lift and high tilt forces throughout the working range help you safely and confidently handle loads with precise control.
- Linkage features excellent visibility to the bucket cutting edge and fork tips.

# Industry Leading Operator Station

Superior visibility, ergonomics and comfort.



## Best Seat on the Job Site

Enjoy all day comfort in the spacious M Series cab:

- Low effort, responsive joystick includes integrated Forward/Neutral/Reverse switch, optional differential lock and continuous flow triggers along with proportional, third function auxiliary hydraulics.
- Easy access to the cab with ergonomically placed grab rails, steps and large platform.
- Low sound levels.
- Superior visibility to the work tool due to the wide windshield and Cat Optimized Z-bar Loader.
- Optional air conditioning.
- Optional heated, air suspension seat with lumbar and seat back tilt adjustment.

## Easy to Use Instrument Panel and Display

The front console provides easy access to vital machine information, along with lights and ECO mode switches. ECO mode saves fuel and reduces engine wear with an engine speed control. The right hand console holds secondary functions beyond the all-in-one joystick controller.

- New soft touch keypad on the right hand console contains new electronic functions and settings including Implement Modulation, Hystat Aggressiveness, Ride Control, Return To Dig, Engine Speed Control and Rimpull Control.
- LCD read out for: travel speed, engine speed, speed range selection, hydraulic oil temperature, service hour meter, engine coolant temperature, and fuel level.
- Indicators: diesel particulate filter, starting aid, engine, electrical, parking brake, directional turn signals, brakes, high beams, action required notice, continuous flow, hydraulic filter bypass, bucket float, creeper, directional F/N/R.



# Power Train

Hydrostatic drive adjusts to be faster or smoother for the task.

## Intelligent Power Management

The Cat power train is computer controlled which actively monitors engine, operator input and drive train load, adjusting the hystat transmission to keep the machine working at peak efficiency.



## Engine

The Cat C3.3B turbo engine provides cleaner, quieter operation while delivering superior performance and durability.

The engine also features:

- The Cat C3.3B Tier 4 Final/Stage V uses an active regeneration system which requires no operator interaction under normal conditions.
- Automatic, electronic, self-priming fuel pump encourages good maintenance practice. At the service interval, simply install a clean, dry filter element and then turn the ignition key to ON.
- The easily accessible diesel particulate filter has a minimum 3,000 hour cleaning service interval. The on-board monitor will advise when diesel ash cleaning service is needed.
- Focused on fuel efficiency, significantly reducing owning and operating costs.

## Transmission

- The Hystat Aggressiveness feature allows the operator to increase the directional shift responsiveness for faster loading cycles, or adjust for finer control for sensitive tasks such as moving heavy pallets.
- Rimpull Control feature enables the operator to match available tractive power to underfoot conditions, helping reduce tire wear.
- Creeper Control precisely adjusts the machine ground speed when using work tools such as brooms and snow blowers.
- Electronic Engine Speed Control feature allows you to maintain constant engine RPM regardless of travel speed.
- Thus, pairing Creeper Control and Engine Speed Control, the operator can easily control the hydraulic power going to the work tool, while optimizing ground speed for best operation.
- Three speed ranges ensure maximum controllability for any task.

## Axles, Brakes and Inching Function

- Fully locking front and rear differential axles are optional and can be engaged at full torque on-the-go below 6 km/h (4 mph), with a button on the joystick.
- The enhanced modulation of the inching function utilizes the first half of brake pedal engagement to hydrostatically decelerate without any wear on the braking system.
- The brake system includes independent service brakes on the front and rear axles. The parking brake is mechanically activated and released with a hand lever next to the operator's seat.

# Couplers

Making the Compact Wheel Loader even more versatile.



## Horizontal Pin Coupler – ISO

This quick coupler will pick up a range of Cat Compact Wheel Loader work tools. The coupler along with the profiled loader arms have been designed to give maximum visibility to the work tool. A simple joystick function allows for easy engagement and disengagement of the locking pins.

Additional HPL-ISO to SSL converter bracket adds even more versatility to these machines, enabling a wide range of SSL interface attachments to be used.

## Horizontal Pin Coupler – A

This coupler is an evolution of the existing ISO horizontal pin coupler and thus has the in built durability and robust design that has been in the market place for many years.

This design gives a zero offset coupler from the machine, similar to the HPL-ISO which optimizes the load capacity and breakout forces versus some Aftermarket Equipment Manufacturer solutions that are less integrated.



## Skid Steer Loader Coupler

The universal skid steer loader coupler allows the use of many Cat Skid Steer Loader work tools. Using either the standard or high flow hydraulic option, this coupler allows the M Series Compact Wheel Loaders to integrate into a skid steer loader fleet.



# Hydraulics

Operator tuned hydraulics matches responsiveness to the task.

## Hydraulic System

M Series machines feature a new electro-hydraulic control system, which allows the operator the ability to fine tune the machine based on the application and operator preference.

- The new electronic joystick operation is finely tuned for smooth operation, yet fast cycle times.
- The Implement Modulation feature provides three settings for faster, more responsive hydraulics for repetitive tasks like truck loading. Or, this feature can adjust for smoother hydraulics needed with heavy fork loads or more restrictive areas.
- An electronic Return To Dig feature levels the bucket as the loader comes down after dumping. This speeds cycle times by letting the operator focus on the next dig point rather than setting the bucket position.
- The third function auxiliary hydraulics can be set for Continuous Flow when using hydro-mechanical work tools.
- Ride Control is available to smooth the ride, keep the tires in contact with the ground and maximize material retention.



# Work Tools

Do more jobs with one machine.

## The Right Tool for the Job

An extensive range of work tools and bucket styles are available to make your Cat Compact Wheel Loader one of the most versatile machines on the job site. Cat work tools are designed to get the best out of the machine and deliver excellent value through high productivity and long life.

## Work Tools for Cat Horizontal Pin Coupler

The Cat Compact Wheel Loader offers a comprehensive range of buckets to suit any environment and specific customer needs. The buckets have been designed and engineered to endure the high breakout forces of the M Series Compact Wheel Loader.

The Cat fork carriage has been designed to increase visibility to the forks, allowing the operator to work much more efficiently and safely, without compromising durability. Various fork tine lengths are available.

## Work Tools for Cat Skid Steer Loader Coupler

This coupler allows the use of a wide range of Cat Skid Steer Loader work tools including many hydro-mechanical work tools such as snow blowers, cold planers, brooms and wheel saws. It is recommended to check the work tool requirements to ensure the machine is configured for optimal performance with features such as High Flow and Return To Dig.

## Auxiliary Lines and Connectors

The auxiliary lines and connectors are fitted as standard, meaning the Cat Compact Wheel Loader comes ready to work.

For a complete list of available work tools please consult your local Cat dealer.





# Reliability and Durability

Quality within, quality throughout.



### E-Coat Protection

Cat Compact Wheel Loaders undergo an extensive 24-Stage 'E-Coat' process. Zinc based electroplated undercoat and polyurethane topcoat provides unmatched corrosion resistant properties.

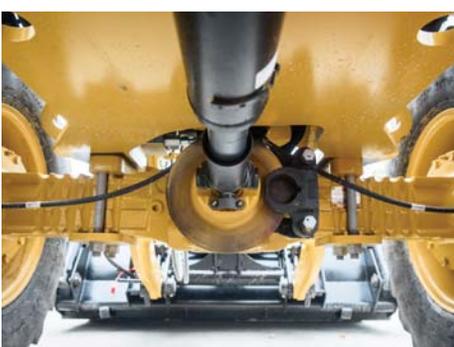


### Heavy Duty Axles

The M Series Compact Wheel Loaders are fitted with heavy duty axles, with outboard planetary reduction gears.

### Wiring

With heavy-duty braided wiring, Cat Compact Wheel Loaders offer great electrical durability. The water resistant sealed connectors prevent dust and moisture interfering with the electrics. Multicolored and numbered wiring is used for easy component identification.



### Durable Design

Durability has been designed into the machine by offering protection to features such as the rear lights, loader arm and coupler greasing points.

### Quality Throughout

High quality solid plastics, well-fitted rubber moldings make up the foundation of the M Series cab. Robust switches are used throughout, ensuring long life of components.

# Options

Customize your machine to meet your needs.

## Configure the Machine the Way You Want It

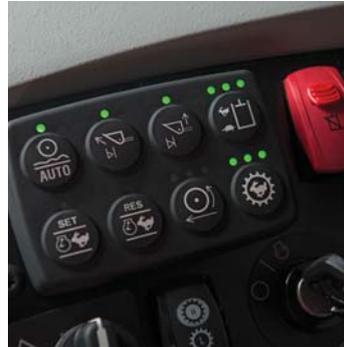
A variety of options are available on the Cat M Series Compact Wheel Loaders to suit your specific operator comfort and application needs. See your Cat dealer for more information about the features below and additional options.



*Coupler Options*



*Turbine Precleaner*



*Road and Load Options*



*Additional Lights*



*Air Conditioning*



*Machine Security*



*Flexport™ Tires*



*Windshield Guard*



*High Flow Auxiliary Hydraulics*



*ECO Drains*



*Work Tool Electrical Harness*



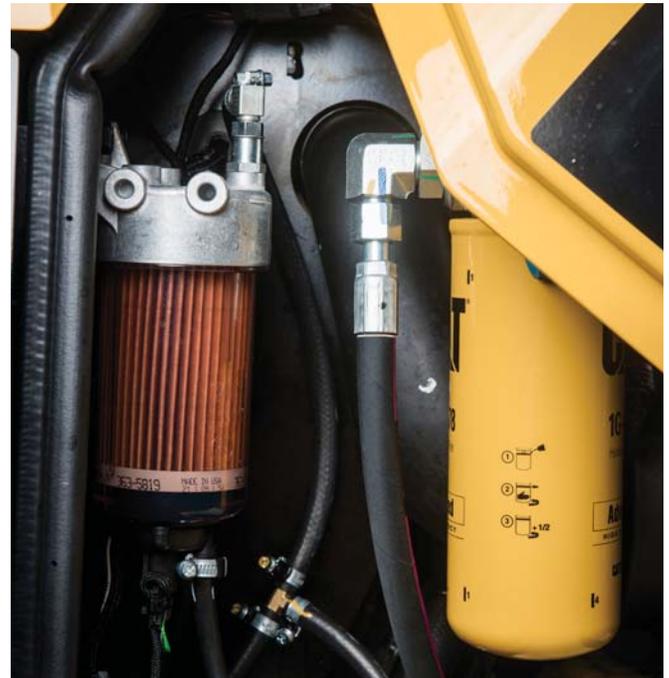
*Product Link™*

# Serviceability

Easy service to keep your machine working.

All service points are easily accessible. The rear hoods large opening allows for easy access to the engine which features all service points located on one side for easy maintenance. Extended service intervals reduce service time and maximize uptime. Additional service features include:

- Remote mounted fuel and hydraulic filters.
- Convenient access door for coolant fill.
- Caterpillar electric fuel priming pump for ease of service.
- Easy access to battery terminals for jump starts.
- Ground level access to all routine maintenance items.
- Easy access to hydraulic and engine coolers, which can be separated for quick cleanout.
- Product Link™ ready (standard).



# Customer Support

Unmatched support makes the difference.



## Renowned Cat Dealer Support

Your Cat dealer is ready to help you every step of the way. From new or used machine sales, to rental or rebuild options, your Cat dealer can provide an optimal solution to your business needs.

Unsurpassed worldwide parts availability, trained technicians and customer support agreements maximize your machine uptime.

For more information on Cat products, dealer services and industry solutions, visit us at [www.cat.com](http://www.cat.com).

# 906M, 907M, 908M Compact Wheel Loader Specifications

## Engine

### 906M, 907M, 908M

Engine model	Cat C3.3B DIT	
Maximum gross power		
ISO 14396	54.6 kW	73 hp
Rated net power @ 2,400 rpm		
SAE J1349	54.7 kW	73 hp
ISO 9249 (1977)/EEC 80/1269	55.3 kW	74 hp
Maximum gross torque		
ISO 14396	261 N·m	192 lbf·ft
Maximum net torque		
SAE J1349	257 N·m	189 lbf·ft
ISO 9249 (1977)/EEC 80/1269	260 N·m	191 lbf·ft
Displacement	3.3 L	201 in <sup>3</sup>
Bore	94 mm	3.7 in
Stroke	120 mm	4.7 in

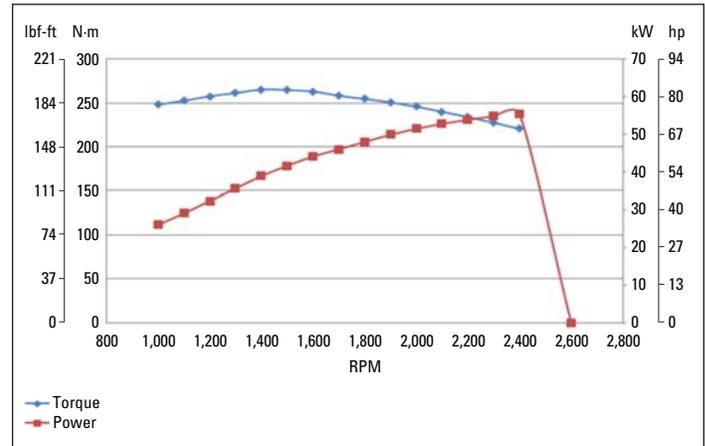
- Net power ratings are tested at the reference conditions for the specified standard.
- Net power shown is the power available at the flywheel when the engine is equipped with alternator, air cleaner, diesel exhaust filter, and fan at minimum speed.
- No derating required up to 3000 m (10,000 ft) altitude. Auto derate protects hydraulic and transmission systems.
- Flywheel per the SAE reference conditions with the fan at maximum speed.
- The Cat C3.3B DIT engine meets Tier 4 Final/Stage V (Europe only) or Tier 4 Final (North America only) emission standards.
- The Cat C3.3B DIT Tier 4 Final/Stage V uses an active regeneration system which requires no operator interaction under normal conditions.
- Stage V engine available for Europe only.

## Buckets



## Engine Power and Torque

### 906M, 907M, 908M



### 906M, 907M, 908M

General Purpose	0.8 m <sup>3</sup> (1 yd <sup>3</sup> ), 0.9 m <sup>3</sup> (1.2 yd <sup>3</sup> ), 1.0 m <sup>3</sup> (1.3 yd <sup>3</sup> ), 1.1 m <sup>3</sup> (1.4 yd <sup>3</sup> ), 1.3 m <sup>3</sup> (1.7 yd <sup>3</sup> )
Light Material	1.2 m <sup>3</sup> (1.6 yd <sup>3</sup> ), 1.5 m <sup>3</sup> (2.0 yd <sup>3</sup> )
Multi-Purpose	0.75 m <sup>3</sup> (1.0 yd <sup>3</sup> ), 0.9 m <sup>3</sup> (1.2 yd <sup>3</sup> ), 1.05 m <sup>3</sup> (1.37 yd <sup>3</sup> )
Grapple	0.9 m <sup>3</sup> (1.2 yd <sup>3</sup> ) heaped

- All capacities are applicable for each model. Bucket selection must be made with an understanding of the material density and application to ensure machine stability is maintained within the tipping loads stated per model and configuration.

# 906M, 907M, 908M Compact Wheel Loader Specifications

## Weights

	906M		907M		908M	
Operating weight	5595 kg	12,331 lb	5783 kg	12,745 lb	6364 kg	14,026 lb

- Specifications shown are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, Dunlop 405/70 SPT9 tires, full fuel, comfort ROPS cab, standard flow hydraulics and skid-steer coupler.
  - 906M is configured with a 0.9 m<sup>3</sup> (1.2 yd<sup>3</sup>) bucket with bolt-on cutting edge.
  - 907M is configured with a 1.0 m<sup>3</sup> (1.31 yd<sup>3</sup>) bucket with bolt-on cutting edge.
  - 908M is configured with a 1.1 m<sup>3</sup> (1.44 yd<sup>3</sup>) bucket with bolt-on cutting edge.

## Steering

	906M		907M		908M	
Steering articulation angle each direction	39°		39°		39°	
Steering cylinder: double acting						
Bore diameter	80 mm	3.1 in	80 mm	3.1 in	80 mm	3.1 in
Rod diameter	35 mm	1.4 in	35 mm	1.4 in	35 mm	1.4 in
Stroke	300 mm	11.8 in	300 mm	11.8 in	300 mm	11.8 in
Nominal flow – steering pump	43.9 L/min	12 gal/min	43.9 L/min	12 gal/min	43.9 L/min	12 gal/min
Maximum working pressure – steering pump	22 000 kPa	3,191 psi	22 000 kPa	3,191 psi	22 000 kPa	3,191 psi
Maximum steering torque						
0° (straight machine)	50 375 N·m	37,155 lbf-ft	50 375 N·m	37,155 lbf-ft	57 630 N·m	42,506 lbf-ft
39° (full turn)	37 620 N·m	27,747 lbf-ft	37 620 N·m	27,747 lbf-ft	42 570 N·m	31,398 lbf-ft
Steering cycle times (full left to full right)						
2,620 rpm	3 seconds		3 seconds		3 seconds	
Number of steering wheel turns						
Full left to full right or full right to full left	<6 turns		<6 turns		<6 turns	

## Service Refill Capacities

	906M		907M		908M	
Fuel tank	52 L	13.7 gal	78 L	20.6 gal	78 L	20.6 gal
Cooling system	16.5 L	4.4 gal	16.5 L	4.5 gal	16.5 L	4.4 gal
Engine crankcase	11.2 L	3 gal	11.2 L	3 gal	11.2 L	3 gal
Transmission (gear box)	8.5 L	2.2 gal	8.5 L	2.2 gal	11 L	2.9 gal
Axles						
Front	N/A	N/A	N/A	N/A	N/A	N/A
Rear	N/A	N/A	N/A	N/A	N/A	N/A
Hydraulic system (including tank)	70 L	18.5 gal	70 L	18.5 gal	72 L	19 gal
Hydraulic tank	46 L	12.2 gal	46 L	12.2 gal	46 L	12.2 gal

# 906M, 907M, 908M Compact Wheel Loader Specifications

## Loader Hydraulic System

	906M		907M		908M	
Maximum flow – implement pump	73 L/min	19 gal/min	73 L/min	19 gal/min	82 L/min	22 gal/min
Auxiliary function standard flow	73 L/min	19 gal/min	73 L/min	19 gal/min	82 L/min	22 gal/min
Auxiliary function high flow	116 L/min	31 gal/min	116 L/min	31 gal/min	126 L/min	33 gal/min
Maximum working pressure – implement pump	23 500 kPa	3,408 psi	23 500 kPa	3,408 psi	23 500 kPa	3,408 psi
Relief pressure – tilt cylinder head	31 000 kPa	4,496 psi	31 000 kPa	4,496 psi	31 000 kPa	4,496 psi
Relief pressure – tilt cylinder rod	19 000 kPa	2,756 psi	19 000 kPa	2,756 psi	19 000 kPa	2,756 psi
3rd function maximum working pressure	23 500 kPa	3,408 psi	23 500 kPa	3,408 psi	23 500 kPa	3,408 psi
Boost flow maximum pressure	22 000 kPa	3,191 psi	22 000 kPa	3,191 psi	22 000 kPa	3,191 psi
Lift cylinder: double acting						
Bore diameter	75 mm	3 in	75 mm	3 in	85 mm	3.3 in
Rod diameter	50 mm	2 in	50 mm	2 in	50 mm	2 in
Stroke	695 mm	27.4 in	695 mm	27.4 in	699 mm	27.5 in
Tilt cylinder: double acting						
Bore diameter	90 mm	3.5 in	90 mm	3.5 in	100 mm	3.9 in
Rod diameter	55 mm	2.2 in	55 mm	2.2 in	55 mm	2.2 in
Stroke	417 mm	16.4 in	417 mm	16.4 in	416 mm	16.4 in
Hydraulic cycle times (1,800 rpm)						
Raise (ground level to maximum lift)	5.5 seconds		5.5 seconds		5.5 seconds	
Dump (at maximum lift height)	1.5 seconds		1.5 seconds		1.5 seconds	
Float down (maximum lift to ground level)	2.6 seconds		2.6 seconds		2.6 seconds	
Total cycle time	9.6 seconds		9.6 seconds		9.6 seconds	
Hydraulic cycle times (1,000 rpm)						
Raise (ground level to maximum lift)	9.6 seconds		9.6 seconds		9.6 seconds	
Dump (at maximum lift height)	3 seconds		3 seconds		3 seconds	
Float down (maximum lift to ground level)	2.6 seconds		2.6 seconds		2.6 seconds	

## Drive Train

	906M		907M		908M	
Forward						
Range 1	10 km/h	6 mph	10 km/h	6 mph	10 km/h	6 mph
Range 2	20 km/h	12 mph	20 km/h	12 mph	20 km/h	12 mph
High range	35 km/h	22 mph	35 km/h	22 mph	35 km/h	22 mph
Reverse						
Range 1	10 km/h	6 mph	10 km/h	6 mph	10 km/h	6 mph
Range 2	20 km/h	12 mph	20 km/h	12 mph	20 km/h	12 mph
High range	35 km/h	22 mph	35 km/h	22 mph	35 km/h	22 mph

# 906M, 907M, 908M Compact Wheel Loader Specifications

## Tires

	906M	907M	908M
335/80 R18 XZSL Michelin	Yes	Yes	
340/80 R18 AT-R Firestone	Yes	Yes	
340/80 R18 XMCL Michelin	Yes	Yes	
340/80 R18 TRI2 Nokian	Yes	Yes	
340/80 R18 Bibload Michelin	Yes	Yes	
405/70 R18 SPT9 Dunlop*	Yes	Yes	
12.5/80 R18 Flexport™	Yes	Yes	
360/80 R20 TRI2 Nokian			Yes
375/75 R20 XZSL Michelin			Yes
400/70 R20 XMCL Michelin			Yes
400/70 R20 Bibload Michelin			Yes
405/70 R20 SPT9 Dunlop			Yes
12.5-20 ATU Firestone			Yes

\*Standard tire.

- Other tire choices available, contact your Cat dealer for details.
- In certain applications, the loader's productive capabilities may exceed the tires' tonnes-km/h (ton-mph) capabilities.
- Caterpillar recommends that you consult a tire supplier to evaluate all conditions before selecting a tire model.

## Cab



- ROPS: SAE J1040 MAY94, ISO 3471-1994.
- FOPS: SAE J/ISO 3449 APR98, Level II, ISO 3449 1992 Level II.
- Cat cab and Rollover Protective Structures (ROPS) are standard in North America and Europe.
- When properly installed and maintained, the cab offered by Caterpillar, when tested with doors, and windows closed as per work cycle procedures specified in ISO 6395 2008, results in operator sound exposure Leq (Equivalent sound pressure level) of 66 dB(A) typical.

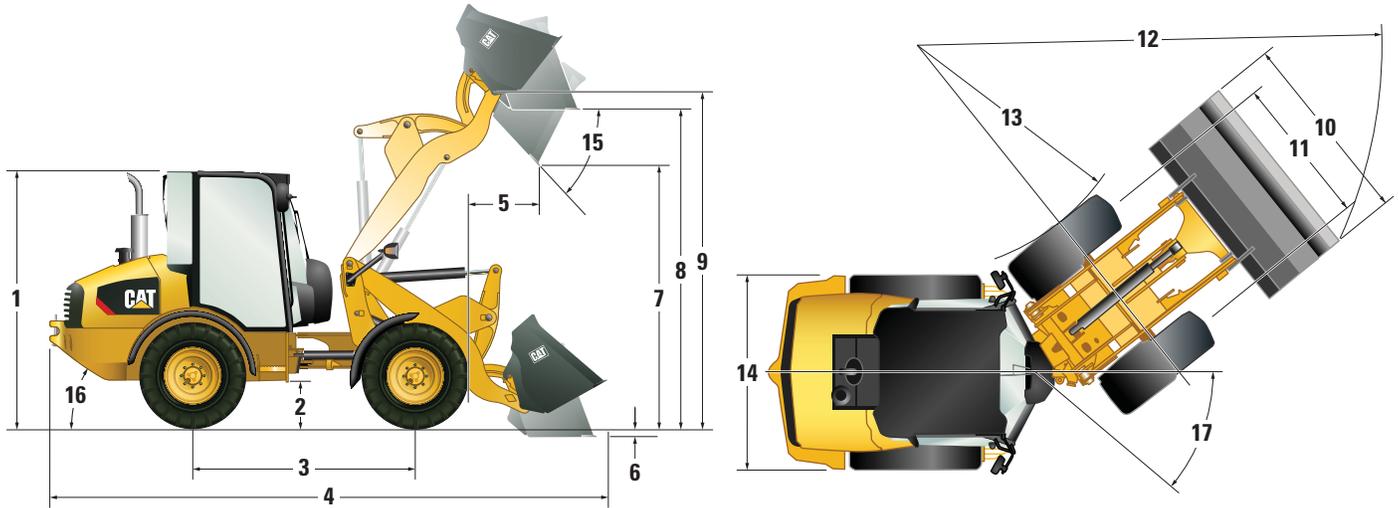
## Operating Specifications

	906M		907M		908M	
Tipping load – straight (ISO 14397-1)	3932 kg	8,666 lb	4087 kg	9,007 lb	4427 kg	9,757 lb
Tipping load – full turn (ISO 14397-1)	3204 kg	7,061 lb	3330 kg	7,339 lb	3606 kg	7,947 lb
Clearance: full lift and 45° dump	2513 mm	8'2"	2429 mm	7'11"	2463 mm	8'0"
Reach: full lift and 45° dump	714 mm	2'4"	792 mm	2'7"	931 mm	3'0"
Steering articulation angle each direction	39°		39°		39°	

# 906M, 907M, 908M Compact Wheel Loader Specifications

## Dimensions with Bucket

All dimensions are approximate. Dimensions will vary with bucket and tire choice. Refer to Operating Specifications with Buckets.



### Standard Lift – with ISO Coupler

	906M		907M		908M	
** 1 Height: ground to cab	2463 mm	8'1"	2586 mm	8'5"	2650 mm	8'8"
** 2 Height: ground clearance	300 mm	11"	300 mm	11"	340 mm	1'1"
3 Length: wheel base	2170 mm	7'1"	2170 mm	7'1"	2170 mm	7'1"
* 4 Length: overall	5469 mm	17'11"	5469 mm	17'11"	5630 mm	18'5"
* 5 Reach: bucket at 45°	725 mm	2'4"	725 mm	2'4"	770 mm	2'6"
** 6 Dig depth	95 mm	3.7"	95 mm	3.7"	101 mm	3.9"
* 7 Clearance: bucket at 45°	2478 mm	8'1"	2478 mm	8'1"	2620 mm	8'7"
** 8 Clearance: level bucket	3027 mm	9'11"	3027 mm	9'11"	3215 mm	10'6"
** 9 Height: bucket pin	3227 mm	10'7"	3227 mm	10'7"	3410 mm	11'2"
10 Width: bucket	1890 mm	6'2"	2045 mm	6'8"	2080 mm	6'9"
11 Width: tread center	1420 mm	4'7"	1420 mm	4'7"	1570 mm	5'1"
12 Turning radius: over bucket	4420 mm	14'6"	4489 mm	14'8"	4530 mm	14'10"
13 Turning radius: inside of tires	2240 mm	7'4"	2240 mm	7'4"	2080 mm	6'9"
14 Machine width	1840 mm	6'0"	1840 mm	6'0"	1985 mm	6'6"
15 Dump angle at full lift	45°		45°		45°	
16 Departure angle	33°		33°		33°	
17 Articulation angle	39°		39°		39°	
Operating weight	5670 kg	12,496 lb	5859 kg	12,913 lb	6499 kg	14,323 lb

\*Vary with bucket.

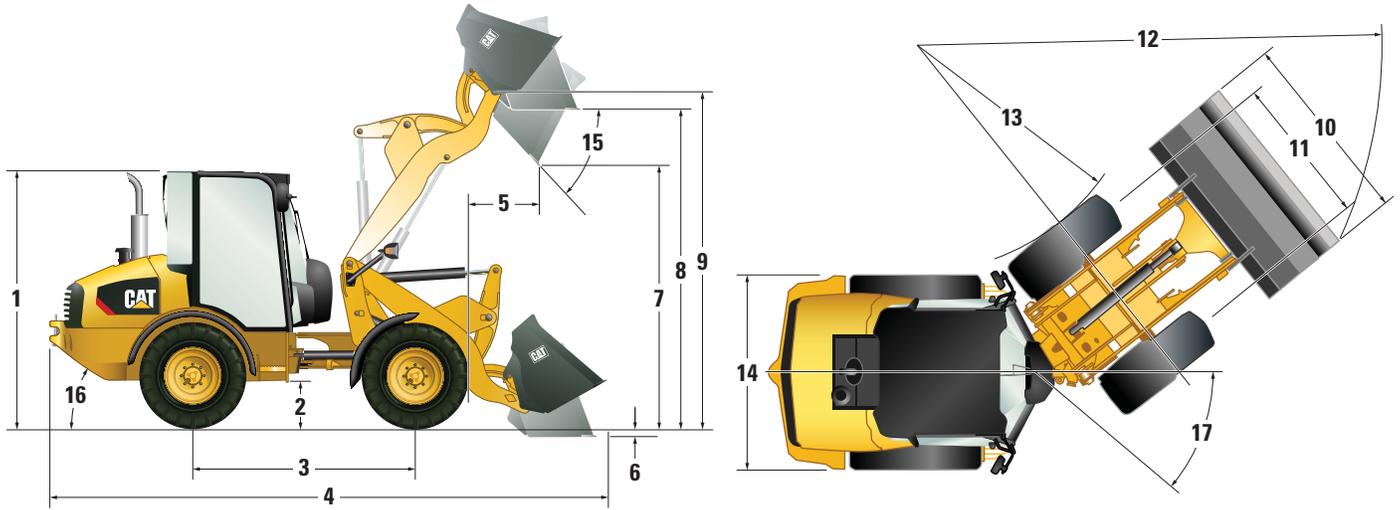
\*\*Vary with tire.

Dimensions listed are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, no air conditioner and Dunlop 405/70 SPT9 tires.

# 906M, 907M, 908M Compact Wheel Loader Specifications

## Dimensions with Bucket

All dimensions are approximate. Dimensions will vary with bucket and tire choice. Refer to Operating Specifications with Buckets.



### Standard Lift – with SSL Coupler

	906M		907M		908M	
** 1 Height: ground to cab	2463 mm	8'1"	2586 mm	8'5"	2650 mm	8'8"
** 2 Height: ground clearance	300 mm	11"	300 mm	11"	340 mm	1'1"
3 Length: wheel base	2170 mm	7'1"	2170 mm	7'1"	2170 mm	7'1"
* 4 Length: overall	5620 mm	18'5"	5620 mm	18'5"	5780 mm	18'11"
* 5 Reach: bucket at 45°	820 mm	2'8"	820 mm	2'8"	866 mm	2'10"
** 6 Dig depth	107 mm	4.2"	107 mm	4.2"	109 mm	4.2"
* 7 Clearance: bucket at 45°	2359 mm	7'8"	2359 mm	7'8"	2505 mm	8'2"
** 8 Clearance: level bucket	3035 mm	9'11"	3035 mm	9'11"	3215 mm	10'6"
** 9 Height: bucket pin	3227 mm	10'7"	3227 mm	10'7"	3410 mm	11'2"
10 Width: bucket	1890 mm	6'2"	2045 mm	6'8"	2080 mm	6'9"
11 Width: tread center	1420 mm	4'7"	1420 mm	4'7"	1570 mm	5'1"
12 Turning radius: over bucket	4464 mm	14'7"	4473 mm	14'8"	4534 mm	14'10"
13 Turning radius: inside of tires	2240 mm	7'4"	2240 mm	7'4"	2080 mm	6'9"
14 Machine width	1840 mm	6'0"	1840 mm	6'0"	1985 mm	6'6"
15 Dump angle at full lift	45°		45°		45°	
16 Departure angle	33°		33°		33°	
17 Articulation angle	39°		39°		39°	
Operating weight	5663 kg	12,481 lb	5859 kg	12,913 lb	6497 kg	14,319 lb

\*Vary with bucket.

\*\*Vary with tire.

Dimensions listed are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, no air conditioner and Dunlop 405/70 SPT9 tires.

# 906M, 907M, 908M Compact Wheel Loader Specifications

## 906M Supplemental Operating Data – Tires

	Michelin Bibload		Nokian		Flexport	
	mm	in	mm	in	mm	in
Vertical heights	-6 mm	-0.2 in	-8 mm	-0.3 in	+14 mm	+0.6 in
Reach: bucket at 45°	+18 mm	+0.7 in	+13 mm	+0.5 in	+28 mm	+1.1 in
Width: over tires	+1 mm	+0 in	+0 mm	+0 in	-2 mm	-0.1 in
Turning radius: inside of tires	-0 mm	-0 in	-0 mm	-0 in	+1 mm	+0 in
Tipping load – straight	-21 kg	-46 lb	-5 kg	-11 lb	+301 kg	+663 lb
Tipping load – full turn	-18 kg	-40 lb	-5 kg	-11 lb	+245 kg	+540 lb
Operating weight	-36 kg	-79 lb	-10 kg	-22 lb	+505 kg	+1,113 lb

## 907M Supplemental Operating Data – Tires

	Michelin Bibload		Nokian		Flexport	
	mm	in	mm	in	mm	in
Vertical heights	-6 mm	-0.2 in	-8 mm	-0.3 in	+14 mm	+0.6 in
Reach: bucket at 45°	+18 mm	+0.7 in	+13 mm	+0.5 in	+28 mm	+1.1 in
Width: over tires	+1 mm	+0 in	+0 mm	+0 in	-2 mm	-0.1 in
Turning radius: inside of tires	-0 mm	-0 in	-0 mm	-0 in	+1 mm	+0 in
Tipping load – straight	-21 kg	-46 lb	-6 kg	-13 lb	+301 kg	+663 lb
Tipping load – full turn	-18 kg	-40 lb	-5 kg	-11 lb	+245 kg	+540 lb
Operating weight	-36 kg	-79 lb	-10 kg	-22 lb	+505 kg	+1,113 lb

## 908M Supplemental Operating Data – Tires

	Michelin Bibload		Nokian	
	mm	in	mm	in
Vertical heights	-12 mm	-0.5 in	+8 mm	+0.3 in
Reach: bucket at 45°	+18 mm	+0.7 in	+0 mm	+0 in
Width: over tires	+0 mm	+0 in	+4 mm	+0.2 in
Turning radius: inside of tires	-0 mm	-0 in	+2 mm	+0.1 in
Tipping load – straight	-5 kg	-11 lb	-31 kg	-68 lb
Tipping load – full turn	-3 kg	-7 lb	-25 kg	-55 lb
Operating weight	-8 kg	-18 lb	-56 kg	-123 lb

## 906M Operating Specifications with Hook On Buckets

		General Purpose							
		Horizontal Pin (HPL – ISO)			Vertical Pin			Horizontal Pin (HPL – A)	
		Base Edge	Bolt-on Edge	Bolt-on Teeth	Base Edge	Bolt-on Edge	Bolt-on Teeth	Bolt-on Edge	Bolt-on Teeth
Rated capacity	m <sup>3</sup>	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
	yd <sup>3</sup>	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Width: bucket	mm	1880	1880	1880	1880	1880	1880	1880	1880
	ft/in	6'2"	6'2"	6'2"	6'2"	6'2"	6'2"	6'2"	6'2"
Nominal material density, 100% fill factor	kg/m <sup>3</sup>	1982	1909	1954	1868	1780	1820	1903	1948
	lb/yd <sup>3</sup>	3,276	3,156	3,230	3,088	2,942	3,008	3,146	3,220
Clearance: full lift, 45° dump	mm	2513	2478	2513	2393	2359	2393	2478	2513
	ft/in	8'2"	8'1"	8'2"	7'10"	7'8"	7'10"	8'1"	8'2"
Reach: full lift, 45° dump	mm	714	725	714	809	820	809	725	714
	ft/in	2'4"	2'4"	2'4"	2'7"	2'8"	2'7"	2'4"	2'4"
Reach: level arm, level bucket	mm	1851	1883	1851	2000	2033	2000	1883	1851
	ft/in	6'0"	6'2"	6'0"	6'6"	6'8"	6'6"	6'2"	6'0"
Dig depth	mm	79	95	79	91	107	91	95	79
	in	3.1	3.7	3.1	3.6	4.2	3.6	3.7	3.1
Length: overall	mm	5436	5469	5538	5586	5620	5690	5469	5538
	ft/in	17'10"	17'11"	18'2"	18'3"	18'5"	18'8"	17'11"	18'2"
Turning radius, bucket at carry	mm	4401	4420	4401	4445	4464	4445	4420	4401
	ft/in	14'5"	14'6"	14'5"	14'7"	14'7"	14'7"	14'6"	14'5"
Tipping load – straight, ISO 14397-1*	kg	4380	4219	4317	4128	3932	4021	4206	4304
	lb	9,653	9,298	9,514	9,098	8,666	8,862	9,270	9,486
Tipping load – full turn, ISO 14397-1*	kg	3568	3437	3517	3363	3204	3276	3426	3506
	lb	7,863	7,575	7,751	7,412	7,061	7,220	7,550	7,727
Breakout force	kN	52	52	52	43	43	43	50	50
	lbf	11,689	11,689	11,689	9,666	9,666	9,666	11,240	11,240
Operating weight	kg	5545	5581	5559	5560	5595	5573	5592	5569
	lb	12,221	12,300	12,252	12,254	12,331	12,282	12,324	12,274

\*Full compliance to ISO 14397-1 (2007) Sections 1 thru 6, which requires 2% verification between calculation and testing.

Dimensions listed are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, no air conditioner and Dunlop 405/70 SPT9 tires.

# Bucket Specifications

## 906M Operating Specifications with Hook On Buckets

		Multi Purpose							
		Horizontal Pin (HPL – ISO)			Vertical Pin			Horizontal Pin (HPL – A)	
		Base Edge	Bolt-on Edge	Bolt-on Teeth	Base Edge	Bolt-on Edge	Bolt-on Teeth	Bolt-on Edge	Bolt-on Teeth
Rated capacity	m <sup>3</sup>	0.7	0.7	0.7	0.7	0.7	0.7	0.75	0.75
	yd <sup>3</sup>	0.9	0.9	0.9	0.9	0.9	0.9	1.0	1.0
Width: bucket	mm	1880	1880	1880	1880	1880	1880	1880	1880
	ft/in	6'2"	6'2"	6'2"	6'2"	6'2"	6'2"	6'2"	6'2"
Nominal material density, 100% fill factor	kg/m <sup>3</sup>	2495	2391	2437	2435	2333	2378	2225	2267
	lb/yd <sup>3</sup>	4,277	4,009	4,178	4,174	3,999	4,076	3,677	3,748
Clearance: full lift, 45° dump	mm	2500	2465	2500	2468	2434	2468	2465	2500
	ft/in	8'2"	8'1"	8'2"	8'1"	7'11"	8'1"	8'1"	8'2"
Reach: full lift, 45° dump	mm	704	715	704	758	770	758	715	704
	ft/in	2'3"	2'4"	2'3"	2'5"	2'6"	2'5"	2'4"	2'3"
Reach: level arm, level bucket	mm	1858	1891	1858	1919	1952	1919	1891	1858
	ft/in	6'1"	6'2"	6'1"	6'3"	6'4"	6'3"	6'2"	6'1"
Dig depth	mm	79	95	79	91	107	91	95	79
	in	3.1	3.7	3.1	3.6	4.2	3.6	3.7	3.1
Length: overall	mm	5436	5469	5538	5586	5620	5599	5469	5538
	ft/in	17'10"	17'11"	18'2"	18'3"	18'5"	18'4"	17'11"	18'2"
Turning radius, bucket at carry	mm	4406	4424	4406	4416	4434	4416	4424	4406
	ft/in	14'5"	14'6"	14'5"	14'5"	14'6"	14'5"	14'6"	14'5"
Tipping load – straight, ISO 14397-1*	kg	4288	4110	4188	4184	4009	4086	4096	4174
	lb	9,450	9,058	9,230	9,221	8,835	9,005	9,027	9,199
Tipping load – full turn, ISO 14397-1*	kg	3493	3348	3412	3409	3266	3329	3337	3401
	lb	7,698	7,378	7,520	7,513	7,198	7,337	7,354	7,495
Breakout force	kN	52	52	52	43	43	43	50	50
	lbf	11,689	11,689	11,689	9,666	9,666	9,666	11,240	11,240
Operating weight	kg	5707	5772	5750	5701	5765	5742	5782	5760
	lb	12,578	12,721	12,673	12,565	12,706	12,655	12,743	12,695

\*Full compliance to ISO 14397-1 (2007) Sections 1 thru 6, which requires 2% verification between calculation and testing.

Dimensions listed are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, no air conditioner and Dunlop 405/70 SPT9 tires.

## 906M Operating Specifications with Hook On Buckets

		Light Material		Industrial Grapple
		Horizontal Pin	Vertical Pin	Vertical Pin
		Bolt-on Edge	Bolt-on Edge	Bolt-on Edge
Rated capacity	m <sup>3</sup>	1.2	1.2	N/A
	yd <sup>3</sup>	1.6	1.6	N/A
Width: bucket	mm	2080	2080	2057
	ft/in	6'9"	6'9"	6'8"
Nominal material density, 100% fill factor	kg/m <sup>3</sup>	1381	1288	N/A
	lb/yd <sup>3</sup>	2,283	2,129	N/A
Clearance: full lift, 45° dump	mm	2429	2395	2439
	ft/in	7'11"	7'10"	8'0"
Reach: full lift, 45° dump	mm	792	803	865
	ft/in	2'7"	2'8"	2'10"
Reach: level arm, level bucket	mm	1994	2144	2011
	ft/in	6'6"	7'0"	6'7"
Dig depth	mm	83	104	12
	in	3.3	4.1	0.5
Length: overall	mm	5580	5730	5596
	ft/in	18'3"	18'9"	18'4"
Turning radius, bucket at carry	mm	4521	4566	4498
	ft/in	14'9"	14'11"	14'9"
Tipping load – straight, ISO 14397-1*	kg	4068	3796	3817
	lb	8,965	8,366	8,412
Tipping load – full turn, ISO 14397-1*	kg	3314	3092	3109
	lb	7,304	6,814	6,852
Operating weight	kg	5649	5663	5865
	lb	12,450	12,481	12,926

\*Full compliance to ISO 14397-1 (2007) Sections 1 thru 6, which requires 2% verification between calculation and testing.

Dimensions listed are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, no air conditioner and Dunlop 405/70 SPT9 tires.

# Bucket Specifications

## 907M Operating Specifications with Hook On Buckets

		General Purpose							
		Horizontal Pin (HPL – ISO)			Vertical Pin			Horizontal Pin (HPL – A)	
		Base Edge	Bolt-on Edge	Bolt-on Teeth	Base Edge	Bolt-on Edge	Bolt-on Teeth	Bolt-on Edge	Bolt-on Teeth
Rated capacity	m <sup>3</sup>	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1
	yd <sup>3</sup>	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4
Width: bucket	mm	2035	2035	2035	2035	2035	2035	1880	1880
	ft/in	6'8"	6'8"	6'8"	6'8"	6'8"	6'8"	6'2"	6'2"
Nominal material density, 100% fill factor	kg/m <sup>3</sup>	1857	1786	1824	1729	1665	1699	1592	1632
	lb/yd <sup>3</sup>	3,147	3,027	3,092	2,930	2,823	2,880	2,757	2,826
Clearance: full lift, 45° dump	mm	2513	2478	2513	2393	2359	2393	2478	2513
	ft/in	8'2"	8'1"	8'2"	7'10"	7'8"	7'10"	8'1"	8'2"
Reach: full lift, 45° dump	mm	714	725	714	809	820	809	725	714
	ft/in	2'4"	2'4"	2'4"	2'7"	2'8"	2'7"	2'4"	2'4"
Reach: level arm, level bucket	mm	1851	1883	1851	2000	2033	2000	1883	1851
	ft/in	6'0"	6'2"	6'0"	6'6"	6'8"	6'6"	6'2"	6'0"
Dig depth	mm	79	95	79	91	107	91	95	79
	in	3.1	3.7	3.1	3.6	4.2	3.6	3.7	3.1
Length: overall	mm	5436	5469	5538	5586	5620	5690	5469	5538
	ft/in	17'10"	17'11"	18'2"	18'3"	18'5"	18'8"	17'11"	18'2"
Turning radius, bucket at carry	mm	4473	4489	4473	4515	4534	4515	4420	4401
	ft/in	14'8"	14'8"	14'8"	14'9"	14'10"	14'9"	14'6"	14'5"
Tipping load – straight, ISO 14397-1*	kg	4558	4384	4478	4244	4087	4172	4300	4408
	lb	10,045	9,662	9,869	9,353	9,007	9,195	9,477	9,715
Tipping load – full turn, ISO 14397-1*	kg	3713	3571	3648	3457	3330	3398	3503	3591
	lb	8,183	7,870	8,040	7,619	7,339	7,489	7,720	7,914
Breakout force	kN	52	52	52	43	43	43	50	50
	lbf	11,689	11,689	11,689	9,666	9,666	9,666	11,240	11,240
Operating weight	kg	5691	5730	5709	5706	5744	5723	5810	5784
	lb	12,542	12,628	12,582	12,576	12,659	12,613	12,805	12,747

\*Full compliance to ISO 14397-1 (2007) Sections 1 thru 6, which requires 2% verification between calculation and testing.

Dimensions listed are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, no air conditioner and Dunlop 405/70 SPT9 tires.

## 907M Operating Specifications with Hook On Buckets

		Multi Purpose							
		Horizontal Pin (HPL – ISO)			Vertical Pin			Horizontal Pin (HPL – A)	
		Base Edge	Bolt-on Edge	Bolt-on Teeth	Base Edge	Bolt-on Edge	Bolt-on Teeth	Bolt-on Edge	Bolt-on Teeth
Rated capacity	m <sup>3</sup>	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	yd <sup>3</sup>	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Width: bucket	mm	1880	1880	1880	1880	1880	1880	1890	1880
	ft/in	6'2"	6'2"	6'2"	6'2"	6'2"	6'2"	6'2"	6'2"
Nominal material density, 100% fill factor	kg/m <sup>3</sup>	2429	2331	2374	2371	2273	2317	2337	2381
	lb/yd <sup>3</sup>	4,016	3,853	3,924	3,920	3,758	3,829	3,863	3,935
Clearance: full lift, 45° dump	mm	2500	2465	2500	2468	2434	2468	2465	2500
	ft/in	8'2"	8'1"	8'2"	8'1"	7'11"	8'1"	8'1"	8'2"
Reach: full lift, 45° dump	mm	704	715	704	758	770	758	715	704
	ft/in	2'3"	2'4"	2'3"	2'5"	2'6"	2'5"	2'4"	2'3"
Reach: level arm, level bucket	mm	1858	1891	1858	1919	1952	1919	1891	1858
	ft/in	6'1"	6'2"	6'1"	6'3"	6'4"	6'3"	6'2"	6'1"
Dig depth	mm	79	95	79	91	107	91	106	90
	in	3.1	3.7	3.1	3.6	4.2	3.6	4.2	3.5
Length: overall	mm	5436	5469	5538	5586	5620	5599	5469	5436
	ft/in	17'10"	17'11"	18'2"	18'3"	18'5"	18'4"	17'11"	17'10"
Turning radius, bucket at carry	mm	4406	4424	4406	4416	4434	4416	4424	4406
	ft/in	14'5"	14'6"	14'5"	14'5"	14'6"	14'5"	14'6"	14'5"
Tipping load – straight, ISO 14397-1*	kg	4473	4291	4382	4366	4186	4265	4303	4384
	lb	9,858	9,457	9,657	9,622	9,225	9,400	9,483	9,662
Tipping load – full turn, ISO 14397-1*	kg	3644	3496	3561	3557	3410	3475	3505	3571
	lb	8,031	7,705	7,848	7,839	7,515	7,658	7,725	7,870
Breakout force	kN	52	52	52	43	43	43	50	50
	lbf	11,689	11,689	11,689	9,666	9,666	9,666	11,240	11,240
Operating weight	kg	5838	5903	5881	5832	5896	5873	5951	5928
	lb	12,866	13,010	12,961	12,853	12,994	12,944	13,116	13,065

\*Full compliance to ISO 14397-1 (2007) Sections 1 thru 6, which requires 2% verification between calculation and testing.

Dimensions listed are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, no air conditioner and Dunlop 405/70 SPT9 tires.

# Bucket Specifications

## 907M Operating Specifications with Hook On Buckets

		Light Material		Industrial Grapple
		Horizontal Pin	Vertical Pin	Vertical Pin
		Bolt-on Edge	Bolt-on Edge	Bolt-on Edge
Rated capacity	m <sup>3</sup>	1.2	1.2	N/A
	yd <sup>3</sup>	1.6	1.6	N/A
Width: bucket	mm	2080	2080	2057
	ft/in	6'9"	6'9"	6'8"
Nominal material density, 100% fill factor	kg/m <sup>3</sup>	1400	1345	N/A
	lb/yd <sup>3</sup>	2,380	2,223	N/A
Clearance: full lift, 45° dump	mm	2429	2395	2439
	ft/in	7'11"	7'10"	8'0"
Reach: full lift, 45° dump	mm	792	803	865
	ft/in	2'7"	2'8"	2'10"
Reach: level arm, level bucket	mm	1994	2144	2011
	ft/in	6'6"	7'0"	6'7"
Dig depth	mm	83	104	12
	in	3.3	4.1	0.5
Length: overall	mm	5580	5730	5596
	ft/in	18'3"	18'9"	18'4"
Turning radius, bucket at carry	mm	4521	4566	4498
	ft/in	14'9"	14'11"	14'9"
Tipping load – straight, ISO 14397-1*	kg	4243	3961	3991
	lb	9,351	8,730	8,796
Tipping load – full turn, ISO 14397-1*	kg	3456	3227	3251
	lb	7,617	7,112	7,165
Operating weight	kg	5779	5794	5996
	lb	12,736	12,769	13,215

\*Full compliance to ISO 14397-1 (2007) Sections 1 thru 6, which requires 2% verification between calculation and testing.

Dimensions listed are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, no air conditioner and Dunlop 405/70 SPT9 tires.

## 908M Operating Specifications with Hook On Buckets

		General Purpose									
		Horizontal Pin (HPL – ISO)					Vertical Pin			Horizontal Pin (HPL – A)	
		Base Edge	Bolt-on Edge	Bolt-on Teeth	Bolt-on Teeth	Bolt-on Edge	Base Edge	Bolt-on Edge	Bolt-on Teeth	Bolt-on Edge	Bolt-on Teeth
Rated capacity	m <sup>3</sup>	1.1	1.1	1.1	1.3	1.3	1.1	1.1	1.1	1.3	1.3
	yd <sup>3</sup>	1.4	1.4	1.4	1.7	1.7	1.4	1.4	1.4	1.7	1.7
Width: bucket	mm	2060	2060	2060	2060	2060	2060	2060	2060	2060	2060
	ft/in	6'9"	6'9"	6'9"	6'9"	6'9"	6'9"	6'9"	6'9"	6'9"	6'9"
Nominal material density, 100% fill factor	kg/m <sup>3</sup>	1810	1747	1788	1448	1481	1696	1639	1676	1445	1478
	lb/yd <sup>3</sup>	3,134	3,026	3,096	2,440	2,496	2,937	2,838	2,902	2,435	2,490
Clearance: full lift, 45° dump	mm	2653	2620	2653	2653	2620	2539	2505	2539	2620	2653
	ft/in	8'8"	8'7"	8'8"	8'8"	8'7"	8'3"	8'2"	8'3"	8'7"	8'8"
Reach: full lift, 45° dump	mm	757	770	757	757	770	854	866	854	846	834
	ft/in	2'5"	2'6"	2'5"	2'5"	2'6"	2'9"	2'10"	2'9"	2'9"	2'8"
Reach: level arm, level bucket	mm	1999	2031	1999	1999	2031	2149	2181	2149	2136	2103
	ft/in	6'6"	6'7"	6'6"	6'6"	6'7"	7'0"	7'1"	7'0"	7'0"	6'10"
Dig depth	mm	85	101	85	85	101	93	109	93	101	85
	in	3.3	4.0	3.3	3.3	4.0	3.7	4.3	3.7	4.0	3.3
Length: overall	mm	5598	5630	5699	5699	5630	5747	5780	5849	5763	5720
	ft/in	18'4"	18'5"	18'8"	18'8"	18'5"	18'10"	18'11"	19'2"	18'10"	18'9"
Turning radius, bucket at carry	mm	4511	4530	4511	4511	4530	4559	4579	4559	4636	4617
	ft/in	14'9"	14'10"	14'9"	14'9"	14'10"	14'11"	15'0"	14'11"	15'2"	15'1"
Tipping load – straight, ISO 14397-1*	kg	4888	4719	4828	4620	4727	4580	4427	4526	4610	4717
	lb	10,773	10,400	10,640	10,182	10,418	10,094	9,757	9,975	10,160	10,396
Tipping load – full turn, ISO 14397-1*	kg	3982	3844	3933	3764	3851	3731	3606	3687	3756	3842
	lb	8,776	8,472	8,668	8,295	8,487	8,223	7,947	8,126	8,278	8,467
Breakout force	kN	61	61	61	61	61	51	51	51	59	59
	lbf	13,712	13,712	13,712	13,712	13,712	11,464	11,464	11,464	13,263	13,263
Operating weight	kg	6311	6350	6324	6379	6353	6325	6364	6338	6390	6364
	lb	13,909	13,995	13,938	14,059	14,002	13,940	14,026	13,968	14,083	14,026

\*Full compliance to ISO 14397-1 (2007) Sections 1 thru 6, which requires 2% verification between calculation and testing.

Dimensions listed are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, no air conditioner and Dunlop 405/70 SPT9 tires.

# Bucket Specifications

## 908M Operating Specifications with Hook On Buckets

		Multi Purpose							
		Horizontal Pin (HPL – ISO)			Vertical Pin			Horizontal Pin (HPL – A)	
		Base Edge	Bolt-on Edge	Bolt-on Teeth	Base Edge	Bolt-on Edge	Bolt-on Teeth	Bolt-on Edge	Bolt-on Teeth
Rated capacity	m <sup>3</sup>	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
	yd <sup>3</sup>	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Width: bucket	mm	2060	2060	2060	2060	2060	2060	2060	2060
	ft/in	6'9"	6'9"	6'9"	6'9"	6'9"	6'9"	6'9"	6'9"
Nominal material density, 100% fill factor	kg/m <sup>3</sup>	2184	2098	2139	2137	2050	2090	2092	2133
	lb/yd <sup>3</sup>	3,610	3,468	3,535	3,532	3,388	3,455	3,458	3,525
Clearance: full lift, 45° dump	mm	2665	2624	2665	2627	2593	2627	2630	2665
	ft/in	8'8"	8'7"	8'8"	8'7"	8'6"	8'7"	8'7"	8'8"
Reach: full lift, 45° dump	mm	737	748	737	788	800	788	748	737
	ft/in	2'5"	2'5"	2'5"	2'7"	2'7"	2'7"	2'5"	2'5"
Reach: level arm, level bucket	mm	1978	2010	1978	2039	2072	2039	2010	1978
	ft/in	6'5"	6'7"	6'5"	6'8"	6'9"	6'8"	6'7"	6'5"
Dig depth	mm	94	110	94	101	117	101	110	94
	in	3.7	4.3	3.7	4.0	4.6	4.0	4.3	3.7
Length: overall	mm	5576	5609	5678	5643	5670	5740	5609	5678
	ft/in	18'3"	18'4"	18'7"	18'6"	18'7"	18'9"	18'4"	18'7"
Turning radius, bucket at carry	mm	4509	4528	4509	4521	4540	4521	4528	4509
	ft/in	14'9"	14'10"	14'9"	14'9"	14'10"	14'9"	14'10"	14'9"
Tipping load – straight, ISO 14397-1*	kg	4825	4636	4726	4721	4530	4618	4622	4712
	lb	10,634	10,217	10,416	10,405	9,984	10,178	10,186	10,385
Tipping load – full turn, ISO 14397-1*	kg	3931	3776	3850	3846	3690	3762	3766	3839
	lb	8,663	8,322	8,485	8,476	8,132	8,291	8,300	8,461
Breakout force	kN	61	61	61	51	51	51	59	59
	lbf	13,712	13,712	13,712	11,464	11,464	11,464	13,263	13,263
Operating weight	kg	3468	3540	3513	3463	6534	6508	6551	6525
	lb	7,643	7,802	7,742	7,632	14,400	14,343	14,438	14,381

\*Full compliance to ISO 14397-1 (2007) Sections 1 thru 6, which requires 2% verification between calculation and testing.

Dimensions listed are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, no air conditioner and Dunlop 405/70 SPT9 tires.

## 908M Operating Specifications with Hook On Buckets

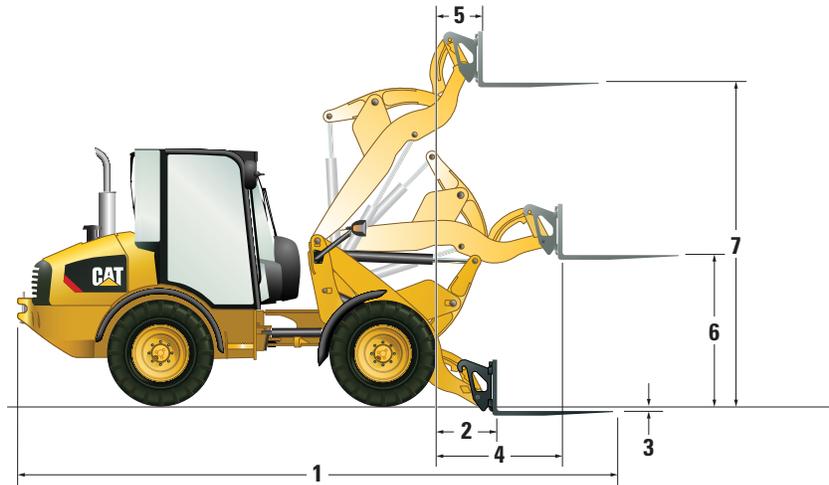
		Light Material		Industrial Grapple
		Horizontal Pin	Vertical Pin	Vertical Pin
		Bolt-on Edge	Bolt-on Edge	Bolt-on Edge
Rated capacity	m <sup>3</sup>	1.5	1.5	N/A
	yd <sup>3</sup>	2.0	2.0	N/A
Width: bucket	mm	2080	2080	2057
	ft/in	6'9"	6'9"	6'8"
Nominal material density, 100% fill factor	kg/m <sup>3</sup>	1229	1156	N/A
	lb/yd <sup>3</sup>	2,032	1,910	N/A
Clearance: full lift, 45° dump	mm	2463	2346	2439
	ft/in	8'0"	7'8"	8'0"
Reach: full lift, 45° dump	mm	931	1025	865
	ft/in	3'0"	3'4"	2'10"
Reach: level arm, level bucket	mm	2256	2405	2011
	ft/in	7'4"	7'10"	6'7"
Dig depth	mm	101	109	12
	in	4.0	4.3	0.5
Length: overall	mm	5854	6004	5596
	ft/in	19'2"	19'8"	18'4"
Turning radius, bucket at carry	mm	5496	4649	4498
	ft/in	18'0"	15'3"	14'9"
Tipping load – straight, ISO 14397-1*	kg	4527	4256	4422
	lb	9,977	9,380	9,746
Tipping load – full turn, ISO 14397-1*	kg	3688	3467	3602
	lb	8,128	7,641	7,938
Operating weight	kg	6421	6435	6584
	lb	14,151	14,182	14,511

\*Full compliance to ISO 14397-1 (2007) Sections 1 thru 6, which requires 2% verification between calculation and testing.

Dimensions listed are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, no air conditioner and Dunlop 405/70 SPT9 tires.

# Operating Specifications

## 906M Operating Specifications with Forks



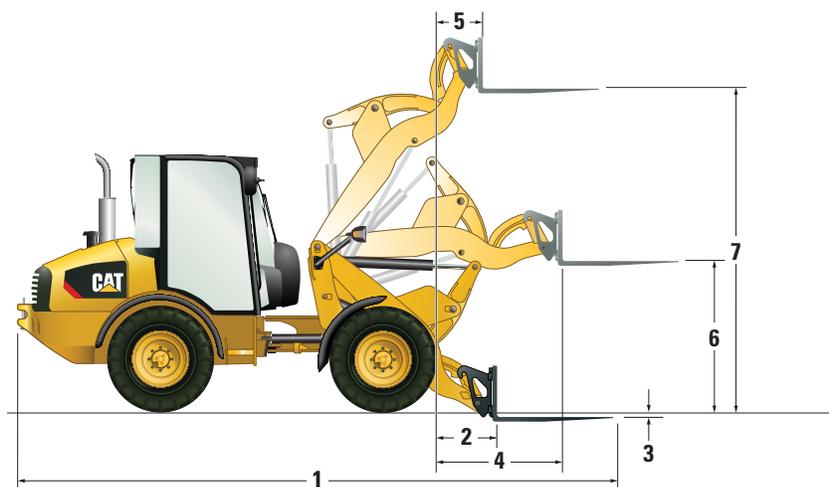
	Horizontal Pin (HPL – ISO)		Vertical Pin		Horizontal Pin (HPL – A)	
Fork carriage width	1400 mm	4'7"	1400 mm	4'7"	1030 mm	3'4"
Tine length – standard	1120 mm	3'8"	1120 mm	3'8"	1220 mm	4'0"
Tine length – optional	1220 mm	4'0"	1220 mm	4'0"		
<b>1</b> Overall length – standard	5915 mm	19'4"	5943 mm	19'5"	6015 mm	19'8"
Overall length – optional	5915 mm	19'4"	5943 mm	19'5"		
<b>2</b> Reach at ground level	720 mm	28.3"	749 mm	29.5"	720 mm	28.3"
<b>3</b> Fork depth below (above) ground	25 mm	1"	(46.5 mm)	(1.8")	25 mm	1"
<b>4</b> Maximum reach	1215 mm	3'11"	1265 mm	4'1"	1215 mm	3'11"
<b>5</b> Reach at maximum height	445 mm	1'5"	507 mm	1'7"	445 mm	1'5"
<b>6</b> Height at maximum reach	1425 mm	4'8"	1492 mm	4'10"	1425 mm	4'8"
<b>7</b> Maximum height	3090 mm	10'1"	3160 mm	10'4"	3090 mm	10'1"
Tipping load – straight, ISO 14397-1 – standard*	3375 kg	7,438 lb	3237 kg	7,134 lb	3373 kg	7,434 lb
Tipping load – straight, ISO 14397-1 – optional*	3374 kg	7,436 lb	3236 kg	7,132 lb		
Tipping load – full turn, ISO 14397-1 – standard*	2750 kg	6,061 lb	2637 kg	5,811 lb	2748 kg	6,056 lb
Tipping load – full turn, ISO 14397-1 – optional*	2749 kg	6,058 lb	2636 kg	5,809 lb		
Operating weight – standard	5368 kg	11,831 lb	5403 kg	11,908 lb	5369 kg	11,833 lb
Operating weight – optional	5367 kg	11,828 lb	5402 kg	11,906 lb		
Rated load (% of full turn tip):						
50% of tip: SAE J1197 – standard**	1375 kg	3,030 lb	1319 kg	2,905 lb	1374 kg	3,028 lb
50% of tip: SAE J1197 – optional**	1375 kg	3,029 lb	1318 kg	2,904 lb		
60% of tip: rough terrain, EN474-3 – standard**	1650 kg	3,636 lb	1582 kg	3,487 lb	1649 kg	3,633 lb
60% of tip: rough terrain, EN474-3 – optional**	1649 kg	3,635 lb	1582 kg	3,485 lb		
80% of tip: firm and level, EN474-3 – standard**	2200 kg	4,848 lb	2110 kg	4,649 lb	2198 kg	4,845 lb
80% of tip: firm and level, EN474-3 – optional**	2199 kg	4,847 lb	2109 kg	4,647 lb		

\*Full compliance to ISO 14397-1 (2007) Sections 1 thru 6, which requires 2% verification between calculation and testing.

\*\*Full compliance to EN474-3 and SAE J1197.

Dimensions listed are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, no air conditioner and Dunlop 405/70 SPT9 tires.

## 907M Operating Specifications with Forks



	Horizontal Pin (HPL – ISO)		Vertical Pin		Horizontal Pin (HPL – A)	
Fork carriage width	1400 mm	4'7"	1400 mm	4'7"	1030 mm	3'4"
Tine length – standard	1120 mm	3'8"	1120 mm	3'8"	1220 mm	4'0"
Tine length – optional	1220 mm	4'0"	1220 mm	4'0"		
<b>1</b> Overall length – standard	5915 mm	19'4"	5943 mm	19'5"	6015 mm	19'8"
Overall length – optional	5915 mm	19'4"	5943 mm	19'5"		
<b>2</b> Reach at ground level	720 mm	28.3"	749 mm	29.5"	720 mm	28.3"
<b>3</b> Fork depth below (above) ground	25 mm	1"	(46.5 mm)	(1.8")	25 mm	1"
<b>4</b> Maximum reach	1215 mm	3'11"	1265 mm	4'1"	1215 mm	3'11"
<b>5</b> Reach at maximum height	445 mm	1'5"	507 mm	1'7"	445 mm	1'5"
<b>6</b> Height at maximum reach	1425 mm	4'8"	1492 mm	4'10"	1425 mm	4'8"
<b>7</b> Maximum height	3090 mm	10'1"	3160 mm	10'4"	3090 mm	10'1"
Tipping load – straight, ISO 14397-1 – standard*	3516 kg	7,749 lb	3374 kg	7,436 lb	3369 kg	7,425 lb
Tipping load – straight, ISO 14397-1 – optional*	3516 kg	7,749 lb	3373 kg	7,434 lb		
Tipping load – full turn, ISO 14397-1 – standard*	2865 kg	6,314 lb	2749 kg	6,058 lb	2745 kg	6,049 lb
Tipping load – full turn, ISO 14397-1 – optional*	2864 kg	6,312 lb	2748 kg	6,056 lb		
Operating weight – standard	5548 kg	12,227 lb	5583 kg	12,304 lb	5587 kg	12,313 lb
Operating weight – optional	5547 kg	12,225 lb	5582 kg	12,302 lb		
Rated load (% of full turn tip):						
50% of tip: SAE J1197 – standard**	1433 kg	3,157 lb	1375 kg	3,029 lb	1373 kg	3,024 lb
50% of tip: SAE J1197 – optional**	1432 kg	3,156 lb	1374 kg	3,028 lb		
60% of tip: rough terrain, EN474-3 – standard**	1719 kg	3,788 lb	1649 kg	3,635 lb	1647 kg	3,629 lb
60% of tip: rough terrain, EN474-3 – optional**	1718 kg	3,787 lb	1649 kg	3,633 lb		
80% of tip: firm and level, EN474-3 – standard**	2292 kg	5,051 lb	2199 kg	4,847 lb	2196 kg	4,839 lb
80% of tip: firm and level, EN474-3 – optional**	2291 kg	5,049 lb	2198 kg	4,845 lb		

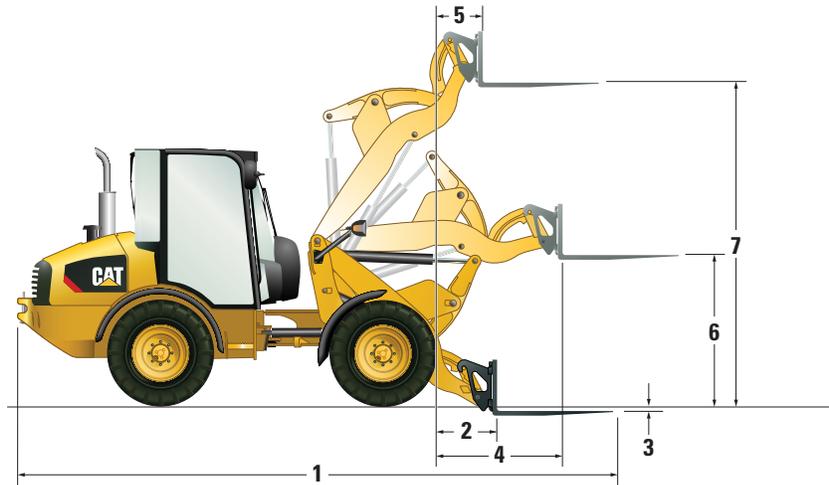
\*Full compliance to ISO 14397-1 (2007) Sections 1 thru 6, which requires 2% verification between calculation and testing.

\*\*Full compliance to EN474-3 and SAE J1197.

Dimensions listed are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, no air conditioner and Dunlop 405/70 SPT9 tires.

# Operating Specifications

## 908M Operating Specifications with Forks



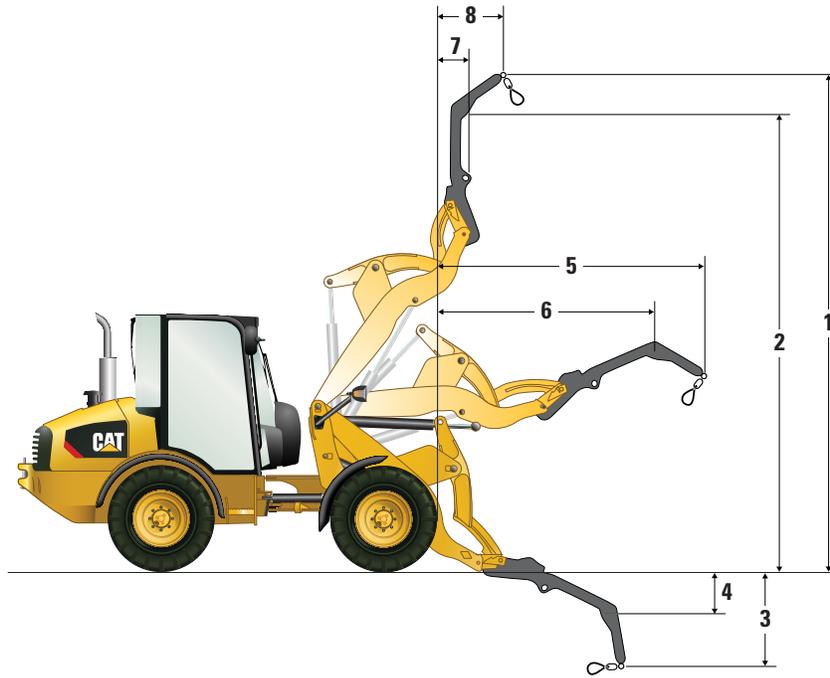
	Horizontal Pin (HPL – ISO)		Vertical Pin		Horizontal Pin (HPL – A)	
Fork carriage width	1400 mm	4'7"	1400 mm	4'7"	1030 mm	3'4"
Tine length – standard	1120 mm	3'8"	1120 mm	3'8"	1220 mm	4'0"
Tine length – optional	1220 mm	4'0"	1220 mm	4'0"		
<b>1</b> Overall length – standard	6016 mm	19'8"	6150 mm	20'2"	6116 mm	20'0"
Overall length – optional	6116 mm	20'0"	6250 mm	20'6"		
<b>2</b> Reach at ground level	789 mm	31.1"	923 mm	36.3"	789 mm	31.1"
<b>3</b> Fork depth below (above) ground	71 mm	2"	(31 mm)	(1.2")	71 mm	2"
<b>4</b> Maximum reach	1309 mm	4'3"	1444 mm	4'8"	1309 mm	4'3"
<b>5</b> Reach at maximum height	460 mm	1'6"	594 mm	1'11"	460 mm	1'6"
<b>6</b> Height at maximum reach	1450 mm	4'9"	1523 mm	4'11"	1450 mm	4'9"
<b>7</b> Maximum height	3324 mm	10'10"	3302 mm	10'10"	3324 mm	10'10"
Tipping load – straight, ISO 14397-1 – standard*	3871 kg	8,531 lb	3620 kg	7,978 lb	3868 kg	8,525 lb
Tipping load – straight, ISO 14397-1 – optional*	3862 kg	8,511 lb	3611 kg	7,958 lb		
Tipping load – full turn, ISO 14397-1 – standard*	3154 kg	6,951 lb	2949 kg	6,499 lb	3151 kg	6,944 lb
Tipping load – full turn, ISO 14397-1 – optional*	3147 kg	6,935 lb	2942 kg	6,484 lb		
Operating weight – standard	6121 kg	13,490 lb	6148 kg	13,550 lb	6122 kg	13,492 lb
Operating weight – optional	6129 kg	13,508 lb	6156 kg	13,567 lb		
Rated load (% of full turn tip):						
50% of tip: SAE J1197 – standard**	1577 kg	3,475 lb	1475 kg	3,249 lb	1576 kg	3,472 lb
50% of tip: SAE J1197 – optional**	1574 kg	3,467 lb	1471 kg	3,242 lb		
60% of tip: rough terrain, EN474-3 – standard**	1892 kg	4,170 lb	1769 kg	3,899 lb	1891 kg	4,166 lb
60% of tip: rough terrain, EN474-3 – optional**	1888 kg	4,161 lb	1765 kg	3,890 lb		
80% of tip: firm and level, EN474-3 – standard**	2523 kg	5,561 lb	2359 kg	5,199 lb	2521 kg	5,555 lb
80% of tip: firm and level, EN474-3 – optional**	2518 kg	5,548 lb	2354 kg	5,187 lb		

\*Full compliance to ISO 14397-1 (2007) Sections 1 thru 6, which requires 2% verification between calculation and testing.

\*\*Full compliance to EN474-3 and SAE J1197.

Dimensions listed are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, no air conditioner and Dunlop 405/70 SPT9 tires.

## Operating Specifications with Material Handling Arm



	906M		907M		908M	
<b>1</b>	4508 mm	14'9"	4508 mm	14'9"	4669 mm	15'3"
<b>2</b>	4080 mm	13'4"	4080 mm	13'4"	4241 mm	13'10"
<b>3</b>	1460 mm	4'9"	1460 mm	4'9"	1457 mm	4'9"
<b>4</b>	988 mm	3'2"	988 mm	3'2"	990 mm	3'2"
<b>5</b>	3296 mm	10'9"	3296 mm	10'9"	3415 mm	11'2"
<b>6</b>	2856 mm	9'4"	2856 mm	9'4"	2976 mm	9'9"
<b>7</b>	694 mm	2'3"	694 mm	2'3"	735 mm	2'4"
<b>8</b>	981 mm	3'2"	981 mm	3'2"	1023 mm	3'4"
Mass	131 kg	288 lb	131 kg	288 lb	131 kg	288 lb
Rated load (50% of full turn tip, SAE J1197):*						
Lift point 1	1067 kg	2,350 lb	1111 kg	2,448 lb	1259 kg	2,773 lb
Lift point 2	928 kg	2,045 lb	967 kg	2,131 lb	1101 kg	2,426 lb

\*Full compliance to EN474-3 and SAE J1197.

Dimensions listed are for a machine configured with general purpose buckets, bolt-on cutting edges, 75 kg (165 lb) operator, no air conditioner and Dunlop 405/70 SPT9 tires.

# 906M, 907M, 908M Standard and Optional Equipment

## Standard and Optional Equipment

Standard and Optional equipment may vary. Consult your Cat dealer for details.

Model	906M		907M		908M	
	Std.	Opt.	Std.	Opt.	Std.	Opt.
<b>TRANSMISSION AND HYDRAULICS</b>						
• 100% differential lock on both axles, selectable on the move	-	✓	-	✓	-	✓
• 18° frame oscillation, 78° articulation	✓	-	✓	-	✓	-
• Adjustable speed control (creeper control)	-	✓	-	✓	-	✓
• Adjustable high stat response settings	-	✓	-	✓	-	✓
• Connect under pressure hydraulic quick connector	-	-	-	-	-	-
• Demand based cooling fan	✓	-	✓	-	✓	-
• Electronic throttle lock	-	✓	-	✓	-	✓
• Hydrostatic drive	✓	-	✓	-	✓	-
• Loader arm float function	✓	-	✓	-	✓	-
• Parallel lift Z-bar loader	✓	-	✓	-	✓	-
• Proportional auxiliary hydraulic circuit	✓	-	✓	-	✓	-
• Ride control	-	✓	-	✓	-	✓
• Rimpull control	-	✓	-	✓	-	✓
• Speeder, 35 km/h (21.7 mph) with secondary steering	-	✓	-	✓	-	✓
• Transmission, 20 km/h (12.4 mph) with heavy duty axles	✓	-	✓	-	✓	-
• Transmission inching function	✓	-	✓	-	✓	-
<b>ENGINE</b>						
• Cat C3.3B DIT Tier 4 Final/Stage V (Europe only) or Tier 4 Final (North America only) emission standards	✓	-	✓	-	✓	-
• Cat extended life coolant	✓	-	✓	-	✓	-
• Closed circuit breather	✓	-	✓	-	✓	-
• Easy quick release fuel filter/water separator	✓	-	✓	-	✓	-
• ECO mode	✓	-	✓	-	✓	-
• Engine block heater 120V	-	✓	-	✓	-	✓
• Engine oil drain valve (non-spill ECO drain)	✓	-	✓	-	✓	-
• Lockable engine compartments	✓	-	✓	-	✓	-
• Precleaner for engine air filter	-	✓	-	✓	-	✓
• Two stage air cleaner with visual indicator	✓	-	✓	-	✓	-

Model	906M		907M		908M	
	Std.	Opt.	Std.	Opt.	Std.	Opt.
<b>ELECTRICAL</b>						
• Alternator 90 amp	✓	-	✓	-	✓	-
• Battery disconnect switch	✓	-	✓	-	✓	-
• Cab mounted fuse panel	✓	-	✓	-	✓	-
• Engine cold starter aid	✓	-	✓	-	✓	-
• Heavy duty battery, 12V	✓	-	✓	-	✓	-
• Machine Security System (MSS)	-	✓	-	✓	-	✓
• Magnetic rotating beacon	-	✓	-	✓	-	✓
• Service point connector for electronic diagnosis (Cat Electronic Technician™)	✓	-	✓	-	✓	-
• Reversing alarm	✓	-	✓	-	✓	-
• Halogen working lights, two front and two rear	-	✓	-	✓	-	✓
• LED working lights, two front and two rear	-	✓	-	✓	-	✓
• Work tool wiring harness	-	✓	-	✓	-	✓
<b>GENERAL</b>						
• Custom color	-	✓	-	✓	-	✓
• E-coat paint primer	✓	-	✓	-	✓	-
• Pressure test points	✓	-	✓	-	✓	-
• Rear light guards	-	✓	-	✓	-	✓
• Recovery hitch and pin	✓	-	✓	-	✓	-
• Scheduled Oil Sampling S·O·S <sup>SM</sup> ports	✓	-	✓	-	✓	-
• Tire options including heavy duty tires	-	✓	-	✓	-	✓
<b>FLUIDS</b>						
• Cat extended life coolant (-50° C/-58° F)	-	✓	-	✓	-	✓
<b>LOADER</b>						
• Adjustable implement modulation	-	✓	-	✓	-	✓
• High flow auxiliary hydraulics with pressure relieving quick disconnect manifold	-	✓	-	✓	-	✓
• Load check valves	-	✓	-	✓	-	✓
• Return To Dig tool positioner	-	✓	-	✓	-	✓
<b>WORK TOOLS</b>						
• For all work tool options, consult your local Cat dealer	-	-	-	-	-	-

# 906M, 907M, 908M Standard and Optional Equipment

## Standard and Optional Equipment

Standard and Optional equipment may vary. Consult your Cat dealer for details.

Model	906M		907M		908M	
	Std.	Opt.	Std.	Opt.	Std.	Opt.
<b>OPERATOR ENVIRONMENT</b>						
• Adjustable internal mirror	✓	-	✓	-	✓	-
• Adjustable wrist rest	✓	-	✓	-	✓	-
• Air conditioning	-	✓	-	✓	-	✓
• Auxiliary power sockets	✓	-	✓	-	✓	-
• Cabin light	-	✓	-	✓	-	✓
• Cat Radio/FM/DAB+/Bluetooth/Aux/Mic/Phone/USB	-	✓	-	✓	-	✓
• Comfort cab includes: cloth suspension seat, heated rear window, sliding left window and radio ready)	-	✓	-	✓	-	✓
• Open canopy: fixed steering column, coat hook, sun visor (North America only)	-	✓	-	✓	-	✓
• Coat hook	✓	-	✓	-	✓	-
• Cup holder	✓	-	✓	-	✓	-
• Deluxe cab includes: Comfort cab options plus heated cloth air suspension seat with lumbar support and right sliding window	-	✓	-	✓	-	✓
• Digital service hour meter	✓	-	✓	-	✓	-
• Easy clean cab floor	✓	-	✓	-	✓	-
• Gauges: fuel hydraulic temperature, coolant temperature, speedometer	✓	-	✓	-	✓	-
• Heated rear window (enclosed cab)	-	✓	-	✓	-	✓
• Heater with window side and feet vents (enclosed cab)	-	✓	-	✓	-	✓
• Multifunction joystick with direction control	✓	-	✓	-	✓	-

Model	906M		907M		908M	
	Std.	Opt.	Std.	Opt.	Std.	Opt.
<b>OPERATOR ENVIRONMENT (continued)</b>						
• On board digital display cluster	✓	-	✓	-	✓	-
• Operator station on isolation mounts	✓	-	✓	-	✓	-
• Radio ready kit including speakers (enclosed cab)	-	✓	-	✓	-	✓
• Rear blind	-	✓	-	✓	-	✓
• Retractable seat belt	✓	-	✓	-	✓	-
• ROPS and FOPS certified canopy/cab	✓	-	✓	-	✓	-
• Sound suppression	✓	-	✓	-	✓	-
• Sun visor	✓	-	✓	-	✓	-
• Suspended brake/accelerator pedals	✓	-	✓	-	✓	-
• Suspension seat	✓	-	✓	-	✓	-
• Two doors (enclosed cab)	✓	-	✓	-	✓	-
• Two external knock back mirrors	✓	-	✓	-	✓	-
• Warning indicators for major systems	✓	-	✓	-	✓	-
• Wiper/washer front and rear (enclosed cab)	✓	-	✓	-	✓	-
• Warnings: master, park brake, hydraulic oil pressure, engine oil pressure, coolant temp, electrical system, hydraulic filter bypass	✓	-	✓	-	✓	-

For more complete information on Cat products, dealer services, and industry solutions, visit us on the web at [www.cat.com](http://www.cat.com)

AEHQ7734-03 (03-2019)  
Replaces AEHQ7734-02

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Materials and specifications are subject to change without notice. Featured machines in photos may include additional equipment. See your Cat dealer for available options.

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**Framingham**  
**Parks and Recreation Department**  
475 Union Avenue • 508 532 5960

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## Memorandum

From the desk of Donald Capen

August 18, 2021

**RE: Capital Budget Vehicle Replacement – Jacobson Gang Mower**

This mower is for cutting all the athletic field and are large parcel of land . this mower is very important to keep up maintaining grass heights to a level of playability on our athletic fields . this machine has had some issues with the motor in the past years and the people at Toro have said the motor on this machine has had major failure to it . we have spent 4,000 dollars in the last 5 years . this mower has become a secondary mower for us in the last couple of years because of the motor

Chris,

As requested, the following is a description of the current issues with the 2007 Ford F450 4x4 Regular Cab Dump Truck. Currently, this vehicle has 58,410 miles on the odometer, which converts to 87,615 engine miles (1 mile equals 1.5 engine miles).

Currently, the usage of this vehicle has been greatly reduced due to its current condition and safety risks. Current issues requiring attention, labor and expense are:

- Repair of engine oil leak at the back of engine;

During the winter months, Truck 12 has been used in snow removal/treatment operations. As part of this, Truck 12 carries a bed-mounted sander during these months to treat City properties. As a result of operating in support of snow removal efforts during the past 14 years, this vehicle has sustained significant salt erosion to its frame and bed mounts. Over the past five years, the Division has expended \$22,000 on repairs. During 2019-2020, the vehicle required replacement of the tie-rods, ball joint, tires, alternator, and break repairs in an attempt to keep this functioning in fleet, specifically for snow removal operations. There are still significant mechanical and structural issues with this vehicle that will need to be addressed in the coming year.

After 14 years of operational service, the overall physical and mechanical condition of the vehicle is significantly degraded. Based on an overall assessment of the vehicle, I believe it has reached its useful life expectancy and would recommend replacement.

Regards,

*Donald Capen*

Donald Capen  
Mechanic



# turf products

157 Moody Road • PO Box 1200 • Enfield, CT 06082  
Main Office: (800) 243-4355 • FAX: (860) 763-5550

# QUOTE

Prepared For: Chris McGinty  
**Town of Framingham**  
150 Concord St. Framingham,  
Massachusetts 01702 United States

Ship To: 5910  
Quote Number: Q81551  
Quoted Date: **07/23/2021**  
Prepared By: Scott Lagana  
slagana@turfproductscorp.com

Qty	Model #	Description	Award	Extended
<b>1</b>	<b>31699</b>	<b>Groundsmaster 5910 (T4)</b>	<b>\$131,174.83</b>	<b>\$131,174.83</b>
1	132-1391	Atomic Blade Service Pack (11 Blades)		
1	127-3509	Wheel and Tire Assembly	\$212.12	\$212.12
1	131-2380	Wheel and Tire Assembly	\$504.58	\$504.58

### Budget Quote

Toro Total:	<b>\$131,891.53</b>
Non – Toro Total:	\$0.00
Set Up:	\$0.00
Freight:	\$0.00
Trade Ins:	(\$0.00)
State Sales Tax:	\$0.00
<b>Total Price:</b>	<b>\$131,891.53</b>

- This quote factors in anticipated Toro Price increase to FAC116 come 1/1/22.
- Will evaluate trade value at end of current mowing season.
- Equipment lead times in 2022 are expected to be excessive.

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Temple Street Playground Replacement/Improvement \$140,000 General Fund

Parks & Recreation

Installation of new and accessible equipment, grounds and pathway improvements

The Parks, Recreation & Cultural Affairs Division is respectfully requesting Capital Funding for the Temple Street Playground Replacement Project. This project will consist of the removal of the current equipment; installation of new, accessible equipment; safety surfacing; fencing; and accessible pathways. This project would focus on improvements while working to maintain the nature of this neighborhood park.

The current play equipment is past its life expectancy and requires replacement. Additionally, the current equipment is not accessible, and lacks a proper accessible route to connect all park visitors to the equipment. The current location of the play equipment is along Temple Street and is not fenced in, creating potential long-term safety concerns. These deficiencies have led the Department and a number of residents from the area, to begin working on conceptual designs for full replacement that would remedy these issues.

The current conceptual design will address all of these concerns, including moving the play equipment to a more centralized location within the park; widening the size of the park; incorporating accessible equipment into the playground; installation of safety surfacing; installing perimeter fencing around the newly located playground; and installing an accessible pathway that will connect the playground with the parking lot.

This proposal includes funding for continued design, community outreach, and proper equipment to complete this project. Once these improvements have been completed, this playground will be accessible for all residents and provide a safe play area for numerous age groups to enjoy.



# CITY OF FRAMINGHAM

DIVISION OF PARKS, RECREATION AND CULTURAL AFFAIRS

---

James C. Snyder, CPRP  
Director

(508) 532-5960  
parks.recreation@framinghamma.gov  
www.framinghamma.gov

BOWDITCH FIELD ATHLETIC &  
CULTURAL COMPLEX  
475 Union Avenue  
Framingham, MA 01702

## Temple Street Playground Replacement

The Parks, Recreation & Cultural Affairs Division is respectfully requesting Capital Funding for the Temple Street Playground Replacement Project. This project will consist of the removal of the current equipment; installation of new, accessible equipment; safety surfacing; fencing; and accessible pathways. This project would focus on improvements while working to maintain the nature of this neighborhood park.

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For these many reasons, the Parks, Recreation & Cultural Affairs Division respectfully requests FY23 Capital Budget funding for the Temple Street Playground Replacement Project. Division staff will be made available to provide additional information and address any questions, as needed.

	<b>UltiPlay Parks &amp; Playgrounds, Inc.</b> 43 Main Street Blackstone, MA 01504	<b>Quote #: 080921</b>
	Phone: (508) 634-1497      Fax: (508) 634-6949 Email: Jmcmahon@ultiplayus.com	

<b>Mr. Thomas Begin</b> Framingham Parks & Recreation Dept. 475 Union Ave Framingham, MA 01702	Phone: (508) 532-5976 Fax: Email: tjb@framinghamma.gov Mobile:	Date: 8/9/2021 Rep.: Joe McMahon
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Qty	Item #	Name	Price	Total
1	32521-Jm	a. Custom Challengers play structure	\$24,358.00	\$24,358.00
1	ZZXX0823	b. Two bay standard swing with 2 belt and tot seat	\$2,667.00	\$2,667.00
1	ZZXX0224	c. Accessible swing seat	\$1,110.00	\$1,110.00
1	ZZXX1153	d. Whirl around	\$5,538.00	\$5,538.00
1	Freight	e. Shipping of play equipment	\$2,300.00	\$2,300.00
1	Labor	f. Installation of play equipment	\$6,500.00	\$6,500.00
1	Safety surfacing	g. 960 s.f poured-in-place rubber path 50/50 blend color to black standard binder	\$13,400.00	\$13,400.00
1	Site prep	h. Processed stone sub-base for path	\$3,500.00	\$3,500.00
1	Safety surfacing	i. 90 yards playground mulch	\$1,890.00	\$1,890.00
1	Labor	j. Installation of playground mulch	\$1,000.00	\$1,000.00
1	labor	k. Removal and disposal of existing play equipment	\$1,950.00	\$1,950.00
		Discount on play equipment		-\$3,704.00
		Excavation of site would be completed by the city of Framingham		
Sub Total				\$60,509.00
<b>TOTAL</b>				<b>\$60,509.00</b>

<b>Comments:</b> This quote is valid for thirty (30) days and requires our confirmation thereafter. State taxes will be collected unless a <b>tax-exempt certificate</b> is submitted with order. Delivery can occur within approximately 3 to 5 weeks after our receipt of an acceptable order.	Office Use Only:
--	------------------

*Thank you for your business.*



Temple Street Playground



Temple Street Playground



Temple Street Playground



## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Fence and Backstop Replacement Program \$326,895 General Fund

Parks & Recreation

Phase 1 to replace failing, aged backstops, field fencing and safety fencing in parks

The Parks, Recreation & Cultural Affairs Division is respectfully requesting Capital Funding for Phase 1 of the Fence and Backstop Removal and Replacement Program. The previous fence & backstop removal and replacement project was funded over 10 years ago, increasing the need for funding of this project and magnifying the need for proper investments.

Properly maintained parks, including vertical structures, are integral to neighborhood beautification, stabilization, site usability, public safety, and maintaining surrounding property values. The "Choose Framingham" initiative identifies the fact that "the average distance to a playground or other recreation area from any single-family parcel is approximately a quarter of a mile." By replacing fence and backstops at park locations, we are able to ensure proper management and safety of our parks and other facilities.

In addition to maintaining neighborhood parks and other passive recreational facilities throughout the City, the Parks, Recreation & Cultural Affairs Division also maintains all school athletic fields and their associated fence lines. Parks staff has identified the need to replace various fence lines due to increased safety concerns that are attributed to normal aging, tree damage, and regular usage.

Phase I of the Fence and Backstop Removal and Replacement Program includes improvements at the following Parks & Recreation maintained properties:

### Removal and replacement of inadequate and undersized fencing at Bowditch Baseball Diamond:

Current fences are 4 feet, creating a safety concern for athletes and field users and leading to injuries of athletes plying in the outfield  
Deterioration and age of fences have also created safety concerns

Removal and replacement of 16 ft. backstops at two softball fields at the Walsh Complex:

These backstops have surpassed their life expectancy and are in desperate need of replacement

Deterioration due to weather, aging, and usage has left these backstops in poor condition, creating potential safety concerns for both users and spectators

Inadequate for current usage, as there is no canopy on the top of the backstop at Lower and Upper Walsh Softball Fields, allowing foul balls to go into spectator sections and neighboring properties

Installation of wooden guardrail at Cushing Memorial Park, Winter Street parking area:

Lack of guardrail leaves no protection or separation of Keefe Tech fencing from vehicles;

Guardrail will prohibit vehicles from parking along this area, reducing the possibility of parked vehicles blocking access and eliminating emergency vehicle corridor;

Due to continued inflation and fluctuation in the cost of steel, we were unable to procure accurate pricing for potential FY23 purchase and installation. As such, this proposal is based off of FY2022 costs with a healthy contingency built in. The Department will undertake as many of these improvements as possible utilizing the funding approved for FY23. Any improvements that are not able to be funded will be carried into Phase II of this project.

This project has been deferred since FY2010

## Fence & Backstop Replacement and Repairs - Phase I

The Parks, Recreation & Cultural Affairs Division is respectfully requesting Capital Funding for Phase I of the Fence and Backstop Removal and Replacement Program. The previous fence & backstop removal and replacement project was funded over 10 years ago, increasing the need for funding of this project and magnifying the need for proper investments.

Properly maintained parks, including vertical structures, are integral to neighborhood beautification, stabilization, site usability, public safety, and maintaining surrounding property values. The "Choose Framingham" initiative identifies the fact that "the average distance to a playground or other recreation area from any single family parcel is approximately a quarter of a mile." By replacing fence and backstops at park locations, we are able to ensure proper management and safety of our parks and other facilities.

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Phase I of the Fence and Backstop Removal and Replacement Program includes improvements at the following Parks & Recreation maintained properties:

- Removal and replacement of inadequate and undersized fencing at Bowditch Baseball Diamond:
  - Current fences are 4 feet, creating a safety concern for athletes and field users and leading to injuries of athletes plying in the outfield;
  - Deterioration and age of fences have also created safety concerns;
- Removal and replacement of 16 ft. backstops at two softball fields at the Walsh Complex;
  - These backstops have surpassed their life expectancy and are in desperate need of replacement;
    - Deterioration due to weather, aging, and usage has left these backstops in poor condition, creating potential safety concerns for both users and spectators;
    - Inadequate for current usage, as there is no canopy on the top of the backstop at Lower and Upper Walsh Softball Fields, allowing foul balls to go into spectator sections and neighboring properties;
- Installation of wooden guardrail at Cushing Memorial Park, Winter Street parking area:
  - Lack of guardrail leaves no protection or separation of Keefe Tech fencing from vehicles;
  - Guardrail will prohibit vehicles from parking along this area, reducing the possibility of parked vehicles blocking access and eliminating emergency vehicle corridor;

Due to continued inflation and fluctuation in the cost of steel, we were unable to procure accurate pricing for potential FY23 purchase and installation. As such, this proposal is based off of FY2022 costs with a healthy contingency built in. The Department will undertake as many of these improvements as possible utilizing the funding approved for FY23. Any improvements that are not able to be funded will be carried into Phase II of this project.

For these reasons, we are respectfully requesting funding for Phase I of the Fence & Backstop Replacement and Repairs project.

<b>Fence and Backstop Repair</b>			
		<b>Contingencies</b>	<b>Sub Total</b>
<b>Phase I</b>	<b>\$251,457.00</b>	<b>\$75,437.10</b>	<b>\$326,894.10</b>
<b>Phase II</b>	<b>\$216,973.00</b>	<b>\$32,545.95</b>	<b>\$249,518.95</b>
<b>Phase III</b>	<b>\$285,239.50</b>	<b>\$42,785.93</b>	<b>\$328,025.43</b>
<b>Phase IV</b>	<b>\$303,955.00</b>	<b>\$45,593.25</b>	<b>\$349,548.25</b>
<b>Total</b>			<b>\$1,253,986.73</b>

## Fence & Backstop Replacement Phase I

	Item	Qty.	Unit Price	Total
Bowditch Baseball	8 ft. fence installation	1500	\$100.25	<b>\$150,375.00</b>
Walsh Complex				
Dunning Softball	16 ft. backstop	1	\$33,416.00	<b>\$33,416.00</b>
Dunning Softball	16 ft. backstop removal	1	\$3,000.00	<b>\$3,000.00</b>
Upper Walsh Softball	16 ft. backstop	1	\$33,416.00	<b>\$33,416.00</b>
Upper Walsh Softball	16 ft. backstop removal	1	\$3,000.00	<b>\$3,000.00</b>
Cushing Park, Keefe side lot	Wooden Guardrail	500	\$56.50	<b>\$28,250.00</b>
	Total			<b>\$251,457.00</b>
	<b>15% Contingency - Price Esculation</b>			<b>\$37,718.55</b>
	<b>15% Contingency - Materials</b>			<b>\$ 37,718.55</b>
	<b>Total Requested</b>			<b>\$326,894.10</b>

Note:

Unit pricing above is taken from budget prices quoted to us by Steelco Fencing September 2020.

## Fence & Backstop Replacement Phase II

Project	Item	Qty	Unit Price	Total
Mary Dennison Softball #1	8 ft. fence installation	700	\$100.25	<b>\$70,175.00</b>
Hemenway (School)	12 Backstop	1	\$23,433.00	<b>\$23,433.00</b>
Hemenway (School)	12 Backstop Removal	1	\$3,000.00	<b>\$3,000.00</b>
Hemenway (School)	Wooden Guard Rail	190	\$56.50	<b>\$10,735.00</b>

King School (School)	Leaf Gate (14 ft )	1	\$ 22,460.00	<b>\$22,460.00</b>
Dr. Harvey Cushing Dr.	Wooden Guardrail	300	\$56.50	<b>\$16,950.00</b>
Dr. Harvey Cushing Dr.	Leaf Gate (14 ft.)	1	\$22,460.00	<b>\$22,460.00</b>
<b>Player Bench Screens</b>				
Mary Dennison Softball #1	6 ft. fencing installation	100	\$79.60	<b>\$7,960.00</b>
Mary Dennison Softball #2	6 ft. fencing installation	100	\$79.60	<b>\$7,960.00</b>
Mary Dennison Baseball	6 ft. fencing installation	100	\$79.60	<b>\$7,960.00</b>
Reardon Baseball	6 ft. fencing installation	100	\$79.60	<b>\$7,960.00</b>
Danforth Baseball	6 ft. fencing installation	100	\$79.60	<b>\$7,960.00</b>
Cameron Baseball (School)	6 ft. fencing installation	100	\$79.60	<b>\$7,960.00</b>
	<b>Total</b>			<b>\$216,973.00</b>
	<b>Contingency 15%</b>			<b>\$32,545.95</b>
	<b>Total Request</b>			<b>\$249,518.95</b>

Note:

Unit pricing above is taken from budget prices quoted to us by Steelco Fencing September 2020.

## Fence & Backstop Replacement Phase III

Project	Item	Qty.	Unit Price	Total
Fram. High (school) Side Field	Leaf Gate (14 ft.)	1	\$22,460.00	<b>\$22,460.00</b>
Oakvale Park	16 ft. backstop	1	\$33,416.00	<b>\$33,416.00</b>
Oakvale Park	backstop removal	1	\$3,000.00	<b>\$3,000.00</b>
Oakvale Park	6 ft. fencing installation	70	\$79.60	<b>\$5,572.00</b>
Potter Rd. (school)	6 ft. fencing installation	1800	\$79.60	<b>\$143,280.00</b>
Potter Rd. (school)	Demo & Clearing	1800	\$10.50	<b>\$18,900.00</b>
Macomber Parking Lot	Wooden Guardrail	200	\$56.50	<b>\$11,300.00</b>
Fuller (School)	Wooden Guardrail	125	\$56.50	<b>\$7,062.50</b>
Juniper Hill (School)	12 ft. backstop	1	\$23,433.00	<b>\$23,433.00</b>
Juniper Hill (School)	12 ft. backstop removal	1	\$3,000.00	<b>\$3,000.00</b>
Juniper Hill (School)	6 ft fence	60	\$79.60	<b>\$4,776.00</b>
Juniper Hill (School)	Wooden Guardrail	160	\$56.50	<b>\$9,040.00</b>
	<b>Total</b>			<b>\$285,239.50</b>
	Contingency 15%			<b>\$42,785.93</b>
	<b>Total Request</b>			<b>\$328,025.43</b>

Note:

Unit pricing above is taken from budget prices quoted to us by Steelco Fencing September 2020.

## Fence & Backstop Replacement Phase IV

Project	Item	Qty.	Unit Price	Total
Lower Longs (Keefe Baseball)	20 ft. backstop	1	\$46,810.00	\$46,810.00
Lower Longs (Keefe Baseball)	Backstop removal	1	\$3,000.00	
Lower Longs (Keefe Baseball)	6 ft. fencing installation	60	\$79.60	\$4,776.00
Oakvale Park	12 ft. backstop	1	\$23,433.00	\$23,433.00
Oakvale Park	backstop removal	1	\$3,000.00	\$3,000.00
Victory Field	4 ft. fencing installation	150	\$68.10	\$ 10,215.00
Longs Complex				
Carter Field	6 ft. fencing installation	330	\$79.60	\$ 26,268.00
Merloni Field	6 ft. fencing installation	530	\$79.60	\$ 42,188.00
Tersoni field	8 ft. fencing installation	700	\$100.25	\$ 70,175.00
Upper Longs	Wooden Guard Rail	250	\$56.50	\$ 14,125.00
McCann Park	Wooden Guard Rail	410	\$56.50	\$23,165.00
<b>Player Bench Screens</b>				
Butterworth Softball	6 ft. fencing installation	100	\$79.60	\$7,960.00
Butterworth Baseball	6 ft. fencing installation	100	\$79.60	\$7,960.00
Muster Field Softball #1( School)	6 ft. fencing installation	100	\$79.60	\$7,960.00
Muster Field Softball #2 (School)	6 ft. fencing installation	100	\$79.60	\$7,960.00
King Softball (School)	6 ft. fencing installation	100	\$79.60	\$7,960.00
	Total			\$303,955.00
	Contingency 15%			\$45,593.25
	<b>Total Request</b>			<b>\$349,548.25</b>

Note:

Unit pricing above is taken from budget prices quoted to us by Steelco Fencing September 2020.

## City of Framingham FY23-27 Capital Improvement Program

### FY23 Recommended:

Loring Arena Audio Upgrades \$100,000 General Fund

Parks & Recreation

Full Replacement of current in-rink audio and PA system

The Parks, Recreation & Cultural Affairs Division is respectfully requesting Capital Funding for the replacement of the current public announcement (PA) system at Loring Arena. This project will consist of the installation of new speakers and audio system throughout the rink; installation of controls in the press box and office; and overall upgrades to the PA system used during games, practices, open skate, and all other events at Loring Arena.

The current system is 10 years old and was designed to function in the former rink and is configured as such. In the former rink, sound was able to reverberate off of the end walls and bounce back into the rink and spectator sections, providing clear audio for user's experience. As a result of the renovations, the material of the end walls have changed, which has created a challenge in projecting sound throughout the rink. In addition, the space has changed with the addition of a second floor with windows for viewing, installation of windows on the four corners of the barrel, and reconfiguration of the front first floor. The main challenge is usage during spectator events.

The rink hosts around 60 games a season from September through March, which generates a large amount of revenue for the City and helps to offset the operational cost of Loring Arena. What we have found is that during these events when there are spectators in the stands, the PA system proves to be subpar and is unable to project any announcements, including pregame ceremonies and singing of the national anthem. Throughout the 2018-2019 season, the Loring Arena and Parks Department staff members received numerous complaints from players, coaches, parents, spectators, Athletic Directors, presidents of leagues, representatives from the MIAA, and so on regarding the subpar PA system.

When the Department was undertaking redesign efforts for the rink, this upgrade was considered at the time as a component to the project. However, when estimated budgets were presented to City staff, we were forced to undertake value engineering approaches, which resulted in the removal of this project and a number of others from the overall renovation project. While the renovations have received glowing reviews from all users and visitors, the lacking PA system has decreased the user experience. As a result, we have identified the replacement of the current PA system as a top priority for Loring Arena. Our goal for this project is to not only improve the user experience but also to continue to grow the popularity of the rink state-wide by providing a state-of-the-art experience for all.

## **Loring Arena Audio Upgrades Project**

The Parks, Recreation & Cultural Affairs Division is respectfully requesting Capital Funding for the replacement of the current public announcement (PA) system at Loring Arena. This project will consist of the installation of new speakers and audio system throughout the rink; installation of controls in the press box and office; and overall upgrades to the PA system used during games, practices, open skate, and all other events at Loring Arena.

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Powering ideas.

A PROPOSAL FOR

CITY OF FRAMINGHAM, MA

LORING ARENA

Arena Upgrades

September 17, 2019

**Submitted by:**  
HB Communications, Inc.  
[www.hbcommunications.com](http://www.hbcommunications.com)

800.243.4414





September 17, 2019

Mr. Thomas Begin  
Deputy Director, Parks and Recreation  
City of Framingham, MA  
165 Fountain Street  
Framingham, MA 01702

Re: Loring Arena Upgrades

Thom,

Thank you for inviting HB Communications, Inc. to submit a proposal for the furnishing and installation of audio performance upgrades for the Loring Arena.

Regards,

William Mintzer  
Senior Account Executive  
HB Communications, Inc.

*HB Communications, Inc. is an Affirmative Action/Equal Opportunity Employer*

**Corporate Office**

60 Dodge Avenue  
North Haven, CT 06473  
203.234.9246

**Boston Office**

1432 Main Street  
Waltham, MA 02451  
781.890.6046

**New York Office**

600 Corporate Court  
South Plainfield, NJ 07080  
908.654.3600

**HB Communications UK, LTD**

Portland House, Bressenden Place, Office 219D  
London, Greater London, SW1E 5RS, United Kingdom  
+44 (0) 20 3102 6896

**Sales & Information**

800.243.4414

**Customer Service**

800.852.8441

## STATEMENT OF WORK

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### Summary:

The City of Framingham is interested in improving the performance and features of the audio system in the main bowl at the Loring Arena. After location meetings and office discussions, HB is proposing a solution to address these needs.

### System Description:

#### Arena

To create proper audio reinforcement in the bleacher areas of the Arena we have designed a system with a total of fourteen new column array loudspeakers. Six column loudspeakers will be evenly distributed across each of the two bleacher areas. These loudspeakers will be suspended directly above the walkway between the dasher boards and the first row of seating. The loudspeakers will be aimed down at approximately a 30 degree angle to keep reflected energy from the back wall.

The loudspeakers shall be zoned with four loudspeakers in the center of each bleacher area tied together to be Zone 1 and Zone 2. The outer-most two loudspeakers of each bleacher area shall be tied together and be Zones 3 and 4. An additional two loudspeakers will be aimed back onto the ice and be Zone 5. If the arena is full, all zones can be active. If the arena is only half full, other zones can be shut off to keep acoustical energy down and improve intelligibility.

An audio input plate for microphone and line level, and a wall mount button panel will be located in the DJ booth. A duplicate button panel controller will be located at the audio equipment rack.

Control functions will include:

- System On/Off
- Zone 2 Off
- Zone 3 Off
- Zone 4 Off
- Microphone Volume

The installation may require additional electrical work and possibly the use of a lift, both of which will need to be provided by the City at no cost to HB.

## PRICING

Item #	Qty	Manufacturer	Model	Description	Unit	Total
Arena Upgrades						
			ARENA AUDIO			
1	14	JBL	CBT 70J-1	Two-Way Line Array Column - Black	934.00	13,076.00
2	14	JBL	MTC-CBT-70T	Bolt-On Transformer Module for CBT 70	94.00	1,316.00
3	4	Extron	60-850-01	XPA 2001-70V, 70 V Mono Amp - 200 Watts	414.00	1,656.00
4	1	Crestron	DSP-860	Crestron Avia 8x6 Digital Signal Processor	1,200.00	1,200.00
5	1	Radio Design Labs	D-TPS8A	Single Gang Audio Input Plate for Mini	146.00	146.00
6	1	Radio Design Labs	D-TPS1A	Single Gang Audio Input Plate for XLR	169.00	169.00
7	1	Radio Design Labs	TX-TPR3A	Single Gang Audio Input Plate for XLR, RCA	153.00	153.00
8	1	Radio Design Labs	PS-24AS	24v DC Switching Power Supply	25.00	25.00
9	14	Adaptive Technologies	RIGGING	Per Loudspeaker - Rigging Kit (ESTIMATE)	165.00	2,310.00
			ARENA CONTROL			
10	2	Crestron	MPC3-302-B	3-Series Media Presentation Controller - Black	709.00	1,418.00
11	4	Crestron	MPB3/MPC3-BTN10-B-ENGR	Custom Engraved Buttons	36.00	144.00
12	1	Luxul	AMS-1208P	AV Series 12-port/8 PoE+ Gigabit Switch	397.00	397.00
13	1	HB	MATERIALS	Cables, Connectors, and Hardware for Install	1,159.00	1,159.00
Arena Upgrades Equipment Total - per room						23,169.00
Arena Upgrades Equipment Total						23,169.00
Non Equipment						
1	1	HB		Engineering		825.00
2	1	HB		Drafting & Documentation		1,136.00
3	1	HB		Programming		833.00
4	1	HB		Shop Assembly/Fabrication/QC		714.00
5	1	HB		Project Management		3,050.00
6	1	HB		Site Installation & QC		14,043.00
7	1	HB		UC Services		NA
8	1	HB		Union Installation		NA
9	1	HB		G&A		1,217.00
10	1	HB		Sales Tax		TE
Non-Equipment Total						21,818.00
GRAND TOTAL						44,987.00



## PAYMENT TERMS & CONDITIONS

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A written contract, purchase order, or other acceptable authorization to proceed must be received prior to the start of all work. HB will submit an initial invoice covering engineering/design services and any initial procurement. The value of this mobilization charge will equal approximately 50% of the entire project value; the invoice is due 'Net 15'.

Each month for the duration of the project, HB will issue a progress billing invoice representing charges for all costs incurred to date, including labor and all goods "bought and stored". Verification of goods received and stored at our facilities will be supplied upon request. Verification may be in the form of receiving records, serial numbers, photographs, personal inspection or other agreeable format.

### Insurance

- An insurance certificate detailing typical coverage will be supplied upon request
- Any additional coverage, if required, will be billed at cost

### Taxes

The Customer shall be responsible for the payment of all sales, use and excise taxes, and any other similar taxes, duties and charges of any kind imposed by any federal, state or local governmental entity on any amounts payable by Customer for the Deliverables and/or Services purchased hereunder whether remitted to HB or directly to the appropriate taxing authority. However, in no event shall the Customer pay or be responsible for any taxes imposed on, or with respect to, HB's income, revenues, gross receipts, personnel or real or personal property or other assets.

IN WITNESS WHEREOF, the Parties have, by their duly authorized representatives, executed this Proposal and agree to the terms contained herein.

HB COMMUNICATIONS, INC.

CUSTOMER

BY: \_\_\_\_\_

BY: \_\_\_\_\_

NAME: \_\_\_\_\_

NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

TITLE: \_\_\_\_\_

DATE: \_\_\_\_\_

DATE: \_\_\_\_\_

## STANDARD TERMS & CONDITIONS

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### Millwork

All millwork shall be supplied by the Customer, unless specifically identified on the accompanying equipment list. It is the responsibility of the Customer and/or its agents to fabricate the millwork pieces to conform to all dimensional, electrical and thermal requirements.

### Blocking/Supports

All in-wall blocking required to support AV equipment or displays shall be furnished and installed by others.

### Loudspeaker Rigging

HB assumes that all loudspeaker rigging attachment points to base building structure will be engineered and installed by others. Rigging hardware included in this offering is limited to hardware attached to the loudspeaker for purposes of flying and aiming the loudspeaker, vertical cables and shackles or other hardware to attach to structural hanging points by others. No horizontal structural steel is included.

### Data, Telecom and VoIP Wiring and Networks

All client network, Ethernet, analog telephone, and other infrastructure wiring required to complete the AV systems functional requirements is the responsibility of the Client. Client WAN, LAN, VLAN, VoIP, analog (POTS) networks, both wired and wireless, as well as any other required networks, must be fully configured and operational at the time of system setup and commissioning. It is assumed that the Client will supply the necessary wiring, information and technical support required to facilitate interfacing their network(s) with the AV system(s). In the event that the client fails to provide the aforementioned requirements in a timely manner and that failure effects the efficient completion of the project, (i) HB will be held harmless for systems that do not meet scheduling requirements and (ii) costs associated with delays and inefficiencies including additional hours or overtime labor rates, shall be considered outside the scope of this offering and will be billable to the Client.

### Phasing and Grounding

All 120-volt AC receptacles and power purposed with feed to all equipment must be independent ground and same phase. If HB discovers improper phasing or grounding to be the cause of functional anomalies, Customer will remedy without penalty or cost to HB.

### Vibration, Ambient Noise and Acoustics

Excessive vibration may cause certain equipment (i.e., ceiling-mounted video projectors and microphones) to malfunction. Conference and recording systems, which employ open microphones, may not perform properly if excessive ambient noise or reverb is present. If any of these conditions exist, HB will be held harmless; costs associated with remedy of these conditions will be considered billable to the Customer.

### Delivery and Acceptance

The Customer agrees to designate a representative who will have the authority to sign for delivery of equipment. Customer is responsible for the security and loss liability of all delivered equipment. Acceptance of delivery does not imply that systems have been accepted as functional. Unless other arrangements are made, a secure, lockable space will be furnished for storage of equipment and material.

### Low Voltage Interfaces

Only those low voltage interfaces specifically included on the attached equipment list are included in this offering. All owner furnished equipment is assumed to be supplied with the appropriate low voltage interface and low voltage interfaces required to connect to any systems furnished and/or installed by others, are assumed to be supplied by the contractor.

### Seismic Certification & Compliance

The cost of any seismic studies or remedies required by local or state-building codes is not included in this proposal.

## Labor Costs

All labor costs included in this offering are based on use of HB staff, non-union personnel. All labor costs are calculated as straight-time during normal business hours. Requirement for union or overtime rates are considered additional to this offering.

## Schedule

If, through no fault of HB, the agreed upon installation schedule changes, HB will exercise its best efforts to accommodate the new schedule. Any costs associated with schedule changes are considered outside of the scope of this offering and will be negotiated as required.

## Completion and Test

The project schedule must allow sufficient time for completion of all installation and final testing of systems prior to occupancy of the site. If sufficient time is not allowed, HB will be held harmless for systems that do not meet requirements. In this case, all costs associated with completion of work, including overtime labor rates, will be considered outside the scope of this offering and billable to the Customer.

## Plenum Rating

Cable and equipment to be installed in air handling spaces is plenum rated as required by code. All other cable is priced as non-plenum.

## Restocking Fees

Any equipment ordered for the project and then returned at the discretion of the Customer may be subject to manufacturer approval to return and will be subject to a 25% restocking fee.

## Software License

Source code for all software developed within the scope of this offering remains the property of HB. Licensing terms are available upon request.

## Updates to Existing Control Code

Updates of any existing control system that was not programmed by HB requires the most current, un-compiled source code for both the control processor and any and all of the touch panels connected to the system be provided to HB. If not available code will have to be re-written at additional cost, not included in this proposal.

## Owner Furnished Equipment (OFE)

All equipment furnished by the Customer, whether new or used, is presumed to meet original specifications and functionality. If any OFE does not meet specifications, cost of all remedies will be borne by the Customer.

## Screen Installations

The customer will be responsible for all costs associated with the installation of projection screens, both rear screen and ceiling/wall mounted.

## Wall or Ceiling Finish Work

The customer will assume responsibility for repairing, patching and painting all walls or ceiling finishes that may be disturbed as the result of penetrations and mounting procedures.

## Site Installation

Typical delivery is (8) eight weeks to (10) ten weeks.

## Permits

The cost of any building permits required by any municipalities will be passed on to the owner.

## WARRANTY

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All equipment contained in this system includes and is governed by a manufacturer's warranty. All manufacturers' warranties are honored and serviced by HB. HB warrants all system installations for six months. Standard Warranty includes the workmanship and labor provided by HB Communications and all of its subcontractors covering the scope of work included in this proposal.

During the six months, HB will provide all necessary labor required to repair or replace any defects in workmanship, cabling, connectors, equipment mounting, software and all other "non-equipment" related systems installed under the contract.

System warranty shall include the coverage of all equipment, specific to each manufacturer's warranty for each product included in the contract.

### Service & Response Times

Scheduled service shall be performed for corrective service and emergency maintenance and then only during normal business hours during normal business days. Normal business hours shall be from 8:00 AM to 5:00 PM and normal business days Monday through Friday, national and local holidays accepted.

HB makes every effort possible to respond to customers' needs as quickly as possible. Response time from a customer's initial call for emergency service is usually within two (2) hours for telephone response and twenty-four (24) hours for on-site service.

### Exclusions

Unless otherwise covered under a manufacturer's warranty, the remedy of failure caused by the following is excluded from the Warranty: normal use and wear, hazardous environmental conditions, continual use in excess of manufacturer's recommendations and alteration of the system or any of its component parts.

Customer shall be responsible for the costs of any repair or replacement parts resulting from exposure of the equipment to abnormal acts or operating conditions over and above expected wear and tear such as fire, storm, lightning, theft, physical abuse, mishandling, vandalism, acts of God, or other causes beyond the reasonable control of HB, for use of a product in an application other than what the unit was intended for or attempted repairs by anyone other than HB's personnel or designated agent.

Such repair or replacement, when requested by the Customer, will be done by HB and billed to the Customer at the published rate, including parts and labor. HB's standard field service rate is \$140.00 per hour during normal business hours, portal to portal, with a minimum charge of four hours.

### Warranty Period

The warranty period shall begin when the client receives beneficial use of the system, or at final acceptance, whichever comes first.

### Extended Warranty and Warranty Options

Customer may choose to extend the duration of the Standard Warranty, improve on Service & Response Time commitments, or request that Preventive Maintenance be performed during the warranty period. These options can be provided at an additional charge and include:

- Extend duration of Standard Warranty
- Response Time Commitment of Next Business Day
- Response Time Commitment of Four (4) Hour response to Critical Incident
- Preventive Maintenance Visits – One or more preventive service visits during the Warranty Term.

## SERVICE AGREEMENTS

Upon expiration of the Standard Warranty period, future service by HB is provided under Time and Materials terms and fees applicable at that time unless Customer engages in a Service Agreement. The benefit of HB Service Agreements is that HB will continue to warrant the workmanship and labor, provide Service Level Agreement (SLA) response time commitments, and include an agreed number of Preventive Maintenance Visits during the term of the contract.

### Service Level Agreements (SLA)

HB offers three maintenance agreements based on varying degrees of service and response times. Of course, plans can be customized to individual circumstances and needs. Agreements are typically entered into for one to three years.

	PLATINUM	GOLD	SILVER
Emergency call back	1 hour	1 hour	1 hour
On-site visit after initial call	4 hours (24/7)	1 business day	2 business days
Preventive maintenance visits	4 visits/year	2 visits/year	1 visit/year
Loaner projector(s)/display(s)	Yes	Yes	No
Onsite emergency visits	Unlimited	Unlimited	Unlimited
Training for all equipment	Unlimited	Unlimited	No
Advanced parts replacement	24 hours for most major hardware	2 business days	Standard ground shipping
Access to video test facilities	24 hours (scheduling ahead required)	During regular business hours	No
System functionality guarantee	Yes	Yes	Yes
Phone support	Unlimited	Unlimited	Unlimited
Rental and event support service can be provided through HB Group	Available	Available	Available

### Strategic Staffing Services

Under an HB Staffing Agreement, HB assigns each Customer one or more HB Audio Visual Support Specialist (AVSS) to assist in the use and operation of the systems at the customer facility. HB Staff Technicians are an extension of our client's staff and report daily to their assigned client site. They are typically responsible for ongoing support for the use and functionality of audio and video technology, providing support for users, meeting and events, and may be involved in the planning and implementation of change or new installation of AV, Video, or related solutions at the client location.

## ROOM READINESS

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The following describes the physical conditions we require at the site in order to bring equipment into the designated area. These “room ready” conditions have been developed to insure proper site conditions that pose no compromise to the proper operation and performance of the equipment. Further, they will allow our installers to work at maximum efficiency insuring timely completion. Where reasonable or possible:

### Conduit

Prior to commencement of work by HB, Customer will assure that adequate cable pathways or conduit are furnished. All conduit may not exceed 40% fill per NEC standards. If HB discovers insufficient conduit capacity, Customer will remedy without penalty or cost to HB.

### 120-Volt Power

All permanent 120-volt AC power and work is the responsibility of the Customer and must be in place. This includes the electrical connection to any electric projection screens. All receptacles must be properly grounded per NEC requirements, and all circuits must be of sufficient capacity to provide full turn on power to all system racks without tripping breakers. Location of all 120-volt receptacles must be within reasonable and logical proximity of equipment.

### Equipment Delivery

Prior to the delivery of all equipment and electronics, all spaces are “broom-clean” and the site is free of dust and dirt. All construction, including drywall, painting, ceilings, flooring and millwork is complete. If, at the discretion of the Customer, equipment is brought to site before it is clean, functionality, longevity and warranties may be compromised.

### OSHA Requirements

Prior to commencement of work by HB, the job site must meet OSHA requirements for a healthful workplace. Appropriate safety policies should be set, maintained, and enforced by all work forces.

## CLOSEOUT PROCESS

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In order to ensure that the client will be satisfied with a complete project, HB has developed a Closeout Process. This process ties up any loose ends ensuring that the project is complete.

### Final Testing

HB will complete final termination, testing and “de-bugging” of installed systems.

### Documentation

All documents referring to the project including spec sheets are handed over to the client for their records.

### Equipment Manuals

HB will provide sets of equipment manuals for each piece of equipment in your project.

### Training

After equipment has been installed, HB will train the client end users on how to use the systems. Training is scheduled based on the customer’s schedule.

### Installation Sign-Off

HB utilizes an “Installation Sign-Off” form to signify project completion.

This document provides a mechanism for the Owner to acknowledge completion or receipt of beneficial use of the system or to identify performance exceptions to the system.

HB is able to remedy such exceptions on a timely basis and then identifies the beginning of the warranty period.

### Portfolio Consideration

Each client project is important to us and many showcase our quality of work. After project completion, with client’s approval, HB will schedule a photo shoot featuring the recently installed technology.

In some instances, a formal case study will also be written and posted online or appear in HB marketing materials.

All photos will be available to the client upon request.



**Framingham Public Schools  
Dr. Robert Tremblay, Ed.D. Superintendent of Schools**

**FRAMINGHAM HIGH SCHOOL**  
**Mrs. Carolyn Banach, Principal • Mr. Mark McGillivray, Associate Principal**  
**Mr. Greg Lagan, Vice Principal of the Class of 2020**  
**Ms. Jeff Convery, Vice Principal of the Class of 2019**  
**Mr. Mark Albright, Vice Principal of the Class of 2020**  
**Mr. John Kanavich, Vice Principal of the Class of 2021**  
115 A St., Framingham, MA. 01701  
Telephone: 508.620.4963 Fax 508.877.6603

---

Dear Mayor Yvonne Spicer,

My name is William Ortiz III. I am a high school math teacher and the head coach for boys' varsity hockey at Framingham High School. I am writing on behalf of Framingham High Athletics and the Framingham boys and girls Hockey Programs to support the proposal to replace the current public announcement system at Loring Arena.

The replacement of the PA system is a critical piece of this project that players, parents, coaches, and spectators cannot overlook. The current system does not work and it is unfortunate because the students who sing the national anthem and the folks who frequent the arena deserve better.

As the head coach of the boy's high school hockey program, it is my responsibility to provide my athletes the best experience possible. In order to carry out these expectations, a PA system that works properly is needed. The system is needed to provide player announcements, national anthem, senior night presentation, charity donations, play-by-play commentating, spectator management and the list can go on. The burden of a terrible PA system paints an image not only on our program but our school and our city. Parents continue to express their frustrations every year.

A replacement of the PA system will not only allow the current programs to best utilize the facility but also allow the spectators the full experience they deserve. On behalf of the athletic department and the Framingham boy's and girl's hockey programs, I fully support the project request for a new PA system.

Thank you,

William Ortiz III

Framingham High School Math Teacher | (V) Hockey Head Coach | (JV) Baseball Head Coach  
wortiz@framingham.k12.ma.us

## Tyler A. Radicioni

---

**From:** Thomas J. Begin  
**Sent:** Monday, October 7, 2019 10:28 AM  
**To:** Tyler A. Radicioni  
**Subject:** FW: Sound system at Loring

Can you please scan this email and load it up to the SmartSheets project submission for the project?

Thanks,  
Thom

Thomas J. Begin | Deputy Director, Framingham Parks, Recreation, & Cultural Affairs



**From:** Paul Spear <pspear@framingham.k12.ma.us>  
**Sent:** Tuesday, October 1, 2019 11:08 AM  
**To:** Thomas J. Begin <tjb@framinghamma.gov>  
**Subject:** Fwd: Sound system at Loring

Paul Spear  
He/His/Him  
Athletic Director  
Framingham High School  
115 A Street  
Framingham, MA 01701  
Office- 508-782-7650  
Cell- 774-279-3989  
Follow us on Facebook and Twitter:

<https://twitter.com/FHSFlyersSports>  
<https://www.facebook.com/FHSFlyersAthletics/>

----- Forwarded message -----

**From:** Williams, Donna L. <Donna.Williams@staples.com>  
**Date:** Tue, Oct 1, 2019 at 10:36 AM  
**Subject:** Sound system at Loring  
**To:** pspear@framingham.k12.ma.us <pspear@framingham.k12.ma.us>  
**Cc:** ltrischitta@hardwarespecialty.com <ltrischitta@hardwarespecialty.com>

Hi Paul,

Loring arena is a beautiful rink to host our hockey games. Just one thing that is not working and sounding up to par. The sound system is not good. It's very hard to hear what the announcer is trying to say. It's not clear at all and not loud enough. We like to hear those announcements of who scored and assisted the goals along with the beginning lineup for each game.

Thanks so much for your consideration.

Donna Williams

(Brett's mom)

**Donna Williams**

**Sr. Tax Accountant**

500 Staples Dr., Framingham MA

508-253-4115

[Donna.Williams@staples.com](mailto:Donna.Williams@staples.com)



*One Framingham - Focused on the Future*

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## Thomas J. Begin

---

**From:** Paul Spear <pspear@framingham.k12.ma.us>  
**Sent:** Thursday, September 19, 2019 12:16 PM  
**To:** Thomas J. Begin  
**Subject:** Fwd: Loring Arena Sounds System

Paul Spear  
He/His/Him  
Athletic Director  
Framingham High School  
115 A Street  
Framingham, MA 01701  
Office- 508-782-7650  
Cell- 774-279-3989

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<https://www.facebook.com/FHSFlyersAthletics/>

----- Forwarded message -----

**From:** TRISCHITTA JR., DON <[dt2341@att.com](mailto:dt2341@att.com)>

**Date:** Thu, Sep 19, 2019 at 8:04 AM

**Subject:** Loring Arena Sounds System

**To:** Paul Spear <[pspear@framingham.k12.ma.us](mailto:pspear@framingham.k12.ma.us)>, Beth Adler <[badler73@yahoo.com](mailto:badler73@yahoo.com)>, [candiceLwesson@gmail.com](mailto:candiceLwesson@gmail.com) <[candiceLwesson@gmail.com](mailto:candiceLwesson@gmail.com)>, Curt Duane <[cf44@hotmail.com](mailto:cf44@hotmail.com)>, [Daniel\\_palma@yahoo.com](mailto:Daniel_palma@yahoo.com) <[Daniel\\_palma@yahoo.com](mailto:Daniel_palma@yahoo.com)>, [Donna.Williams@staples.com](mailto:Donna.Williams@staples.com) <[Donna.Williams@staples.com](mailto:Donna.Williams@staples.com)>, [Dwilliams@ug2.com](mailto:Dwilliams@ug2.com) <[Dwilliams@ug2.com](mailto:Dwilliams@ug2.com)>, [exceptab@comcast.net](mailto:exceptab@comcast.net) <[exceptab@comcast.net](mailto:exceptab@comcast.net)>, [jadeletti@hotmail.com](mailto:jadeletti@hotmail.com) <[jadeletti@hotmail.com](mailto:jadeletti@hotmail.com)>, [Jeaniegads12@yahoo.com](mailto:Jeaniegads12@yahoo.com) <[Jeaniegads12@yahoo.com](mailto:Jeaniegads12@yahoo.com)>, [Jleone09@verizon.net](mailto:Jleone09@verizon.net) <[Jleone09@verizon.net](mailto:Jleone09@verizon.net)>, [Jpduane8@gmail.com](mailto:Jpduane8@gmail.com) <[Jpduane8@gmail.com](mailto:Jpduane8@gmail.com)>, [jpprwatton@aol.com](mailto:jpprwatton@aol.com) <[jpprwatton@aol.com](mailto:jpprwatton@aol.com)>, [jshim@rentex.com](mailto:jshim@rentex.com) <[jshim@rentex.com](mailto:jshim@rentex.com)>, Karen Galluzzo <[kgalluzzo@outlook.com](mailto:kgalluzzo@outlook.com)>, [katefarese@gmail.com](mailto:katefarese@gmail.com) <[katefarese@gmail.com](mailto:katefarese@gmail.com)>, [Kelly.b.leone@gmail.com](mailto:Kelly.b.leone@gmail.com) <[Kelly.b.leone@gmail.com](mailto:Kelly.b.leone@gmail.com)>, [kfinneran89@yahoo.com](mailto:kfinneran89@yahoo.com) <[kfinneran89@yahoo.com](mailto:kfinneran89@yahoo.com)>, [lmvilla14@gmail.com](mailto:lmvilla14@gmail.com) <[lmvilla14@gmail.com](mailto:lmvilla14@gmail.com)>, [lshimelman@comcast.net](mailto:lshimelman@comcast.net) <[lshimelman@comcast.net](mailto:lshimelman@comcast.net)>, [markbhandy@gmail.com](mailto:markbhandy@gmail.com) <[markbhandy@gmail.com](mailto:markbhandy@gmail.com)>, [martelcd@yahoo.com](mailto:martelcd@yahoo.com) <[martelcd@yahoo.com](mailto:martelcd@yahoo.com)>, [Melanie\\_palma@yahoo.com](mailto:Melanie_palma@yahoo.com) <[Melanie\\_palma@yahoo.com](mailto:Melanie_palma@yahoo.com)>, Mike Adler <[aepitaz@gmail.com](mailto:aepitaz@gmail.com)>, [Peter\\_Farese@bose.com](mailto:Peter_Farese@bose.com) <[Peter\\_Farese@bose.com](mailto:Peter_Farese@bose.com)>, [Srb818@hotmail.com](mailto:Srb818@hotmail.com) <[Srb818@hotmail.com](mailto:Srb818@hotmail.com)>, [Stevebalducci@yahoo.com](mailto:Stevebalducci@yahoo.com) <[Stevebalducci@yahoo.com](mailto:Stevebalducci@yahoo.com)>, [tamisparkles@yahoo.com](mailto:tamisparkles@yahoo.com) <[tamisparkles@yahoo.com](mailto:tamisparkles@yahoo.com)>, [tosi5@verizon.net](mailto:tosi5@verizon.net) <[tosi5@verizon.net](mailto:tosi5@verizon.net)>, [tvilla65@gmail.com](mailto:tvilla65@gmail.com) <[tvilla65@gmail.com](mailto:tvilla65@gmail.com)>

**Cc:** [wortiz@framingham.k12.ma.us](mailto:wortiz@framingham.k12.ma.us) <[wortiz@framingham.k12.ma.us](mailto:wortiz@framingham.k12.ma.us)>

Hi Paul,

As the upcoming hockey season is approaching, we have been recently talking about home games at Loring Arena. The current sound system leaves fans (home and away) confused and frustrated. No one can understand the garbled messages that come out of it! It is frustrating for the announcer who tries in vein to get the play calls conveyed and embarrassing when we are trying to do on-ice presentations, etc. We have a beautiful top notch facility, but the sound system is not up to par with all the other amenities

I am really excited to hear word that there may be a proposal created for a new sound system for Loring. I am sure all the other parents on this email will echo my sentiments. If there is going to be an open meeting on the topic we can attend and help with the cause

Thank you for your support

Don

Don Trischitta

AT&T Network Integration

550 Cochituate Road

Framingham MA 01701

[508 215 0020](tel:5082150020) Office

[508 494 8701](tel:5084948701) Cell

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## Thomas J. Begin

---

**From:** Paul Spear <pspear@framingham.k12.ma.us>  
**Sent:** Thursday, September 19, 2019 12:17 PM  
**To:** Thomas J. Begin  
**Subject:** Fwd: Sound system

Paul Spear  
He/His/Him  
Athletic Director  
Framingham High School  
115 A Street  
Framingham, MA 01701  
Office- 508-782-7650  
Cell- 774-279-3989

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<https://www.facebook.com/FHSFlyersAthletics/>

----- Forwarded message -----

**From:** Joanne Floudaras <[jfloudaras@gmail.com](mailto:jfloudaras@gmail.com)>  
**Date:** Thu, Sep 19, 2019 at 12:14 PM  
**Subject:** Sound system  
**To:** <[pspear@framingham.k12.ma.us](mailto:pspear@framingham.k12.ma.us)>

What a great way to finish off the beautiful work at Loring arena with a new sound system.

They have updated the old hockey rink into a beautiful stadium. It would be great as a fan and parent whose child has played there for many years to have a better sound system.

Sincerely  
Joanne Floudaras

Sent from my iPhone

## Thomas J. Begin

---

**From:** Paul Spear <pspear@framingham.k12.ma.us>  
**Sent:** Thursday, September 19, 2019 12:17 PM  
**To:** Thomas J. Begin  
**Subject:** Fwd: Loring Sound System

Paul Spear  
He/His/Him  
Athletic Director  
Framingham High School  
115 A Street  
Framingham, MA 01701  
Office- 508-782-7650  
Cell- 774-279-3989

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<https://www.facebook.com/FHSFlyersAthletics/>

----- Forwarded message -----

**From:** Jeff Shimelman <[jshimelman@rentex.com](mailto:jshimelman@rentex.com)>  
**Date:** Thu, Sep 19, 2019 at 5:07 AM  
**Subject:** Loring Sound System  
**To:** [pspear@framingham.k12.ma.us](mailto:pspear@framingham.k12.ma.us) <[pspear@framingham.k12.ma.us](mailto:pspear@framingham.k12.ma.us)>

Hi Paul.

Loring desperately needs a sound system we can actually hear. The arena looks amazing, let's finish the job with a sound system that matches it.

Hoping you can pass this along to whomever makes the decision and let them know.

It would have a huge impact on the experience we have as parents/fans/taxpayers.

Thanks!!!

Jeff Shimelman

Jeff Shimelman  
Rentex Inc.  
617-212-3941 mobile

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## Thomas J. Begin

---

**From:** Paul Spear <pspear@framingham.k12.ma.us>  
**Sent:** Thursday, September 19, 2019 12:16 PM  
**To:** Thomas J. Begin  
**Subject:** Fwd: new sound system

Paul Spear  
He/His/Him  
Athletic Director  
Framingham High School  
115 A Street  
Framingham, MA 01701  
Office- 508-782-7650  
Cell- 774-279-3989

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<https://www.facebook.com/FHSFlyersAthletics/>

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**From:** Lisa Trischitta <[ltrischitta@hardwarespecialty.com](mailto:ltrischitta@hardwarespecialty.com)>  
**Date:** Wed, Sep 18, 2019 at 10:26 PM  
**Subject:** new sound system  
**To:** [pspear@framingham.k12.ma.us](mailto:pspear@framingham.k12.ma.us) <[pspear@framingham.k12.ma.us](mailto:pspear@framingham.k12.ma.us)>

Hi Paul,

I'm hearing that a formal request is being put together for a new sound system at Loring.

A bunch of the hockey parents and I were just discussing this very topic the other night as we were discussing some of the events surrounding the upcoming season.

The existing sound system is impossible to hear from all areas of the facility, making it very difficult to make announcements during the game. It's the last missing piece to this beautiful new facility that we are all so proud to have.

Please pass this along to whom it may concern and let me know if there is anything else I can do to help this endeavor. Thank you.

Regards,

**Lisa Trischitta**  
508-494-5926

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Gas Tank Cement Pad at Police Headquarters \$79,000 General Fund

Police Department

Replacement of existing failing gas tank cement pad at Police Headquarters location

Replace the existing gas tank cement pad, manholes, drop tube and overfill protection at Police Headquarters location.

Project is necessary to maintain existing capital equipment. The current cement pad and equipment are cracked and deteriorating, damage to the cement pad can cause damage to the tank. This can shorten the life of the tank or allow tank to leak gasoline. This project will also bring us into State and Federal compliance.



# CITY OF FRAMINGHAM

CAPITAL PROJECTS & FACILITIES MANAGEMENT DEPARTMENT

---

**James J. Paolini**  
Director

o 508-532-5485  
e [facilities@framinghamma.gov](mailto:facilities@framinghamma.gov)  
w [www.framingham.gov](http://www.framingham.gov)

10 Nicholas Road  
Framingham, MA 01701

## Memo

To: Finance Sub Committee

From: James Paolini

cc:

Date: 10/20/21

Subject Concrete pad replacement at the Police Department

---

Here are some bullet points on why the tank pad and access covers need replacement.

- The tank itself is in good overall condition, it is a 10,000 gallon double wall fiberglass tank that was installed in 1993. The settling of the pad can put undue stress on the tank.  
It is important to keep the pad in good condition to protect the tank.
- The pad in its present condition is showing signs of major structural deficiencies, cracking, deterioration and settling. There have been repairs and mandatory upgrades over the years that because of age are starting to fail.
- The vent connection (orange cover) has settled below grade and is submerged during heavy rain, this could compromise the fuel stored in the tank.
- The main sump cover is supposed to be supported by timbers under the steel ring but has settled to the point that some of the timbers can be removed by hand, meaning the sump cover and pad are floating and just being held by the concrete pad.
- If we were to do minor repairs we would then be obligated by MA Department of Environmental Protection to upgrade some of the service ports to containment spill buckets that are Enhanced Vapor Recovery approved.

Please do not hesitate to contact me if any clarification is needed,

James J. Paolini



**Northeastern Petroleum Service and Supply Inc.**  
 37 Brookley Road • Jamaica Plain, MA 02130  
 617-522-8390-8391-8392  
 Industrial Measurement and Control Division  
 617-522-6060-6061



**QUOTATION & CONTRACT FORM**

To: Framingham Police  
 1 William Welch Way  
 Framingham, Ma 01702

No. 101221  
 In reply, refer to this number

Date: 10/12/21

Attention Of: John Babineau

Your Inquiry: Concrete Tank Pad & Manhole Replacement

Gentlemen:

We are pleased to submit quotation on our interpretation of your requirements, subject to terms and conditions printed on reverse side of this proposal.

- Northeastern Petroleum will remove and replace the entire concrete pad in front of the bay doors and underground gasoline tank. We will pour a 64' X 32' X 8" thick pad with 6" X 6" wire mesh. The concrete will be 4000 PSI with fibermesh.
- We will remove the existing 44" gasoline piping sump access manhole and replace it with a 44 Emco Wheaton composite camlock watertight manhole.
- We will remove the existing three 18" access manholes and replace them with Fairfield 18" bolt down watertight manholes. We will remove the existing fill spill containment manhole and overfill valve and replace it with an OPW EVR approved two point fill manhole with sealable plunger type cover, EVR approved 4" swivel adapter and cap. The manhole will be provided with an OPW model 71 testable EVR approved overfill valve. We will remove the existing vapor recovery manhole and replace it with an OPW EVR approved containment manhole, 4" vapor recovery swivel poppeted adapter and cap.
- We will do one half one week, let it cure for a week and follow with the other half.
- Concrete pad will be butted up against saw cut asphalt to alleviate any asphalt patch work.

*The cost for the above work including labor, manholes and materials is \$78,358.92*

**Please See Next Page For Notes**

\_\_\_\_\_  
 PURCHASER

- Northeastern Petroleum Service and Supply Inc.
- Industrial Measurement and Control Div.

By \_\_\_\_\_  
 DULY AUTHORIZED AGENT

By Paul McMahon \_\_\_\_\_

Date \_\_\_\_\_

\_\_\_\_\_  
 Paul McMahon, Sales Manager



**Northeastern Petroleum Service and Supply Inc.**

37 Brookley Road • Jamaica Plain, MA 02130

617-522-8390-8391-8392

Industrial Measurement and Control Division

617-522-6060-6061



Page

9 of 2

**QUOTATION & CONTRACT CONTINUATION SHEET**

**NOTES**

-Prevailing labor rates were quoted for this job.

-Both the replacement fill and vapor manholes and components will be EVR approved. As of 1/2/22 all two point fill systems must be EVR approved. Your current system is not EVR compliant because the existing vapor recover spill containment manhole is not EVR approved.

-Freight is included.

-Above prices are good thru 11/12/21.

Again, thank you for this opportunity to be of service. I look forward to meeting your needs.









## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Equipment and Vehicle Replacement \$800,000 General Fund

Public Works

2015 Peterbilt Automated Side Loader Packer \$395,000

2001 Sterling 35,000 GVW Dump with Plow Setup \$205,000

Trackless Sidewalk Tractor with Plow and Blower Attachments \$95,000

2008 Ford 4WD Rack Body with Plow \$74,000

Partial recommendation for request of \$2,459,000 for fifteen (15) pieces of equipment and vehicle replacements.

<b>Priority</b>	<b>Department</b>	<b>Type</b>	<b>Cost</b>
1	Highway	2001 Sterling 35,000 GVW Dump Plow Setup	\$ 205,000
2	Highway	Trackless Sidewalk Tractor with Plow and Blower Attachments	\$ 95,000
3	Highway	2008 Ford 4WD Rack Body w/Plow	\$ 74,000
4	Highway	2008 John Deere 3.5 Yard Loader with Plow	\$ 215,000
5	Highway	2007 VR Trailer Air Compressor	\$ 25,000
6	Highway	2006 Ford 15,000 GVW 4WD Service Body and Plow	\$ 75,000
7	Highway	2003 Bobcat Skidsteer Loader with Plow and Attachments	\$ 135,000
8	Highway	2008 Mack 35,000 GVW Aerial Lift	\$ 290,000
9	Highway	2014 Ford 4 WD Utility Vehicle	\$ 35,000
10	Highway	2007 Ford 15,000 GVW 4WD Service Body and Plow	\$ 75,000
11	Highway	2011 Ford 4WD Pickup w/Plow	\$ 50,000
12	Highway	2004 Sterling 35,000 GVW Dump w/Plow Setup	\$ 205,000
		<b>Total</b>	<b>\$ 1,479,000</b>
1	Sanitation	2015 Peterbilt Automated Side Loader Packer	\$ 395,000
2	Sanitation	2015 Peterbilt Automated Side Loader Packer	\$ 395,000
3	Sanitation	1999 Volvo Rolloff Truck	\$ 190,000
		<b>Total</b>	<b>\$ 980,000</b>

Vehicle and equipment per Public Work's vehicle management and replacement schedule. The procurement and upkeep of equipment is a significant factor in providing cost-effective and reliable service for systems operation, maintenance, repair, rehabilitation and replacements.

All vehicles and equipment are managed through the Fleet Department and included within a replacement schedule according to specific criteria, such as age, mileage, and major repairs needed for continued reliable service. Industry and Framingham DPW experience indicates that above those thresholds maintenance increases substantially to assure service reliability, as do major repairs, none of which provide a return on investment, and they are not sustainable with the current DPW facility and staffing. In addition to daily service for the various Divisions, nearly all vehicles and equipment are used for the Department's snow and ice management program which is particularly destructive to vehicles.

**General Fund (Highway) FY23 Vehicle Replacement**

<b>Year</b>	<b>Make</b>	<b>Description</b>	<b>Cost</b>
2014	Ford	4wd Utility Vehicle	\$35,000
2011	Ford	4WD Pickup w/plow	\$50,000
2008	Ford	4wd Rack Body w/plow	\$74,000
2006	Ford	15,000 GVW 4wd service body and plow	\$75,000
2007	Ford	15,000 GVW 4wd service body and plow	\$75,000
2001	Sterling	35,000 GVW Dump plow setup	\$205,000
2008	Mack	35,000 GVW Aerial Lift	\$290,000
2004	Sterling	35,000 GVW Dump plow setup	\$205,000
2003	Bobcat	Skidsteer loader with plow and attachments	\$135,000
2007	I/R	trailer air compressor	\$25,000
1996	Tracless	Sidewalk Tractor with plow and blower attachments	95,000
2008	JohnDeere	3.5 yd loader with plow	\$215,000
		<b>Total</b>	<b>1,479,000.00</b>

**SANITATION FY23 Vehicle Replacements**

<b>Year</b>	<b>Make</b>	<b>Description</b>	<b>Cost</b>
2015	Peterbilt	Automated Side load Packer	\$395,000
2015	Peterbilt	Automated Side load Packer	\$395,000
1999	Volvo	Rolloff Truck	\$190,000
		Total	\$980,000

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Roadway and Sidewalk Improvements and ADA Compliance \$2,000,000 General Fund

Public Works

Various Roadway and Sidewalk Improvements with ADA Compliance

Partial recommendation of request for \$8,787,000 of Annual Various Roadway and Sidewalk Improvements including ADA Compliance.

This funding provides ongoing roadway, curb, sidewalk and related infrastructure rehabilitation and improvements necessary to retain an overall State of Good Repair citywide, as well as safety and accessibility improvements. The majority of this work provides roadway resurfacing such as mill and overlay, stress absorbing membrane interlayer, bonded wearing course, rubber chip seal, mill and fill and crack sealing.

Without substantial and appropriate ongoing roadway work, this infrastructure deteriorates rapidly, costs more to raise back up to a State of Good Repair, and increases the annual needs and costs for roadway maintenance, including emergency and other corrective repairs.



# CITY OF FRAMINGHAM

## DEPARTMENT OF PUBLIC WORKS

Blake D. Lukis  
 Director  
 Diane M. Conner  
 Deputy Director of Administration  
 William R. Sedewitz, P.E.  
 Chief Engineer

100 Western Avenue  
 Framingham, MA 01702

### **ANTICIPATED FY23 ROADWAY AND DRAINAGE PROJECTS** *PENDING APPROVED FUNDING*

**Please Note:** Anticipated priorities listed below are subject to change

	<b><u>Street</u></b>	<b><u>Limits</u></b>	<b><u>Proposed Improvements</u></b>
1	Edmands Road	Grove Street to Southborough Town Line	Roadway, Drainage, and Culvert
2	Fountain Street	Winter Street to Ashland Town Line	Roadway, Sidewalk, Drainage, and Culvert
3	Old Connecticut Path	School Street to Concord Street	Roadway Surface Treatment
4	School Street	Hamilton Street to School Street Bridge (over Cochituate Brook)	Roadway, Sidewalk, Drainage, and Intersection Improvements
5	Hamilton Street	School Street to Old Connecticut Path	Roadway, Sidewalk, Drainage, and Intersection Improvements
6	Various Locations Citywide		Mill and Fill and Crack Sealing
7	Second Street	Waverly Street to Beaver Street	Roadway, Sidewalk, and Drainage
8	Dudley Road	Fountain Street to Mount Wayte Avenue	Roadway, Sidewalk, and Drainage
9	Mount Wayte Avenue	Dudley Road to Franklin Street	Roadway, Sidewalk, and Drainage
10	Tripoli Area		Roadway Surface Treatment and Drainage
11	Pinefield Area – Phase I of II		Roadway Surface Treatment and Drainage
12	Route 30	Between Route 9 to Speen Street (City-owned limits T.B.D.)	Roadway, Sidewalk, Drainage, and Intersection Improvements

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Flagg Drive ADA Sidewalk and Curbing \$572,000 General Fund

Public Works

Construct New ADA Compliant Concrete and Curb Ramps

The proposed work will construct new ADA compliant concrete sidewalks and curb ramps along Flagg Drive between Oaks Street and Warren Avenue.

An assessment of the sidewalks on Flagg Drive was performed in May of 2021. It was determined that several sections of the sidewalk were non-compliant. These funds will be used in conjunction with the previously approved roadway improvements funding. The City has made significant investments in Flagg Drive with the new Fuller Middle School. It makes good sense to complete all outstanding work in this location at this time.

## FY2023 General Fund capital Budget Request Flagg Drive - Sidewalks /ADA

### Road Construction 2021 Cumulative Log

Flagg Drive Warren Ave to Oaks  
L= 2400', W=26'

\$818,369.43

RRR 2021  
2" leveller/2" top

Description	Price	Cost	Road %		Sidewalk %		
Clearing and Grubbing	\$ 1.00	\$0.00		\$0.00		\$0.00	\$0.00
Roadside Tree Protection	\$ 23.00	\$0.00		\$0.00		\$0.00	\$0.00
Unclassified Excavation	\$ 7.00	\$3,491.67	0.2	\$698.33	0.8	\$2,793.34	\$3,491.67
Hot Mix Asphalt Pavement Milling	\$ 8.00	\$55,816.00	1	\$55,816.00		\$0.00	\$55,816.00
Hot Mix Asphalt Pavement Trench Milling	\$ 6,000.00	\$0.00		\$0.00		\$0.00	\$0.00
Class A Trench Excavation	\$ 1.00	\$0.00		\$0.00		\$0.00	\$0.00
Class B Rock Excavation	\$ 1.00	\$0.00		\$0.00		\$0.00	\$0.00
Abandon Existing Pipe (All Sizes)	\$ 10.00	\$0.00		\$0.00		\$0.00	\$0.00
Drainage Structure Removed	\$ 2,000.00	\$0.00		\$0.00		\$0.00	\$0.00
Ordinary Borrow	\$ 0.01	\$0.00		\$0.00		\$0.00	\$0.00
Gravel Borrow	\$ 3.00	\$748.23	0.18	\$134.68	0.82	\$613.55	\$748.23
Controlled Density Fill - Excavatable	\$ 200.00	\$0.00		\$0.00		\$0.00	\$0.00
Crushed Stone	\$ 7.00	\$0.00		\$0.00		\$0.00	\$0.00
Fine Grading and Compacting	\$ 20.00	\$45,524.40	0.18	\$8,194.39	0.82	\$37,330.01	\$45,524.40
Prepare Soil and Waste Management Plan (SWMP)	\$ 3,935.00	\$393.50	0.5	\$196.75	0.5	\$196.75	\$393.50
Testing of Soils	\$ 2,000.00	\$2,000.00	0.18	\$360.00	0.82	\$1,640.00	\$2,000.00
Management, Hauling and Disposal of Impacted Soil Less Than RCS-1	\$ 45.00	\$4,500.00	0.18	\$810.00	0.82	\$3,690.00	\$4,500.00
Management, Hauling and Disposal of Material Suitable for Daily Cover in an Unlined Landfill	\$ 45.00	\$0.00		\$0.00		\$0.00	\$0.00
Management, Hauling and Disposal of Material Suitable for Daily Cover in an Lined Landfill	\$ 65.00	\$0.00		\$0.00		\$0.00	\$0.00
Prepare Asbestos Work Plan	\$ 5,000.00	\$0.00		\$0.00		\$0.00	\$0.00
Management, Hauling and Disposal of Non-Friable Asbestos Cement Pipe	\$ 50.00	\$0.00		\$0.00		\$0.00	\$0.00
Management, Hauling and Disposal of Friable Asbestos Cement Pipe Fragments and Soil Impacted by Friable Asbestos Cement Pipe Fragments	\$ 135.00	\$0.00		\$0.00		\$0.00	\$0.00
Treatment of Contaminated Groundwater	\$ 3.00	\$0.00		\$0.00		\$0.00	\$0.00
Disposal of Granular Activated Carbon	\$ 3.00	\$0.00		\$0.00		\$0.00	\$0.00
Catch Basin - Municipal Standard	\$ 9,000.00	\$0.00		\$0.00		\$0.00	\$0.00
Manhole - Municipal Standard	\$ 9,000.00	\$0.00		\$0.00		\$0.00	\$0.00
Gutter Inlet - Municipal Standard	\$ 5,000.00	\$0.00		\$0.00		\$0.00	\$0.00
Precast Concrete Leaching Galley - (4'x4'x4')	\$ 3,500.00	\$0.00		\$0.00		\$0.00	\$0.00
Precast Concrete Leaching Galley - (4'x4'x3')	\$ 3,500.00	\$0.00		\$0.00		\$0.00	\$0.00
Precast Concrete Leaching Drywell - (6' Dia.)	\$ 10,000.00	\$0.00		\$0.00		\$0.00	\$0.00
Precast Concrete Leaching Drywell - (8' Dia.)	\$ 12,000.00	\$0.00		\$0.00		\$0.00	\$0.00

# Road Construction 2021

## Cumulative Log

Flagg Drive Warren Ave to Oaks  
L= 2400', W=26'

\$818,369.43

RRR 2021  
2" leveller/2" top

Description	Price	Cost	Road %		Sidewalk %		
Clearing and Grubbing	\$ 1.00	\$0.00				\$0.00	\$0.00
Underground Infiltration Chambers	\$ 50,000.00	\$0.00				\$0.00	\$0.00
Water Quality Units	\$ 40,000.00	\$0.00				\$0.00	\$0.00
Drainage Structure Adjusted	\$ 600.00	\$15,600.00	1	\$15,600.00		\$0.00	\$15,600.00
Drainage Structure Rebuilt	\$ 300.00	\$7,800.00	1	\$7,800.00		\$0.00	\$7,800.00
Drainage Structure Change in Type	\$ 500.00	\$0.00				\$0.00	\$0.00
Drainage Structure Remodeled	\$ 200.00	\$0.00				\$0.00	\$0.00
Sanitary Sewer Rebuilt	\$ 300.00	\$3,000.00	1	\$3,000.00		\$0.00	\$3,000.00
Sanitary Structure Adjusted	\$ 600.00	\$6,000.00	1	\$6,000.00		\$0.00	\$6,000.00
Frame and Grate (or Cover) Municipal Standard	\$ 350.00	\$350.00	1	\$350.00		\$0.00	\$350.00
Removal of Drainage Structure Sediment	\$ 200.00	\$3,000.00	1	\$3,000.00		\$0.00	\$3,000.00
Removal of Drainage Pipe Sediment	\$ 10.00	\$0.00				\$0.00	\$0.00
8 Inch Ductile Iron Pipe	\$ 150.00	\$0.00				\$0.00	\$0.00
12 Inch Ductile Iron Pipe	\$ 250.00	\$0.00				\$0.00	\$0.00
16 Inch Ductile Iron Pipe	\$ 200.00	\$0.00				\$0.00	\$0.00
12 Inch Reinforced Concrete Pipe	\$ 150.00	\$0.00				\$0.00	\$0.00
18 Inch Reinforced Concrete Pipe	\$ 150.00	\$0.00				\$0.00	\$0.00
24 Inch Reinforced Concrete Pipe	\$ 200.00	\$0.00				\$0.00	\$0.00
12 Inch Reinforced Concrete Pipe Flared End	\$ 800.00	\$0.00				\$0.00	\$0.00
18 Inch Reinforced Concrete Pipe Flared End	\$ 800.00	\$0.00				\$0.00	\$0.00
24 Inch Reinforced Concrete Pipe Flared End	\$ 800.00	\$0.00				\$0.00	\$0.00
12 Inch Reinforced Concrete Pipe Class V	\$ 125.00	\$0.00				\$0.00	\$0.00
4 Inch Polyvinyl Chloride Sanitary Sewer Pipe	\$ 125.00	\$0.00				\$0.00	\$0.00
6 Inch Polyvinyl Chloride Sanitary Sewer Pipe	\$ 125.00	\$0.00				\$0.00	\$0.00
12 Inch Corrugate Plastic (Polyethylene) Pipe	\$ 200.00	\$0.00				\$0.00	\$0.00
18 Inch Corrugate Plastic (Polyethylene) Pipe	\$ 125.00	\$0.00				\$0.00	\$0.00
24 Inch Corrugate Plastic (Polyethylene) Pipe	\$ 100.00	\$0.00				\$0.00	\$0.00
8 Inch Slot-Perforated Corrugated Plastic Pipe (Subdrain)	\$ 55.00	\$0.00				\$0.00	\$0.00
Gate Box, Service Box, Curb Stop Installation Only	\$ 200.00	\$0.00				\$0.00	\$0.00
Gate Box Adjusted	\$ 250.00	\$3,750.00	1	\$3,750.00		\$0.00	\$3,750.00
Service Box Adjusted	\$ 250.00	\$0.00				\$0.00	\$0.00
Curb Stop Adjusted	\$ 250.00	\$0.00				\$0.00	\$0.00
Reclaimed Pavement for Base Course	\$ 0.80	\$0.00				\$0.00	\$0.00
Crushed Stone for Blending	\$ 20.00	\$0.00				\$0.00	\$0.00

# Road Construction 2021

## Cumulative Log

Flagg Drive Warren Ave to Oaks  
L= 2400', W=26'

\$818,369.43

RRR 2021  
2" leveller/2" top

Description	Price	Cost	Road %		Sidewalk %		
Clearing and Grubbing	\$ 1.00	\$0.00				\$0.00	\$0.00
High Early Strength Concrete for Base Course	\$ 250.00	\$0.00				\$0.00	\$0.00
Calcium Chloride for Roadway Dust Control	\$ 0.01	\$0.00				\$0.00	\$0.00
Water for Roadway Dust Control	\$ 0.01	\$0.00				\$0.00	\$0.00
Superpave Surface Course – 12.5 (SSC-12.5)	\$ 102.00	\$0.00				\$0.00	\$0.00
Superpave Surface Course – 12.5 Polymer (SSC-12.5 - P)	\$ 119.00	\$95,438.00	1	\$95,438.00		\$0.00	\$95,438.00
Superpave Intermediate Course – 12.5 (SIC-12.5)	\$ 102.00	\$0.00				\$0.00	\$0.00
Superpave Base Course – 37.5 (SBC-37.5)	\$ 49.00	\$0.00				\$0.00	\$0.00
Asphalt Emulsion for Tack Coat	\$ 0.01	\$139.54	1	\$139.54		\$0.00	\$139.54
HMA Joint Sealant	\$ 0.01	\$45.94	1	\$45.94		\$0.00	\$45.94
HMA - MassDOT	\$ 102.00	\$81,804.00	1	\$81,804.00		\$0.00	\$81,804.00
Liquid Asphalt Adjustment		\$0.00				\$0.00	\$0.00
Hot Mix Asphalt Berm	\$ 165.00	\$0.00				\$0.00	\$0.00
Hot Mix Asphalt for Miscellaneous Work	\$ 300.00	\$45,000.00	0.5	\$22,500.00	0.5	\$22,500.00	\$45,000.00
Sawing Asphalt Pavement	\$ 0.01	\$5.00	0.5	\$2.50	0.5	\$2.50	\$5.00
Granite Curb Type VA-4	\$ 45.00	\$4,500.00	0	\$0.00	1	\$4,500.00	\$4,500.00
Granite Curb Type VA-4 – Splayed End	\$ 1.00	\$0.00			0	\$0.00	\$0.00
Granite Curb Transition for Wheelchair Ramps	\$ 50.00	\$10,000.00			1	\$10,000.00	\$10,000.00
Granite Edging Type SB	\$ 12.00	\$0.00				\$0.00	\$0.00
Granite Curb Inlet	\$ 150.00	\$1,500.00			1	\$1,500.00	\$1,500.00
Curb Removed and Reset	\$ 30.00	\$90,180.00			1	\$90,180.00	\$90,180.00
Curb Inlet Removed and Reset	\$ 1.00	\$0.00				\$0.00	\$0.00
Curb Corner Removed and Reset	\$ 1.00	\$0.00				\$0.00	\$0.00
Edging Removed and Reset	\$ 10.00	\$0.00				\$0.00	\$0.00
Curb Removed and Stacked	\$ 1.00	\$0.00				\$0.00	\$0.00
Roadside Wood Fence	\$ 60.00	\$0.00				\$0.00	\$0.00
Steel Backed Wood Highway Guard	\$ 60.00	\$0.00				\$0.00	\$0.00
Guardrail, TL-2 (Single Faced)	\$ 60.00	\$0.00				\$0.00	\$0.00
Guardrail, TL-2 - Curved (Single Faced)	\$ 60.00	\$0.00				\$0.00	\$0.00
Trailing Anchorage	\$ 4,000.00	\$0.00				\$0.00	\$0.00
Steel Beam Highway Guard (Tangent End Treatment)	\$ 4,000.00	\$0.00				\$0.00	\$0.00
Guardrail Tangent End Treatment, TL-2	\$ 2,000.00	\$0.00				\$0.00	\$0.00
Guardrail Flared End Treatment, TL-2	\$ 2,500.00	\$0.00				\$0.00	\$0.00
48 Inch Chain Link Fence (STW) (Line Post Option)	\$ 40.00	\$0.00				\$0.00	\$0.00

# Road Construction 2021

## Cumulative Log

Flagg Drive Warren Ave to Oaks  
L= 2400', W=26'

\$818,369.43

RRR 2021  
2" leveller/2" top

Description	Price	Cost	Road %		Sidewalk %		
Clearing and Grubbing	\$ 1.00	\$0.00				\$0.00	\$0.00
72 Inch Chain Link Fence (STW) (Line Post Option)	\$ 40.00	\$0.00				\$0.00	\$0.00
48 Inch Chain Link Fence (Pipe top Rail) (Line Post Option)	\$ 40.00	\$0.00				\$0.00	\$0.00
72 Inch Chain Link Fence (Pipe top Rail) (Line Post Option)	\$ 40.00	\$0.00				\$0.00	\$0.00
Temporary Fence	\$ 1.00	\$0.00				\$0.00	\$0.00
Fence Removed and Reset	\$ 30.00	\$0.00				\$0.00	\$0.00
Stone Masonry Wall in Cement Mortar	\$ 700.00	\$0.00				\$0.00	\$0.00
Modular Block Retaining Wall	\$ 400.00	\$0.00				\$0.00	\$0.00
Modular Block Retaining Wall with Geogrid	\$ 125.00	\$0.00				\$0.00	\$0.00
Stone Masonry Wall Removed and Rebuilt Dry	\$ 137.00	\$0.00				\$0.00	\$0.00
Sedimentation Fence	\$ 4.00	\$0.00				\$0.00	\$0.00
Silt Sack	\$ 1.00	\$20.00	1	\$20.00	0	\$0.00	\$20.00
Straw Wattles	\$ 5.00	\$0.00				\$0.00	\$0.00
Cement Concrete Sidewalk	\$ 90.00	\$167,760.00			1	\$167,760.00	\$167,760.00
Cement Concrete At Driveway	\$ 95.00	\$13,004.55			1	\$13,004.55	\$13,004.55
Cement Concrete Wheelchair Ramp	\$ 150.00	\$41,250.00			1	\$41,250.00	\$41,250.00
Hot Mix Asphalt Walk Surface	\$ 250.00	\$0.00				\$0.00	\$0.00
Hot Mix Asphalt Driveway	\$ 250.00	\$18,750.00	0.5	\$9,375.00	0.5	\$9,375.00	\$18,750.00
Brick or Concrete Paver Walk	\$ 50.00	\$0.00				\$0.00	\$0.00
Brick or Concrete Paver Walk Removed and Relaid	\$ 50.00	\$0.00				\$0.00	\$0.00
Bound Removed and Reset	\$ 500.00	\$0.00				\$0.00	\$0.00
Loam Borrow and Seed	\$ 6.00	\$0.00				\$0.00	\$0.00
Loam Borrow and Seed Placement Only	\$ 75.00	\$7,500.00			1	\$7,500.00	\$7,500.00
Bioretention Soil	\$ 100.00	\$0.00				\$0.00	\$0.00
3 Inch Electrical Conduit Type NM - Plastic -(UL)	\$ 40.00	\$0.00				\$0.00	\$0.00
4 Inch Electrical Conduit Type NM - Plastic -(UL) - Double	\$ 40.00	\$0.00				\$0.00	\$0.00
Pull Box 8 x 23 Inches - SD2.030	\$ 3,000.00	\$0.00				\$0.00	\$0.00
Pull Box 12 x 12 Inches - SD2.031	\$ 3,000.00	\$0.00				\$0.00	\$0.00
Communications Pull box 36 x 36 Inches	\$ 3,000.00	\$0.00				\$0.00	\$0.00
Wire Loop Installed in Roadway	\$ 20.00	\$0.00				\$0.00	\$0.00
Warning - Regulatory and Route Markers Alum. Panel (Type A)	\$ 12.00	\$0.00				\$0.00	\$0.00
Sign Support with One Breakaway Post - Steel	\$ 150.00	\$2,250.00			1	\$2,250.00	\$2,250.00
Roadway Flagger	\$ 1.00	\$0.00				\$0.00	\$0.00
Safety Signing for Construction Traffic	\$ 5.00	\$225.00			1	\$225.00	\$225.00

# Road Construction 2021

## Cumulative Log

Flagg Drive Warren Ave to Oaks  
L= 2400', W=26'

\$818,369.43

RRR 2021  
2" leveller/2" top

Description	Price	Cost	Road %		Sidewalk %		
Clearing and Grubbing	\$ 1.00	\$0.00				\$0.00	\$0.00
Pavement Marking Removal	\$ 1.00	\$0.00				\$0.00	\$0.00
Temporary Pavement Markings – 4 In. (Painted)	\$ 0.50	\$2,400.00	1	\$2,400.00	0	\$0.00	\$2,400.00
Pavement Arrow and Legends (Epoxy)	\$ 5.00	\$0.00				\$0.00	\$0.00
Slotted Pavement Marker One-Way White	\$ 20.00	\$0.00				\$0.00	\$0.00
Slotted Pavement Marker Two-Way Yellow/Yellow	\$ 20.00	\$0.00				\$0.00	\$0.00
4 Inch ReflectORIZED White Line (Polyurea) (Recessed)	\$ 1.00	\$0.00				\$0.00	\$0.00
6 Inch ReflectORIZED White Line (Polyurea) (Recessed)	\$ 1.00	\$0.00				\$0.00	\$0.00
12 Inch ReflectORIZED White Line (Polyurea) (Recessed)	\$ 2.00	\$0.00				\$0.00	\$0.00
4 Inch ReflectORIZED Yellow Line (Polyurea) (Recessed)	\$ 2.00	\$0.00				\$0.00	\$0.00
6 Inch ReflectORIZED Yellow Line (Polyurea) (Recessed)	\$ 2.00	\$0.00				\$0.00	\$0.00
12 Inch ReflectORIZED Yellow Line (Polyurea) (Recessed)	\$ 3.00	\$0.00				\$0.00	\$0.00
4 Inch ReflectORIZED White Line (Epoxy)	\$ 2.00	\$0.00				\$0.00	\$0.00
6 Inch ReflectORIZED White Line (Epoxy)	\$ 2.00	\$5,300.00	1	\$5,300.00		\$0.00	\$5,300.00
12 Inch ReflectORIZED White Line (Epoxy)	\$ 2.00	\$1,352.00	1	\$1,352.00		\$0.00	\$1,352.00
4 Inch ReflectORIZED Yellow Line (Epoxy)	\$ 2.00	\$0.00				\$0.00	\$0.00
6 Inch ReflectORIZED Yellow Line (Epoxy)	\$ 1.00	\$2,650.00	1	\$2,650.00		\$0.00	\$2,650.00
12 Inch ReflectORIZED Yellow Line (Epoxy)	\$ 2.00	\$2,400.00	1	\$2,400.00		\$0.00	\$2,400.00
4000 PSI 1.5" 565 Cement Concrete	\$ 200.00	\$0.00				\$0.00	\$0.00
3000 PSI 1.5" 470 Cement Concrete	\$ 200.00	\$0.00				\$0.00	\$0.00
Stamped and Colored Cement Concrete	\$ 15.00	\$0.00				\$0.00	\$0.00
Steel Reinforcement for Structures	\$ 7.00	\$0.00				\$0.00	\$0.00
Modified Rockfill	\$ 70.00	\$0.00				\$0.00	\$0.00
Police Details	\$ 56.97	\$72,921.60	0.25	\$18,230.40	0.75	\$54,691.20	\$72,921.60
Price Adjustment for Portland Cement Concrete Mixes		\$0.00				\$0.00	\$0.00
Price Adjustment for Diesel Fuel and Gasoline		\$0.00				\$0.00	\$0.00
Price Adjustment for Structural Steel and Reinforcing Steel		\$0.00				\$0.00	\$0.00
Emergency Repair Work	\$ 50,000.00	\$0.00				\$0.00	\$0.00
Equipment and Operator	\$ 50,000.00	\$0.00				\$0.00	\$0.00
4x4 With Plow and Operator	\$ 25,000.00	\$0.00				\$0.00	\$0.00
Backhoe/Front End Loader with Plow and Operator	\$ 25,000.00	\$0.00				\$0.00	\$0.00
Front End Loader with Plow and Operator	\$ 25,000.00	\$0.00				\$0.00	\$0.00
Snow Hauling with Equipment and Operator	\$ 10,000.00	\$0.00				\$0.00	\$0.00

# Road Construction 2021 Cumulative Log

Flagg Drive Warren Ave to Oaks  
L= 2400', W=26'

\$818,369.43

RRR 2021  
2" leveller/2" top

Description	Price	Cost	Road %		Sidewalk %	
Clearing and Grubbing	\$ 1.00	\$0.00		\$0.00		\$0.00
		Total		\$347,367.54		\$471,001.89

**Including 10% Contigency \$518,101**

**Say \$520,000**

**+ DPW Costs \$52,000**

**TOTAL \$572,000**

Prepared by DPW September 9, 2021

# Road Construction 2021

## Cumulative Log

Flagg Drive Warren Ave to Oaks  
L= 2400', W=26'

\$818,369.43

RRR 2021  
2" leveller/2" top

Description	Price	Cost	Road %		Sidewalk %		
Clearing and Grubbing	\$ 1.00	\$0.00				\$0.00	\$0.00
Roadside Tree Protection	\$ 23.00	\$0.00				\$0.00	\$0.00
Unclassified Excavation	\$ 7.00	\$3,491.67	0.2	\$698.33	0.8	\$2,793.34	\$3,491.67
Hot Mix Asphalt Pavement Milling	\$ 8.00	\$55,816.00	1	\$55,816.00		\$0.00	\$55,816.00
Hot Mix Asphalt Pavement Trench Milling	\$ 6,000.00	\$0.00		\$0.00		\$0.00	\$0.00
Class A Trench Excavation	\$ 1.00	\$0.00		\$0.00		\$0.00	\$0.00
Class B Rock Excavation	\$ 1.00	\$0.00		\$0.00		\$0.00	\$0.00
Abandon Existing Pipe (All Sizes)	\$ 10.00	\$0.00		\$0.00		\$0.00	\$0.00
Drainage Structure Removed	\$ 2,000.00	\$0.00		\$0.00		\$0.00	\$0.00
Ordinary Borrow	\$ 0.01	\$0.00		\$0.00		\$0.00	\$0.00
Gravel Borrow	\$ 3.00	\$748.23	0.18	\$134.68	0.82	\$613.55	\$748.23
Controlled Density Fill - Excavatable	\$ 200.00	\$0.00		\$0.00		\$0.00	\$0.00
Crushed Stone	\$ 7.00	\$0.00		\$0.00		\$0.00	\$0.00
Fine Grading and Compacting	\$ 20.00	\$45,524.40	0.18	\$8,194.39	0.82	\$37,330.01	\$45,524.40
Prepare Soil and Waste Management Plan (SWMP)	\$ 3,935.00	\$393.50	0.5	\$196.75	0.5	\$196.75	\$393.50
Testing of Soils	\$ 2,000.00	\$2,000.00	0.18	\$360.00	0.82	\$1,640.00	\$2,000.00
Management, Hauling and Disposal of Impacted Soil Less Than RCS-1	\$ 45.00	\$4,500.00	0.18	\$810.00	0.82	\$3,690.00	\$4,500.00
Management, Hauling and Disposal of Material Suitable for Daily Cover in an Unlined Landfill	\$ 45.00	\$0.00		\$0.00		\$0.00	\$0.00
Management, Hauling and Disposal of Material Suitable for Daily Cover in an Lined Landfill	\$ 65.00	\$0.00		\$0.00		\$0.00	\$0.00
Prepare Asbestos Work Plan	\$ 5,000.00	\$0.00		\$0.00		\$0.00	\$0.00
Management, Hauling and Disposal of Non-Friable Asbestos Cement Pipe	\$ 50.00	\$0.00		\$0.00		\$0.00	\$0.00
Management, Hauling and Disposal of Friable Asbestos Cement Pipe Fragments and Soil Impacted by Friable Asbestos Cement Pipe Fragments	\$ 135.00	\$0.00		\$0.00		\$0.00	\$0.00
Treatment of Contaminated Groundwater	\$ 3.00	\$0.00		\$0.00		\$0.00	\$0.00
Disposal of Granular Activated Carbon	\$ 3.00	\$0.00		\$0.00		\$0.00	\$0.00
Catch Basin - Municipal Standard	\$ 9,000.00	\$0.00		\$0.00		\$0.00	\$0.00
Manhole - Municipal Standard	\$ 9,000.00	\$0.00		\$0.00		\$0.00	\$0.00
Gutter Inlet - Municipal Standard	\$ 5,000.00	\$0.00		\$0.00		\$0.00	\$0.00
Precast Concrete Leaching Galley - (4'x4'x4')	\$ 3,500.00	\$0.00		\$0.00		\$0.00	\$0.00
Precast Concrete Leaching Galley - (4'x4'x3')	\$ 3,500.00	\$0.00		\$0.00		\$0.00	\$0.00
Precast Concrete Leaching Drywell - (6' Dia.)	\$ 10,000.00	\$0.00		\$0.00		\$0.00	\$0.00
Precast Concrete Leaching Drywell - (8' Dia.)	\$ 12,000.00	\$0.00		\$0.00		\$0.00	\$0.00

# Road Construction 2021

## Cumulative Log

Flagg Drive Warren Ave to Oaks  
L= 2400', W=26'

\$818,369.43

RRR 2021  
2" leveller/2" top

Description	Price	Cost	Road %		Sidewalk %		
Clearing and Grubbing	\$ 1.00	\$0.00				\$0.00	\$0.00
Underground Infiltration Chambers	\$ 50,000.00	\$0.00				\$0.00	\$0.00
Water Quality Units	\$ 40,000.00	\$0.00				\$0.00	\$0.00
Drainage Structure Adjusted	\$ 600.00	\$15,600.00	1	\$15,600.00		\$0.00	\$15,600.00
Drainage Structure Rebuilt	\$ 300.00	\$7,800.00	1	\$7,800.00		\$0.00	\$7,800.00
Drainage Structure Change in Type	\$ 500.00	\$0.00				\$0.00	\$0.00
Drainage Structure Remodeled	\$ 200.00	\$0.00				\$0.00	\$0.00
Sanitary Sewer Rebuilt	\$ 300.00	\$3,000.00	1	\$3,000.00		\$0.00	\$3,000.00
Sanitary Structure Adjusted	\$ 600.00	\$6,000.00	1	\$6,000.00		\$0.00	\$6,000.00
Frame and Grate (or Cover) Municipal Standard	\$ 350.00	\$350.00	1	\$350.00		\$0.00	\$350.00
Removal of Drainage Structure Sediment	\$ 200.00	\$3,000.00	1	\$3,000.00		\$0.00	\$3,000.00
Removal of Drainage Pipe Sediment	\$ 10.00	\$0.00				\$0.00	\$0.00
8 Inch Ductile Iron Pipe	\$ 150.00	\$0.00				\$0.00	\$0.00
12 Inch Ductile Iron Pipe	\$ 250.00	\$0.00				\$0.00	\$0.00
16 Inch Ductile Iron Pipe	\$ 200.00	\$0.00				\$0.00	\$0.00
12 Inch Reinforced Concrete Pipe	\$ 150.00	\$0.00				\$0.00	\$0.00
18 Inch Reinforced Concrete Pipe	\$ 150.00	\$0.00				\$0.00	\$0.00
24 Inch Reinforced Concrete Pipe	\$ 200.00	\$0.00				\$0.00	\$0.00
12 Inch Reinforced Concrete Pipe Flared End	\$ 800.00	\$0.00				\$0.00	\$0.00
18 Inch Reinforced Concrete Pipe Flared End	\$ 800.00	\$0.00				\$0.00	\$0.00
24 Inch Reinforced Concrete Pipe Flared End	\$ 800.00	\$0.00				\$0.00	\$0.00
12 Inch Reinforced Concrete Pipe Class V	\$ 125.00	\$0.00				\$0.00	\$0.00
4 Inch Polyvinyl Chloride Sanitary Sewer Pipe	\$ 125.00	\$0.00				\$0.00	\$0.00
6 Inch Polyvinyl Chloride Sanitary Sewer Pipe	\$ 125.00	\$0.00				\$0.00	\$0.00
12 Inch Corrugate Plastic (Polyethylene) Pipe	\$ 200.00	\$0.00				\$0.00	\$0.00
18 Inch Corrugate Plastic (Polyethylene) Pipe	\$ 125.00	\$0.00				\$0.00	\$0.00
24 Inch Corrugate Plastic (Polyethylene) Pipe	\$ 100.00	\$0.00				\$0.00	\$0.00
8 Inch Slot-Perforated Corrugated Plastic Pipe (Subdrain)	\$ 55.00	\$0.00				\$0.00	\$0.00
Gate Box, Service Box, Curb Stop Installation Only	\$ 200.00	\$0.00				\$0.00	\$0.00
Gate Box Adjusted	\$ 250.00	\$3,750.00	1	\$3,750.00		\$0.00	\$3,750.00
Service Box Adjusted	\$ 250.00	\$0.00				\$0.00	\$0.00
Curb Stop Adjusted	\$ 250.00	\$0.00				\$0.00	\$0.00
Reclaimed Pavement for Base Course	\$ 0.80	\$0.00				\$0.00	\$0.00
Crushed Stone for Blending	\$ 20.00	\$0.00				\$0.00	\$0.00

# Road Construction 2021

## Cumulative Log

Flagg Drive Warren Ave to Oaks  
L= 2400', W=26'

\$818,369.43

RRR 2021  
2" leveller/2" top

Description	Price	Cost	Road %		Sidewalk %		
Clearing and Grubbing	\$ 1.00	\$0.00				\$0.00	\$0.00
High Early Strength Concrete for Base Course	\$ 250.00	\$0.00				\$0.00	\$0.00
Calcium Chloride for Roadway Dust Control	\$ 0.01	\$0.00				\$0.00	\$0.00
Water for Roadway Dust Control	\$ 0.01	\$0.00				\$0.00	\$0.00
Superpave Surface Course – 12.5 (SSC-12.5)	\$ 102.00	\$0.00				\$0.00	\$0.00
Superpave Surface Course – 12.5 Polymer (SSC-12.5 - P)	\$ 119.00	\$95,438.00	1	\$95,438.00		\$0.00	\$95,438.00
Superpave Intermediate Course – 12.5 (SIC-12.5)	\$ 102.00	\$0.00				\$0.00	\$0.00
Superpave Base Course – 37.5 (SBC-37.5)	\$ 49.00	\$0.00				\$0.00	\$0.00
Asphalt Emulsion for Tack Coat	\$ 0.01	\$139.54	1	\$139.54		\$0.00	\$139.54
HMA Joint Sealant	\$ 0.01	\$45.94	1	\$45.94		\$0.00	\$45.94
HMA - MassDOT	\$ 102.00	\$81,804.00	1	\$81,804.00		\$0.00	\$81,804.00
Liquid Asphalt Adjustment		\$0.00				\$0.00	\$0.00
Hot Mix Asphalt Berm	\$ 165.00	\$0.00				\$0.00	\$0.00
Hot Mix Asphalt for Miscellaneous Work	\$ 300.00	\$45,000.00	0.5	\$22,500.00	0.5	\$22,500.00	\$45,000.00
Sawing Asphalt Pavement	\$ 0.01	\$5.00	0.5	\$2.50	0.5	\$2.50	\$5.00
Granite Curb Type VA-4	\$ 45.00	\$4,500.00	0	\$0.00	1	\$4,500.00	\$4,500.00
Granite Curb Type VA-4 – Splayed End	\$ 1.00	\$0.00			0	\$0.00	\$0.00
Granite Curb Transition for Wheelchair Ramps	\$ 50.00	\$10,000.00			1	\$10,000.00	\$10,000.00
Granite Edging Type SB	\$ 12.00	\$0.00				\$0.00	\$0.00
Granite Curb Inlet	\$ 150.00	\$1,500.00			1	\$1,500.00	\$1,500.00
Curb Removed and Reset	\$ 30.00	\$90,180.00			1	\$90,180.00	\$90,180.00
Curb Inlet Removed and Reset	\$ 1.00	\$0.00				\$0.00	\$0.00
Curb Corner Removed and Reset	\$ 1.00	\$0.00				\$0.00	\$0.00
Edging Removed and Reset	\$ 10.00	\$0.00				\$0.00	\$0.00
Curb Removed and Stacked	\$ 1.00	\$0.00				\$0.00	\$0.00
Roadside Wood Fence	\$ 60.00	\$0.00				\$0.00	\$0.00
Steel Backed Wood Highway Guard	\$ 60.00	\$0.00				\$0.00	\$0.00
Guardrail, TL-2 (Single Faced)	\$ 60.00	\$0.00				\$0.00	\$0.00
Guardrail, TL-2 - Curved (Single Faced)	\$ 60.00	\$0.00				\$0.00	\$0.00
Trailing Anchorage	\$ 4,000.00	\$0.00				\$0.00	\$0.00
Steel Beam Highway Guard (Tangent End Treatment)	\$ 4,000.00	\$0.00				\$0.00	\$0.00
Guardrail Tangent End Treatment, TL-2	\$ 2,000.00	\$0.00				\$0.00	\$0.00
Guardrail Flared End Treatment, TL-2	\$ 2,500.00	\$0.00				\$0.00	\$0.00
48 Inch Chain Link Fence (STW) (Line Post Option)	\$ 40.00	\$0.00				\$0.00	\$0.00

# Road Construction 2021

## Cumulative Log

Flagg Drive Warren Ave to Oaks  
L= 2400', W=26'

\$818,369.43

RRR 2021  
2" leveller/2" top

Description	Price	Cost	Road %		Sidewalk %		
Clearing and Grubbing	\$ 1.00	\$0.00				\$0.00	\$0.00
72 Inch Chain Link Fence (STW) (Line Post Option)	\$ 40.00	\$0.00				\$0.00	\$0.00
48 Inch Chain Link Fence (Pipe top Rail) (Line Post Option)	\$ 40.00	\$0.00				\$0.00	\$0.00
72 Inch Chain Link Fence (Pipe top Rail) (Line Post Option)	\$ 40.00	\$0.00				\$0.00	\$0.00
Temporary Fence	\$ 1.00	\$0.00				\$0.00	\$0.00
Fence Removed and Reset	\$ 30.00	\$0.00				\$0.00	\$0.00
Stone Masonry Wall in Cement Mortar	\$ 700.00	\$0.00				\$0.00	\$0.00
Modular Block Retaining Wall	\$ 400.00	\$0.00				\$0.00	\$0.00
Modular Block Retaining Wall with Geogrid	\$ 125.00	\$0.00				\$0.00	\$0.00
Stone Masonry Wall Removed and Rebuilt Dry	\$ 137.00	\$0.00				\$0.00	\$0.00
Sedimentation Fence	\$ 4.00	\$0.00				\$0.00	\$0.00
Silt Sack	\$ 1.00	\$20.00	1	\$20.00	0	\$0.00	\$20.00
Straw Wattles	\$ 5.00	\$0.00				\$0.00	\$0.00
Cement Concrete Sidewalk	\$ 90.00	\$167,760.00			1	\$167,760.00	\$167,760.00
Cement Concrete At Driveway	\$ 95.00	\$13,004.55			1	\$13,004.55	\$13,004.55
Cement Concrete Wheelchair Ramp	\$ 150.00	\$41,250.00			1	\$41,250.00	\$41,250.00
Hot Mix Asphalt Walk Surface	\$ 250.00	\$0.00				\$0.00	\$0.00
Hot Mix Asphalt Driveway	\$ 250.00	\$18,750.00	0.5	\$9,375.00	0.5	\$9,375.00	\$18,750.00
Brick or Concrete Paver Walk	\$ 50.00	\$0.00				\$0.00	\$0.00
Brick or Concrete Paver Walk Removed and Relaid	\$ 50.00	\$0.00				\$0.00	\$0.00
Bound Removed and Reset	\$ 500.00	\$0.00				\$0.00	\$0.00
Loam Borrow and Seed	\$ 6.00	\$0.00				\$0.00	\$0.00
Loam Borrow and Seed Placement Only	\$ 75.00	\$7,500.00			1	\$7,500.00	\$7,500.00
Bioretention Soil	\$ 100.00	\$0.00				\$0.00	\$0.00
3 Inch Electrical Conduit Type NM - Plastic -(UL)	\$ 40.00	\$0.00				\$0.00	\$0.00
4 Inch Electrical Conduit Type NM - Plastic -(UL) - Double	\$ 40.00	\$0.00				\$0.00	\$0.00
Pull Box 8 x 23 Inches - SD2.030	\$ 3,000.00	\$0.00				\$0.00	\$0.00
Pull Box 12 x 12 Inches - SD2.031	\$ 3,000.00	\$0.00				\$0.00	\$0.00
Communications Pull box 36 x 36 Inches	\$ 3,000.00	\$0.00				\$0.00	\$0.00
Wire Loop Installed in Roadway	\$ 20.00	\$0.00				\$0.00	\$0.00
Warning - Regulatory and Route Markers Alum. Panel (Type A)	\$ 12.00	\$0.00				\$0.00	\$0.00
Sign Support with One Breakaway Post - Steel	\$ 150.00	\$2,250.00			1	\$2,250.00	\$2,250.00
Roadway Flagger	\$ 1.00	\$0.00				\$0.00	\$0.00
Safety Signing for Construction Traffic	\$ 5.00	\$225.00			1	\$225.00	\$225.00

# Road Construction 2021

## Cumulative Log

Flagg Drive Warren Ave to Oaks  
L= 2400', W=26'

\$818,369.43

RRR 2021  
2" leveller/2" top

Description	Price	Cost	Road %		Sidewalk %		
Clearing and Grubbing	\$ 1.00	\$0.00				\$0.00	\$0.00
Pavement Marking Removal	\$ 1.00	\$0.00				\$0.00	\$0.00
Temporary Pavement Markings – 4 In. (Painted)	\$ 0.50	\$2,400.00	1	\$2,400.00	0	\$0.00	\$2,400.00
Pavement Arrow and Legends (Epoxy)	\$ 5.00	\$0.00				\$0.00	\$0.00
Slotted Pavement Marker One-Way White	\$ 20.00	\$0.00				\$0.00	\$0.00
Slotted Pavement Marker Two-Way Yellow/Yellow	\$ 20.00	\$0.00				\$0.00	\$0.00
4 Inch ReflectORIZED White Line (Polyurea) (Recessed)	\$ 1.00	\$0.00				\$0.00	\$0.00
6 Inch ReflectORIZED White Line (Polyurea) (Recessed)	\$ 1.00	\$0.00				\$0.00	\$0.00
12 Inch ReflectORIZED White Line (Polyurea) (Recessed)	\$ 2.00	\$0.00				\$0.00	\$0.00
4 Inch ReflectORIZED Yellow Line (Polyurea) (Recessed)	\$ 2.00	\$0.00				\$0.00	\$0.00
6 Inch ReflectORIZED Yellow Line (Polyurea) (Recessed)	\$ 2.00	\$0.00				\$0.00	\$0.00
12 Inch ReflectORIZED Yellow Line (Polyurea) (Recessed)	\$ 3.00	\$0.00				\$0.00	\$0.00
4 Inch ReflectORIZED White Line (Epoxy)	\$ 2.00	\$0.00				\$0.00	\$0.00
6 Inch ReflectORIZED White Line (Epoxy)	\$ 2.00	\$5,300.00	1	\$5,300.00		\$0.00	\$5,300.00
12 Inch ReflectORIZED White Line (Epoxy)	\$ 2.00	\$1,352.00	1	\$1,352.00		\$0.00	\$1,352.00
4 Inch ReflectORIZED Yellow Line (Epoxy)	\$ 2.00	\$0.00				\$0.00	\$0.00
6 Inch ReflectORIZED Yellow Line (Epoxy)	\$ 1.00	\$2,650.00	1	\$2,650.00		\$0.00	\$2,650.00
12 Inch ReflectORIZED Yellow Line (Epoxy)	\$ 2.00	\$2,400.00	1	\$2,400.00		\$0.00	\$2,400.00
4000 PSI 1.5" 565 Cement Concrete	\$ 200.00	\$0.00				\$0.00	\$0.00
3000 PSI 1.5" 470 Cement Concrete	\$ 200.00	\$0.00				\$0.00	\$0.00
Stamped and Colored Cement Concrete	\$ 15.00	\$0.00				\$0.00	\$0.00
Steel Reinforcement for Structures	\$ 7.00	\$0.00				\$0.00	\$0.00
Modified Rockfill	\$ 70.00	\$0.00				\$0.00	\$0.00
Police Details	\$ 56.97	\$72,921.60	0.25	\$18,230.40	0.75	\$54,691.20	\$72,921.60
Price Adjustment for Portland Cement Concrete Mixes		\$0.00				\$0.00	\$0.00
Price Adjustment for Diesel Fuel and Gasoline		\$0.00				\$0.00	\$0.00
Price Adjustment for Structural Steel and Reinforcing Steel		\$0.00				\$0.00	\$0.00
Emergency Repair Work	\$ 50,000.00	\$0.00				\$0.00	\$0.00
Equipment and Operator	\$ 50,000.00	\$0.00				\$0.00	\$0.00
4x4 With Plow and Operator	\$ 25,000.00	\$0.00				\$0.00	\$0.00
Backhoe/Front End Loader with Plow and Operator	\$ 25,000.00	\$0.00				\$0.00	\$0.00
Front End Loader with Plow and Operator	\$ 25,000.00	\$0.00				\$0.00	\$0.00
Snow Hauling with Equipment and Operator	\$ 10,000.00	\$0.00				\$0.00	\$0.00

# Road Construction 2021 Cumulative Log

Flagg Drive Warren Ave to Oaks  
L= 2400', W=26'

\$818,369.43

RRR 2021  
2" leveller/2" top

Description	Price	Cost	Road %		Sidewalk %		
Clearing and Grubbing	\$ 1.00	\$0.00					
	Total	\$818,369.43		\$0.00		\$0.00	\$0.00
				\$347,367.54		\$471,001.89	\$0.00

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Drainage System and Surface Water Quality Projects \$250,000 General Fund

Public Works

Infrastructure Improvements of Stormwater Conveyance System

Partial recommendation for \$250,000 of the request for \$550,000.

Appropriation for DPW capital repairs to the stormwater conveyance system. Locations are selected in conjunction with the Various Roadway Improvements, so that stormwater issues can be addressed prior to paving. Additional locations are selected to provide capital improvements to the system as identified by CCTV inspection or through operation and maintenance and are intended to restore system capacity and mitigate flooding. Necessary infrastructure improvements.



# CITY OF FRAMINGHAM

## DEPARTMENT OF PUBLIC WORKS

Blake D. Lukis  
 Director  
 Diane M. Conner  
 Deputy Director of Administration  
 William R. Sedewitz, P.E.  
 Chief Engineer

100 Western Avenue  
 Framingham, MA 01702

### **ANTICIPATED FY23 ROADWAY AND DRAINAGE PROJECTS** *PENDING APPROVED FUNDING*

**Please Note:** Anticipated priorities listed below are subject to change

	<b><u>Street</u></b>	<b><u>Limits</u></b>	<b><u>Proposed Improvements</u></b>
1	Edmands Road	Grove Street to Southborough Town Line	Roadway, Drainage, and Culvert
2	Fountain Street	Winter Street to Ashland Town Line	Roadway, Sidewalk, Drainage, and Culvert
3	Old Connecticut Path	School Street to Concord Street	Roadway Surface Treatment
4	School Street	Hamilton Street to School Street Bridge (over Cochituate Brook)	Roadway, Sidewalk, Drainage, and Intersection Improvements
5	Hamilton Street	School Street to Old Connecticut Path	Roadway, Sidewalk, Drainage, and Intersection Improvements
6	Various Locations Citywide		Mill and Fill and Crack Sealing
7	Second Street	Waverly Street to Beaver Street	Roadway, Sidewalk, and Drainage
8	Dudley Road	Fountain Street to Mount Wayte Avenue	Roadway, Sidewalk, and Drainage
9	Mount Wayte Avenue	Dudley Road to Franklin Street	Roadway, Sidewalk, and Drainage
10	Tripoli Area		Roadway Surface Treatment and Drainage
11	Pinefield Area – Phase I of II		Roadway Surface Treatment and Drainage
12	Route 30	Between Route 9 to Speen Street (City-owned limits T.B.D.)	Roadway, Sidewalk, Drainage, and Intersection Improvements

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Edgell Road/Central Street Intersection Improvements \$432,000 General Fund

Public Works

Safety and Traffic Improvements for Intersection of Edgell Road and Central Street

The proposed work will construct safety and traffic improvements for the intersection of Edgell Road and Central Street, including intersection geometric improvements, sidewalks, and installation of a traffic signal via State TIP funding. The funding will cover the construction costs not covered by the TIP funding.

The project will reduce traffic congestion and improve pedestrian mobility and safety by providing an exclusive pedestrian phase in the traffic signal, as well as provide crosswalks and ADA/AAB compliant sidewalks along both sides of both roadways. The majority of the construction will be paid by the Federal and State funds, but some specific items like underground City communication conduits are not eligible for the State funding and must be paid by the City.



September 2, 2021

Ref: 13484.07

Adam Kiel, P.E.  
Senior Traffic and Transportation Engineer  
110 Western Avenue  
Framingham, MA 01702

Re: FY-2023 Capital Improvements  
Edgell Road at Central Street Intersection Improvement

Dear Mr. Kiel,

VHB has prepared this letter to provide a description and cost estimate for the design and construction oversight efforts required for the roadway improvements for the Edgell Road at Central Street intersection.

In 2017, the City applied for state and federal funding under the State Transportation Improvement Program (STIP). The funding was approved, and the project has been programmed for the 2023 STIP year. On behalf of the City, VHB is preparing to submit the 100% Design package to MassDOT at the beginning of September 2021. The project is scheduled for advertisement by MassDOT in October 2022 and it is anticipated that construction will begin in April 2023 and be completed by October 2024.

The remaining design includes the preparation of the PS&E Design, Right -of -Way Plans and part-time construction phase services. The total costs associated with the remaining design and part-time construction oversight and preparation of as-built plans of the Edgell Road at Central Street Intersection Improvements is estimated to be \$222,000.00. The cost does not include temporary or permanent easement acquisition that will be required for the construction nor any legal fees or overhead costs which are already funded by the City (FY-2022). There are additional costs to the City which include DPW oversight and non-participating construction costs which add to \$209,905.00 to the Design costs bringing the total costs to \$432,000.00.

If you have any questions, or require additional information, please do not hesitate to contact me.

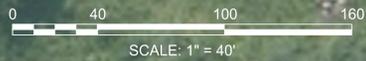
Sincerely,

Vanasse Hangen Brustlin, Inc.

Tracie Lenhardt, P.E.  
Senior Project Manager

Engineers | Scientists | Planners | Designers

101 Walnut Street  
PO Box 9151  
Watertown, Massachusetts 02471  
P 617.924.1770  
F 617.924.2286





# Edgell Road at Central Street Intersection Improvements Project

*Community Meeting  
Thursday, May 27, 2021*



# Introductions

- City of Framingham Department of Public Works
  - Blake Lukis, Public Works Director
  - William Sedewitz, PE, Chief Engineer
  - Eric Johnson, PE, City Engineer
  - Simon Alexandrovich, PE, Director of Transportation
  - Adam Kiel, PE, Senior Traffic and Transportation Engineer
  - Allyssa Jewell, Communications Project Manager
- VHB, Inc. (*City's Consultant*)
  - Josh Cone-Roddy, PE, Senior Project Engineer
  - Erin Thompson, PE, Supervising Traffic Engineer
  - Tracie Lenhardt, PE, Senior Project Manager

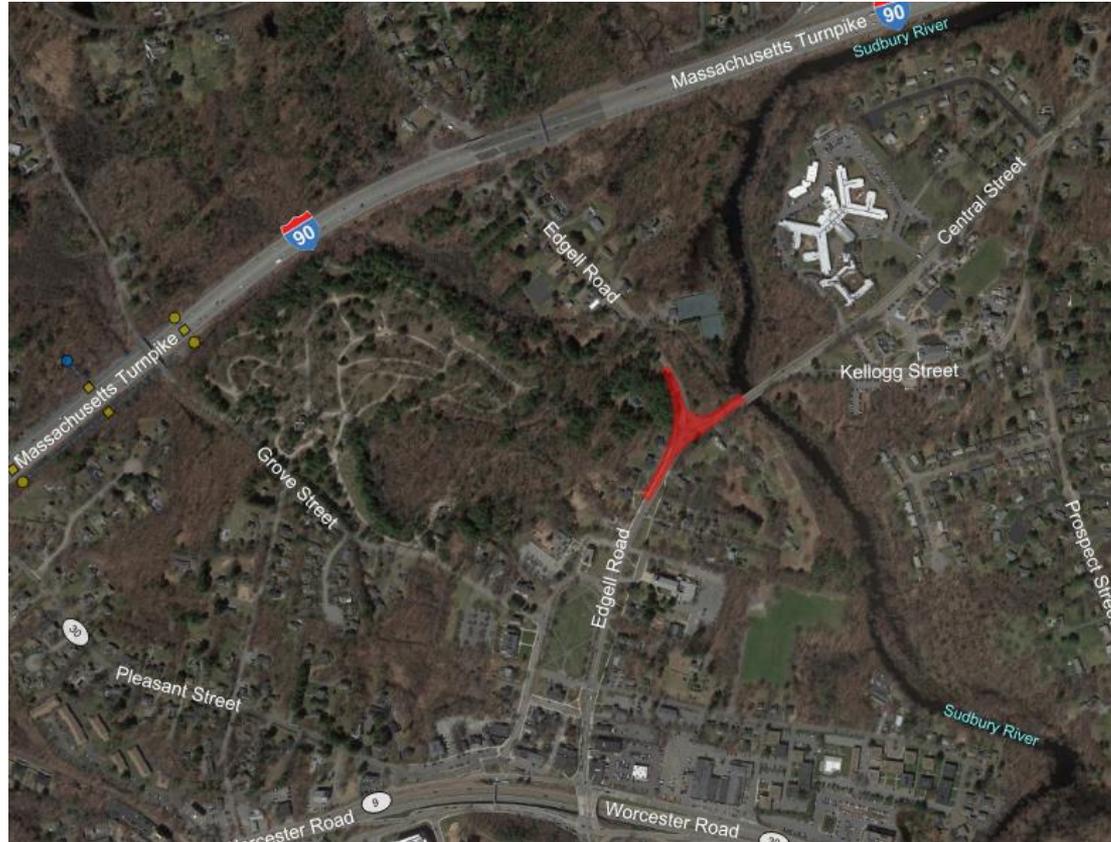


# Agenda

- Project Overview
- Existing Conditions
- Why Reconstruct the Intersection?
- Alternatives Considered
- Proposed Project Features
- Anticipated Traffic and Pedestrian Impacts
- Next Steps/Schedule
- Questions and Comments



# Project Overview – Location and Limits



# Existing Conditions

- Difficult Left-Turns
- Long Vehicle Queues
- Non-ADA Compliant Intersection
- No Crosswalks
- Poor Sight Distance
- Increased Crash Occurrences



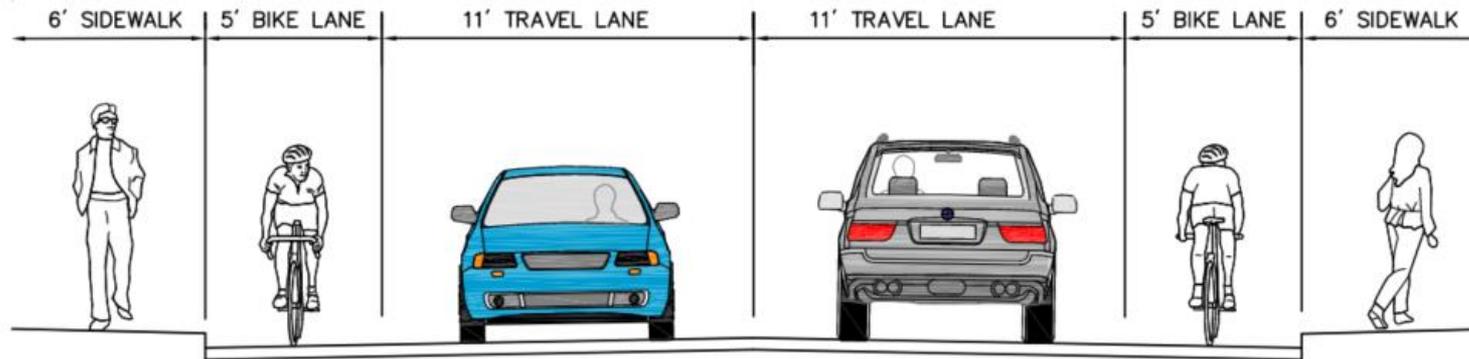
# Existing Conditions & Recent Crash Data



Collision Type	2013-2015	2016-2019
Angle	7	17
Head-On	0	4
Rear-End	7	10
Sideswipe (Opposite Direction)	0	1
Sideswipe (Same Direction)	0	1
Single Vehicle	1	2
<b>Total:</b>	<b>15</b>	<b>35</b>
<b>% Injury</b>	<b>27%</b>	<b>31%</b>
<b>MassDOT District 3 Average Crash Rate</b>	<b>0.65</b>	<b>0.61</b>
<b>Calculated Crash Rate</b>	<b>0.58</b>	<b>1.07</b>

# Why Reconstruct the Intersection?

- Improve safety and mobility for all users
- Improve sight distance
- Reduce vehicle speeds



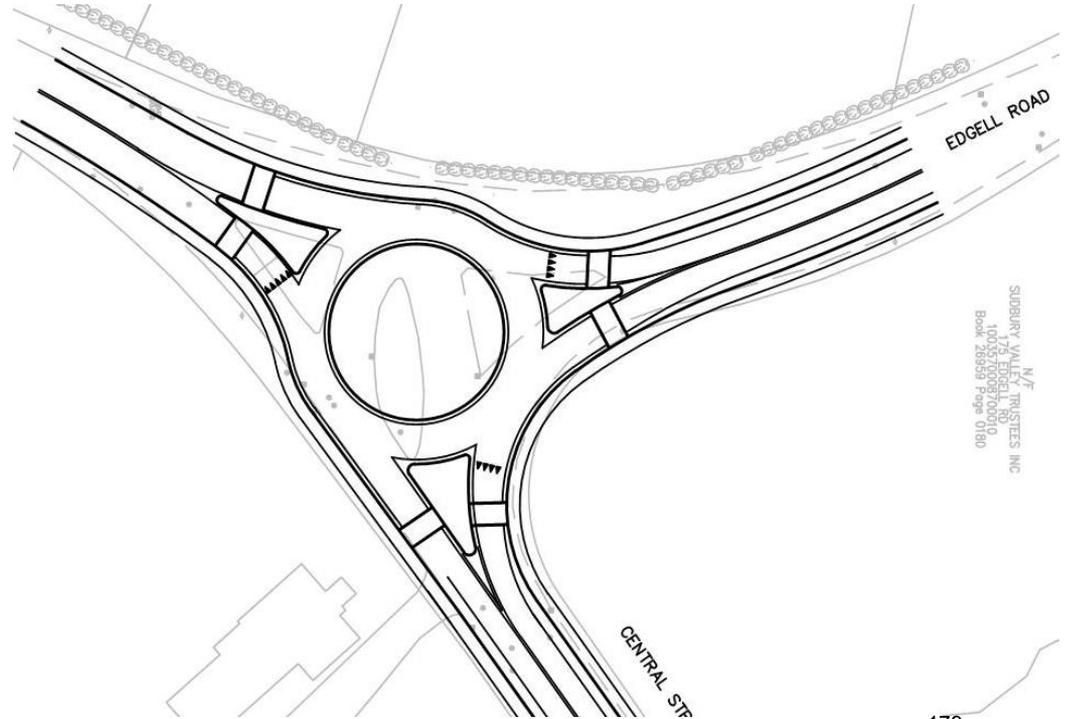
# Alternatives Considered - Roundabout

## Pros:

- Improved safety with fewer vehicle conflicts
- Short pedestrian crosswalks

## Cons:

- Lacks bicycle accommodation
- Single Lane: Significant vehicle queues on Edgell Road
- Double Lane: Significant property impacts



N/F  
SUDBURY VALLEY TRUSTEES INC  
175 EDGELL RD  
100557008700010  
Book 2859 Page 0180

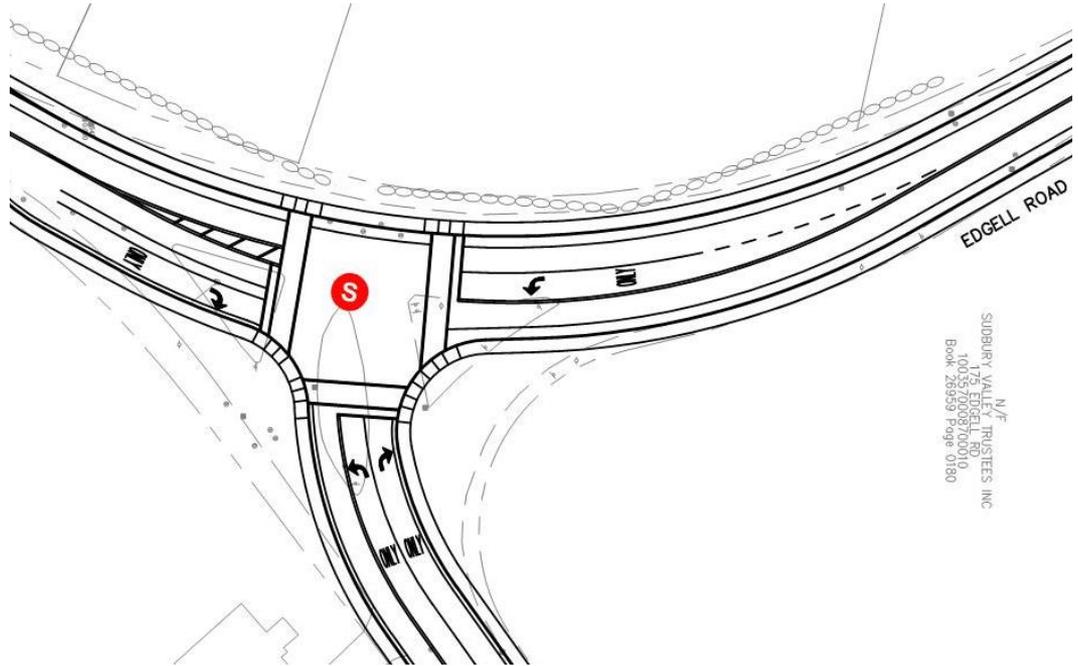
# Alternatives Considered – Traffic Signal

## Pros:

- Pedestrian crossings
- Bicycle lanes
- Exclusive turn lanes

## Cons:

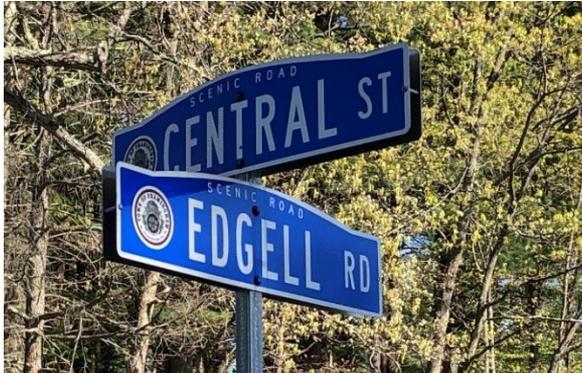
- Larger vehicles not accommodated
- Inadequate storage length on Edgell Road
- Possible historic wall impact



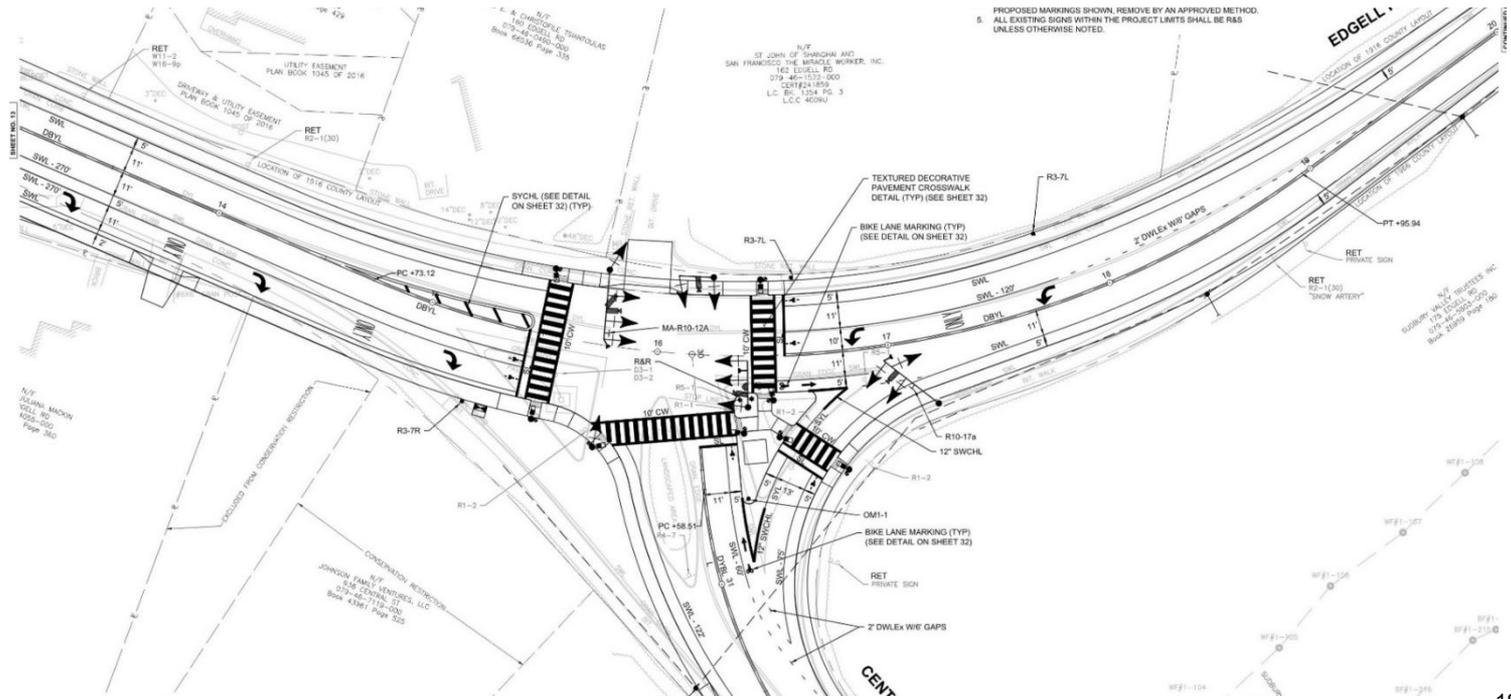
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SIOBURY VALLEY TRUSTEES, INC  
10025 EDGELL ROAD  
10025 EDGELL ROAD  
Book 26959 Page 0180

# Project Constraints

- Central Street Bridge
- Abutted by Conservation Land
- Scenic Roads – Stone Wall on Edgell Road



# 25% Design



# 25% Design



# Comments Heard at 25% Design Meeting

No need for traffic light here

Widen Central Street on the north side from the bridge to provide two west bound traffic lanes.

Eliminate the sidewalk on the east side of Edgell Road north of Central.

Eliminate the second crosswalk north of Central Street across Edgell Road.

Move the Central Street crosswalks east of the intersection so walkers can cross on a shorter crosswalk.

Eliminate any dedicated roadway for bikers

Synchronize the traffic light with the traffic light at Route 9.

Pleased City and MassDOT working together to address the traffic issues

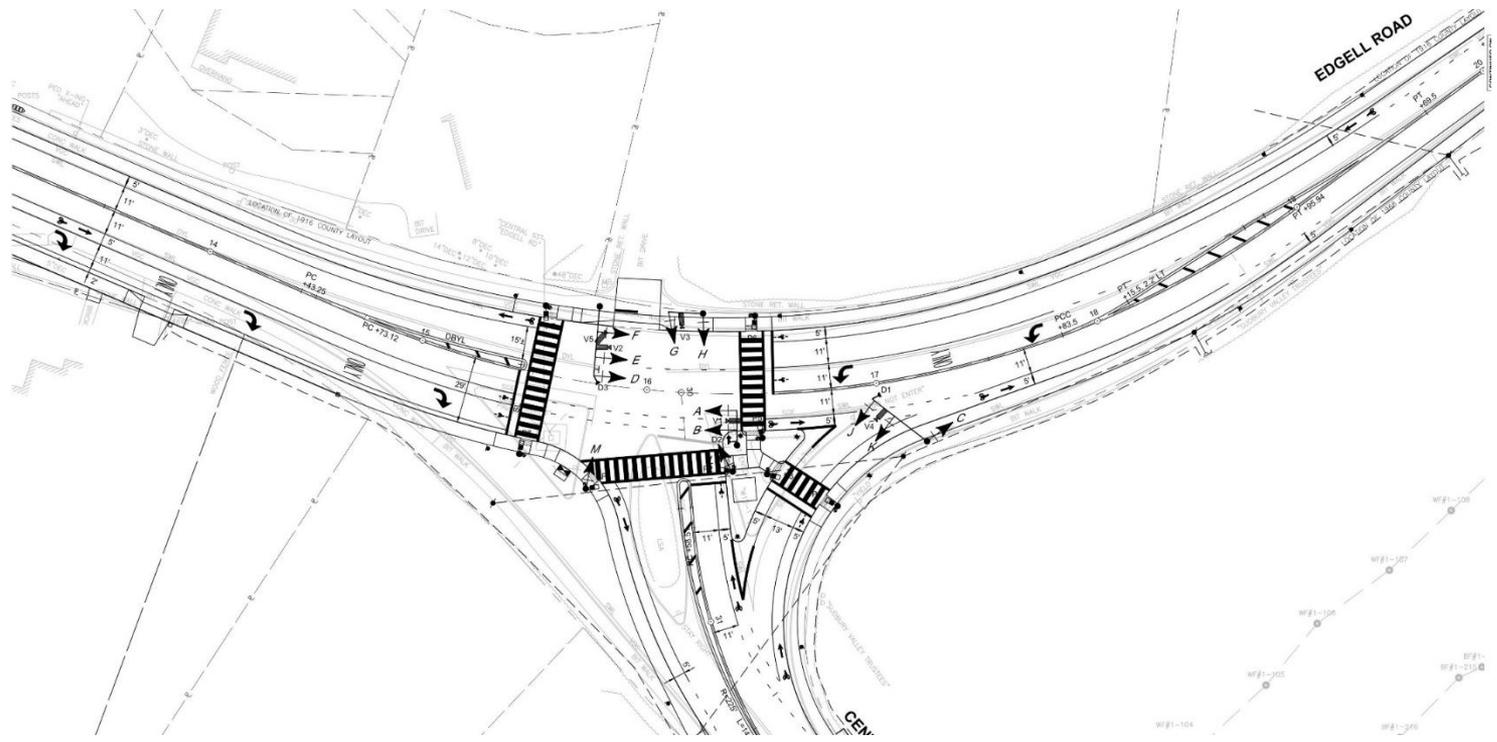
Thrilled to see plans for bicycle lanes

How will Vernon Street be impacted

Concern for emergency vehicles and school busses with increased congestion/queues

Enforce speeding and remove trees to increase safety

# 75% Design



# 75% Design



# Proposed Project Features

- Roadway widening for turn lanes
- Pedestrian Improvements:
  - New ADA compliant cement concrete sidewalks with pedestrian access ramps
  - New pedestrian signals
  - Decorative crosswalks with stamped imprinting
- Two crosswalks on Edgell Road with an exclusive signalized pedestrian phase



# Proposed Project Features

- Ornamental Traffic Signals
- Accommodation for bicyclists with shoulders – dedicated bicycle lanes



# Easements Required Right of Way

- City is required to secure the right of way
- Easements are required for construction, including:
  - 2 permanent
  - 14 temporary
  - 2 permanent utility
  - 2 permanent guardrail easements



# Coordination

- Framingham Historic Commission
- Framingham Historic District Commission
- Framingham Conservation Commission
- Parks and Recreation Department



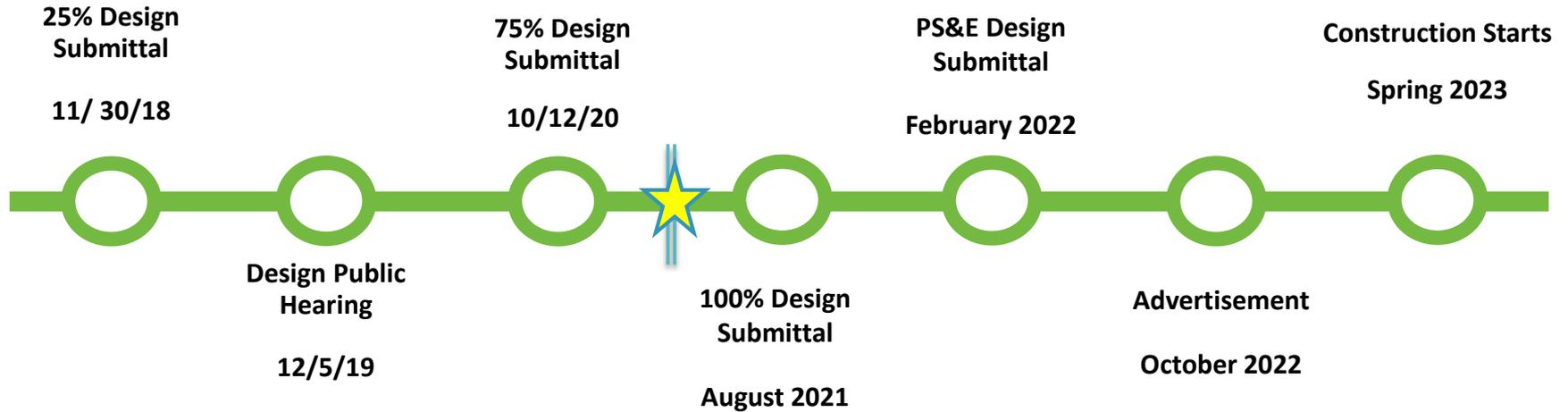
# Anticipated Traffic and Pedestrian Impacts

*Construction is expected to take two construction seasons*

- Hours of Construction:
  - Monday – Friday, 7:00 a.m. to 3:30 p.m.
- Daily Traffic Impacts:
  - Lane shifts and alternating traffic
  - A minimum of 1-lane in each direction will be maintained
  - Work is anticipated during the day
  - MassDOT contractor will be selected for the project
  - Detours are not anticipated
- Pedestrian and bicycle access will be maintained
- Police details will be on-site to facilitate vehicular traffic and pedestrians



# Next Steps/Project Schedule



# Questions Received

**Q: How would the signal timing likely affect the large line of cars/school buses trying to get off Vernon onto Edgell during morning commute time (just S of this intersection)?**

*A: Vernon intersection is approximately 800' south of the Central Street Intersection. The Edgell Road weekday morning NB Through movement has a 50% queue of approximately 175' and 95% queue of approximately 500'. It is not anticipated that this signal will have a significant impact on the Vernon Street intersection, although it may provide more gaps at that intersection.*

**Q: Is there a potential for two established lanes on Central Street?**

*A: VHB and the City are looking at all options to widen and stripe Central Street with two dedicated turn lanes while still minimizing impacts to Environmentally sensitive areas as well as private Sudbury Valley Trustees property.*

# FOR FUTURE PROJECT UPDATES AND TO STAY CONNECTED WITH FRAMINGHAM PUBLIC WORKS, PLEASE VISIT:



Online:

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If you need assistance or have questions about the project, please contact:

Adam Kiel, P.E., Senior Project Manager:  
[awk@framinghamma.gov](mailto:awk@framinghamma.gov)



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# Questions/Comments

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Roof Repairs to 110 Western Avenue Public Works Facility \$53,100 General Fund

Public Works

Replacement of roof membrane and additional insulation at modular Capital Program office location

Work on the 110 Western Ave roof (modular capital program office) includes adding additional insulation and replacing the 5,500 square foot roof membrane.

The replacement of the 110 Western Ave roof will provide continued use of the building for Public Works capital, procurement, and administration and finance staff



# CITY OF FRAMINGHAM

DEPARTMENT OF PUBLIC WORKS | CAPITAL PROJECTS

Blake D. Lukis  
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CAPITAL BUILDING  
110 Western Avenue  
Framingham, MA 01702

## MEMORANDUM

**DATE:** September 9, 2021  
**TO:** File  
**FROM:** William Sedewitz, P.E., Chief Engineer *wrs*  
**RE:** FY23 General Fund Request - 110 Western Avenue Roof Repairs

**Project Description** – This request is for repairs to the roof of the capital program office modular building at 110 Western Avenue.

**Project Justifications** – This roof is in need of repairs to extend its useful lives and restore it to a weatherproof and water tight condition.

The structure at 110 Western Avenue was originally established as a temporary office, but it has held up well and continues to provide necessary space for key personnel and functions, including Capital Projects, DPW Procurement, and DPW leadership. The one feature of the structure that is in need of repairs is the roof, and making those repairs will enable the DPW to extend the life of the structure for many more years.

**Project Budgets** – A quote of \$48,280 from a local contractor is attached to this memorandum. A contingency of 10% brings the total to \$53,108, say **\$53,100**.



179 Kelleher St.  
Marlborough MA, 01752  
Phone: (508) 596-9191  
[harrysconstruction@outlook.com](mailto:harrysconstruction@outlook.com)  
[www.harrysconstructionusa.com](http://www.harrysconstructionusa.com)

---

**Date: 08/27/2021**

**Proposal #: 827211**

**Proposal Submitted to:**

Name: City Of Framingham  
Address: 100 Western Ave Framingham, MA  
Phone:  
E-mail: [jrousseau@framinghamma.gov](mailto:jrousseau@framinghamma.gov)

**Job Location:**

Address: 110 Western ave Framingham, MA

---

**Work Description**

Roof Replacement: 55 squares of roof.

- 1- Install 1/2" insulation at the entire roof using 3" plates and screws.
- 2- Install 6" russ strip and 2" russ plates all around the penetrations as needed.
- 3- Install 0.60 RPI 10'x100' membranes using (low voc bonding)
- 4- Install 3" seam tape at all the seams
- 5- Install properly flashing at all the corners and penetrations
- 6- Install edge metal c6 bronze around the edges and strip with 6" cover tape.
- 7- Clean all the gutters.
- 8- Install 1/2" CDX nailer all around the edges.
- 9- Provide dumpster as needed for the work
- 10- Remove all job debris
- 11- Provide the owner with 15years Labor warranty and 40yrs membrane warranty by RPI Manufacture

\* Prevailing wages are included on the price bellow.



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Marlborough MA, 01752  
Phone: (508) 596-9191  
[harrysconstruction@outlook.com](mailto:harrysconstruction@outlook.com)  
[www.harrysconstructionusa.com](http://www.harrysconstructionusa.com)

## Terms & Conditions:

If your roof is replaced during the winter or spring when there is snow on the ground, you might find some roofing debris once it is melted. We will gladly come back and clean the lawn if you give us a call.

If you have any satellite dishes on the roof, they will need to be removed in order for the roof to be installed correctly. We will do our best to install the dish back and facing the same direction once the job is completed but you may need to call your dish satellite company and have them realign the dish after the job is completed. Fees are the responsibility of the customer.

Harry's Construction is not responsible to any interior damages resulting from water penetration resulting from a pre-existing skylight.

Make sure to secure or remove any loose or delicate objects on your walls or shelves before the work is begun. Roof replacement can shake the house cause things to break or fall.

We are not responsible for roofing debris that might fall into your attic. Harry's Construction always strip your roof to ensure the best installation but small pieces may fall into your attic, please cover your belongings.

This contract does not include, unless explicitly specified, any mold abatement, removal or cleaning. If mold is found extra cost for abate, remove and clean will apply. In addition, any warranty given to you under this contract does NOT include the cost to abate, remove and clean mold that might be found in the future. Harry's Construction shall not be liable for any mold after the installation of the roof, as the responsibility to maintain the interior of the property is the responsibility of the homeowner.

Harry's Construction and the product manufacturer shall NOT be responsible for any interior damage occurred from an event of water infiltration resulting from snow and/or ice on the roof.

Please understand that brick, stone and mortar can deteriorate over time and heavy rain can penetrate above the area of the work performed.

Payment Terms: 30% of payment once this proposal is accepted and the remaining 70% once the work is completed. If payments under this agreement are not paid in full once the work is done, Harry's Construction reserves the right to pursue all appropriate remedies, including lien and suit.

Price includes:

Labor, materials and removal of debris

Clean gutters.

Tarp installation

All loose boards tightened

Any damage incurred during roof installation repaired/replaced at an equal value.



## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Catchment Investigations (MS4) Permit \$100,000 General Fund

Public Works

Compliance with Year 5 of the National Pollutant Discharge Elimination System (NPDES) Phase II Municipal Separate Storm Sewer System (MS4) Permit requirements.

Partial recommendation for \$100,000 of the \$327,950 requested for Catchment Investigations (MS4) Permit.

This project will provide funds to assist with compliance with Year 5 of the National Pollutant Discharge Elimination System (NPDES) Phase II Municipal Separate Storm Sewer System (MS4) permit requirements. Specifically, this project will provide consultant and contractor services for catchment investigations (i.e. inspections of the drainage system to identify pollution sources and assess infrastructure).

The City of Framingham is required to operate its storm sewer system under a permit from the US EPA. The permit requires the City to complete catchment investigations. In addition to water quality benefits, this work will help the City improve asset management of drainage infrastructure. Non-compliance could result in administrative orders or fines.

**FY2023 General Fund Capital Budget Request  
Catchment Investigations (MS4 Permit)**

Year 5 (FY2023)		
Ref. No.	Data Need / Task	Cost Estimate
<b>MCM 3 - IDDE</b>		
2.3.4.8	Catchment Investigations (start Year 5/FY23, complete by Year 10/FY28) Total = 499 catchments (updated based on field work) ~500 investigations distributed over 5 years (approximately 95-100 per year, starting FY23) Assume 1/2 day per catchment to complete catchment investigation. Allowance for equipment for CCTV, vactor truck, smoke testing, & other investigation techniques. Assume \$3,400 per catchment (based on interpolation from W&S Waushakum investigation proposal and sample size using on-call CCTV/disposal costs)	\$ 323,000
2.3.4.8.c.ii.2	Complete wet weather investigation and sampling Based on dry weather screening, catchment investigation, system vulnerability factors, & manhole screening. Assume 10% of catchments distributed over 5 years (approximately 9-10 per year). Estimated at 2 hour per 2-person stormwater crew per outfall for field work (i.e. 4 hours per sample). Assume \$100 per person per hour for consultant fees (i.e. \$400 per sample for crew). Approx. \$150 per sample for lab fees and equipment rental.	\$ 4,950
<b>Total Cost</b>		<b>\$327,950</b>

Notes:

Prepared by Kerry Reed, P.E. - Framingham DPW

Prepared on July 22, 2021

Based on the 2016 National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) requirements

**United States Environmental Protection Agency (EPA)  
National Pollutant Discharge Elimination System (NPDES)**

**GENERAL PERMITS FOR STORMWATER DISCHARGES FROM  
SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS  
IN MASSACHUSETTS  
(as modified)**

**AUTHORIZATION TO DISCHARGE UNDER THE  
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM**

In compliance with the provisions of the Clean Water Act (CWA), as amended (33 U.S.C. §1251 *et seq.*), and the Massachusetts Clean Waters Act, as amended (M.G.L. Chap.21 §§ 26-53), any operator of a small municipal separate storm sewer system whose system:

- Is located in the areas described in part 1.1;
- Is eligible for coverage under part 1.2 and part 1.9; and
- Submits a complete and accurate Notice of Intent in accordance with part 1.7 of this permit and EPA issues a written authorization

is authorized to discharge in accordance with the conditions and the requirements set forth herein.

The following appendices are also included as part of these permits:

- Appendix A – Definitions, Abbreviations, and Acronyms;
- Appendix B – Standard permit conditions applicable to all authorized discharges;
- Appendix C – Endangered Species Act Eligibility Guidance;
- Appendix D – National Historic Preservation Act Eligibility Guidance;
- Appendix E – Information required for the Notice of Intent (NOI);
- Appendix F – Requirements for MA Small MS4s Subject to Approved TMDLs;
- Appendix G – Impaired Waters Monitoring Parameter Requirements;
- Appendix H – Requirements related to discharges to certain water quality limited waterbodies;

This modifies parts: 2.0; 2.1; 2.1.1; 2.1.2.a; 2.2.; 2.2.2 (paragraphs 2 and 3); 2.3.3; 2.3.5; 2.3.6; 2.3.7.b; 4.1; 4.4; 5.1.5; 6.5; Appendix F part A.I; Appendix F part A.II; and Appendix H of the permits that became effective on July 1, 2018

These permit modifications become effective on **January 6, 2021**.

These permits and the authorization to discharge expire at midnight, **June 30, 2022**.

Signed this **7th** day of **December 2020**

Signed this **7th** day of **December 2020**

/S/Signature On File

\_\_\_\_\_  
Ken Moraff, Director  
Water Division  
United States Environmental Protection Agency  
5 Post Office Square – Suite 100  
Boston, Massachusetts 02109-3912

  
\_\_\_\_\_  
Lealdon Langley, Director  
Division of Watershed Management  
Department of Environmental Protection  
One Winter Street  
Boston, Massachusetts 02108

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## 1.0. Introduction

This document consists of three (3) general permits listed in part 1.1. Each general permit is applicable to a particular type of municipal system within Massachusetts. Many of the permit terms and conditions are applicable across all regulated entities, and therefore are presented just once in parts 1-2, part 4, and Appendices A through E. Other conditions are applicable to a particular set of authorized entities; these terms and conditions are included in parts 3, and 5 and Appendices F through H. Throughout the permit, the terms “this permit” or “the permit” will refer to the three general permits.

### 1.1. Areas of Coverage

This permit covers small municipal separate storm sewer systems (MS4s) located in the Commonwealth of Massachusetts:

- Traditional Cities and Towns (NPDES Permit No. MAR041000)
- State, federal, county and other publicly owned properties (Non-traditional) (MAR042000)
- State transportation agencies (except for MassDOT- Highway Division) (MAR043000)

### 1.2. Eligibility

The MS4 shall meet the eligibility provisions described in part 1.2.1 and part 1.9 to be eligible for authorization under this permit.

#### 1.2.1. Small MS4s Covered

This permit authorizes the discharge of stormwater from small MS4s as defined at 40 CFR § 122.26(b) (16). This includes MS4s described in 40 CFR §122.32(a) (1) and (a) (2). An MS4 is eligible for coverage under this permit if it is:

- A small MS4 within the Commonwealth of Massachusetts;
- Not a large or medium MS4 as defined in 40 CFR §§122.26(b)(4) or (7);
- Located either fully or partially within an urbanized area as determined by the latest Decennial Census by the Bureau of Census as of the effective date of this permit (the 2010 Census); or
- Located in a geographic area designated by EPA as requiring a permit.

If the small MS4 is not located entirely within an urbanized area, only the portion of the MS4 that is located within the urbanized area is regulated under 40 CFR §122.32(a) (1).

A small municipal separate storm sewer system means all separate storm sewers that are:

- Owned or operated by the United States, a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States.
- Not defined as large or medium municipal separate storm sewer systems pursuant to 40 CFR § 122.26(b) (4) and (b) (7) or designated under 40 CFR § 122.26(a) (1) (v).
- This term includes systems similar to separate storm sewer systems in municipalities such as systems at military bases, large hospitals or prison complexes, and highways

and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings.

### 1.3. Limitations on Coverage

This permit does not authorize the following:

- a. Stormwater discharges mixed with sources of non-stormwater unless such non-stormwater discharges are:
  - Authorized under a separate NPDES permit; or
  - A non-stormwater discharge as listed in part 1.4.
- b. Stormwater discharges associated with industrial activity as defined in 40 CFR §122.26 (b) (14) (i)-(ix) and (xi).
- c. Stormwater discharges associated with construction activity as defined in 40 CFR §122.26(b) (14) (x) or (b) (15).
- d. Stormwater discharges currently authorized under another NPDES permit, including discharges covered under other regionally issued general permits.
- e. Stormwater discharges or discharge related activities that are likely to adversely affect any species that are listed as endangered or threatened under the Endangered Species Act (ESA) or result in the adverse modification or destruction of habitat that is designated as critical under the ESA. The permittee shall follow the procedures detailed in Appendix C to make a determination regarding eligibility. The permittee shall certify compliance with this provision on the submitted NOI.
- f. Stormwater discharges whose direct or indirect impacts do not prevent or minimize adverse effects on any Essential Fish Habitat.
- g. Stormwater discharges, or implementation of a stormwater management program, which adversely affects properties listed or eligible to be listed on the National Register of Historic Places. The permittee shall follow the procedures detailed in Appendix D to make a determination regarding eligibility. The permittee shall certify compliance with this provision on the submitted NOI.
- h. Stormwater discharges prohibited under 40 CFR § 122.4.
- i. Stormwater discharges to the subsurface subject to state Underground Injection Control (UIC) regulations. Although the permit includes provisions related to infiltration and groundwater recharge, structural controls that dispose of stormwater into the ground may be subject to UIC regulation requirements. Authorization for such discharges shall be obtained from Massachusetts Department of Environmental Protection, Bureau of Resource Protection, Drinking Water Program, Underground Injection Control, One Winter Street, Boston, MA 02108 – phone 617-292-5859.
- j. Any non-traditional MS4 facility that is a “new discharger” as defined in part 5.1.4. and discharges to a waterbody listed in category 5 or 4b on the Massachusetts Integrated Report of waters listed pursuant to Clean Water Act section 303(d) and 305(b) due to nutrients (Total Nitrogen or (Total Phosphorus), metals (Cadmium, Copper, Iron, Lead or Zinc), solids (TSS or Turbidity), bacteria/pathogens (E. Coli, Enterococcus or Fecal Coliform), chloride (Chloride) or oil and grease

(Petroleum Hydrocarbons or Oil and Grease), or discharges to a waterbody with an approved TMDL for any of those pollutants.

#### 1.4. Non-Stormwater Discharges

The following categories of non-stormwater discharges are allowed under this permit *unless* the permittee, EPA, or the MassDEP identifies any category or individual discharge of non-stormwater discharge in part 1.4.a-r as a significant contributor of pollutants to the MS4, then that category or individual discharge is not allowed under part 1.4, but rather shall be deemed an “illicit discharge” under part 2.3.4.1, and the permittee shall address that category or individual discharge as part of the Illicit Discharge Detection and Elimination (IDDE) Program described in part 2.3.4 of this permit.

- a. Water line flushing
- b. Landscape irrigation
- c. Diverted stream flows
- d. Rising ground water
- e. Uncontaminated ground water infiltration (as defined at 40 CFR § 35.2005(20))
- f. Uncontaminated pumped ground water
- g. Discharge from potable water sources
- h. Foundation drains
- i. Air conditioning condensation
- j. Irrigation water, springs
- k. Water from crawl space pumps
- l. Footing drains
- m. Lawn watering
- n. Individual resident car washing
- o. Flows from riparian habitats and wetlands
- p. De-chlorinated swimming pool discharges
- q. Street wash waters
- r. Residential building wash waters without detergents

Discharges or flows from firefighting activities are allowed under this permit need only be addressed where they are identified as significant sources of pollutants to waters of the United States.

#### 1.5. Permit Compliance

Non-compliance with any of the requirements of this permit constitutes a violation of the permit and the CWA and may be grounds for an enforcement action and may result in the imposition of injunctive relief and/or penalties.

#### 1.6. Continuation of this Permit

If this permit is not reissued prior to the expiration date, it will be administratively continued in accordance with the Administrative Procedure Act and remain in force and effect for discharges that were authorized prior to expiration. If a small MS4 was granted permit authorization prior to the expiration date of this permit, it will automatically remain authorized by this permit until the earliest of:

- Authorization under a reissued general permit following timely and appropriate submittal of a complete and accurate NOI requesting authorization to discharge under the reissued permit; or
- Issuance or denial of an individual permit for the MS4’s discharges; or

- Authorization or denial under an alternative general permit.

If the MS4 operator does not submit a timely, appropriate, complete, and accurate NOI requesting authorization to discharge under the reissued permit or a timely request for authorization under an individual or alternative general permit, authorization under this permit will terminate on the due date for the NOI under the reissued permit unless otherwise specified in the reissued permit.

## **1.7. Obtaining Authorization to Discharge**

### **1.7.1. How to Obtain Authorization to Discharge**

To obtain authorization under this permit, a small MS4 shall:

- Be located in the areas listed in part 1.1 of this permit;
- Meet the eligibility requirements in part 1.2 and part 1.9;
- Submit a complete and accurate Notice of Intent (NOI) in accordance with the requirements of part 1.7.2; and
- EPA issues a written authorization.

### **1.7.2. Notice of Intent**

- a. Operators of Small MS4s seeking authorization to discharge under the terms and conditions of this permit shall submit a Notice of Intent that contains the information identified in Appendix E. This includes operators of small MS4s that were previously authorized under the May 1, 2003 small MS4 general permit (MS4-2003 permit).
- b. The NOI shall be signed by an appropriate official (see Appendix B, Subparagraph B.11, Standard Conditions).
- c. The NOI shall contain the following certification: I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print the name and title of the official, followed by signature and date.

- d. The NOI shall be submitted within 90 days of the effective date of the permit. If EPA notifies an MS4 that it is designated under 40 CFR § 122.32(a) (2) or (b), the NOI shall be submitted within 180 days of receipt of notice unless granted a longer period of time by EPA.

### **1.7.3. Submission of Notice of Intent**

- a. All small MS4s shall submit a complete and accurate Notice of Intent (suggested form in Appendix E) to EPA-Region 1 at the following address:

United States Environmental Protection Agency  
Stormwater and Construction Permits Section (OEP06-1)  
Five Post Office Square, Suite 100

Boston, MA 02109

Or submitted electronically to EPA at the following email address: [stormwater.reports@epa.gov](mailto:stormwater.reports@epa.gov)

b. All small MS4s shall also submit a copy of the NOI to the MassDEP at the following address:

Massachusetts Department of Environmental Protection  
One Winter Street -5th Floor  
Boston, Massachusetts 02108  
ATTN: Frederick Civian, Stormwater Coordinator

c. Late notification: A small MS4 is not prohibited from submitting a NOI after the dates provided in part 1.7.2.d. However, if a late NOI is submitted, authorization is only for discharges that occur after permit authorization is granted. EPA and MassDEP reserve the right to take enforcement actions for any unpermitted discharges. All NOIs submitted after December 21, 2020 must be submitted electronically.

#### **1.7.4. Public Notice of NOI and Effective Date of Coverage**

a. EPA will provide a public notice and opportunity for comment on the contents of the submitted NOIs. The public comment period will be a minimum of 30 calendar days.

b. Based on a review of a small MS4's NOI or other information, EPA may grant authorization, extend the public comment period, or deny authorization under this permit and require submission of an application for an individual or alternative NPDES permit. (See part 1.8) A small MS4 will be authorized to discharge under the terms and conditions of this permit upon receipt of notice of authorization from EPA.

c. Permittees whose authorization to discharge under the MS4-2003 permit, which expired on May 1, 2008, has been administratively continued in accordance with the Administrative Procedure Act 5 U.S.C. § 558(c) and 40 CFR § 122.6, who wish to obtain coverage under this permit, must submit a new NOI requesting permit coverage in accordance with the requirements of part 1.7 of this permit to EPA within 90 days after the effective date of this permit. Permittees whose authorization to discharge under the expired MS4-2003 permit was administratively continued, who fail to submit a timely, complete and accurate NOI or an application for an individual NPDES permit within 90 days after the effective date of this permit will be considered to be discharging without a permit (see 40 CFR § 122.28(b)(3)(iii)).

#### **1.8. Individual Permits and Alternative General Permits**

a. EPA may require a small MS4 to apply for and obtain authorization under either an individual NPDES permit or an alternative NPDES general permit. Any interested person may petition EPA in accordance with the provisions of 40 CFR § 122.26(f) to require a small MS4 to apply for and/or obtain authorization under either an individual NPDES permit or an alternative NPDES general permit. If EPA requires a small MS4 to apply for an individual or alternative NPDES permit, EPA will notify the small MS4 in writing that a permit application is required. This notification will include a brief statement of the reasons for this decision and will provide application information and an application deadline. If a small MS4 is authorized under the MS4-2003 permit or this permit and fails to submit an individual NPDES or an alternative general permit NPDES permit application as required by EPA, then the authorization under the MS4-2003 permit or this permit to the small MS4 is automatically terminated at the end of the date specified by EPA as the deadline

for application submittal. EPA reserves the right to take enforcement action for any unpermitted discharge.

- b. A small MS4 may request to be excluded from this general permit by applying for an individual permit or authorization under an alternative general permit. In such a case, a small MS4 shall submit an individual permit application in accordance with the requirements of 40 CFR § 122.33(b) (2) (i) or § 122.33(b) (2) (ii), with reasons supporting the request, to EPA at the address listed in part 1.7.3 of this permit. The request may be granted by issuance of an individual permit or authorization under an alternative general permit if EPA determines that the reasons stated by the small MS4 are adequate to support the request. (See 40 CFR § 122.28(b) (3)).
- c. When an individual NPDES permit is issued, or a small MS4 is authorized to discharge under an alternative NPDES general permit, authorization under this permit automatically terminates on the effective date of the individual permit or the date of authorization of coverage under the alternative general permit.

## **1.9. Special Eligibility Determinations**

### **1.9.1. Documentation Regarding Endangered Species**

The small MS4 shall certify eligibility regarding endangered species in the NOI required by part 1.7.2. The Stormwater Management Program (SWMP) shall include documentation supporting the permittee's eligibility determination with regard to federal Endangered and Threatened Species and Critical Habitat Protection, including:

- Results of the Appendix C U.S. Fish and Wildlife Service endangered species screening determination; and
- If applicable, a description of the measures the small MS4 shall implement to protect federally listed endangered or threatened species, or critical habitat, including any conditions imposed by the U.S. Fish and Wildlife Service. If a permittee fails to document and implement such measures, the permittee's discharges are ineligible for coverage under this permit.

### **1.9.2. Documentation Regarding Historic Properties**

The small MS4 shall certify eligibility regarding historic properties on the NOI required by part 1.7.2. The SWMP shall include documentation supporting the small MS4's eligibility determination with regard to Historic Properties Preservation, including:

- Information on whether the permittee's stormwater discharges, allowable non-stormwater discharges, or stormwater discharge-related activities would have an effect on a property that is listed or eligible for listing on the National Register of Historic Properties (NRHP);
- Where such effects may occur, any documents received by the permittee or any written agreements the permittee has made with the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (THPO), or other Tribal representative to mitigate those effects;
- Results of the Appendix D historic property screening investigations; and
- If applicable, a description of the measures the permittee shall implement to avoid or minimize adverse impacts on places listed, or eligible for listing, on the NRHP, including any conditions imposed by the SHPO or THPO. If the permittee fails to

document and implement such measures, those discharges are ineligible for coverage under this permit.

### **1.10. Stormwater Management Program (SWMP)**

- a. The permittee shall develop and implement a written (hardcopy or electronic) SWMP. The SWMP shall be signed in accordance with Appendix B, Subsection 11, including the date of signature. A signature and date is required for initial program preparation and for any significant revision to the program, which shall be in writing. The written SWMP shall be completed within one (1) year of the effective date of the permit.

The SWMP is the document used by the permittee to describe and detail the activities and measures that will be implemented to meet the terms and conditions of the permit. The SWMP shall accurately describe the permittees plans and activities. The document should be updated and/or modified during the permit term as the permittee's activities are modified, changed or updated to meet permit conditions during the permit term.

- b. Permittees authorized by the MS4-2003 permit shall modify or update their existing Best Management Practices (BMPs) and measurable goals to meet the terms and conditions of part 2.3 of this permit within one (1) year of the effective date of the permit. These modifications and updates shall be reflected in the written (hardcopy or electronic) SWMP. Permittees authorized by the MS4-2003 permit shall continue to implement their existing SWMP until the program has been updated.

#### **1.10.1. Stormwater Management Program Availability**

- a. The permittee shall retain a copy of the current SWMP required by this permit at the office or facility of the person listed as the program contact on the submitted Notice of Intent (NOI). The SWMP shall be immediately available to representatives from EPA, MassDEP, U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) at the time of an onsite inspection or upon request.
- b. The permittee shall make the SWMP available to the public during normal business hours. The permittee shall also post the SWMP online<sup>1</sup> if the permittee has a website on which to post the SWMP.

#### **1.10.2. Contents and Timelines of the Stormwater Management Program for 2003 permittees**

The following information must be included in the SWMP within one (1) year of the permit effective date and updated annually thereafter, as necessary:

- Identification of names and titles of people responsible for program implementation. If a position is currently unfilled, list the title of the position and modify the SWMP with the name once the position is filled;
- Documentation of compliance with part 1.9.1;
- Documentation of compliance with part 1.9.2;

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<sup>1</sup> Should a permittee not wish to post mapping information included in the SWMP (see part 1.10.2) on their website for public safety reasons, they must state the reason either with or within the online SWMP and provide how the MS4 mapping information can be obtained. The permittee must retain the entire SWMP, including all completed mapping, at a location where it can be made available to the public during normal business hours.

## MA MS4 General Permit

- Documentation of authorization of all new or increased discharges granted by MassDEP in compliance with part 2.1.2;
- Listing of all discharges identified pursuant to part 2.1.1 and description of response;
- Description of practices to achieve compliance with part 2.3 (MEP requirements) identified in the permittee's NOI and any updates to those BMPs within the first year;  
For each permit condition in part 2.3 identify:
  - The person(s) or department responsible for the measure;
  - The BMPs for the control measure or permit requirement;
  - The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal shall have a measure of assessment associated with it;
- Sanitary Sewer Overflow (SSO) inventory including all of the information required in part 2.3.4.4.b;
- Written IDDE Program pursuant to part 2.3.4.6;
- Written procedures for site inspections and enforcement of sediment and erosion control procedures in accordance with part 2.3.5;
- Description of measures to avoid or minimize impacts to surface public drinking water supply sources. The permittee is also encouraged to include provisions to notify public water supplies in the event of an emergency. Massachusetts Department of Environmental Protection, Bureau of Resource Protection, Drinking Water Program, One Winter Street, Boston, MA 02108 – phone 617.292.5770.
- Description of activities to achieve compliance with part 3.0;
- Annual program evaluation (part 4.1). Update annually and maintain copies.

The following information must be included in the SWMP within two (2) years of the permit effective date and updated annually thereafter, as necessary:

- Listing of all receiving waterbody segments, their classification under the applicable state water quality standards, any impairment(s) and associated pollutant(s) of concern, applicable TMDLs and WLAs, and number of outfalls from the MS4 that discharge to each waterbody. In addition to the receiving water, the permittee shall document in the SWMP all surface public drinking water sources that may be impacted by MS4 discharges;
- Listing of all interconnected MS4s and other separate storm sewer systems receiving a discharge from the permitted MS4, the receiving waterbody segment(s) ultimately receiving the discharge, their classification under the applicable state water quality standards, any impairment(s) and associated pollutant(s) of concern, applicable TMDLs and WLAs, and the number of interconnections;
- Written procedures to require submission of as-built drawings and ensure long term operation and maintenance in accordance with part 2.3.6.a.iii;
- The map of the separate storm sewer system required by part 2.3.4.5.

The following information must be included in the SWMP within four (4) years of the permit effective date and updated annually thereafter, as necessary:

- Report(s) assessing current street design and parking lot guidelines and other local requirements within the municipality that affect the creation of impervious cover.

The following information must be included in the SWMP concurrent with the applicable

deadlines in Appendix F and H and updated annually thereafter, as necessary:

- Description of practices to achieve compliance with part 2.2.1 (TMDL requirements) including:
  - The person(s) or department responsible for the measure;
  - The BMPs for the control measure or permit requirement;
  - The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal must have an associated measure of assessment.
- Description of practices to achieve compliance with part 2.2.2 (discharges to certain water quality limited waters subject to additional requirements) including:
  - The person(s) or department responsible for the measure;
  - The BMPs for the control measure or permit requirement;
  - The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal must have an associated measure of assessment;
- Description of any other practices to achieve compliance with part 2.1 (water quality based requirements)

### **1.10.3. Contents and Timelines of the Stormwater Management Program for New Permittees**

a. Permittees seeking authorization for the first time shall meet all deadlines contained in this permit except the following:

- Timelines for public education requirements in part 2.3.2.c shall be extended by one (1) year and need to include one (1) message to each audience over the permit term;
- The ordinances, by-laws, or other regulatory mechanisms required by parts 2.3.4, 2.3.5 and 2.3.6 shall be completed as soon as possible, but no later than three (3) years from the permit effective date; and
- All other deadlines in part 2.3.4 shall be extended by three (3) years.
- All other deadlines in part 2.3.5, 2.3.6 and 2.3.7 shall be extended by two (2) years.
- All deadlines for discharges to water quality limited waters without a TMDL under part 2.2.2 shall be extended by two (2) years.

b. Contents of the Stormwater Management Program for New Permittees

The following information must be included in the SWMP within one (1) year of the permit effective date and updated annually thereafter, as necessary:

- Identification of names and titles of people responsible for program implementation. If a position is currently unfilled, list the title of the position and modify the SWMP with the name once the position is filled;
- Documentation of compliance with part 1.9.1;
- Documentation of compliance with part 1.9.2;
- Documentation of authorization of all new or increased discharges granted by MassDEP in compliance with part 2.1.2;
- Listing of all discharges identified pursuant to part 2.1.1 and description of response;
- Description of practices to achieve compliance with part 2.3 (MEP requirements)

identified in the permittee's NOI and any updates to those BMPs within the first year;

For each permit condition in part 2.3 identify:

- The person(s) or department responsible for the measure;
  - The BMPs for the control measure or permit requirement;
  - The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal shall have a measure of assessment associated with it;
- Description of measures to avoid or minimize impacts to surface public drinking water supply sources. The permittee is also encouraged to include provisions to notify public water supplies in the event of an emergency. Massachusetts Department of Environmental Protection, Bureau of Resource Protection, Drinking Water Program, One Winter Street, Boston, MA 02108 – phone 617.292.5770. Description of activities to achieve compliance with part 3.0;
  - Annual program evaluation (part 4.1). Update annually and maintain copies.

The following information must be included in the SWMP within three (3) years of the permit effective date and updated annually thereafter, as necessary:

- Written procedures for site inspections and enforcement of sediment and erosion control procedures in accordance with part 2.3.5;

The following information must be included in the SWMP within four (4) years of the permit effective date and updated annually thereafter, as necessary:

- Outfall and interconnection inventory;
- Sanitary Sewer Overflow (SSO) inventory including all of the information required in part 2.3.4.4.b;
- Written IDDE Program pursuant to part 2.3.4.6.
- Written operation and maintenance procedures for municipal activities in part 2.3.7.a.ii;
- Written program detailing the activities and procedures the permittee will implement so that the MS4 infrastructure is maintained in a timely manner to reduce the discharge of pollutants from the MS4 in accordance with part 2.3.7.a.iii.1;
- Written procedures to require submission of as-built drawings and ensure long term operation and maintenance in accordance with part 2.3.6.a.iii;

The following information must be included in the SWMP within five (5) years of the permit effective date and updated annually thereafter, as necessary:

- Phase 1 of the map of the separate storm sewer system required by part 2.3.4.5;
- Listing of all receiving waterbody segments, their classification under the applicable state water quality standards, any impairment(s) and associated pollutant(s) of concern, applicable TMDLs and WLAs, and number of outfalls from the MS4 that discharge to each waterbody. In addition to the receiving water, the permittee shall document in the SWMP all surface public drinking water sources that may be impacted by MS4 discharges;
- Listing of all interconnected MS4s and other separate storm sewer systems receiving a discharge from the permitted MS4, the receiving waterbody segment(s) ultimately receiving the discharge, their classification under the applicable state water quality standards, any impairment(s) and associated pollutant(s) of concern, applicable TMDLs

and WLAs, and the number of interconnections;

The following information must be included in the SWMP within six (6) years of the permit effective date and updated annually thereafter, as necessary:

- Report(s) assessing current street design and parking lot guidelines and other local requirements within the municipality that affect the creation of impervious cover.

The following information must be included in the SWMP concurrent with the applicable deadlines in Appendix F and H (extended by two (2) years) and updated annually thereafter, as necessary:

- Description of practices to achieve compliance with part 2.2.1 (discharges subject to requirements related to approved TMDLs) including:
  - The person(s) or department responsible for the measure;
  - The BMPs for the control measure or permit requirement;
  - The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal must have an associated measure of assessment.
- Description of practices to achieve compliance with part 2.2.2 (discharges to certain water quality limited waters subject to additional requirements) including:
  - The person(s) or department responsible for the measure;
  - The BMPs for the control measure or permit requirement;
  - The measurable goal(s) for each BMP. Each measurable goal shall include milestones and timeframes for its implementation and have a quantity or quality associated with its endpoint. Each goal must have an associated measure of assessment;
- Description of any other practices to achieve compliance with part 2.1 (water quality based requirements).

## **2.0. Non-Numeric Effluent Limitations**

This section includes terms and conditions necessary to reduce the discharge of pollutants from the MS4 to the maximum extent practicable; to protect water quality and to satisfy the appropriate water quality requirements of the Clean Water Act and the Massachusetts Water Quality Standards.

### **2.1. Water Quality Based Effluent Limitations**

Pursuant to Clean Water Act 402(p)(3)(B)(iii), this permit includes provisions to ensure that discharges from the permittee's small MS4 meet applicable water quality standards as set forth in part 2.1.1. below.

#### **2.1.1. Requirement to Meet Water Quality Standards**

- a. The permittee's discharges shall meet applicable water quality standards by complying with parts 2.1.1.b and/or 2.1.1.c in accordance with the schedules set forth therein.<sup>2</sup> Any other

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<sup>2</sup> Applicable water quality standards are the state standards that have been federally approved or promulgated as of the issuance date of this permit and are compiled by EPA at <http://www.epa.gov/waterscience/standards/wqslibrary/>.

discharge of a pollutant that: (i) is not addressed by part 2.1.1.b, part 2.1.1.c, part 2.2.1, and/or part 2.2.2, (ii) is not the result of an illicit discharge subject to part 2.3.4, and (iii) does not meet applicable water quality standards, either independently or in conjunction with other discharges, shall comply with part 2.1.1.d.

- b. If there is a discharge from the MS4 to a waterbody (or its tributaries in some cases) that is subject to an EPA approved or established TMDL identified in part 2.2.1, the permittee is subject to the requirements of part 2.2.1 and Appendix F of this permit and the permittee shall comply with all applicable schedules, alternative schedules and requirements in Appendix F. A permittee's compliance with all applicable requirements and BMP implementation schedules in Appendix F or any alternative schedules applicable to it will constitute compliance with part 2.1.1.a. of the Permit for discharges of pollutants addressed in Appendix F.
- c. If (i) there is a discharge from the MS4 to a waterbody (or its tributaries in some cases) that is water quality limited (see definition in Appendix A) due to nutrients (Total Nitrogen or Total Phosphorus), metals (Cadmium, Copper, Iron, Lead or Zinc), solids (TSS or Turbidity), bacteria/pathogens (E. Coli, Enterococcus or Fecal Coliform), chloride (Chloride) or oil and grease (Petroleum Hydrocarbons or Oil and Grease) and is not subject to an approved TMDL, or (ii) the MS4 is located within a municipality listed in part 2.2.2.a.-b., then the permittee is subject to the requirements of part 2.2.2 and Appendix H of this permit and the permittee shall comply with all applicable schedules and requirements in Appendix H. A permittee's compliance with all applicable requirements and BMP implementation schedules in Appendix H applicable to it will constitute compliance with part 2.1.1.a. of the Permit for discharges of pollutants addressed in Appendix H.
- d. Pursuant to Part 2.1.1.a, upon notice from EPA or MassDEP to the permittee that a discharge of a pollutant from the MS4 that is exceeding applicable water quality standards, the permittee must, within 60 days, remedy the exceedance or eliminate the discharge. However, where such remedy or elimination within 60 days is impracticable, the permittee shall submit to EPA, by the same deadline, a schedule of actions to achieve a remedy or elimination in the shortest time not impracticable. The permittee shall implement such actions on the schedule submitted to EPA and report on progress in its annual reports unless or until EPA takes any other action that effectively replaces the schedule..

### **2.1.2. Increased Discharges**

- a. Any increased discharge, including increased pollutant loading(s) through the MS4 to waters of the United States is subject to Massachusetts antidegradation regulations at 314 CMR 4.04. The permittee shall comply with the provisions of 314 CMR 4.04 including information submittal requirements and obtaining authorization for increased discharges where appropriate<sup>3</sup>. Any authorization of an increased discharge by MassDEP shall be incorporated into the permittee's SWMP. If an applicable MassDEP approval specifies conditions or requirements related to the increased discharge, such requirements may be independently enforceable under State law and may be adopted into a future permit.
- b. There shall be no increased discharges, including increased pollutant loading(s) from the MS4 to impaired waters listed in categories 5 or 4b on the most recent Massachusetts Integrated Report of waters listed pursuant to Clean Water Act section 303(d) and 305(b) unless the permittee

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<sup>3</sup> Contact MassDEP for guidance on compliance with 314 CMR 4.04

demonstrates that there is no net increase in loading from the MS4 to the impaired water of the pollutant(s) for which the waterbody is impaired. The permittee may demonstrate compliance with this provision by *either*:

- i. Documenting that the pollutant(s) for which the waterbody is impaired is not present in the MS4's discharge and retaining documentation of this finding with the SWMP; or
  - ii. Documenting that the total load of the pollutant(s) of concern from the MS4 to any impaired portion of the receiving water will not increase as a result of the activity and retaining documentation of this finding in the SWMP. Unless otherwise determined by the Permittee, USEPA or by MassDEP that additional demonstration is necessary, compliance with the requirements of part 2.2.2 and part 2.3.6 of this Permit, including all reporting and documentation requirements, shall be considered as demonstrating no net increase as required by this part.
- c. The requirements of this part are independent of permit conditions requiring reduction in discharges of pollutants as set forth in parts 2.1.1 and 2.2 (water quality based requirements) and 2.3 (requirements to reduce discharge of pollutants to the maximum extent practicable). Permittees remain subject to requirements to reduce the discharge of pollutants from the MS4 as set forth in those parts.

## **2.2. Discharges to Certain Impaired Waters**

The permittee shall identify in the SWMP and Annual Reports all MS4 discharges, including both outfalls and interconnections to other MS4s or other separate storm sewer systems, that:

- Are subject to Total Maximum Daily Load (TMDL) related requirements as identified in part 2.2.1.
- Are subject to additional requirements to protect water quality as identified in part 2.2.2.

The discharge location from an interconnection shall be determined based on the receiving water of the outfall from the interconnected system.

Permittees are subject to the applicable requirements in part 2.2.1, Appendix F, or an approved alternative structural control implementation schedule, and/or the applicable requirements in part 2.2.2, and Appendix H.

### **2.2.1. Discharges Subject to Requirements Related to an Approved TMDL**

- a. "Approved TMDLs" are those that have been approved by EPA as of the date of issuance of this permit.
- b. The MS4s specified below discharge to waters within Massachusetts that are subject to TMDLs, or in some cases, to tributaries of such waters, and shall comply with the requirements of Appendix F, part A. Appendix F identifies, by section, the provisions the permittee shall implement to be consistent with the terms of the approved TMDL. Alternatively, EPA may notify the permittee that an individual permit application is necessary in accordance with part 1.8.a.
  - i. The following is a list of municipalities in the Charles River Watershed:

1.

Arlington	Mendon
Ashland	Milford
Bellingham	Millis
Belmont	Natick
Brookline	Needham
Cambridge	Newton
Dedham	Norfolk
Dover	Sherborn
Foxborough	Walpole
Franklin	Waltham
Holliston	Watertown
Hopedale	Wayland
Hopkinton	Wellesley
Lexington	Weston
Lincoln	Westwood
Medfield	Wrentham
Medway	

Permittees that operate regulated MS4s located in municipalities listed above that discharge to the Charles River or its Tributaries shall meet the requirements of Appendix F, part A.I with respect to the reduction of phosphorus discharges from their MS4.

- ii. The following is a list of municipalities that contain a lake or pond subject to an approved lake or pond phosphorus TMDL in the Northern Blackstone Basin, Chicopee Basin, Connecticut Basin, French Basin, Millers Basin or in the watershed of Bare Hill Pond, Flint Pond, Indian Lake, Lake Boon, Lake Quinsigamond, Leesville Pond, Salisbury Pond, Quaboag Pond or Quacumquasit Pond.

1.

Auburn	Millbury
Charlton	Oxford
Dudley	Shrewsbury
Gardner	Spencer
Grafton	Springfield
Granby	Stow
Hadley	Templeton
Harvard	Westminster
Hudson	Winchendon
Leicester	Wilbraham

Ludlow	
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Permittees that operate regulated MS4s in the above municipalities that discharge to waterbodies listed on Table F-6 in Appendix F or their tributaries, and any other MS4 that discharges to waterbodies listed on Table F-6 in Appendix F or their tributaries, shall meet the requirements of Appendix F, part A.II with respect to reduction of phosphorus discharges from their MS4.

iii. The following is a list of municipalities that contain waters subject to an approved TMDL for bacteria or pathogens.

1.

Abington	Marshfield
Acushnet	Mashpee
Andover	Mattapoisett
Avon	Medfield
Barnstable	Medway
Bedford	Melrose
Bellingham	Mendon
Belmont	Milford
Berkley	Millis
Beverly	Milton
Billerica	Nahant
Bourne	Natick
Brewster	Needham
Bridgewater	New Bedford
Brockton	Newton
Brookline	Norfolk
Burlington	North Andover
Cambridge	Norton
Canton	Norwell
Chatham	Norwood
Cohasset	Orleans
Concord	Peabody
Danvers	Pembroke
Dartmouth	Plymouth
Dedham	Raynham
Dennis	Rehoboth
Dighton	Revere
Dover	Rockland
Duxbury	Rockport
East Bridgewater	Salem

Eastham	Sandwich
Essex	Saugus
Everett	Scituate
Fairhaven	Seekonk
Fall River	Sharon
Falmouth	Sherborn
Foxborough	Somerset
Franklin	Stoughton
Freetown	Swampscott
Gloucester	Swansea
Hanover	Taunton
Hanson	Tewksbury
Harwich	Wakefield
Holliston	Walpole
Hopedale	Waltham
Hopkinton	Wareham
Ipswich	Watertown
Kingston	Wellesley
Lawrence	Wellfleet
Lexington	West Bridgewater
Lincoln	Weston
Lynn	Westport
Lynnfield	Westwood
Malden	Whitman
Manchester	Wilmington
Mansfield	Winthrop
Marblehead	Yarmouth
Marion	

The operators of MS4s located in municipalities listed above that discharge to a waterbody segment listed on Table F-8 in Appendix F and any other MS4 that discharges directly to a waterbody segment listed on Table F-8 in Appendix F shall meet the requirements of Appendix F, part A.III with respect to reduction of bacteria/pathogens discharges from their MS4.

- iv. The following is a list of municipalities located on Cape Cod that contain waters subject to an approved TMDL for nitrogen (Total Nitrogen).

1.

Bourne
Barnstable
Chatham
Falmouth

Harwich
Mashpee
Orleans
Yarmouth

Permittees that operate regulated MS4s located in the municipalities above that discharge to waterbodies found on Table F-9 in Appendix F or their tributaries and any other MS4 that discharges to waterbodies found on Table F-9 in Appendix F or their tributaries shall meet the requirements of Appendix F, part A.IV with respect to reduction of nitrogen discharges from their MS4.

- v. The following is a list of municipalities located in the Assabet River Watershed:

- 1.

Acton	Hudson
Berlin	Littleton
Bolton	Marlborough
Boxborough	Maynard
Boylston	Northborough
Carlisle	Shrewsbury
Clinton	Stow
Concord	Westborough
Grafton	Westford
Harvard	

Permittees that operate regulated MS4s located in the municipalities above that discharge to the Assabet River or its tributaries shall meet the requirements of Appendix F part A.V with respect to reduction of phosphorus discharges from their MS4.

- c. The MS4s specified below discharge to waters, or tributaries of waters, that have been identified in an adjacent state’s approved TMDL as being impaired due, in part, to MS4 stormwater discharges in Massachusetts, and shall comply with the requirements of Appendix F, part B. Appendix F identifies, by section, the provisions the permittee shall implement to be consistent with the reasonable assumptions related to Massachusetts MS4 discharges. Alternatively, EPA may notify the permittee that an individual permit application is necessary in accordance with part 1.8.a.

- i. The following is a list of municipalities in Massachusetts located in the watershed of Long Island Sound, which has an approved TMDL for nitrogen (Total Nitrogen).

- 1.

Adams	North Adams
Agawam	Northampton
Amherst	Oxford
Ashburnham	Palmer

Ashby	Paxton
Auburn	Pelham
Belchertown	Pittsfield
Charlton	Richmond
Cheshire	Russell
Chicopee	Rutland
Dalton	South Hadley
Douglas	Southampton
Dudley	Southbridge
East Longmeadow	Southwick
Easthampton	Spencer
Gardner	Springfield
Granby	Sturbridge
Hadley	Sutton
Hampden	Templeton
Hatfield	Ware
Hinsdale	Webster
Holyoke	West Springfield
Lanesborough	Westfield
Leicester	Westhampton
Lenox	Westminster
Longmeadow	Wilbraham
Ludlow	Williamsburg
Millbury	Winchendon
Monson	

Permittees that operate regulated MS4s located in the municipalities above that discharge to a water within the Connecticut River Watershed, the Housatonic River Watershed, or the Thames River Watershed shall meet the requirements of Appendix F part B. I with respect to nitrogen discharges from their MS4.

- ii. The following is a list of municipalities in Massachusetts identified in a TMDL as containing MS4s contributing phosphorus to waterbody segments that have out of state approved TMDLs for phosphorus:

- 1.

Attleboro
North Attleborough
Plainville
Rehoboth
Seekonk
Swansea

Permittees that operate regulated MS4s located in the municipalities above that discharge to a waterbody found on Table F-12 in Appendix F or its tributaries shall meet the requirements of Appendix F part B. II with respect to phosphorus discharges from their MS4.

- iii. The following is a list of municipalities in Massachusetts identified in a TMDL as containing MS4s contributing bacteria/pathogens to waterbody segments that have out of state approved TMDLs for bacteria/pathogens:

- 1.

Attleboro
North Attleborough
Plainville
Rehoboth
Seekonk

Permittees that operate regulated MS4s located in the municipalities above that discharge to a waterbody found on Table F-13 in Appendix F or its tributaries shall meet the requirements of Appendix F part B. III with respect to bacteria/pathogens discharges from their MS4.

- iv. The following is a list of municipalities in Massachusetts identified in a TMDL as containing MS4s contributing metals (cadmium, lead, aluminum iron) to waterbody segments that have out of state approved TMDLs for metals (cadmium, lead, aluminum, iron):

- 1.

Attleboro
North Attleborough
Plainville
Seekonk

Permittees that operate regulated MS4s located in the municipalities above that discharge to a waterbody found on Table F-14 in Appendix F or its tributaries shall meet the requirements of Appendix F part B. IV with respect to metals discharges from their MS4.

**2.2.2. Discharges to Certain Water Quality Limited Waters Subject to Additional Requirements**

For purposes of this permit, a ‘water quality limited water body’ is any water body that does not meet applicable water quality standards, including but not limited to waters listed in categories 5 or 4b on the Massachusetts Integrated Report of waters listed pursuant to Clean Water Act section 303(d) and 305(b).

If there is a discharge from the MS4 to a water quality limited waterbody where pollutants typically found in stormwater (specifically nutrients (Total Nitrogen or Total Phosphorus), solids (TSS or Turbidity), bacteria/pathogens (E. Coli, Enterococcus or Fecal Coliform), chloride (Chloride), metals (Cadmium, Copper, Iron, Lead or Zinc) and oil and grease (Petroleum Hydrocarbons or Oil and Grease)) are the cause of the impairment and is not subject to part 2.1.1.b for those pollutants, or the MS4 is located in a town listed in part 2.2.2.a.-b, the permittee shall comply with the provisions

in Appendix H applicable to it. Permittees notified by EPA or MassDEP during the permit term that they are discharging to a water quality limited water shall update their SWMP to include measures they must take in accordance with Appendix H.

In the absence of a defined pollutant reduction target and where no approved TMDL has been established as of the issuance date of this permit, this permit part and Appendix H define an iterative approach addressing pollutant reductions to waterbodies where the permittee’s discharge is not meeting applicable water quality standards due to nutrients (Total Nitrogen Total Phosphorus), solids (TSS or Turbidity), bacteria/pathogens (E. Coli, Enterococcus or Fecal Coliform), chloride (Chloride), metals (Cadmium, Copper, Iron, Lead or Zinc) or oil and grease (Petroleum Hydrocarbons or Oil and Grease).

a. Discharges to water quality limited waterbodies where nitrogen (Total Nitrogen) is the cause of the impairment, or their tributaries

i. The requirements of this part are applicable to:

1. Permittees (including traditional and non-traditional MS4s) that own or operate an MS4 in the following municipalities. Discharges from MS4s within these municipalities are to waterbodies that are impaired due to nitrogen (Total Nitrogen), or their tributaries.

Abington	Mattapoisett
Acushnet	Middleborough
Attleboro	New Bedford
Avon	Norton
Barnstable	Peabody
Berkley	Pembroke
Bourne	Plainville
Bridgewater	Plymouth
Brockton	Plympton
Carver	Raynham
Dartmouth	Rehoboth
Dighton	Rochester
East Bridgewater	Salem
Easton	Seekonk
Fairhaven	Sharon
Fall River	Somerset
Foxborough	Stoughton
Freetown	Swansea
Halifax	Taunton
Hanson	Wakefield
Holbrook	Wareham
Kingston	West Bridgewater
Lakeville	Westport

Lynnfield	Whitman
Mansfield	Wrentham
Marion	Yarmouth

2. Any other permittee that, during the permit term, becomes aware that its discharge is to a waterbody that is water quality limited due to nitrogen (Total Nitrogen), or a tributary of such water.
    - ii. Permittees subject to part 2.2.2.a.i above shall meet the requirements of Appendix H part I with respect to the control of nitrogen discharges from their MS4;
    - iii. During development of their Notice of Intent, the permittee may determine that all discharges from the regulated area through their MS4 are outside of a watershed that contains a nitrogen (Total Nitrogen) impairment in a downstream segment. The permittee shall retain all documentation used in this determination as part of their NOI and are relieved from the requirements of part 2.2.2.a.i and Appendix H part I.
- b. Discharges to water quality limited waterbodies where phosphorus (“Total Phosphorus”) is the cause of the impairment, or their tributaries
- i. The requirements of this part are applicable to:
    1. Permittees (including traditional and non-traditional MS4s) that own or operate an MS4 in the following municipalities. Discharges from MS4s within these municipalities are to waterbodies that are impaired due to phosphorus (Total Phosphorus), or their tributaries.

Abington	Lynn
Acushnet	Lynnfield
Andover	Malden
Arlington	Mansfield
Ashburnham	Marlborough
Ashland	Mashpee
Auburn	Medfield
Avon	Medford
Ayer	Melrose
Barnstable	Mendon
Bedford	Methuen
Belchertown	Millbury
Belmont	Millville
Billerica	Milton
Blackstone	North Andover
Bolton	Northbridge
Brewster	Norton

Bridgewater	Norwood
Brockton	Oxford
Burlington	Peabody
Cambridge	Pembroke
Canton	Pepperell
Carlisle	Pittsfield
Carver	Quincy
Chelmsford	Randolph
Chelsea	Reading
Clinton	Revere
Concord	Rockland
Dalton	Salem
Dedham	Scituate
Douglas	Seekonk
Dover	Sharon
Dracut	Shirley
Dunstable	Shrewsbury
East Bridgewater	Somerville
Eastham	Southampton
Easthampton	Spencer
Everett	Springfield
Falmouth	Stoneham
Fitchburg	Stoughton
Foxborough	Sudbury
Framingham	Sutton
Gloucester	Taunton
Grafton	Tewksbury
Granby	Townsend
Groton	Tyngsborough
Halifax	Upton
Hanover	Uxbridge
Hanson	Wakefield
Harvard	Walpole
Haverhill	Wareham
Hinsdale	Watertown
Hopkinton	Wayland
Hudson	West Bridgewater
Lancaster	Westfield

Lawrence	Westminster
Leicester	Westwood
Lenox	Whitman
Leominster	Wilmington
Lexington	Winchendon
Littleton	Winchester
Lowell	Winthrop
Lunenburg	Woburn
Lynn	

2. Any other permittee that, during the permit term, becomes aware that its discharge is to a waterbody that is water quality limited due to phosphorus (“Total Phosphorus”), or to a tributary of such water.
    - ii. The permittees subject to part 2.2.2.b.i. above shall meet all requirements of Appendix H part II with respect to the control of phosphorus discharges from the MS4.
    - iii. During development of their Notice of Intent, the permittee may determine that all discharges from the regulated area through their MS4 are outside of a watershed that contains a phosphorus (“Total Phosphorus”) impairment in a downstream segment. The permittee shall retain all documentation used in this determination as part of their NOI and are relieved from the requirements of part 2.2.2.b.i and Appendix H part II.
- c. Discharges to water quality limited waterbodies where bacteria or pathogens is the cause of the impairment
- i. The requirements of this part are applicable to:
    1. Any MS4 discharge identified by the permittee on their Notice of Intent as discharging directly to an impaired waterbody on the most recent EPA approved Massachusetts 303(d) list where bacteria or pathogens (E. Coli, Enterococcus or Fecal Coliform) is the cause of the impairment.
    2. Any other MS4 that, during the permit term, becomes aware that its discharge is to a waterbody that is water quality limited due to bacteria or pathogens.
  - ii. The permittees subject to part 2.2.2.c.i. shall meet all requirements of Appendix H part III with respect to reduction of bacteria or pathogens discharges from the MS4.
- d. Discharges to water quality limited waterbodies where chloride (Chloride) is the cause of the impairment
- i. The requirements of this part are applicable to:
    1. Any MS4 discharge identified by the permittee on their Notice of Intent as discharging directly to an impaired waterbody on the most recent EPA approved Massachusetts 303(d) list where chloride (Chloride) is the cause of the impairment.

2. Any other MS4 that, during the permit term, becomes aware that its discharge is to a waterbody that is water quality limited due to chloride (Chloride).
- ii. The permittees subject to part 2.2.2.d.i. shall meet all requirements of Appendix H part IV with respect to reduction of chloride discharges from the MS4.
- e. Discharges to water quality limited waterbodies where oil and grease (Petroleum Hydrocarbons or Oil and Grease), solids (TSS or Turbidity) or metals (Cadmium, Copper, Iron, Lead or Zinc) is the cause of the impairment
- i. The requirements of this part are applicable to:
    1. Any MS4 discharge identified by the permittee on their Notice of Intent as discharging directly to an impaired waterbody on the most recent EPA approved Massachusetts 303(d) list where oil and grease, solids or metals (Oil and Grease, Petroleum Hydrocarbons TSS, Turbidity, Cadmium, Copper, Iron, Lead or Zinc) is the cause of the impairment.
    2. Any other MS4 that, during the permit term, becomes aware that its discharge is to a waterbody that is water quality limited due to oil and grease (Petroleum Hydrocarbons or Oil and Grease), solids (TSS or Turbidity) or metals (Cadmium, Copper, Iron, Lead or Zinc).
  - ii. The permittees subject to part 2.2.2.d.i. shall meet all requirements of Appendix H part V with respect to reduction of solids, oil and grease or metals discharges from the MS4.

### **2.3. Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP)**

The permittee shall reduce the discharge of pollutants from the MS4 to the maximum extent practicable (MEP) as detailed in parts 2.3.2 through 2.3.7.

#### **2.3.1. Control Measures**

- a. Permittees authorized under the MS4-2003 permit shall continue to implement their existing SWMPs while updating their SWMPs pursuant to this permit. This permit does not extend the compliance deadlines set forth in the MS4-2003 permit.
- b. Implementation of one or more of the minimum control measures described in parts 2.3.2- 2.3.7 or other permit requirements may be shared with another entity (including another interconnected MS4) or the other entity may fully implement the measure or requirement, if the following requirements are satisfied:
  - The other entity, in fact, implements the control measure.
  - The particular control measure or component thereof undertaken by the other entity is at least as stringent as the corresponding permit requirement.
  - The other entity agrees to implement the control measure on the permittee's behalf. The annual reports must specify that the permittee is relying on another entity to satisfy some of its permit obligations and specify what those obligations are.
  - If the permittee is relying on another governmental entity regulated under 40 CFR §122 to satisfy all of its permit obligations, including the obligation to file annual reports, the permittee shall note that fact in its NOI, but is not required to file annual reports.

- The permittee remains responsible for compliance with all permit obligations if the other entity fails to implement the control measures (or component thereof). The permittee may enter into a legally binding agreement with the other entity regarding the other entity's performance of control measures, but the permittee remains ultimately responsible for permit compliance.

### 2.3.2. Public Education and Outreach

Objective: The permittee shall implement an education program that includes educational goals based on stormwater issues of significance within the MS4 area. The ultimate objective of a public education program is to increase knowledge and change behavior of the public so that pollutants in stormwater are reduced.

- a. The permittee shall continue to implement the public education program required by the MS4-2003 permit by distributing educational material to the MS4 community. The educational program shall define educational goals, express specific messages, define the targeted audience for each message, and identify responsible parties for program implementation. If appropriate for the target audience, materials may be developed in a language other than English. At a minimum, the program shall provide information concerning the impact of stormwater discharges on water bodies within the community, especially those waters that are impaired or identified as priority waters. The program shall identify steps and/or activities that the public can take to reduce the pollutants in stormwater runoff and their impacts to the environment.
- b. The educational program shall include education and outreach efforts for the following four audiences: (1) residents, (2) businesses, institutions (churches, hospitals), and commercial facilities, (3) developers (construction), and (4) industrial facilities, unless one of these audiences is not present in the MS4 community. In such a situation, the MS4 must document in both the NOI and SWMP which audience is absent from the community and no educational messages are required to that audience.
- c. The permittee shall distribute a minimum of two (2) educational messages over the permit term to each audience identified in part 2.3.2.b. The distribution of materials to each audience shall be spaced at least a year apart. Educational messages may be printed materials such as brochures or newsletters; electronic materials such as websites; mass media such as newspaper articles or public service announcement (radio or cable); targeted workshops on stormwater management, or displays in a public area such as town/city hall. The permittee may use existing materials if they are appropriate for the message the permittee chooses to deliver or the permittee may develop its own educational materials. The permittee may partner with other MS4s, community groups or watershed associations to implement the education program to meet this permit requirement.

Some EPA educational materials are available at: <http://cfpub.epa.gov/npstbx/index.html>.

- d. The permittee shall, at a minimum, consider the topics listed in part 2.3.2.d.i. – iv when developing the outreach/education program. The topics are not exclusive and the permittee shall focus on those topics most relevant to the community.
  - i. Residential program: effects of outdoor activities such as lawn care (use of pesticides, herbicides, and fertilizers and information on Massachusetts Regulation 331 CMR 31 pertaining to proper use of phosphorus containing fertilizers on turf grasses) on water

quality; benefits of appropriate on-site infiltration of stormwater; effects of automotive work and car washing on water quality; proper disposal of swimming pool water; proper management of pet waste; maintenance of septic systems. If the small MS4 area has areas serviced by septic systems, the permittee shall consider information pertaining to maintenance of septic systems as part of its education program.

- ii. Business/Commercial/Institution program: proper lawn maintenance (use of pesticides, herbicides and fertilizer, and information on Massachusetts Regulation 331 CMR 31 pertaining to proper use of phosphorus containing fertilizers on turf grasses); benefits of appropriate on-site infiltration of stormwater; building maintenance (use of detergents); use of salt or other de-icing and anti-icing materials (minimize their use); proper storage of salt or other de-icing/anti-icing materials (cover/prevent runoff to storm system and contamination to ground water); proper storage of materials (emphasize pollution prevention); proper management of waste materials and dumpsters (cover and pollution prevention); proper management of parking lot surfaces (sweeping); proper car care activities (washing of vehicles and maintenance); and proper disposal of swimming pool water by entities such as motels, hotels, and health and country clubs (discharges must be dechlorinated and otherwise free from pollutants).
  - iii. Developers and Construction: proper sediment and erosion control management practices; information about Low Impact Development (LID) principles and technologies; and information about EPA's construction general permit (CGP). This education can also be a part of the Construction Site Stormwater Runoff Control measure detailed in part 2.3.5.
  - iv. Industrial program: equipment inspection and maintenance; proper storage of industrial materials (emphasize pollution prevention); proper management and disposal of wastes; proper management of dumpsters; minimization of use of salt or other de-icing/anti-icing materials; proper storage of salt or other de-icing/anti-icing materials (cover/prevent runoff to storm system and ground water contamination); benefits of appropriate on-site infiltration of stormwater runoff from areas with low exposure to industrial materials such as roofs or employee parking; proper maintenance of parking lot surfaces (sweeping); and requirements for coverage under EPA's Multi-Sector General Permit.
- e. The program shall show evidence of focused messages for specific audiences as well as evidence that progress toward the defined educational goals of the program has been achieved. The permittee shall identify methods that it will use to evaluate the effectiveness of the educational messages and the overall education program. Any methods used to evaluate the effectiveness of the program shall be tied to the defined goals of the program and the overall objective of changes in behavior and knowledge.
  - f. The permittee shall modify any ineffective messages or distribution techniques for an audience prior to the next scheduled message delivery.
  - g. The permittee shall document in each annual report the messages for each audience; the method of distribution; the measures/methods used to assess the effectiveness of the messages, and the method/measures used to assess the overall effectiveness of the education program.

### 2.3.3. Public Involvement and Participation

Objective: The permittee shall provide opportunities to engage the public to participate in the review and implementation of the permittee's SWMP.

- a. All public involvement activities shall comply with state public notice requirements (MGL Chapter 30A, Sections 18 – 25 – effective 7/10/2010). The SWMP, all documents submitted to EPA in accordance with Appendix F, and all annual reports shall be available to the public online if the permittee has a website on which to post these documents.
- b. The permittee shall annually provide the public an opportunity to participate in the review and implementation of the SWMP.
- c. The permittee shall report on the activities undertaken to provide public participation opportunities including compliance with part 2.3.3.a. Public participation opportunities pursuant to part 2.3.3.b may include, but are not limited to, websites; hotlines; clean-up teams; monitoring teams; or an advisory committee.

### 2.3.4 Illicit Discharge Detection and Elimination (IDDE) Program

Objective: The permittee shall implement an IDDE program to systematically find and eliminate sources of non-stormwater discharges to its municipal separate storm sewer system and implement procedures to prevent such discharges.

- a. Legal Authority - The IDDE program shall include adequate legal authority to: prohibit illicit discharges; investigate suspected illicit discharges; eliminate illicit discharges, including discharges from properties not owned by or controlled by the MS4 that discharge into the MS4 system; and implement appropriate enforcement procedures and actions. Adequate legal authority consists of a currently effective ordinance, by-law, or other regulatory mechanism. For permittees authorized by the MS4-2003 permit, the ordinance, by-law, or other regulatory mechanism was a requirement of the MS4-2003 permit and was required to be effective by May 1, 2008. For new permittees the ordinance, by-law, or other regulatory mechanism shall be in place within 3 years of the permit effective date.
- b. During the development of the new components of the IDDE program required by this permit, permittees authorized by the MS4-2003 permit must continue to implement their existing IDDE program required by the MS4-2003 permit to detect and eliminate illicit discharges to their MS4.

#### 2.3.4.1. Definitions and Prohibitions

The permittee shall prohibit illicit discharges and sanitary sewer overflows (SSOs) to its MS4 and require removal of such discharges consistent with parts 2.3.4.2 and 2.3.4.4 of this permit.

An SSO is a discharge of untreated sanitary wastewater from a municipal sanitary sewer.

An illicit discharge is any discharge to a municipal separate storm sewer that is not composed entirely of stormwater, except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.

#### 2.3.4.2. Elimination of Illicit Discharges

- a. Upon detection of an illicit discharge, the permittee shall locate, identify and eliminate the illicit discharge as expeditiously as possible. Upon identification of the illicit source the MS4 notify all responsible parties for any such discharge and require immediate cessation of improper disposal

practices in accordance with its legal authorities. Where elimination of an illicit discharge within 60 days of its identification as an illicit discharge is not possible, the permittee shall establish an expeditious schedule for its elimination and report the dates of identification and schedules for removal in the permittee's annual reports. The permittee shall immediately commence actions necessary for elimination. The permittee shall diligently pursue elimination of all illicit discharges. In the interim, the permittee shall take all reasonable and prudent measures to minimize the discharge of pollutants to and from its MS4.

- b. The period between identification and elimination of an illicit discharge is not a grace period. Discharges from an MS4 that are mixed with an illicit discharge are not authorized by this Permit (part 1.3.a) and remain unlawful until eliminated.

#### 2.3.4.3. Non-Stormwater Discharges

The permittee may presume that the sources of non-stormwater listed in part 1.4 of this permit need not be addressed. However, if the permittee identifies any of these sources as significant contributors of pollutants to the MS4, then the permittee shall implement measures to control these sources so they are no longer significant contributors of pollutants, and/or eliminate them entirely, consistent with part 2.3.4.

#### 2.3.4.4. Sanitary Sewer Overflows

- a. Upon detection of an SSO the permittee shall eliminate it as expeditiously as possible and take interim mitigation measures to minimize the discharge of pollutants to and from its MS4 until elimination is completed.
- b. The permittee shall identify all known locations where SSOs have discharged to the MS4 within the previous five (5) years. This shall include SSOs resulting, during dry or wet weather, from inadequate conveyance capacities, or where interconnectivity of the storm and sanitary sewer infrastructure allows for communication of flow between the systems. Within one (1) year of the effective date of the permit, the permittee shall develop an inventory of all identified SSOs indicating the following information, if available:
  - 1. Location (approximate street crossing/address and receiving water, if any);
  - 2. A clear statement of whether the discharge entered a surface water directly or entered the MS4;
  - 3. Date(s) and time(s) of each known SSO occurrence (i.e., beginning and end of any known discharge);
  - 4. Estimated volume(s) of the occurrence;
  - 5. Description of the occurrence indicating known or suspected cause(s);
  - 6. Mitigation and corrective measures completed with dates implemented; and
  - 7. Mitigation and corrective measures planned with implementation schedules.

The permittee shall maintain the inventory as a part of the SWMP and update the inventory annually, all updates shall include the information in part 2.3.4.4.b.1-7.

- c. In accordance with Paragraph B.12 of Appendix B of this permit, upon becoming aware of an SSO to the MS4, the permittee shall provide oral notice to EPA within 24 hours. Additionally, the permittee shall provide written notice to EPA and MassDEP within five (5) days of becoming aware of the SSO occurrence and shall include the information in the updated inventory. The notice shall contain all of the information listed in part 2.3.4.4.b. Where common notification requirements for SSOs are

included in multiple NPDES permits issued to a permittee, a single notification may be made to EPA as directed in the permittee's wastewater or CSO NPDES permit and constitutes compliance with this part.

- d. The permittee shall include and update the SSO inventory in its annual report, including the status of mitigation and corrective measures implemented by the permittee to address each SSO identified pursuant to this part.
- e. The period between detection and elimination of a discharge from the SSO to the MS4 is not a grace period. Discharges from an MS4 that are mixed with an SSO are not authorized by this Permit (part 1.3.a) and remain unlawful until eliminated.

#### 2.3.4.5. System mapping

The permittee shall develop a revised and more detailed map than was required by the MS4-2003 permit. This revised map of the MS4 shall be completed in two phases as outlined below. The mapping shall include a depiction of the permittee's separate storm sewer system in the permit area. The mapping is intended to facilitate the identification of key infrastructure and factors influencing proper system operation, and the potential for illicit sanitary sewer discharges.

- a. Phase I: The system map shall be updated within two (2) years of the permit effective date to include the following information:
  - Outfalls and receiving waters (required by MS4-2003 permit)
  - Open channel conveyances (swales, ditches, etc.)
  - Interconnections with other MS4s and other storm sewer systems
  - Municipally-owned stormwater treatment structures (e.g., detention and retention basins, infiltration systems, bioretention areas, water quality swales, gross particle separators, oil/water separators, or other proprietary systems)
  - Waterbodies identified by name and indication of all use impairments as identified on the most recent EPA approved Massachusetts Integrated List of waters report pursuant to Clean Water Act section 303(d) and 305(b)
  - Initial catchment delineations. Any available system data and topographic information may be used to produce initial catchment delineations. For the purpose of this permit, a catchment is the area that drains to an individual outfall or interconnection.
- b. Phase II: The system map shall be updated annually as the following information becomes available during implementation of catchment investigation procedures in part 2.3.4.8. This information must be included in the map for all outfalls within ten (10) years of the permit effective date:
  - Outfall spatial location (latitude and longitude with a minimum accuracy of +/-30 feet)
  - Pipes
  - Manholes
  - Catch basins
  - Refined catchment delineations. Catchment delineations shall be updated to reflect information collected during catchment investigations
  - Municipal sanitary sewer system (if available)
  - Municipal combined sewer system (if applicable).

- c. Recommended elements to be included in the system map as information becomes available:
- Storm sewer material, size (pipe diameter) and age
  - Sanitary sewer system material, size (pipe diameter) and age
  - Privately-owned stormwater treatment structures
  - Where a municipal sanitary sewer system exists, properties known or suspected to be served by a septic system, especially in high-density urban areas
  - Area where the permittee's MS4 has received or could receive flow from septic system discharges (e.g., areas with poor soils, or high ground water elevations unsuitable for conventional subsurface disposal systems)
  - Seasonal high water table elevations impacting sanitary alignments
  - Topography
  - Orthophotography
  - Alignments, dates and representation of work completed (with legend) of past illicit discharge investigations (e.g., flow isolation, dye testing, CCTV)
  - Locations of suspected, confirmed and corrected illicit discharges (with dates and flow estimates).
- d. The mapping may be produced by hand or through computer-aided methods (e.g. GIS). The required scale and detail of the map shall be appropriate to facilitate a rapid understanding of the system by the permittee, EPA and the state. In addition, the mapping shall serve as a planning tool for the implementation and phasing of the IDDE program and demonstration of the extent of complete and planned investigations and corrections. The permittee shall update the mapping as necessary to reflect newly discovered information and required corrections or modifications.
- e. The permittee shall report on the progress towards the completion of the system map in each annual report.

#### 2.3.4.6. Written Illicit Discharge Detection and Elimination Program

The IDDE program shall be recorded in a written (hardcopy or electronic) document. The IDDE program shall include each of the elements described in parts 2.3.4.7 and part 2.3.4.8, unless the permittee provides a written explanation within the IDDE program as to why a particular element is not applicable to the permittee.

Notwithstanding the permittee's explanation, EPA may at any time determine that a particular element is in fact applicable to the permittee and require the permittee to add it to the IDDE program. The written (hardcopy or electronic) IDDE program shall be completed within one (1) year of the effective date of the permit and updated in accordance with the milestones of this part. The permittee shall implement the IDDE program in accordance with the goals and milestones contained in this part.

- a. The written (hardcopy or electronic) IDDE program shall include a reference or citation of the authority the permittee will use to implement all aspects of the IDDE program.
- b. Statement of IDDE Program Responsibilities - The permittee shall establish a written (hardcopy or electronic) statement that clearly identifies responsibilities with regard to eliminating illicit discharges. The statement shall identify the lead municipal agency(ies) or department(s) responsible for implementing the IDDE Program as well as any other agencies or departments that may have responsibilities for aspects of the program (e.g., board of health responsibilities for overseeing septic system construction; sanitary sewer system staff; inspectional services for enforcing plumbing codes;

town counsel responsibilities in enforcement actions, etc.). Where multiple departments and agencies have responsibilities with respect to the IDDE program specific areas of responsibility shall be defined and processes for coordination and data sharing shall be established and documented.

- c. Program Procedures – The permittee shall include in the written IDDE program all written procedures developed in accordance with the requirements and timelines in parts 2.3.4.7 and 2.3.4.8 below. At a minimum this shall include the written procedures for dry weather outfall screening and sampling and for catchment investigations.

#### 2.3.4.7. Assessment and Priority Ranking of Outfalls/Interconnections

The permittee shall assess and priority rank the outfalls in terms of their potential to have illicit discharges and SSOs and the related public health significance. This ranking will determine the priority order for screening of outfalls and interconnections pursuant to part 2.3.4.7.b, catchment investigations for evidence of illicit discharges and SSOs pursuant to part 2.3.4.8, and provides the basis for determining permit milestones of this part.

- a) Outfall/Interconnection Inventory and Initial Ranking:

An initial outfall and interconnection inventory and priority ranking to assess illicit discharge potential based on existing information shall be completed within one (1) year from the effective date of the permit; an updated inventory and ranking will be provided in each annual report thereafter. The inventory shall be updated annually to include data collected in connection with the dry weather screening and other relevant inspections conducted by the permittee.
- i. The outfall and interconnection inventory will identify each outfall and interconnection discharging from the MS4, record its location and condition, and provide a framework for tracking inspections, screenings and other activities under the permittee’s IDDE program.
  - An outfall means a point source as defined by 40 CFR § 122.2 as the point where the municipal separate storm sewer discharges to waters of the United States. An outfall does not include open conveyances connecting two municipal separate storm sewers or pipes, tunnels or other conveyances that connect segments of the same stream or other waters of the United States and that are used to convey waters of the United States. (40 CFR § 122.26(b)(9)). However, it is strongly recommended that a permittee inspect all accessible portions of the system as part of this process. Culverts longer than a simple road crossing shall be included in the inventory unless the permittee can confirm that they are free of any connections and simply convey waters of the United States.
  - An interconnection means the point (excluding sheet flow over impervious surfaces) where the permittee’s MS4 discharges to another MS4 or other storm sewer system, through which the discharge is conveyed to waters of the United States or to another storm sewer system and eventually to a water of the United States.
- ii. The permittee shall classify each of the permittee’s outfalls and interconnections into one of the following categories:
  - Problem Outfalls: Outfalls/interconnections with known or suspected contributions of illicit discharges based on existing information shall be designated as Problem Outfalls. This shall

include any outfalls/interconnections where previous screening indicates likely sewer input.<sup>4</sup> Problem Outfalls need not be screened pursuant to part 2.3.4.7.b.

- High Priority Outfalls: Outfalls/interconnections that have not been classified as Problem Outfalls and that are:
    - discharging to an area of concern to public health due to proximity of public beaches, recreational areas, drinking water supplies or shellfish beds;
    - determined by the permittee as high priority based on the characteristics listed below or other available information;
  - Low Priority Outfalls: Outfalls/interconnections determined by the permittee as low priority based on the characteristics listed below or other available information.
  - Excluded outfalls: Outfalls/interconnections with no potential for illicit discharges may be excluded from the IDDE program. This category is limited to roadway drainage in undeveloped areas with no dwellings and no sanitary sewers; drainage for athletic fields, parks or undeveloped green space and associated parking without services; cross-country drainage alignments (that neither cross nor are in proximity to sanitary sewer alignments) through undeveloped land.
- iii. The permittee shall priority rank outfalls into the categories above (except for excluded outfalls), based on the following characteristics of the defined initial catchment area where information is available:
- Past discharge complaints and reports.
  - Poor receiving water quality- the following guidelines are recommended to identify waters as having a high illicit discharge potential: exceeding water quality standards for bacteria; ammonia levels above 0.5 mg/l; surfactants levels greater than or equal to 0.25 mg/l.
  - Density of generating sites- Generating sites are those places, including institutional, municipal, commercial, or industrial sites, with a potential to generate pollutants that could contribute to illicit discharges. Examples of these sites include, but are not limited to, car dealers; car washes; gas stations; garden centers; and industrial manufacturing areas.
  - Age of development and infrastructure – Industrial areas greater than 40 years old and areas where the sanitary sewer system is more than 40 years old will probably have a high illicit discharge potential. Developments 20 years or younger will probably have a low illicit discharge potential.
  - Sewer conversion – contributing catchment areas that were once serviced by septic systems, but have been converted to sewer connections may have a high illicit discharge potential.
  - Historic combined sewer systems – contributing areas that were once serviced by a combined sewer system, but have been separated may have a high illicit discharge potential.
  - Surrounding density of aging septic systems – Septic systems thirty years or older in residential land use areas are prone to have failures and may have a high illicit discharge potential.
  - Culverted streams – any river or stream that is culverted for distances greater than a simple roadway crossing may have a high illicit discharge potential.
  - Water quality limited waterbodies that receive a discharge from the MS4 or waters with approved TMDLs applicable to the permittee, where illicit discharges have the potential to

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<sup>4</sup> Likely sewer input indicators are any of the following:

- Olfactory or visual evidence of sewage,
- Ammonia  $\geq$  0.5 mg/L, surfactants  $\geq$  0.25 mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
- Ammonia  $\geq$  0.5 mg/L, surfactants  $\geq$  0.25 mg/L, and detectable levels of chlorine.

contain the pollutant identified as the cause of the water quality impairment.

- The permittee may also consider additional relevant characteristics, including location-specific characteristics; if so, the permittee shall include the additional characteristics in its written (hardcopy or electronic) IDDE program.

b) Dry Weather Outfall and Interconnection Screening and Sampling

All outfalls/interconnections (excluding Problem and excluded Outfalls) shall be inspected for the presence of dry weather flow within three (3) years of the permit effective date. The permittee shall screen all High and Low Priority Outfalls in accordance with their initial ranking developed at part 2.3.4.7.a.

- i. Written procedure: The permittee shall develop an outfall and interconnection screening and sampling procedure to be included in the IDDE program within one (1) year of the permit effective date. This procedure shall include the following procedures for:

- sample collection,
- use of field kits,
- storage and conveyance of samples (including relevant hold times), and
- field data collection and storage.

An example screening and sampling protocol (*EPA New England Bacterial Source Tracking Protocol*) can be found on EPA's website.

- ii. Weather conditions: Dry weather screening and sampling shall proceed only when no more than 0.1 inches of rainfall has occurred in the previous 24-hour period and no significant snow melt is occurring.

- iii. Screening requirements: For each outfall/interconnection:

1. The permittee shall record all of the following information and include it in the outfall/interconnection inventory and priority ranking:

- unique identifier,
- receiving water,
- date of most recent inspection,
- dimensions,
- shape,
- material (concrete, PVC),
- spatial location (latitude and longitude with a minimum accuracy of +/-30 feet,
- physical condition,
- indicators of potential non-stormwater discharges (including presence or evidence of suspect flow and sensory observations such as odor, color, turbidity, floatables, or oil sheen).

2. If an outfall/interconnection is inaccessible or submerged, the permittee shall proceed to the first accessible upstream manhole or structure for the observation and sampling and report the location with the screening results.

3. If no flow is observed, but evidence of illicit flow exists, the permittee shall revisit the

outfall during dry weather within one week of the initial observation, if practicable, to perform a second dry weather screening and sample any observed flow (proceed as in iv. below).

4. Where dry weather flow is found at an outfall/interconnection, at least one (1) sample shall be collected, and:
  - a) Samples shall be analyzed at a minimum for:
    - ammonia,
    - chlorine,
    - conductivity,
    - salinity,
    - *E. coli* (freshwater receiving water) or enterococcus (saline or brackish receiving water),
    - surfactants (such as MBAS),
    - temperature, and
    - pollutants of concern<sup>5</sup>
  - b) All analyses with the exception of indicator bacteria and pollutants of concern can be performed with field test kits or field instrumentation and are not subject to 40 CFR part 136 requirements. Sampling for bacteria and pollutants of concern shall be conducted using the analytical methods found in 40 CFR §136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR §136. Sampling for ammonia and surfactants must use sufficiently sensitive methods to detect those parameters at or below the threshold indicator concentrations of 0.5 mg/L for ammonia and 0.25 mg/L for surfactants. Sampling for residual chlorine must use a method with a detection limit of 0.02 mg/L or 20 ug/L.
- iv. The permittee may rely on screening conducted under the MS4-2003 permit, pursuant to an EPA enforcement action, or by the state or EPA to the extent that it meets the requirements of part 2.3.4.7.b.iii.4. All data shall be reported in each annual report. Permittees that have conducted substantially equivalent monitoring to that required by part 2.3.4.7.b as part of an EPA enforcement action can request an exemption from the requirements of part 2.3.4.7.b by submitting a written request to EPA and retaining exemption approval from EPA as part of the SWMP. Until the permittee receives formal written approval of the exemption from part 2.3.4.7.b from EPA the permittee remains subject to all requirements of part 2.3.4.7.b.
- v. The permittee shall submit all screening data used in compliance with this part in its Annual Report.
- c) Follow-up ranking of outfalls and interconnections:
  - i. The permittee's outfall and interconnection ranking (2.3.4.7.a) shall be updated to reprioritize outfalls and interconnections based on information gathered during dry weather screening (part 2.3.4.7.b).

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<sup>5</sup> Where the discharge is directly into a water quality limited water or a water subject to an approved TMDL as indicated in Appendix F; the sample shall be analyzed for the pollutant(s) of concern identified as the cause of the impairment as specified in Appendix G

- ii. Outfalls/interconnections where relevant information was found indicating sewer input to the MS4 or sampling results indicating sewer input<sup>6</sup> shall be considered highly likely to contain illicit discharges from sanitary sources, and such outfalls/interconnections shall be ranked at the top of the High Priority Outfalls category for investigation. At this time, permittees may choose to rank other outfalls and interconnections based on any new information from the dry weather screening.
- iii. The ranking can be updated continuously as dry weather screening information becomes available, but shall be completed within three (3) years of the effective date of the permit.

#### 2.3.4.8. Catchment Investigations

The permittee shall develop a systematic procedure to investigate each catchment associated with an outfall or interconnection within their MS4 system.

a. Timelines:

- A written catchment investigation procedure shall be developed within 18 months of the permit effective date in accordance with the requirements of part 2.3.4.8.b below.
- Investigations of catchments associated with Problem Outfalls shall begin no later than two (2) years from the permit effective date.
- Investigations of catchments associated with High and Low Priority Outfalls shall follow the ranking of outfalls updated in part 2.3.4.7.c.
- Investigations of catchments associated with Problem Outfalls shall be completed within seven (7) years of the permit effective date
- Investigations of catchments where any information gathered on the outfall/interconnection identifies sewer input<sup>7</sup> shall be completed within seven (7) years of the permit effective date.
- Investigations of catchments associated with all High- and Low-Priority Outfalls shall be completed within ten (10) years of the permit effective date.

\*For the purposes of these milestones, an individual catchment investigation will be considered complete if all relevant procedures in part 2.3.4.8.c. and 2.3.4.8.d. below have been completed.

b. A written catchment investigation procedure shall be developed that:

- i. **Identifies maps, historic plans and records, and other sources of data**, including but not limited to plans related to the construction of the storm drain and of sanitary sewers, prior work performed on the storm drains or sanitary sewers, board of health or other municipal data on septic system failures or required upgrades, and complaint records related to SSOs, sanitary sewer surcharges, and septic system breakouts. These data sources will be used in identifying system

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<sup>6</sup> Likely sewer input indicators are any of the following:

- Olfactory or visual evidence of sewage,
- Ammonia  $\geq 0.5$  mg/L, surfactants  $\geq 0.25$  mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
- Ammonia  $\geq 0.5$  mg/L, surfactants  $\geq 0.25$  mg/L, and detectable levels of chlorine.

<sup>7</sup> Likely sewer input indicators are any of the following:

- Olfactory or visual evidence of sewage,
- Ammonia  $\geq 0.5$  mg/L, surfactants  $\geq 0.25$  mg/L, and bacteria levels greater than the water quality criteria applicable to the receiving water, or
- Ammonia  $\geq 0.5$  mg/L, surfactants  $\geq 0.25$  mg/L, and detectable levels of chlorine.

vulnerability factors within each catchment.

- ii. **Includes a manhole inspection methodology** that shall describe a storm drain network investigation that involves systematically and progressively observing, sampling (as required below) and evaluating key junction manholes (see definition in Appendix A) in the MS4 to determine the approximate location of suspected illicit discharges or SSOs. The manhole inspection methodology may either start from the outfall and work up the system or start from the upper parts of the catchment and work down the system or be a combination of both practices. Either method must, at a minimum, include an investigation of each key junction manhole within the MS4, even where no evidence of an illicit discharge is observed at the outfall. The manhole inspection methodology must describe the method the permittee will use. The manhole inspection methodology shall include procedures for dry and wet weather investigations.
  - iii. **Establishes procedures to isolate and confirm sources of illicit discharges** where manhole investigations or other physical evidence or screening has identified that MS4 alignments are influenced by illicit discharges or SSOs. These shall include isolation of the drainage area for implementation of more detailed investigations, inspection of additional manholes along the alignment to refine the location of potential contaminant sources, and methods such as sandbagging key junction manhole inlets, targeted internal plumbing inspections, dye testing, video inspections, or smoke testing to isolate and confirm the sources.
- c. Requirements for each catchment investigation associated with an outfall/interconnection:
- i. For each catchment being investigated, the permittee shall review relevant mapping and historic plans and records gathered in accordance with Part 2.3.4.8.b.i. This review shall be used to identify areas within the catchment with higher potential for illicit connections. The permittee shall identify and record the presence of any of the following specific **System Vulnerability Factors (SVFs)**:
    - History of SSOs, including, but not limited to, those resulting from wet weather, high water table, or fat/oil/grease blockages;
    - Common or twin-invert manholes serving storm and sanitary sewer alignments;
    - Common trench construction serving both storm and sanitary sewer alignments;
    - Crossings of storm and sanitary sewer alignments where the sanitary system is shallower than the storm drain system;
    - Sanitary sewer alignments known or suspected to have been constructed with an underdrain system;
    - Inadequate sanitary sewer level of service (LOS) resulting in regular surcharging, customer back-ups, or frequent customer complaints;
    - Areas formerly served by combined sewer systems;
    - Sanitary sewer infrastructure defects such as leaking service laterals, cracked, broken, or offset sanitary infrastructure, directly piped connections between storm drain and sanitary sewer infrastructure, or other vulnerability factors identified through Inflow/Infiltration Analyses, Sanitary Sewer Evaluation Surveys, or other infrastructure investigations.

EPA recommends the permittee include the following in their consideration of System Vulnerability Factors:

- Sewer pump/lift stations, siphons, or known sanitary sewer restrictions where power/equipment failures or blockages could readily result in SSOs;
- Any sanitary sewer and storm drain infrastructure greater than 40 years old;

- Widespread code-required septic system upgrades required at property transfers (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance);
- History of multiple Board of Health actions addressing widespread septic system failures (indicative of inadequate soils, water table separation, or other physical constraints of the area rather than poor owner maintenance);

The permittee shall document the presence or absence of System Vulnerability Factors for each catchment, retain this documentation as part of its IDDE program, and report this information in Annual Reports. Catchments with a minimum of one (1) System Vulnerability Factor are subject to wet weather sampling requirements of part 2.3.4.8.c.ii.2.

- ii. For each catchment, the permittee must inspect key junction manholes and gather catchment information on the locations of MS4 pipes, manholes, and the extent of the contributing catchment.

1. For all catchments

- a) Infrastructure information shall be incorporated into the permittee's mapping required at part 2.3.4.5; the permittee will refine their catchment delineation based on the field investigation where appropriate.
- b) The SVF inventory for the catchment will be updated based on information obtained during the inspection, including common (twin invert) manholes, directly piped connections between storm drains and sanitary sewer infrastructure, common weir walls, sanitary sewer underdrain connections and other structural vulnerabilities where sanitary discharges could enter the storm drain system during wet weather.
  - 1) **Where a minimum of one (1) SVF is identified based on previous information or the investigation, a wet weather investigation must be conducted at the associated outfall (see below).**
- c) During dry weather, key junction manholes<sup>8</sup> shall be opened and inspected systematically for visual and olfactory evidence of illicit connections (e.g., excrement, toilet paper, gray filamentous bacterial growth, or sanitary products present).
  - 1) If flow is observed, the permittee shall sample the flow at a minimum for ammonia, chlorine and surfactants and can use field kits for these analyses.
  - 2) Where sampling results or visual or olfactory evidence indicate potential illicit discharges or SSOs, the area draining to the junction manhole shall be flagged for further upstream investigation.
- d) Key junction and subsequent manhole investigations will proceed until the location of suspected illicit discharges or SSOs can be isolated to a pipe segment between two manholes. If no evidence of an illicit discharge is found, catchment investigations will be considered complete upon completion of key junction manhole sampling.

2. For all catchments with a minimum of one (1) SVF identified

- a) The permittee shall meet the requirements above for dry weather screening
- b) The permittee shall inspect and sample under wet weather conditions to the extent necessary to determine whether wet weather-induced high flows in sanitary sewers or high groundwater in areas served by septic systems result in discharges of sanitary flow to the

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<sup>8</sup> Where catchments do not contain junction manholes, the dry weather screening and sampling shall be considered as meeting the manhole inspection requirement. In these catchments, dry weather screenings that indicate potential presence of illicit discharges shall be further investigated pursuant to part 2.3.4.8.d. Investigations in these catchments may be considered complete where dry weather screening reveals no flow; no evidence of illicit discharges or SSOs is indicated through sampling results or visual or olfactory means; and no wet weather System Vulnerability Factors are identified.

MS4.

- 1) The permittee shall conduct at least one wet weather screening and sampling at the outfall that includes the same parameters required during dry weather screening, part 2.3.4.7.b.iii.4.
  - 2) Wet weather sampling and screening shall proceed during or after a storm event of sufficient depth or intensity to produce a stormwater discharge. EPA strongly recommends sampling during the spring (March through June) when groundwater levels are relatively high.
  - 3) The permit does not require a minimum rainfall event prior to wet weather screening. However, permittees may incorporate provisions that assist in targeting such discharges, including avoiding sampling during the initial period of discharge (“first flush”) and/or identifying minimum storm event intensities likely to trigger sanitary sewer interconnections.
- c) This sampling can be done upon completion of any dry weather investigation but must be completed before the catchment investigation is marked as complete.
- iii. All data collected as part of the dry and wet weather catchment investigations shall be recorded and reported in each annual report.
- d. Identification/Confirmation of illicit source  
Where the source of an illicit discharge has been approximated between two manholes in the permittee’s MS4, the permittee shall isolate and identify/confirm the source of the illicit discharge using more detailed methods identified in their written procedure (2.3.4.8.b.iii). For outfalls that contained evidence of an illicit discharge, catchment investigations will be considered complete upon confirmation of all illicit sources.
- e. Illicit discharge removal  
When the specific source of an illicit discharge is identified, the permittee shall exercise its authority as necessary to require its removal pursuant to part 2.3.4.2 or 2.3.4.3.
- i. For each confirmed source the permittee shall include in the annual report the following information:
    - the location of the discharge and its source(s);
    - a description of the discharge;
    - the method of discovery;
    - date of discovery;
    - date of elimination, mitigation or enforcement action OR planned corrective measures and a schedule for completing the illicit discharge removal; and
    - estimate of the volume of flow removed.
  - ii. Within one year of removal of all identified illicit discharges within a catchment area, confirmatory outfall or interconnection screening shall be conducted. The confirmatory screening shall be conducted in dry weather unless System Vulnerability Factors have been identified, in which case both dry weather and wet weather confirmatory screening shall be conducted. If confirmatory screening indicates evidence of additional illicit discharges, the catchment shall be scheduled for additional investigation.

#### 2.3.4.9. Indicators of IDDE Program Progress

The permittee shall define or describe indicators for tracking program success and evaluate and report on the overall effectiveness of the IDDE program in each annual report. At a minimum the permittee shall document in each annual report:

- the number of SSOs and illicit discharges identified and removed,
- the number and percent of total outfall catchments served by the MS4 evaluated using the catchment investigation procedure,
- all dry weather and wet weather screening and sampling results and
- the volume of sewage removed

#### 2.3.4.10 Ongoing Screening

Upon completion of all catchment investigations pursuant to part 2.3.4.8.c and illicit discharge removal and confirmation (if necessary) pursuant to paragraph 2.3.4.8.e, each outfall or interconnection shall be reprioritized for screening in accordance with part 2.3.4.7.a and scheduled for ongoing screening once every five years. Ongoing screening shall consist of dry weather screening and sampling consistent with part 2.3.4.7.b; wet weather screening and sampling shall also be required at outfalls where wet weather screening was required due to SVFs and shall be conducted in accordance with part 2.3.4.8.c.ii. All sampling results shall be reported in the permittee's annual report.

#### 2.3.4.11 Training

The permittee shall, at a minimum, annually provide training to employees involved in IDDE program about the program, including how to recognize illicit discharges and SSOs. The permittee shall report on the frequency and type of employee training in the annual report.

### 2.3.5. Construction Site Stormwater Runoff Control

**Objective:** The objective of an effective construction stormwater runoff control program is to minimize or eliminate erosion and maintain sediment on site so that it is not transported in stormwater and allowed to discharge to a water of the U.S through the permittee's MS4. The construction site stormwater runoff control program required by this permit is a separate and distinct program from EPA's Construction General Permit in that the former is implemented by the MS4 operator to ensure that runoff from construction sites discharging to the MS4 are controlled consistent with the MS4's applicable requirements, whereas the latter is implemented by construction site operators to comply with the terms and conditions of EPA's permit (<https://www.epa.gov/npdes/2017-construction-general-permit-cgp>).

- a. Permittees shall implement and enforce a program to reduce pollutants in any stormwater runoff discharged to the MS4 from all construction activities that result in a land disturbance of greater than or equal to one acre within the regulated area. The permittee's program shall include disturbances less than one acre if that disturbance is part of a larger common plan of development or sale that would disturb one or more acres. Permittees authorized under the MS4-2003 permit shall continue to implement and enforce their existing program and modify as necessary to meet the requirements of this part.
- b. The permittee does not need to apply its construction program requirements to projects that receive a waiver from EPA under the provisions of 40 CFR § 122.26(b) (15) (i).

- c. The permittee shall develop and implement a construction site runoff control program that includes the elements in Paragraphs i. through iii. of this part:
- i. An ordinance or regulatory mechanism that requires the use of sediment and erosion control practices at construction sites. In addition to addressing sediment and erosion control, the ordinance must include controls for other wastes on construction sites such as demolition debris, litter and sanitary wastes. The ordinance or regulatory mechanisms shall provide that the permittee may, to the extent authorized by law, impose sanctions to ensure compliance with the local program. Development of an ordinance or other regulatory mechanism was a requirement of the MS4-2003 permit (See part II.B.4 and part IV.B.4). The ordinance or other regulatory mechanism required by the MS4-2003 permit shall have been effective by May 1, 2008.
  - ii. Written (hardcopy or electronic) procedures for site plan review, site inspections and enforcement of sediment and erosion control measures by the permittee. If not already existing, these procedures shall be completed within one (1) year from the effective date of the permit.
    1. The site plan review procedure shall include:
      - a pre-construction review by the permittee of the site design, the planned operations at the construction site, planned BMPs during the construction phase, and the planned BMPs to be used to manage runoff created after development;
      - consideration of potential water quality impacts;
      - procedures for the receipt and consideration of information submitted by the public; and
      - evaluating the incorporation of Low Impact Development (LID) site planning and design strategies, unless such practices are infeasible.
    2. The site inspection and enforcement procedures shall include:
      - who is responsible for site inspections and the necessary qualifications for performing inspections, as well as who has authority to implement enforcement procedures;
      - the requirement that inspections of BMPs occur during construction of BMPs as well as after construction of BMPs to ensure they are working as described in the approved plans
      - the use of mandated inspection forms, if appropriate; and
      - procedure for tracking the number of site reviews, inspections, and enforcement actions. This tracking information shall be included as part of each annual report required by part 4.4.
  - iii. Requirements for construction site operators performing land disturbance activities within the MS4 jurisdiction that result in stormwater discharges to the MS4 to implement a sediment and erosion control program that includes BMPs appropriate for the conditions at the construction site. The program may include references to the requirements of EPA's Construction General Permit (including the development of a SWPPP) to the extent they are consistent with the program requirements of this part. The program may include references to BMP design standards in state manuals, such as the 2008 Massachusetts Stormwater Handbook<sup>9</sup>, or design standards developed by the

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<sup>9</sup> The handbook is available at: <https://www.mass.gov/guides/massachusetts-stormwater-handbook-and-stormwater-standards>

MS4. EPA supports and encourages the use of design standards in local programs. Examples of appropriate sediment and erosion control measures for construction sites include local requirements to:

1. Minimize the amount of disturbed area and protect natural resources;
2. Stabilize sites when projects are complete or operations have temporarily ceased;
3. Protect slopes on the construction site;
4. Protect all storm drain inlets and armor all newly constructed outlets;
5. Use perimeter controls at the site;
6. Stabilize construction site entrances and exits to prevent off-site tracking;
7. Control wastes that may be discharged, including but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes (these wastes may not be discharged to the MS4); and
8. Inspect stormwater controls at consistent intervals.

### 2.3.6. Stormwater Management in New Development and Redevelopment (Post Construction Stormwater Management)

Objective: The objective of this control measure is to reduce the discharge of pollutants found in stormwater through the retention or treatment of stormwater after construction on new or redeveloped sites. For the purposes of this part (2.3.6.), the following definitions apply:

**site** is defined as the area extent of construction activities, including but not limited to the creation of new impervious cover and improvement of existing impervious cover (e.g. repaving not covered by 2.3.6.a.ii.4.b.)

**new development** is defined as any construction activities or land alteration resulting in total earth disturbances equal to or greater than 1 acre (or activities that are part of a larger common plan of development disturbing greater than 1 acre) on an area that has not previously been developed to include impervious cover.

**redevelopment** is defined as any construction, land alteration, or improvement of impervious surfaces resulting in total earth disturbances equal to or greater than 1 acre (or activities that are part of a larger common plan of development disturbing greater than 1 acre) that does not meet the definition of new development (see above).

- a. Permittees shall develop, implement, and enforce a program to address post-construction stormwater runoff from all new development and redevelopment sites that disturb one or more acres and discharge into the permittees MS4 at a minimum. Permittees authorized under the MS4-2003 permit shall continue to implement and enforce their program and modify as necessary to meet the requirements of this part.
  - i. The permittee's new development/ redevelopment program shall include sites less than one acre if the site is part of a larger common plan of development or redevelopment which disturbs one or more acre.

- ii. The permittee shall develop or modify, as appropriate, an ordinance or other regulatory mechanism within three (3) years of the effective date of the permit to contain provisions that are at least as stringent as the following:
  1. Low Impact Development (LID) site planning and design strategies must be implemented unless infeasible in order to reduce the discharge of stormwater from development sites..
  2. Stormwater management systems design shall be consistent with, or more stringent than, the requirements of the 2008 Massachusetts Stormwater Handbook.  
:
  3. Stormwater management systems on new development shall be designed to meet an average annual pollutant removal equivalent to 90% of the average annual load of Total Suspended Solids (TSS) related to the total post-construction impervious area on the site AND 60% of the average annual load of Total Phosphorus (TP) related to the total post-construction impervious surface area on the site<sup>10</sup>.
    - a) Average annual pollutant removal requirements in 2.3.6.a.ii.3 are achieved through one of the following methods:
      1. installing BMPs that meet the pollutant removal percentages based on calculations developed consistent with EPA Region 1's BMP Accounting and Tracking Tool (2016) or other BMP performance evaluation tool provided by EPA Region 1, where available. If EPA Region 1 tools do not address the planned or installed BMP performance, then any federally or State-approved BMP design guidance or performance standards (e.g., State stormwater handbooks and design guidance manuals) may be used to calculate BMP performance; or
      2. retaining the volume of runoff equivalent to, or greater than, one (1.0) inch multiplied by the total post-construction impervious surface area on the new development site; or
      3. meeting a combination of retention and treatment that achieves the above standards; or
      4. utilizing offsite mitigation that meets the above standards within the same USGS HUC12 as the new development site.
  4. Stormwater management systems on redevelopment sites shall be designed to meet an average annual pollutant removal equivalent to 80% of the average annual post-construction load of Total Suspended Solids (TSS) related to the total post-construction impervious area on the site AND 50% of the average annual load of Total Phosphorus (TP) related to the total post-construction impervious surface area on the site<sup>11</sup>.
    - a) Average annual pollutant removal requirements in 2.3.6.a.ii.4 above are

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<sup>10</sup> Pollutant removal is calculated based on average annual loading and not on the basis of any individual storm event

<sup>11</sup> Pollutant removal is calculated based on average annual loading and not on the basis of any individual storm event

achieved through one of the following methods:

1. installing BMPs that meet the pollutant removal percentages based on calculations developed consistent with EPA Region 1's BMP Accounting and Tracking Tool (2016) or other BMP performance evaluation tool provided by EPA Region 1, where available. If EPA Region 1 tools do not address the planned or installed BMP performance, then any federally or State-approved BMP design guidance or performance standards (e.g., State stormwater handbooks and design guidance manuals) may be used to calculate BMP performance; or
2. retaining the volume of runoff equivalent to, or greater than, 0.8 inch multiplied by the total post-construction impervious surface area on the redeveloped site; or
3. meeting a combination of retention and treatment that achieves the above standards; or
4. utilizing offsite mitigation that meets the above standards within the same USGS HUC12 as the redevelopment site.

- b) Redevelopment activities that are exclusively limited to maintenance and improvement of existing roadways, (including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems, and repaving projects) shall improve existing conditions unless infeasible and are exempt from part 2.3.6.a.ii.4. Roadway widening or improvements that increase the amount of impervious area on the redevelopment site by greater than or equal to a single lane width shall meet the requirements of part 2.3.6.a.ii.4..

iii. The permittee shall require, at a minimum, the submission of as-built drawings no later than two (2) years after completion of construction projects. The as-built drawings must depict all on site controls, both structural and non-structural, designed to manage the stormwater associated with the completed site (post construction stormwater management). The new development/redevelopment program shall have procedures to ensure adequate long-term operation and maintenance of stormwater management practices that are put in place after the completion of a construction project. These procedures may include the use of dedicated funds or escrow accounts for development projects or the acceptance of ownership by the permittee of all privately owned BMPs. These procedures may also include the development of maintenance contracts between the owner of the BMP and the permittee. Alternatively, these procedures may include the submission of an annual certification documenting the work that has been done over the last 12 months to properly operate and maintain the stormwater control measures. The procedures to require submission of as-built drawings and ensure long term operation and maintenance shall be a part of the SWMP. The permittee shall report in the annual report on the measures that the permittee has utilized to meet this requirement.

- b. Within four (4) years of the effective date of this permit, the permittee shall develop a report assessing current street design and parking lot guidelines and other local requirements that affect

the creation of impervious cover. This assessment shall be used to provide information to allow the permittee to determine if changes to design standards for streets and parking lots can be made to support low impact design options. If the assessment indicates that changes can be made, the assessment shall include recommendations and proposed schedules to incorporate policies and standards into relevant documents and procedures to minimize impervious cover attributable to parking areas and street designs. The permittee shall implement all recommendations, in accordance with the schedules, contained in the assessment. The local planning board and local transportation board should be involved in this assessment. This assessment shall be part of the SWMP. The permittee shall report in each annual report on the status of this assessment including any planned or completed changes to local regulations and guidelines.

- c. Within four (4) years from the effective date of the permit, the permittee shall develop a report assessing existing local regulations to determine the feasibility of making, at a minimum, the following practices allowable when appropriate site conditions exist:
  - i. Green roofs;
  - ii. Infiltration practices such as rain gardens, curb extensions, planter gardens, porous and pervious pavements, and other designs to manage stormwater using landscaping and structured or augmented soils; and
  - iii. Water harvesting devices such as rain barrels and cisterns, and the use of stormwater for non-potable uses.

The assessment should indicate if the practices are allowed in the MS4 jurisdiction and under what circumstances are they allowed. If the practices are not allowed, the permittee shall determine what hinders the use of these practices, what changes in local regulations may be made to make them allowable, and provide a schedule for implementation of recommendations. The permittee shall implement all recommendations, in accordance with the schedules, contained in the assessment. The permittee shall report in each annual report on its findings and progress towards making the practices allowable. (Information available at:

<http://www.epa.gov/region1/npdes/stormwater/assets/pdf/AddressingBarrier2LID.pdf> and <http://www.mapc.org/resources/low-impact-dev-toolkit/local-codes-lid>)

- d. Four (4) years from the effective date of this permit, the permittee shall identify a minimum of 5 permittee-owned properties that could potentially be modified or retrofitted with BMPs designed to reduce the frequency, volume, and pollutant loads of stormwater discharges to and from its MS4 through the reduction of impervious area. Properties and infrastructure for consideration shall include those with the potential for reduction of on-site impervious area (IA) as well as those that could provide reduction of off-site IA. At a minimum, the permittee shall consider municipal properties with significant impervious cover (including parking lots, buildings, and maintenance yards) that could be modified or retrofitted. MS4 infrastructure to be considered includes existing street right-of-ways, outfalls and conventional stormwater conveyances and controls (including swales and detention practices) that could be readily modified or retrofitted to provide reduction in frequency, volume or pollutant loads of such discharges through reduction of impervious cover.

In determining the potential for modifying or retrofitting particular properties, the permittee shall consider factors such as access for maintenance purposes; subsurface geology; depth to water table; proximity to aquifers and subsurface infrastructure including sanitary sewers and septic systems; and opportunities for public use and education. In determining its priority ranking, the permittee shall consider factors such as schedules for planned capital improvements to storm and

sanitary sewer infrastructure and paving projects; current storm sewer level of service; and control of discharges to water quality limited waters, first or second order streams, public swimming beaches, drinking water supply sources and shellfish growing areas.

Beginning with the fifth year annual report and in each subsequent annual report, the permittee shall identify additional permittee owned sites and infrastructure that could be retrofitted such that the permittee maintains a minimum of 5 sites in their inventory, until such a time as when the permittee has less than 5 sites remaining. In addition, the permittee shall report on all properties that have been modified or retrofitted with BMPs to mitigate IA that were inventoried in accordance with this part. The permittee may also include in its annual report non-MS4 owned property that has been modified or retrofitted with BMPs to mitigate IA.

### **2.3.7. Good House Keeping and Pollution Prevention for Permittee Owned Operations**

Objective: The permittee shall implement an operations and maintenance program for permittee-owned operations that has a goal of preventing or reducing pollutant runoff and protecting water quality from all permittee-owned operations.

#### **a. Operations and Maintenance Programs**

- i. Within two (2) years from the effective date of the permit, the permittee shall develop, if not already developed, written (hardcopy or electronic) operations and maintenance procedures for the municipal activities listed below in part 2.3.7.a.ii. These written procedures shall be included as part of the SWMP.
- ii. Within two (2) year of the effective date of this permit, the permittee shall develop an inventory of all permittee owned facilities within the categories listed below. The permittee shall review this inventory annually and update as necessary.
  1. Parks and open space: Establish procedures to address the proper use, storage, and disposal of pesticides, herbicides, and fertilizers including minimizing the use of these products and using only in accordance manufacturer's instruction. Evaluate lawn maintenance and landscaping activities to ensure practices are protective of water quality. Protective practices include reduced mowing frequencies, proper disposal of lawn clippings, and use of alternative landscaping materials (e.g., drought resistant planting). Establish pet waste handling collection and disposal locations at all parks and open space where pets are permitted, including the placing of proper signage concerning the proper collection and disposal of pet waste. Establish procedures to address waterfowl congregation areas where appropriate to reduce waterfowl droppings from entering the MS4. Establish procedures for management of trash containers at parks and open space (scheduled cleanings; sufficient number). Establish procedures to address erosion or poor vegetative cover when the permittee becomes aware of it; especially if the erosion is within 50 feet of a surface water.
  2. Buildings and facilities where pollutants are exposed to stormwater runoff: This includes schools (to the extent they are permittee-owned or operated), town offices, police, and fire stations, municipal pools and parking garages and other permittee-owned or operated buildings or facilities. Evaluate the use, storage, and disposal of petroleum products and other potential stormwater pollutants. Provide employee training as necessary so that those responsible for handling these products know proper procedures. Ensure that Spill Prevention Plans are

in place, if applicable, and coordinate with the fire department as necessary. Develop management procedures for dumpsters and other waste management equipment. Sweep parking lots and keep areas surrounding the facilities clean to reduce runoff of pollutants.

3. **Vehicles and Equipment:** Establish procedures for the storage of permittee vehicles. Vehicles with fluid leaks shall be stored indoors or containment shall be provided until repaired. Evaluate fueling areas owned or operated by the permittee. If possible, place fueling areas under cover in order to minimize exposure. Establish procedures to ensure that vehicle wash waters are not discharged to the municipal storm sewer system or to surface waters. This permit does not authorize such discharges.

iii. Infrastructure Operations and Maintenance

1. The permittee shall establish within two (2) year of the effective date of the permit a written (hardcopy or electronic) program detailing the activities and procedures the permittee will implement so that the MS4 infrastructure is maintained in a timely manner to reduce the discharge of pollutants from the MS4. If the permittee has an existing program to maintain its MS4 infrastructure in a timely manner to reduce or eliminate the discharge of pollutants from the MS4, the permittee shall document the program in the SWMP.
2. The permittee shall optimize routine inspections, cleaning and maintenance of catch basins such that the following conditions are met:
  - Prioritize inspection and maintenance for catch basins located near construction activities (roadway construction, residential, commercial, or industrial development or redevelopment). Clean catch basins in such areas more frequently if inspection and maintenance activities indicate excessive sediment or debris loadings.
  - Establish a schedule with a goal that the frequency of routine cleaning will ensure that no catch basin at anytime will be more than 50 percent full.
  - If a catch basin sump is more than 50 percent full during two consecutive routine inspections/cleaning events, the permittee shall document that finding, investigate the contributing drainage area for sources of excessive sediment loading, and to the extent practicable, abate contributing sources. The permittee shall describe any actions taken in its annual report.
  - For the purposes of this part, an excessive sediment or debris loading is a catch basin sump more than 50 percent full. A catch basin sump is more than 50 percent full if the contents within the sump exceed one half the distance between the bottom interior of the catch basin to the invert of the deepest outlet of the catch basin.
  - The permittee shall document in the SWMP and in the first annual report its plan for optimizing catch basin cleaning, inspection plans, or its schedule for gathering information to develop the optimization plan. Documentation shall include metrics and other information used to reach the determination that the established plan for cleaning and maintenance is optimal for the MS4. The permittee shall keep a log of catch basins cleaned or inspected.

- The permittee shall report in each annual report the total number of catch basins, number inspected, number cleaned, and the total volume or mass of material removed from all catch basins.
3. The permittee shall establish and implement procedures for sweeping and/or cleaning streets, and permittee-owned parking lots. All streets with the exception of rural uncurbed roads with no catch basins or high speed limited access highways shall be swept and/or cleaned a minimum of once per year in the spring (following winter activities such as sanding). The procedures shall also include more frequent sweeping of targeted areas determined by the permittee on the basis of pollutant load reduction potential, based on inspections, pollutant loads, catch basin cleaning or inspection results, land use, water quality limited or TMDL waters or other relevant factors as determined by the permittee. The permittee shall report in each annual report the number of miles cleaned or the volume or mass of material removed.

For rural uncurbed roadways with no catch basins and limited access highways, the permittee shall either meet the minimum frequencies above, or develop and implement an inspection, documentation and targeted sweeping plan within two (2) years of the effective date of the permit, and submit such plan with its year one annual report.

4. The permittee shall ensure proper storage of catch basin cleanings and street sweepings prior to disposal or reuse such that they do not discharge to receiving waters. These materials should be managed in compliance with current MassDEP policies:
- For catch basin cleanings:  
<http://www.mass.gov/eea/agencies/massdep/recycle/regulations/management-of-catch-basin-cleanings.html>
  - For street sweepings:  
<http://www.mass.gov/eea/docs/dep/recycle/laws/stsweep.pdf>.
5. The permittee shall establish and implement procedures for winter road maintenance including the use and storage of salt and sand; minimize the use of sodium chloride and other salts, and evaluate opportunities for use of alternative materials; and ensure that snow disposal activities do not result in disposal of snow into waters of the United States. For purposes of this MS4 Permit, salt shall mean any chloride-containing material used to treat paved surfaces for deicing, including sodium chloride, calcium chloride, magnesium chloride, and brine solutions.
6. The permittee shall establish and implement inspection and maintenance frequencies and procedures for all stormwater treatment structures such as water quality swales, retention/detention basins, infiltration structures, proprietary treatment devices or other similar structures. All permittee-owned stormwater treatment structures (excluding catch basins) shall be inspected annually at a minimum.

- iv. The permittee shall report in the annual report on the status of the inventory required by this part and any subsequent updates; the status of the O&M programs for the permittee-owned facilities and activities in part 2.3.7.a.ii; and the maintenance activities associated with each.
- v. The permittee shall keep a written (hardcopy or electronic) record of all required activities including but not limited to maintenance activities, inspections and training required by part 2.3.7.a. The permittee shall maintain, consistent with part 4.2.a, all records associated with maintenance and inspection activities required by part 2.3.7.a.

b. Stormwater Pollution Prevention Plan (SWPPP)

The permittee shall develop and fully implement a SWPPP for each of the following permittee-owned or operated facilities: maintenance garages, public works yards, transfer stations, and other waste handling facilities where pollutants are exposed to stormwater as determined by the permittee. If facilities are located at the same property, the permittee may develop one SWPPP for the entire property. The SWPPP is a separate and different document from the SWMP required in part 1.10. A SWPPP does not need to be developed for a facility if the permittee has either developed a SWPPP or received a no exposure certification for the discharge under the Multi-Sector General Permit or the discharge is authorized under another NPDES permit.

- i. No later than two (2) years from the effective date of the permit, the permittee shall develop and implement a written (hardcopy or electronic) SWPPP for the facilities described above. The SWPPP shall be signed in accordance with the signatory requirements of Appendix B – Subparagraph 11.
- ii. The SWPPP shall contain the following elements:
  - 1. Pollution Prevention Team  
Identify the staff on the team, by name and title. If the position is unstaffed, the title of the position should be included and the SWPPP updated when the position is filled. The role of the team is to develop, implement, maintain, and revise, as necessary, the SWPPP for the facility.
  - 2. Description of the facility and identification of potential pollutant sources  
The SWPPP shall include a map of the facility and a description of the activities that occur at the facility. The map shall show the location of the stormwater outfalls, receiving waters, and any structural controls. Identify all activities that occur at the facility and the potential pollutants associated with each activity including the location of any floor drains. These may be included as part of the inventory required by part 2.3.7.a.
  - 3. Identification of stormwater controls  
The permittee shall select, design, install, and implement the control measures detailed in paragraph 4 below to prevent or reduce the discharge of pollutants from the permittee owned facility.

The selection, design, installation, and implementation of the control measures shall be in accordance with good engineering practices and manufacturer's specifications. The permittee shall also take all reasonable steps to control or

address the quality of discharges from the site that may not originate at the facility.

If the discharge from the facility is to a water quality limited water and the facility has the potential to discharge the pollutant identified as causing the water quality limitation, the permittee shall identify the control measures that will be used to address this pollutant at the facility so that the discharge meets applicable water quality standards.

4. The SWPPP shall include the following management practices:
  - a) Minimize or Prevent Exposure: The permittee shall to the extent practicable either locate materials and activities inside, or protect them with storm-resistant coverings in order to prevent exposure to rain, snow, snowmelt and runoff (although significant enlargement of impervious surface area is not recommended). Materials do not need to be enclosed or covered if stormwater runoff from affected areas will not be discharged directly or indirectly to surface waters or to the MS4 or if discharges are authorized under another NPDES permit.
  - b) Good Housekeeping: The permittee shall keep clean all exposed areas that are potential sources of pollutants, using such measures as sweeping at regular intervals. Ensure that trash containers are closed when not in use, keep storage areas well swept and free from leaking or damaged containers; and store leaking vehicles needing repair indoors.
  - c) Preventative Maintenance: The permittee shall regularly inspect, test, maintain, and repair all equipment and systems to avoid situations that may result in leaks, spills, and other releases of pollutants in stormwater to receiving waters. Inspections shall occur at a minimum once per quarter.
  - d) Spill Prevention and Response: The permittee shall minimize the potential for leaks, spills, and other releases that may be exposed to stormwater and develop plans for effective response to such spills if or when they occur. At a minimum, the permittee shall have procedures that include:
    - Preventive measures such as barriers between material storage and traffic areas, secondary containment provisions, and procedures for material storage and handling.
    - Response procedures that include notification of appropriate facility personnel, emergency agencies, and regulatory agencies, and procedures for stopping, containing, and cleaning up leaks, spills and other releases. Measures for cleaning up hazardous material spills or leaks shall be consistent with applicable Resource Conservation and Recovery Act (RCRA) regulations at 40 CFR section 264 and 40 CFR section 265. Employees

who may cause, detect, or respond to a spill or leak shall be trained in these procedures and have necessary spill response equipment available. If possible, one of these individuals should be a member of the Pollution Prevention Team; and

- Contact information for individuals and agencies that shall be notified in the event of a leak, spill, or other release. Where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under 40 CFR section 110, 40 CFR section 117, or 40 CFR section 302, occurs during a 24-hour period, the permittee shall notify the National Response Center (NRC) at (800) 424-8802 in accordance with the requirements of 40 CFR section 110, 40 CFR section 117, and 40 CFR section 302 as soon as the permittee has knowledge of the discharge. State or local requirements may necessitate reporting spills or discharges to local emergency, public health or drinking water supply agencies, and owners of public drinking water supplies. Contact information shall be in locations that are readily accessible and available.
- e) Erosion and Sediment Control: The permittee shall use structural and non-structural control measures at the facility to stabilize and contain runoff from exposed areas and to minimize or eliminate onsite erosion and sedimentation. Efforts to achieve this may include the use of flow velocity dissipation devices at discharge locations and within outfall channels where necessary to reduce erosion.
- f) Management of Runoff: The permittee shall manage stormwater runoff from the facility to prevent or reduce the discharge of pollutants. This may include management practices which divert runoff from areas that are potential sources of pollutants, contain runoff in such areas, or reuse, infiltrate or treat stormwater to reduce the discharge of pollutants.
- g) Salt Storage Piles or Piles Containing Salt: For storage piles of salt or piles containing salt used for deicing or other purposes (including maintenance of paved surfaces) for which the discharge during precipitation events discharges to the permittee's MS4, any other storm sewer system, or to a Water of the US, the permittee shall prevent exposure of the storage pile to precipitation by enclosing or covering the storage piles. Such piles shall be enclosed or covered within two (2) years of the permit effective date. The permittee shall implement appropriate measures (e.g., good housekeeping, diversions, containment) to minimize exposure resulting from adding to or removing materials from the pile. The permittee is encouraged to store piles in such a manner as not to impact surface water resources, ground water resources, recharge areas, and wells.
- h) Employee Training: The permittee shall regularly train employees who work in areas where materials or activities are exposed to stormwater, or who are responsible for implementing activities identified in the SWPPP

(e.g., inspectors, maintenance personnel), including all members of the Pollution Prevention Team. Training shall cover both the specific components and scope of the SWPPP and the control measures required under this part, including spill response, good housekeeping, material management practices, any best management practice operation and maintenance, etc. EPA recommends annual training.

The permittee shall document the following information for each training:

- The training date, title and training duration;
  - List of municipal attendees;
  - Subjects covered during training
- i) Maintenance of Control Measures: The permittee shall maintain all control measures, required by this permit in effective operating condition. The permittee shall keep documentation onsite that describes procedures and a regular schedule for preventative maintenance of all control measures and discussions of back-up practices in place should a runoff event occur while a control measure is off-line. Nonstructural control measures shall also be diligently maintained (e.g., spill response supplies available, personnel trained).

iii. The permittee shall conduct the following inspections:

1. Site Inspections: Inspect all areas that are exposed to stormwater and all stormwater control measures. Inspections shall be conducted at least once each calendar quarter. More frequent inspections may be required if significant activities are exposed to stormwater. Inspections shall be performed when the facility is in operation. At least one of the quarterly inspections shall occur during a period when a stormwater discharge is occurring.

The permittee shall document the following information for each facility inspection:

- The inspection date and time;
- The name of the inspector;
- Weather information and a description of any discharge occurring at the time of the inspection;
- Identification of any previously unidentified discharges from the site;
- Any control measures needing maintenance or repair;
- Any failed control measures that need replacement.
- Any SWPPP changes required as a result of the inspection.

If during the inspections, or any other time, the permittee identifies control measures that need repair or are not operating effectively, the permittee shall repair or replace them before the next anticipated storm event if possible, or as soon as practicable following that storm event. In the interim, the permittee shall have back-up measures in place.

The permittee shall report the findings from the Site Inspections in the annual report.

- iv. The permittee must keep a written (hardcopy or electronic) record of all required activities including but not limited to maintenance, inspections, and training required by part 2.3.7.b. The permittee shall maintain all records associated with the development and implementation of the SWPPP required by this part consistent with the requirements of part 4.2.

### **3.0. Additional Requirements for Discharges to Surface Drinking Water Supplies and Their Tributaries**

- a. Permittees which discharge to public surface drinking water supply sources (Class A and Class B surface waters used for drinking water) or their tributaries should consider these waters a priority in the implementation of the SWMP.
- b. Permittees should provide pretreatment and spill control measures to stormwater discharges to public drinking water supply sources or their tributaries to the extent feasible.
- c. Direct discharges to Class A waters should be avoided to the extent feasible.

### **4.0. Program Evaluation, Record Keeping, and Reporting**

#### **4.1. Program Evaluation**

- a. The permittee shall annually self-evaluate its compliance with the terms and conditions of this permit and submit each self-evaluation in the Annual Report. The permittee shall also maintain the annual evaluation documentation as part of the SWMP.
- b. The permittee shall evaluate the appropriateness of the selected BMPs in achieving the objectives of each control measure and the defined measurable goals. Where a BMP is found to be ineffective the permittee shall change BMPs in accordance with the provisions below. In addition, permittees may augment or change BMPs at any time following the provisions below:
  - Changes adding (but not subtracting or replacing) components or controls may be made at any time.
  - Changes replacing an ineffective or infeasible BMP specifically identified in the SWMP with an alternative BMP may be made as long as the basis for the changes is documented in the SWMP by, at a minimum:
    - An analysis of why the BMP is ineffective or infeasible;
    - Expectations on the effectiveness of the replacement BMP; and
    - An analysis of why the replacement BMP is expected to achieve the defined goals of the BMP to be replaced.

The permittee shall indicate BMP modifications along with a brief explanation of the modification in each Annual Report.

- c. EPA or MassDEP may request the permittee to add, modify, repair, replace or change BMPs or other measures described in the annual reports as needed to satisfy the conditions of this permit.

Any changes requested by EPA or MassDEP will be in writing and may set forth the schedule for the permittee to develop the changes and may offer the permittee the opportunity to propose alternative program changes to satisfy the permit conditions..

#### **4.2. Record Keeping**

- a. The permittee shall keep all records required by this permit for a period of at least five years. EPA may extend this period at any time. Records include information used in the development of any written (hardcopy or electronic) program required by this permit, any monitoring results, copies of reports, records of screening, follow-up and elimination of illicit discharges; maintenance records; inspection records; and data used in the development of the notice of intent, SWMP, SWPPP, and annual reports. This list provides examples of records that should be maintained, but is not all inclusive.
- b. Records other than those required to be included in the annual report, part 4.4, shall be submitted only when requested by the EPA or the MassDEP.
- c. The permittee shall make the records relating to this permit, including the written (hardcopy or electronic) stormwater management program, available to the public. The public may view the records during normal business hours. The permittee may charge a reasonable fee for copying requests. The permittee is encouraged to satisfy this requirement by posting records online.

#### **4.3. Outfall Monitoring Reporting**

- a. The permittee shall monitor and sample its outfalls at a minimum through sampling and testing at the frequency and locations required in connection with IDDE screening under part 2.3.4.7.b. and 2.3.4.8.c.ii.2. The monitoring program may also include additional outfall and interconnection monitoring as determined by the permittee in connection with assessment of SWMP effectiveness pursuant to part 4.1; evaluation of discharges to water quality limited waters pursuant to part 2.2; assessment of BMP effectiveness pursuant to part 2.2 or 2.3; or otherwise.
- b. The permittee shall document all monitoring results each year in the annual report. The report shall include the date, outfall or interconnection identifier, location, weather conditions at time of sampling, precipitation in previous 48 hours, field screening parameter results, and results of all analyses. The annual report shall include all of this information and data for the current reporting period and for the entire permit period.
- c. The permittee shall also include in the annual report results from any other stormwater or receiving water quality monitoring or studies conducted during the reporting period where that data is being used by the permittee to inform permit compliance or program effectiveness. If such monitoring or studies were conducted on behalf of the permittee, or if monitoring or studies conducted by other entities were reported to the permittee, a brief description of the type of information gathered or received shall be included in the annual report(s) covering the time period(s) the information was received.

#### **4.4. Annual Reports**

- a. The permittee shall submit annual reports each year of the permit term. The reporting period will be a one year period commencing on the permit effective date, and subsequent anniversaries thereof, except that the first annual report under this permit shall also cover the period from May 1, [year of

final permit effective date] to the permit effective date. The annual report is due ninety days from the close of each reporting period.

b. The annual reports shall contain the following information:

- i. A self-assessment review of compliance with the permit terms and conditions.
- ii. An assessment of the appropriateness of the selected BMPs.
- iii. The status of any plans or activities required by part 2.1 and/ or part 2.2, including:
  - Identification of all discharges that do not meet applicable water quality standards;
  - For discharges subject to TMDL related requirements, identification of specific BMPs used to address the pollutant identified as the cause of impairment and assessment of the BMPs effectiveness at controlling the pollutant (part 2.2.1. and Appendix F) and any deliverables required by Appendix F;
  - For discharges to water quality limited waters a description of each BMP required by Appendix H and any deliverables required by Appendix H.
- iv. An assessment of the progress towards achieving the measurable goals and objectives of each control measure in part 2.3 including:
  - Evaluation of the public education program including a description of the targeted messages for each audience; method of distribution and dates of distribution; methods used to evaluate the program; and any changes to the program.
  - Description of the activities used to promote public participation including documentation of compliance with state public notice regulations.
  - Description of the activities related to implementation of the IDDE program including: status of the map; status and results of the illicit discharge potential ranking and assessment; identification of problem catchments; status of all protocols described in part 2.3.4.(program responsibilities and systematic procedure); number and identifier of catchments evaluated; number and identifier of outfalls screened; number of illicit discharges located; number of illicit discharges removed; gallons of flow removed; identification of tracking indicators and measures of progress based on those indicators; and employee training.
  - Evaluation of the construction runoff management including number of project plans reviewed; number of inspections; and number of enforcement actions.
  - Evaluation of stormwater management for new development and redevelopment including status of ordinance development (2.3.6.a.ii.), review and status of the street design assessment(2.3.6.b.), assessments to barriers to green infrastructure (2.3.6.c), and retrofit inventory status (2.3.6.d.)
  - Status of the O&M Programs required by part 2.3.7.a.
  - Status of SWPPP required by part 2.3.7.b. including inspection results.
  - Any additional reporting requirements in part 3.0.

- v. All outfall screening and monitoring data collected by or on behalf of the permittee during the reporting period and cumulative for the permit term, including but not limited to all data collected pursuant to part 2.3.4. The permittee shall also provide a description of any additional monitoring data received by the permittee during the reporting period.
- vi. Description of activities for the next reporting cycle.
- vii. Description of any changes in identified BMPs or measurable goals.
- viii. Description of activities undertaken by any entity contracted for achieving any measurable goal or implementing any control measure.

c. Reports shall be submitted to EPA at the following address:

United State Environmental Protection Agency  
Stormwater and Construction Permits Section (OEP06-1)  
Five Post Office Square, Suite 100  
Boston, MA 02109

Massachusetts Department of Environmental Protection  
One Winter Street – 5th Floor  
Boston, MA 02108  
ATTN: Frederick Civian

Or submitted electronically to EPA at the following email address: [stormwater.reports@epa.gov](mailto:stormwater.reports@epa.gov). After December 21, 2020 all Annual Reports must be submitted electronically.

## **5.0. Non-Traditional MS4s**

Non-traditional MS4s are MS4s owned and operated by the Commonwealth of Massachusetts, counties or other public agencies within the Commonwealth of Massachusetts, and properties owned and operated by the United States (Federal Facilities) within the Commonwealth of Massachusetts. This part addresses all non-traditional MS4s except MS4s that are owned or operated by transportation agencies, which are addressed in part 6.0 below.

### **5.1. Requirements for Non-Traditional MS4s**

All requirements and conditions of parts 1 – 4 above apply to all Non-traditional MS4s, except as specifically provided below:

#### **5.1.1. Public education**

For the purpose of this permit, the audiences for a Non-traditional MS4 include the employees, clients and customers (including students at education MS4s), visitors to the property, tenants, long term contractors and any other contractors working at the facility where the MS4 is located. The permittee may use some of the educational topics included in part 2.3.2.d. as appropriate, or may focus on topics specific to the MS4. The permittee shall document the educational topics for each target audience in the SWMP and annual reports.

### **5.1.2. Ordinances and regulatory mechanisms**

Some Non-traditional MS4s may not have authority to enact an ordinance, by-law, or other regulatory mechanisms. MS4s without the authority to enact an ordinance shall ensure that written policies or procedures are in place to address the requirements of part 2.3.4.5., part 2.3.4.6 and part 2.3.6.a.

### **5.1.3. Assessment of Regulations**

Non-traditional MS4s do not need to meet the requirements of part 2.3.6.c.

### **5.1.4. New Dischargers**

New MS4 facilities are subject to additional water quality-based requirements if they fall within the definition of “new discharger” under 40 CFR § 122.2: “A new discharger is any building, structure, facility or installation (a) from which there is or may be a ‘discharge of pollutants’ (b) that did not commence the ‘discharge of pollutants’ at a particular ‘site’ prior to August 13, 1979; (c) which is not a ‘new source’; and (d) which never received a finally effective NPDES permit for discharges at that ‘site.’ The term “site” is defined in § 122.2 to mean “the land or water area where any ‘facility or activity’ is physically located or conducted including adjacent land used in connection with the facility or activity.”

Consistent with these definitions, a Non-traditional MS4 is a “new discharger” if it discharges stormwater from a new facility with an entirely new separate storm sewer system that is not physically located on the same or adjacent land as an existing facility and associated system operated by the same MS4.

Any Non-traditional MS4 facility that is a “new discharger” and discharges to a waterbody listed in category 5 or 4b on the Massachusetts Integrated Report of waters listed pursuant to Clean Water Act section 303(d) and 305(b) due to nutrients (Total Nitrogen or Total Phosphorus), metals (Cadmium, Copper, Iron, Lead or Zinc), solids (TSS or Turbidity), bacteria/pathogens (E. Coli, Enterococcus or Fecal Coliform), chloride (Chloride) or oil and grease (Petroleum Hydrocarbons or Oil and Grease), or discharges to a waterbody with an approved TMDL for any of those pollutants, is not eligible for coverage under this permit and shall apply for an individual permit.

Any Non-traditional MS4 facility that is a “new discharger” and discharges to a waterbody that is in attainment is subject to Massachusetts antidegradation regulations at 314 CMR 4.04. The permittee shall comply with the provisions of 314 CMR 4.04 including information submittal requirements and obtaining authorization for new discharges where appropriate<sup>12</sup>. Any authorization of new discharges by MassDEP shall be incorporated into the permittee's SWMP. If an applicable MassDEP approval specifies additional conditions or requirements, then those requirements are incorporated into this permit by reference. The permittee must comply with all such requirements.

### **5.1.5 Dischargers Subject to Appendix F Part A.I**

Those dischargers not identified in Appendix F Table F-2 or Table F-3 discharging to waterbodies in the Charles River Watershed or to an MS4 that discharges to a waterbody in the Charles River Watershed shall coordinate with the municipality in which they are located to facilitate compliance

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<sup>12</sup> Contact MassDEP for guidance on compliance with 314 CMR 4.04

with the phosphorus reduction applicable to the municipality. In each annual report the permittee shall indicate planned phosphorus reduction activities on site and coordination progress with the municipality. In addition, the year 4 annual report shall contain the following information:

- a. Estimated current impervious area of permittee owned property,
- b. Land Use information for permittee owned property,
- c. Phosphorus removal in pounds per year for any structural BMP owned by the permittee, calculated in accordance with Appendix F Attachment 3
- d. Date of last maintenance activity for all structural BMPs for which phosphorus removal is calculated

## **6.0 Requirements for MS4s Owned or Operated by Transportation Agencies**

This part applies to all MS4s owned or operated by any state or federal transportation agency (except Massachusetts Department of Transportation –MassDOT- Highway Division, which is subject to a separate individual permit). All requirements and conditions of this permit apply with the following exceptions:

### **6.1 Public education**

For the purpose of this permit, the audiences for a transportation agency education program include the general public (users of the roadways), employees, and any contractors working at the location. The permittee may use some of the educational topics included in part 2.3.2.d. as appropriate, or may focus on topics specific to the agency. The permittee shall document the educational topics for each target audience.

### **6.2 Ordinances and regulatory mechanisms**

The transportation agency may not have authority to enact an ordinance, by-law or other regulatory mechanisms. The agency shall ensure that written agency policies or procedures are in place to address the requirements of part 2.3.4.5., part 2.3.4.6 and part 2.3.6.a.

### **6.3 Assessment of regulations**

Non-traditional MS4s do not need to meet the requirements of part 2.3.6.c.

### **6.4 New Dischargers**

New MS4 facilities are subject to additional water quality-based requirements if they fall within the definition of “new dischargers” under 40 CFR § 122.2: “A new discharger is any building, structure, facility or installation (a) from which there is or may be a ‘discharge of pollutants’ (b) that did not commence the ‘discharge of pollutants’ at a particular ‘site’ prior to August 13, 1979; (c) which is not a ‘new source’; and (d) which never received a finally effective NPDES permit for discharges at that ‘site.’ The term “site” is defined in § 122.2 to mean “the land or water area where any ‘facility or activity’ is physically located or conducted including adjacent land used in connection with the facility or activity.”

Consistent with these definitions, a new transportation MS4 is a “new discharger” if it discharges stormwater from a new facility with an entirely new separate storm sewer system that is not physically located on the same or adjacent land as an existing facility and associated system operated by the same MS4.

Any transportation MS4 facility that is a “new discharger” and discharges to a waterbody listed as impaired in category 5 or 4b on the Massachusetts Integrated Report of waters listed pursuant to Clean Water Act section 303(d) and 305(b) due to nutrients (Total Nitrogen or Total Phosphorus), metals (Cadmium, Copper, Iron, Lead or Zinc), solids (TSS or Turbidity), bacteria/pathogens (E. Coli, Enterococcus or Fecal Coliform), chloride

(Chloride) or oil and grease (Petroleum Hydrocarbons or Oil and Grease), or discharges to a waterbody with an approved TMDL for any of those pollutants, is not eligible for coverage under this permit and shall apply for an individual permit.

Any transportation MS4 facility that is a “new discharger” and discharges to a waterbody that is in attainment is subject to Massachusetts antidegradation regulations at 314 CMR 4.04. The permittee shall comply with the provisions of 314 CMR 4.04 including information submittal requirements and obtaining authorization for new discharges where appropriate<sup>13</sup>. Any authorization of new discharges by MassDEP shall be incorporated into the permittee's SWMP. If an applicable MassDEP approval specifies additional conditions or requirements, then those requirements are incorporated into this permit by reference. The permittee must comply with all such requirements.

## **6.5 Dischargers Subject to Appendix F Part A.I**

Those dischargers not identified in Appendix F Table F-2 or Table F-3 discharging to waterbodies in the Charles River Watershed or to an MS4 that discharges to a waterbody in the Charles River Watershed shall coordinate with the municipality in which they are located to facilitate compliance with the phosphorus reduction applicable to the municipality. In each annual report the permittee shall indicate planned phosphorus reduction activities on site and coordination progress with the municipality. In addition, the year 4 annual report shall contain the following information:

- a. Estimated current impervious area of permittee owned property,
- b. Land Use information for permittee owned property,
- c. Phosphorus removal in pounds per year for any structural BMP owned by the permittee, calculated in accordance with Appendix F Attachment 3,
- d. Date of last maintenance activity for all structural BMPs for which phosphorus removal is calculated

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<sup>13</sup> Contact MassDEP for guidance on compliance with 314 CMR 4.04

**Stormwater Catchment Investigations – MS4 – FY23 Capital Project Submission – Framingham Public Works**



*Sampling at Lake Waushakum.*



*Asbestos pipe outfall near Woodmere Road.*

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Traffic Calming for Public Roadways \$150,000 General Fund

Public Works

Study, design and construction of traffic calming measures for public roadways following the city's Traffic Calming Policy

This appropriation will provide funding for the study, design and construction of traffic calming measures and other related safety improvements to public roadways following the City's Traffic Calming Policy. The policy seeks to improve the safety and livability of Framingham's streets and neighborhoods. Projects will be identified by the Traffic Commission and city departments. While new traffic concerns are brought forward by residents and business owners on an ongoing basis, current areas of focus include speeding on Grove Street, Brook Street, Potter Road, Winter Street, and Old Connecticut Path, and excessive accident counts on Grant Street.

These funds will provide for study, design and construction of physical features that guide, warn, and manage the movement of vehicles, bicycles, and pedestrians as part of the traffic calming program.

## Traffic Calming – FY23 Capital Project Submission – Framingham Public Works



*Grove Street horse riding sign.*



*Nixon Road solar speed feedback sign.*



*Speen Street rectangular rapid flash beacons.*

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

School Farley Roof Repairs \$2,818,400 General Fund

School Department

Construction Phase for full replacement of Farley Building roof.

The design phase for the Farley Roof has been approved by the City Council as of October 2021. This request is for the construction phase.

This project is for the full replacement of the roof and corresponding components at the Farley Building. The current roof is failing and in need of full replacement to ensure continued operations and avoidance of catastrophic failure.

## **Off-Cycle Farley Roof Replacement Capital Proposal**

### ***Fiscal Year 2022***

The Framingham School Department respectfully requests mid-year FY2022 capital budget funding for the Farley Building Roof Replacement project. In anticipation of the District receiving management, oversight, and capital investment responsibilities from MassBay, the School Department requested a capital appropriation from the City in our FY19, FY20, and FY22 proposals to address facilities maintenance issues. During FY19 and FY20, the requests were focused on facility renovations, and mechanical system upgrades and replacements in anticipation of relocating all Central Office staff, The Parent information Center and various school programs, and community initiatives to Farley. In FY22, we requested funding to replace the failing roof to ensure continued safe operations while protecting the interior infrastructure. Unfortunately that request was deferred, allowing for the continued deterioration of the roof system.

The current roofing system is in poor condition. In October of 2020, a routine, full study and roof scan was performed by Gale Associates. This study found multiple deficiencies all pointing to a full system replacement. Deficiencies identified included portions of the roof systems holding water, allowing moisture infiltration and reported leaks throughout the building; moisture damage at multiple test pit locations; lack of effective slope to direct moisture to the drains resulting in ponding water; deteriorated roofing lap seams between reinforcing plies; and the presence of water collecting within the open flutes of the metal deck furthering damage and water infiltration. The School Department's roof contractor, Tremco, has performed numerous assessments and repairs due to continued leaks and infiltration damage. Additionally, the warranties for Farley expired in 2017 & 2018, leaving the City open to potential liabilities with the failing system and responsible for any needed repairs.

Staff have researched alternative funding sources such as the accelerated roof repair program offered by the MSBA. Unfortunately due to the current and future planned usage of Farley, it does not meet the requirements of remaining a public K-12 school facility, serving public school students, for the duration of the useful life of roof repair. This has limited our ability to submit a statement of interest for the accelerated roof repair program, similar to how we have approached projects at McCarthy and Dunning Elementary School's. The current project cost is \$3,108,400, which has greatly increased over the FY22 request of \$1,826,975. A number of factors have impacted costs, leading to a large project increase. Those factors include inflation; increase in materials and labor; inclusion of a structural analysis for future solar placement; repairs to the copper roofs which were not included or needed in the prior year proposal; and increase in cost per s.f. over the past fiscal year (FY22- \$30/s.f.; current pricing is \$38/s.f.). It is our expectation that if this project continues to be deferred, the cost will continue to increase, placing a large financial burden on the City.

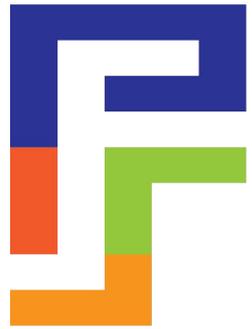
The Farley Building plays a vital role in the District's future vision. Starting in the summer of 2021, all central office Departments have begun relocating to the Farley Building. This includes,

but is not limited to Adult ESL; Welcome Center; Business Operations; Superintendent's Office; Equity, Diversity and Community Development; Buildings & Grounds; Human Resources; Community Resource Development; School Committee; and many other District Departments. MassBay plans on vacating the 80,000 s.f. they currently occupy by 2023. If catastrophic failure occurred to the roof and we were forced to vacate the building, the cost to the district to rent a similar sized footprint (22,000 s.f.) to support operations of these Departments and programs would cost between \$440,000 to \$704,000 annually to rent appropriate space. The School Department will continue to develop plans once we determine the future use of the Farley building in the areas currently occupied by Mass Bay. It is imperative for the City to replace the Farley roof as soon as possible as construction costs continue to escalate and the roof continues to deteriorate.

**FRAMINGHAM PUBLIC SCHOOLS - ROOF REPAIRS AND REPLACEMENTS**  
**FISCAL YEAR 2022-2023 SNAPSHOT**

9/20/2021 12:35:14

Scope Item	Bldg. Name	Construction	(SF)	Installation	Warranty	Consultant Total (Solar, Structural, and Enclosure)	Construction Total (Material, Labor, Bonds, Insurance, Profit, etc.)	Design, Bidding, and Construction Administration	FY23 Replacement Cost	15 Year Bond @ 2.9%
		Date		Date	Expiration					
1	Farley Middle School	1974	54,200	2002 / 2003	Feb 27 2017 / Mar 23 2018	\$276,450	\$2,574,500	\$257,450	\$3,108,400	\$682,087
2	Miriam McCarthy Elementary School - Phase I	1952	32,500	1999	Oct 22 2014	\$173,375	\$1,543,750	\$154,375	\$1,871,500	\$410,670
3	Charlotte Dunning Elementary School	1965	65,841	1996	Aug 31 2023	\$331,745	\$3,127,448	\$312,745	\$3,771,937	\$827,689
4	Potter Road Elementary School	1955	46,984	1996	Aug 31 2023	\$242,174	\$2,231,740	\$223,174	\$2,697,088	\$591,831
5	Brophy Elementary School	1968	49,900	2002	Sep 6 2022	\$256,025	\$2,370,250	\$237,025	\$2,863,300	\$628,304
6	King Elementary School	1957	45,803	1998	Aug 31 2023	\$236,564	\$2,175,643	\$217,564	\$2,629,771	\$577,060
7	Barbieri Elementary School	1974	69,383	1998	Aug 31 2023	\$348,569	\$3,295,693	\$329,569	\$3,973,831	\$871,992
8	Hemenway Elementary	1961	65,126	1996	Aug 31 2023	\$328,349	\$3,093,485	\$309,349	\$3,731,182	\$818,746
9	Cameron Middle	2001	70,000	2001	Aug 31 2023	\$351,500	\$3,325,000	\$332,500	\$4,009,000	\$879,709
10	Harmony Grove Elementary School	1998	58,000	1998	Aug 31 2023	\$294,500	\$2,755,000	\$275,500	\$3,325,000	\$729,617
11	Juniper Hill - BLOCKS	1960	45,600	2001	Sep 12 2021	\$235,600	\$2,166,000	\$216,600	\$2,618,200	\$574,520
12	Stapleton Elementary School	1922, 1956, 1976	30,200	2007	Dec 12 2027	\$162,450	\$1,434,500	\$143,450	\$1,740,400	\$381,902
13	Miriam McCarthy Elementary School - Phase II	1952	24,300	2007	Dec 12 2027	\$134,425	\$1,154,250	\$115,425	\$1,404,100	\$308,106
14	Walsh Middle School	1969	119,800	2005	May 16 2025	\$588,050	\$5,690,500	\$569,050	\$6,847,600	\$1,502,592
15	Framingham High	1963, 2006	215,000	2006	May 24 2026	\$1,040,250	\$10,212,500	\$1,021,250	\$12,274,000	\$2,693,325
16	New Fuller Middle School	2021	137,000	2021	August, 2041	TBD	TBD	TBD	TBD	TBD



**Framingham**

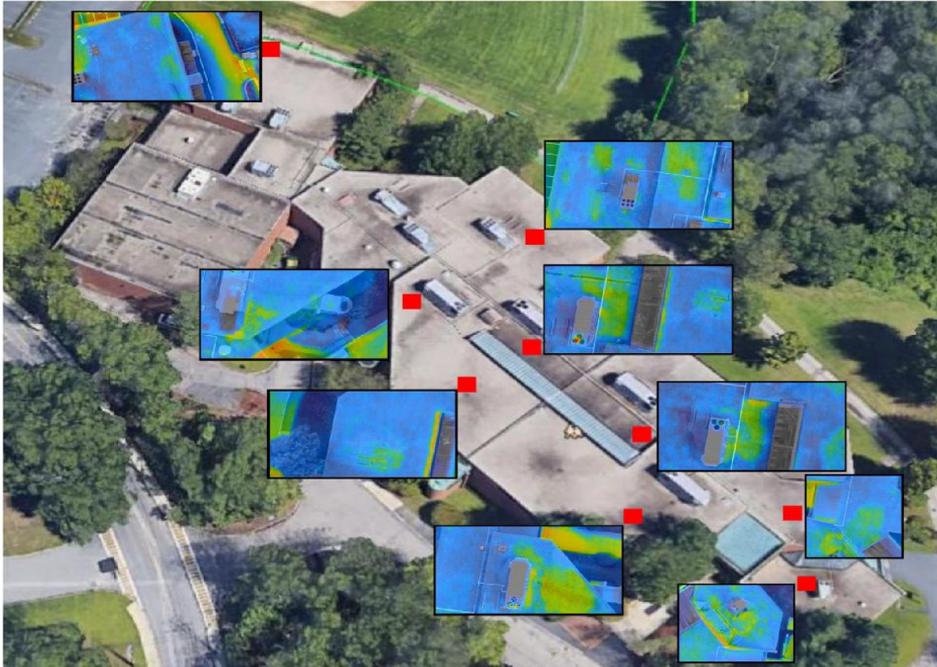
**PUBLIC SCHOOLS**

**Embracing differences. Inspiring futures.**

**FRAMINGHAM PUBLIC SCHOOLS  
CAPITAL BUDGET PROPOSAL**

# **FARLEY BUILDING ROOF REPLACEMENT - \$3,108,400**

## **FY2022 MID-YEAR CAPITAL**



**Infrared Scans Showing Moisture Infiltration Of Roof**



**Test Pits At Roof  
Exposing Water  
Infiltration  
And Deterioration**



# ***DAMAGE TO CEILING TILES FROM WATER INFILTRATION***



# DAMAGE TO CEILING TILES FROM WATER INFILTRATION



Numerous Areas Where Moisture Infiltration Has Damaged Ceiling Tiles Due to Years of Leaks



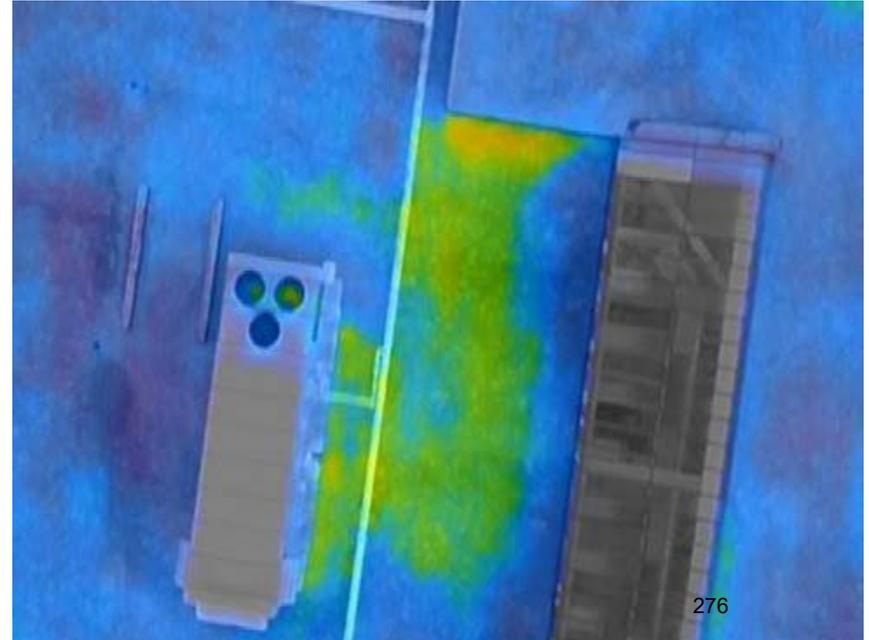
# ***FARLEY BUILDING ROOF REPLACEMENT - \$3,108,400***

## ***FY2022 MID-YEAR CAPITAL***

Moisture Sensitive Test Strip Showing Presence of Moisture In Roof System



Infrared Camera Identifying High Levels of Moisture at Roof Area Near Skylight



**FARLEY BUILDING ROOF REPLACEMENT - \$3,108,400**  
**FY2022 MID-YEAR CAPITAL**



Gas Line Supports Resting Directly On The Aggregate-Surfaced Roofing System, Leading To Damage Under These Pressure-Points

**FARLEY BUILDING ROOF REPLACEMENT - \$3,108,400**  
**FY2022 MID-YEAR CAPITAL**



**Areas Where Plywood Siding Has Failed Due To Aging  
And Continued Water Damage**

# **FARLEY BUILDING ROOF REPLACEMENT - \$3,108,400**

## **FY2022 MID-YEAR CAPITAL**



**Highlighted Area Where Wet-Insulation Detected and Moisture is Migrating into the Roof System Through Multiple Sources**



**Obsolete Supports That Were Left in Roof System Following HVAC Renovations That Need To Be Removed and infilled**



**ROOF SYSTEM EVALUATION  
AT FARLEY MIDDLE SCHOOL  
FRAMINGHAM PUBLIC SCHOOLS  
73 MOUNT WAYT AVENUE, SUITE 5  
FRAMINGHAM, MA 01702**

**October 20, 2020**

**Evaluation Report**

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**Prepared For:**

**Mr. Matt Torti  
Director of Buildings and Grounds  
Framingham Public Schools  
73 Mount Wayt Avenue, Suite 5  
Framingham, MA 01702**

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**ROOF SYSTEM EVALUATION  
AT THE FARLEY MIDDLE SCHOOL  
FRAMINGHAM PUBLIC SCHOOLS  
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**Appendices:**

- Appendix A – Photographic Documentation
  - Appendix B – Farley Middle School Roof Area Plan
-



### ***Executive Summary***

In accordance with our contract, Gale Associates, Inc. (Gale) has prepared a roof condition survey for the Framingham Public Schools (FPS). This submission relates specifically to the existing condition of the low-sloped roof areas at the Farley Middle School (FMS) located at 19 Flagg Street, Framingham, MA. This report includes descriptions of the existing conditions, photo documentation, and provides roof remediation options.

The existing roofing systems at Farley Middle School reviewed consist of multi-ply built-up roofing assemblies installed over polyisocyanurate rigid insulation. The roof deck at the FMS was observed to consist of sloped metal decking. Based on our observations, portions of the roof systems are wet and allowing moisture infiltration and reported leaks. The system appears to be approaching the end of their useful service life.

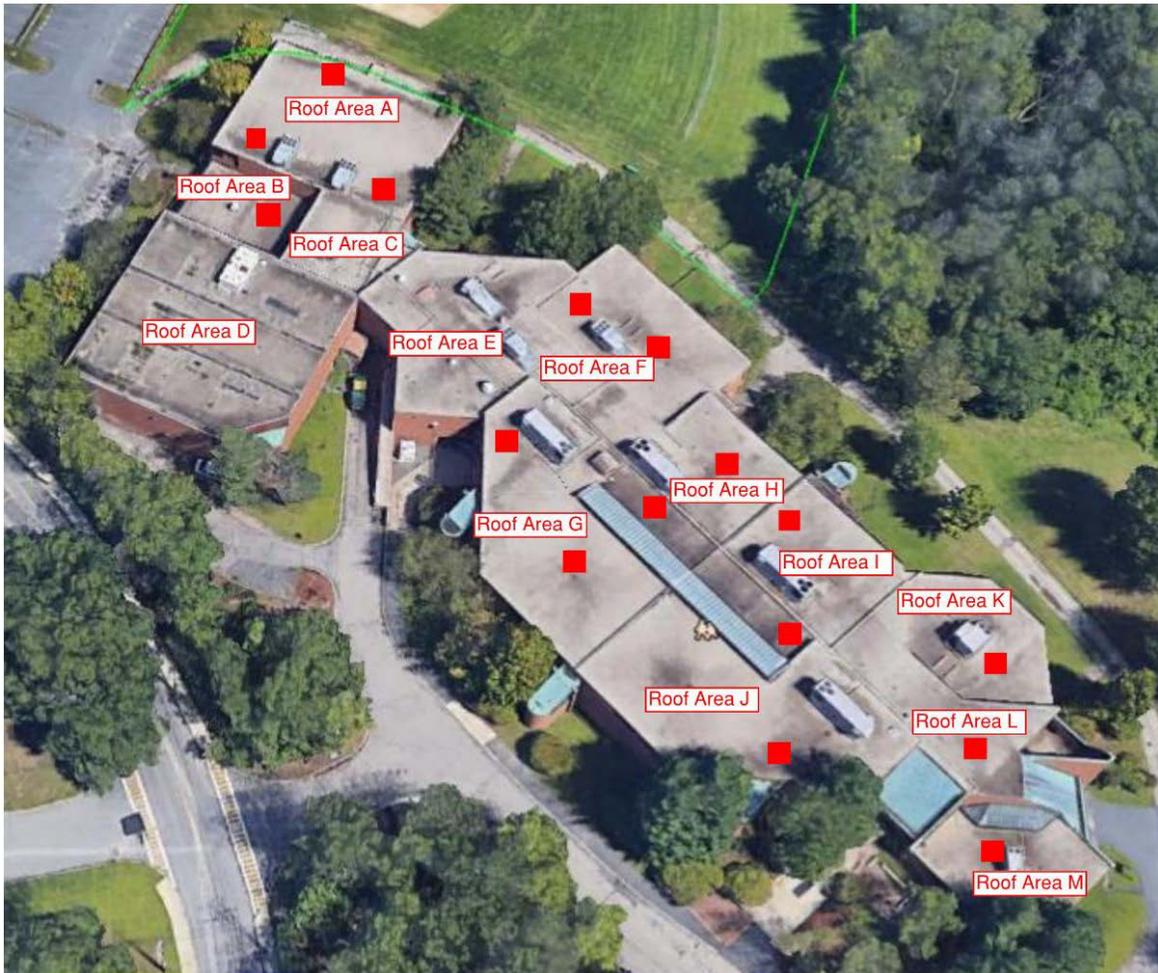
An infrared roof scan was performed to identify areas of potential moisture damage. Based on the extent of moisture, a potential full system replacement should be considered at the Farley Middle School. Additional deficiencies observed include lack of effective slope to direct moisture to the drains resulting in ponding water, deteriorated roofing lap seams between reinforcing plies, and the presence of water collecting within the open flutes of the metal deck.

- Roof Areas A, G, H, I, J, L appear to exhibit the most widespread signs of moisture within the roofing system with the potential to cause deterioration to the roofing structural deck and it is Gale's opinion that these roof areas should be considered for immediate removal and replacement.
- Roof Area D consists of an EPDM roof system that was installed in 2016 and is currently covered under a 20-year warranty and was not reviewed as part of this evaluation.

Please note that the estimated cost noted below does not include any special permitting fees which may or may not be required for this project, additional engineering fees, Framingham's monitoring of the project, interior renovations beyond those that are described within this report, a construction trailer/office space, or soft costs associated with working with Framingham Public Schools. Again, these recommended budgets are preliminary, and should not be used for sensitive budgeting, as the final scope of work, and detailing has not been confirmed at this time.

#### **Estimated Remediation Cost:**

- Full System Replacement with a Multi-ply Built-up Roofing System: \$3,000,000
- Full System Replacement with a Single-ply PVC Roofing Membrane: \$2,110,000
- Full System Replacement with a Single-ply Kee Roofing Membrane: \$2,140,000
- Replacement of the Skylight Glazing Assemblies: Approx. \$50 sq.ft. = \$70,000



**Figure 1: Farley Middle School Roof Area Plan**

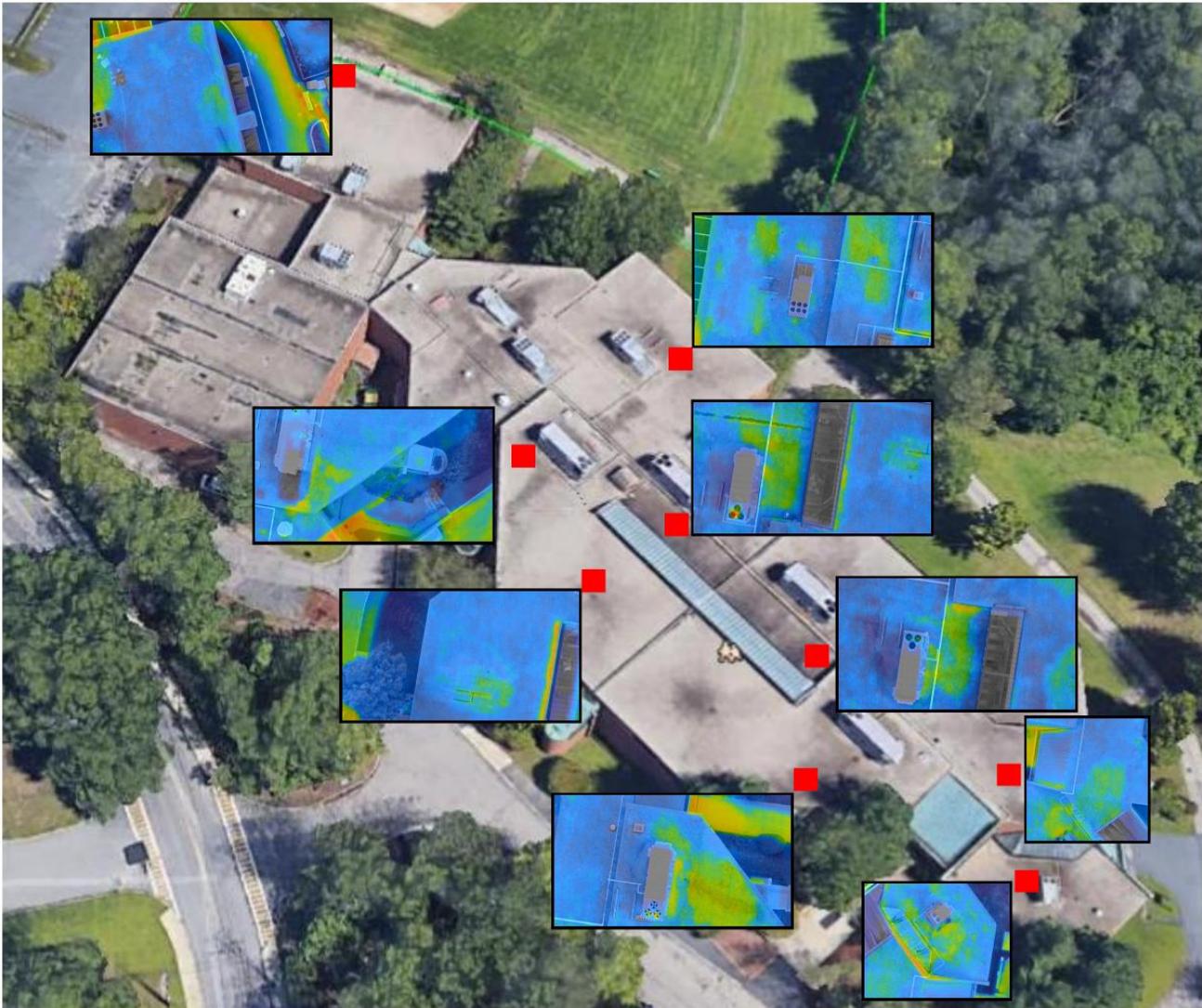
### **Background**

The Farley Middle School reportedly constructed in 1973 and renovated in 2003 is currently leased to the Massachusetts Bay Community College. The approximate 52,000 sq.ft., two-story building is constructed with a concrete masonry unit (CMU) backup wall and the masonry veneer. Irregular shaped aluminum windows, areas of wood siding, and hollow metal doors are located within the exterior walls. The roofing consists of isolated areas of sloped metal panels, translucent skylights with single pane glazing and a gravel surface built-up roofing assembly.

The existing roofing systems at the FMS include low sloped and limited areas of steep sloped roofs. The steep sloped roofs consist of standing seam copper panel roofs installed over structural metal decking located over stair towers and entrances. The low sloped roof systems consist of gravel surface built-up roofing assemblies incorporating 4 plies of reinforced fabric that are set in a fluid applied asphaltic based adhesive over a ½" fiber board coverboard and varying thickness of flat stock polyisocyanurate insulation. The roofing system is installed on a sloped structural metal decking. Several large Roof Top Units (RTU)s, Air Handler Units (AHU)s, and smaller air conditioners and vents are located within the roof areas.

### ***Visual Evaluation***

As part of the evaluation, Gale conducted a visual evaluation of the FMS's roof areas to observe the extent and location of defects as well as locate areas of potential moisture infiltration using non-destructive capacitance metering and infrared thermography.



***Figure 2: Farley Middle School Roof Area Plan with Infrared Images Overlaid***

### **Low Sloped Roofs, Roof Areas A through M**

Gale's general observations include but are not limited to the following:

1. The existing roof drains generally consist of no-hub cast iron assemblies that appear to be in good condition however, they exhibit surface rust in the bowls and on drain hardware. Cast iron strainers are generally in good condition but are dislodged from the clamping rings at some locations.

2. Numerous previously performed repairs were evident based on the quantity of stripped-in membrane seams and roof patches that were observed in the field of the roof and at roof-to-wall flashings. The repairs appear to be in fair condition, but the presence of the stone ballast created difficulties in confirming the extent of the repairs and condition of the patch perimeters which are typically more susceptible to failure and allowing moisture infiltration.
3. A large ribbon of slope skylight assemblies is present between Roof Areas G/J and H/I. Signs of previous repairs to the mullions of the skylight were observed. Several fastener heads were observed to not be in full contact with the skylight frame and could provide path for water to enter into the skylight frame. The roof areas at the base of the skylight slope were found to wet during the test cut in this area, and water was observed collecting within the flutes of the metal deck.
4. Roof flashing heights were generally observed to meet or exceed the industry recommended standard of 8" minimum. The addition of insulation may affect limited areas around select rooftop unit curbs.
5. Visible flashing membrane installed at rooftop equipment curbs appears in good condition however, patches installed at seams and corners are delaminated.
6. Results of the roof infrared (IR) thermographic survey revealed areas of potential wet insulation at the following locations:
  - a. Along the north and south edges of Roof Area A.
  - b. The southern portion of Roof Area E.
  - c. A significant portion of Roof Areas G, H, I, J. Most notably were areas where roof repairs had previously been performed as well as along the length of the low side of the skylight assembly.
  - d. The southern portion of Roof Area L.
  - e. Due to access restrictions, Gale did not review the existing conditions at Roof Areas B and M but based on the infrared images and Gale's observations at similar roofing condition areas of limited moisture are anticipated to exist on these roof areas.

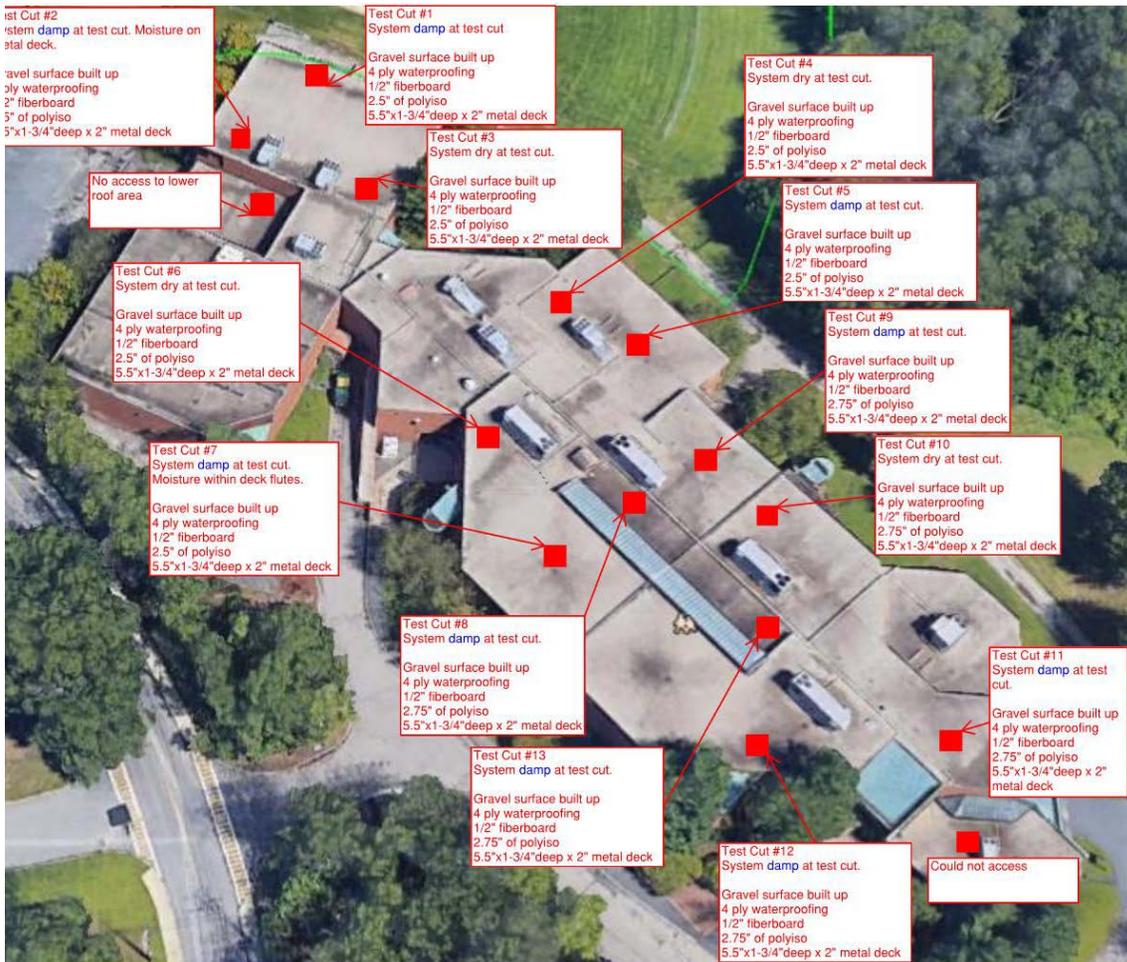
### ***Destructive Testing***

Following the infrared scan of the roof that was performed to confirm the findings of the infrared roof scan. On Wednesday, September 9, 2020, a representative from Gale coordinated with Greenwood Industries, Inc. (Greenwood) to perform destructive test cuts to determine existing conditions at select areas of the low sloped roofs. Test cuts were performed in areas suspected to contain moisture based on the infrared scan. In total, thirteen (13) test cuts, most of which were approximately 6" square in size, were performed on the existing low sloped roof systems. Test cut locations were patched by Greenwood following Gale's review of the test cut locations. Please note that the test cuts we observed were representative, and not indicative of each condition that may exist on the building. Refer to the following roof plan for approximate test cut locations, Figure 3.

Test cuts on low sloped roofs revealed the following cross section from top to bottom:

- Stone ballast
- Multi-ply built-up roofing
- ½” flat stock fiberboard coverboard
- 2.5 inchers of flat stock polyisocyanurate (polyiso) insulation
- Corrugated metal deck
- There was no vapor barrier (VB) membrane observed in any of the test cut locations.

<b>Test Cut #</b>	<b>Roof Area</b>	<b>Observed Condition</b>	
1	A	<b>Wet</b>	<b>System damp at test cut location</b>
2	A	<b>Wet</b>	<b>System damp at test cut location. Moisture on metal deck</b>
3	A	<b>Dry</b>	<b>System components dry at test cut location</b>
4	F	<b>Dry</b>	<b>System components dry at test cut location</b>
5	F	<b>Wet</b>	<b>System damp at test cut location</b>
6	E	<b>Dry</b>	<b>System components dry at test cut location</b>
7	G	<b>Wet</b>	<b>System damp at test cut location</b>
8	H	<b>Wet</b>	<b>System damp at test cut location. Moisture on metal deck</b>
9	H	<b>Wet</b>	<b>System damp at test cut location</b>
10	I	<b>Dry</b>	<b>System components dry at test cut location</b>
11	L	<b>Wet</b>	<b>System damp at test cut location</b>
12	J	<b>Wet</b>	<b>System damp at test cut location. Moisture on metal deck</b>
13	I	<b>Wet</b>	<b>System damp at test cut location.</b>



**Figure 2: Framingham Farley School – Partial Roof Area Plan – Approximate Test Cut locations**

**DESIGN CONSIDERATIONS**

New construction, as well as repair and alteration of existing buildings in Massachusetts, is regulated by 780 CMR, Massachusetts State Building Code (MSBC), and 521 CMR, The Architectural Access Board (AAB). The code review was based on the proposed renovations being constructed under the 9th Edition of the MSBC which is based upon the *International Building Code 2015* (IBC) and the Massachusetts Amendments. The 9th Edition is reportedly based upon the 2015 versions of the International Building Code (IBC), International Existing Building Code (IEBC), 2018 International Energy Conservation Code (IECC), and along with Massachusetts Amendments.

Under the 9th Edition of the MSBC *Chapter 34 Existing Structures* refers to the *International Existing Building Code 2015* (IEBC) as modified by the Massachusetts Amendments. This section of the code applies when there are repairs, alterations, additions or a change in use to existing buildings and generally refers to other sections of 780 CMR for specific requirements. Alterations to existing buildings including the removal and replacement of building elements with a continuation of the same use group (as is the case for the roof replacement at the FHS) are governed by *Chapter 6, Alterations – Level 1:*

- *Section 602: Building Elements and Materials* – Generally, existing buildings must be modified in a manner that does not decrease safety.
- *Section 603: Fire Protection* – At this time, Gale does not anticipate any modifications to the existing fire protection system.
- *Section 604: Means of Egress* – It is Gale’s understanding that the building is fully compliant with egress requirements. No modifications to egress components are anticipated.
- *Section 605: Accessibility* – Gale recommends that FPS confirm that the building conforms with the MAAB requirements or perform a compliance study.

Based on the current scope of work and anticipated costs, FPS should confirm that the renovations not exceed 30% of the full and fair cash value of the facility and will not require additional accessibility improvements. As the project will exceed \$500,000, a minimum accessible entrance and bathroom will be required if not already present. Gale recommends that FPS confirm that the building conforms with the MAAB requirements or perform a compliance study.

- *Section 606: Structural* – This section of the code outlines requirements of the alterations of work where reroofing is required. As part of the evaluation of the existing roofing system, Gale completed a gravity load code review of the existing FHS building’s roof framing in accordance with Chapter 34: Existing Structures, of 780 CMR, the MSBC. Based on our review and calculations, the following is a summary of our findings:
  - As this building appears to be Seismic Design Category B, it is Gale’s opinion this section of the code does not apply for this project.
  - Because the basic wind speed for the City of Framingham is 130 mph and the building appear to be classified as Occupancy Category III, this section of the code does not appear to apply for this project.
  - The proposed replacement at FMS building is not anticipated to increase the roof dead and live load capacity more than 5%.

Due the presence of stone ballast and the potential for displacing stones down the drain, Gale was not able to confirm the exact sizes and locations of all roof drains and therefore was not able to confirm the capacity of the existing roof drainage system. However, based on our visual observations, the existing roof drains of the low slope roof areas appear to provide adequate drainage, but evidence of ponding water suggests that low lying areas are collecting and retaining moisture following rain events. A full review of the existing drainage to confirm the capacity of the existing roof drainage system for compliance with the Massachusetts State Plumbing Code (MSPC) should be performed during the design phase of the roof replacement. Additional crickets should be provided to facilitate drainage from low areas. Secondary overflow drainage may be recommended at some locations.

## ***DISCUSSION AND OPINIONS***

Based on our evaluation of the low sloped roofs, reported leaks, and water observed in the roof system it is Gale's opinion that the existing built-up roof assemblies is approaching the end of its useful service life. The Owner can select to preserve portions of the roofing but based on the system configuration lacking proper air/vapor barrier components and system transitions, continued deterioration of the underlaying system components can affect the overall performance of the roofing assembly.

### **Low Sloped Roof Systems**

Based on the observed conditions noted previously, there are five (5) types of roof coverings which could be considered for the low-slope replacement roof systems at this facility. Each system has its own chemical and physical properties and proven performance characteristics. Refer to the appropriate building section for discussions of unique conditions, and how they may affect the final design recommendations. These membrane systems are as follows:

1. Gravel Surfaced Built-Up Roofing (GSBUR) membranes are alternating layers of asphalt, reinforcing felts (organic or non-organic) and gravel surfacing similar to the current roof system. Of the systems discussed herein for low slope applications, the GSBUR is the most time proven. Properly designed and installed, these systems have shown good longevity. GSBUR systems are field fabricated and therefore, considered more workmanship dependent, and can be susceptible to problems during construction. GSBUR can be applied with hot asphalt or cold mastics. Hot applied systems are accompanied by the odor of asphalt and use of 450°F to 500°F asphalt on the roof. The asphalt acts as the waterproofing materials while the fabric and felts provide the strength. Hot asphalt used to install the system can have logistic implications due to the strong fumes associated with the asphalt and the possibility of a fire hazard created by the asphalt kettle application. "Cold-process" built-up systems avoid temperature application of asphalt, and as such, have less odor. The cold process systems offer superior resistance to vandalism but can be difficult to repair. Manufacturers of this type of system offer 10-20 and sometimes 30-year material and workmanship warranties.
2. Styrene – Butadiene – Styrene Granular Surfaced Modified-Bitumen Roof Membranes (SBS) are field fabricated and installed in multi-ply (minimum of two) configurations. SBS membranes can be set in hot asphalt or cold adhesive, or they can be torch applied. With its thick, puncture resistant, granular surfaced cap sheet, SBS exhibits excellent puncture and impact resistance similar to the BUR systems. As with cold and hot applied BUR systems, modified-bitumen membranes are workmanship dependent and can be susceptible to problems during construction for contractors not proficient with the installation requirements. Hot applied systems are accompanied by the odor of asphalt and use of 450°F to 500°F asphalt on the roof. The asphalt acts as the waterproofing material while the plies provide the strength. Hot asphalt used to install the system can have logistic implications due to the strong fumes associated with the asphalt and the possibility of a fire hazard created by the asphalt kettle or torch application. Cold process systems avoid temperature application of asphalt, and as such, have less odor and would be a good alternative for this site. The manufacturers of SBS membrane systems offer 15-20 year and sometimes 30-year

material and workmanship warranties that are similar with other membrane system manufacturers.

3. Elastomeric Roof Membranes (EPDM - Ethylene Propylene Diene Terpolymer) are single-ply synthetic rubber membranes which can be installed as a fully adhered or mechanically attached system. EPDM roof coverings are field fabricated with the seams of the membrane adhered with adhesive or a two-sided adhesive seam tape. The adhered membrane seams require specific preparation work to conform to the manufacturer's requirements. It has been Gale's experience that the seams of EPDM systems are prone to delamination within the warranty period and unless leaks occur, are not repaired under warranty. Proper slope to drain is required to effectively remove water from the membrane surface and is critical for extended surface life and warranty coverages. Some EPDM warranties have specific limitations excluding ponded water as a result of seam adhesive degeneration when exposed to prolonged moisture. EPDM sheets are prefabricated off-site in the manufacturer's plants by making large sheets of membrane that are installed in "panels" on the site. Each of these panels are then adhered together using the bonding adhesives or pre-manufactured tapes to provide a watertight roof. These systems have a lower puncture resistance compared to the SBS, but their reparability is good and can easily be performed by certified maintenance personnel.

Gale is aware of 15-year-old EPDM systems which are currently performing satisfactorily. However, it is Gale's experience that after seven to ten years, maintenance in the form of seam repairs will be required. Manufacturers of this type of system typically offer 10 to 20-year materials and workmanship warranties and have recently promoted thicker membranes that carry a 30-year warranty. Gale would recommend stripping-in all field fabricated seams if EPDM is specified, as well as designing for complete removal of all water through proper slope to drain (i.e. additional tapered insulation).

4. Single-ply thermoplastic polyolefin (TPO) roof membranes are also single-ply membranes that are available from several manufacturers. TPO membranes are manufactured in wide rolls similar to that of the EPDM sheets and can be adhered with a bonding adhesive, or in some cases with a self-adhesive backing, to the insulation system. TPO membrane seams are thermally fused (hot air welded or in some cases solvent welded depending on the manufacturer's requirements) to form a monolithic sheet that does not rely on adhesives for a watertight bond. Warranties that are competitive with SBS and EPDM systems are available. TPO warranties do not typically contain a ponded water exclusion as a result of the thermally fused seams. Similar to the EPDM systems, the puncture resistance of the TPO membrane is lower than that of SBS. It should be noted that repairs to TPO membrane can often be difficult as the top surface of the membrane ages, making future welding problematic. Also, there are multiple manufacturers of TPO systems, with multiple formulations and differing material characteristics. These different characteristics do not allow for accurate monitoring of the product's track record. It should also be noted that there have been several reports of premature aging and failures of TPO systems, which is assumed to be a direct result of modifying the formulations in an attempt to modify the final roofing product. Should TPO's be considered, additional walkway pads should be used as the membrane becomes very slippery when exposed to accumulated precipitation.

5. Single-ply thermoplastic (polyvinyl chloride – PVC, or Elvaloy based) roof membranes are another option. PVC/Elvaloy membrane systems are available from several manufacturers. Based on our experience, it is Gale’s opinion that the reinforced coated systems offer satisfactory chemical/physical properties. PVC/Elvaloy membranes can be installed as a fully adhered, mechanically attached or a loose laid and ballasted application. Similar to the EPDM and TPO membranes, the PVC/Elvaloy membrane is manufactured in wide rolls. However, the PVC/Elvaloy membrane seams are thermally fused by hot air welds only to form a monolithic sheet that does not rely on adhesives for a watertight bond. Warranties that are competitive with GSBUR and EPDM systems are available. PVC/Elvaloy warranties do not typically contain a ponded water exclusion as a result of the thermally fused seams. Similar to the EPDM systems, the puncture resistance of the PVC/Elvaloy membrane is lower than that of SBS but is easy to repair using handheld heat welding equipment. Gale is aware of several membrane assemblies in New England which have been performing successfully for over 20 years. There are European installations of these products reported to be in excess of 25 years old. Similar to the TPO system, additional walkway pads should be considered on this membrane as it becomes very slippery when wet.

### **Coverboards**

As standard polyisocyanurate insulation systems are typically susceptible to puncture from falling objects, can be crushed if uneven weight is applied, or can allow sharp objects such as tools to damage the roof membranes proposed, Gale recommends that a dense coverboard be utilized between the polyisocyanurate and roof membrane components. This coverboard can vary from manufacturer and roof system, but would either be a moisture resistant gypsum board such as that manufactured by Georgia-Pacific, a high density isocyanurate as supplied by several single ply manufactures, or a wood fiberboard insulation as required by the manufacturers of GSBUR or SBS systems.

It is however the experience of this office that the moisture resistant gypsum and fiberboard coverboards are more susceptible to moisture accumulation over long periods of time should water infiltration or vapor drive issues occur under the roof membrane. Therefore, Gale recommends that a high density, polyisocyanurate insulation be fully adhered over the attached roof insulation system to provide a more durable substrate for the roof membrane, as well as reduce the potential of damage to the roof membrane as a result of potential fastener back-out should the fasteners be in direct contact with the roof membrane. Some additional review of these products may be required during the design phase to confirm the intent of the installation requirements.

### **Insulation**

There are several types of roof insulation boards that may be considered suitable for application on these roofs. In a conventional, insulated roof system, only polyisocyanurate insulation has a higher thermal resistance (R-Value) per inch requiring much less overall insulation thicknesses over its competitors. Due to the existing positive slope of the roof deck, the use of flat stock insulation should be considered. The greater thicknesses of insulation may result in additional wood blocking and raising rooftop equipment to accommodate flashing heights.



As referenced, long-term repairs would include the removal and replacement of the existing roof assemblies down to the roof deck. Replacement would consist of new roof assembly components that includes, but is not limited to, multiply built-up roof waterproofing, high density insulation coverboard, rigid flat and tapered insulation, and vapor barrier (VB) membrane, over a base layer of insulation on top of the existing steel deck. It is Gale's opinion that an adhered VB membrane be installed that ties-in to the exterior wall system's vapor barrier if there is one in place. Roof replacement would also include new membrane and sheet metal flashings along the perimeter and around rooftop penetrations. It is Gale's opinion that throughwall flashings at rising masonry walls would not need to be replaced but several low rising walls could be clad with roofing to address potentially low flashing heights due to added tapered insulation. Based on the age of the drains, FPS should consider replacement of drain assemblies in conjunction with the roof replacement.

Thank you for your attention. Should you have any questions or comments, please do not hesitate to contact us at this office.

Best regards,

GALE ASSOCIATES, INC.

*Derick Wiaderski*/lad

Derick A. Wiaderski  
Staff Engineer

DAW:lad

Attachments: Roof Plans

cc: Jason Wagner – Gale  
Brian Neely – Gale

I:\837040\01 Evaluation\report\837040 Framingham Schools Farley Roof Condition Evaluation 2020 1016.docx

APPENDIX A  
PHOTOGRAPHIC DOCUMENTATION

**PHOTOS**



Photo 1 – The initial appearance of the existing conditions at the Farley Middle School Building appear to indicate a reasonably sound roofing system. The presence of stone ballast reduces the ability to identify deficiencies through visual evaluation alone.

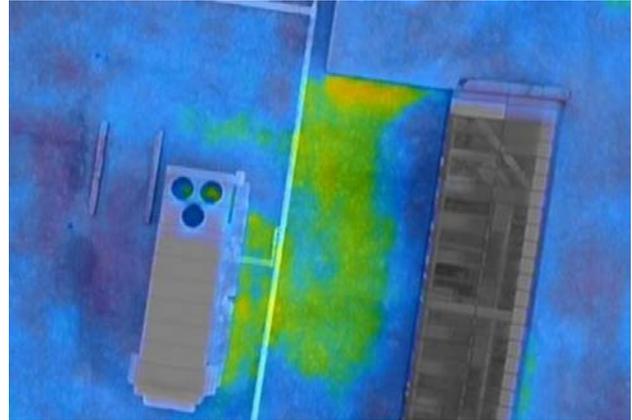


Photo 2 – Through the use of unmanned aerial drones equipped with infrared camera technology, Gale identified several areas with the potential of containing moisture within the roofing assembly.



Photo 3 – In conjunction with the infrared roof scan, Gale utilized capacitance testing to determine the locations of test cuts.



Photo 4 – Thirteen (13) individual test cut locations were selected based on the gather data. In general, the roofing system at the test locations consists of a gravel surface built-up roofing membrane installed over a fiberboard coverboard, Polyiso rigid insulation and a sloped metal deck.



Photo 5 – The presence of moisture within the roofing system components was confirmed with the use of moisture sensitive test strips. Varying levels of moisture were observed at each of the test locations where moisture was found.



Photo 6 – Varying levels of moisture were observed within the roofing system components at select locations.

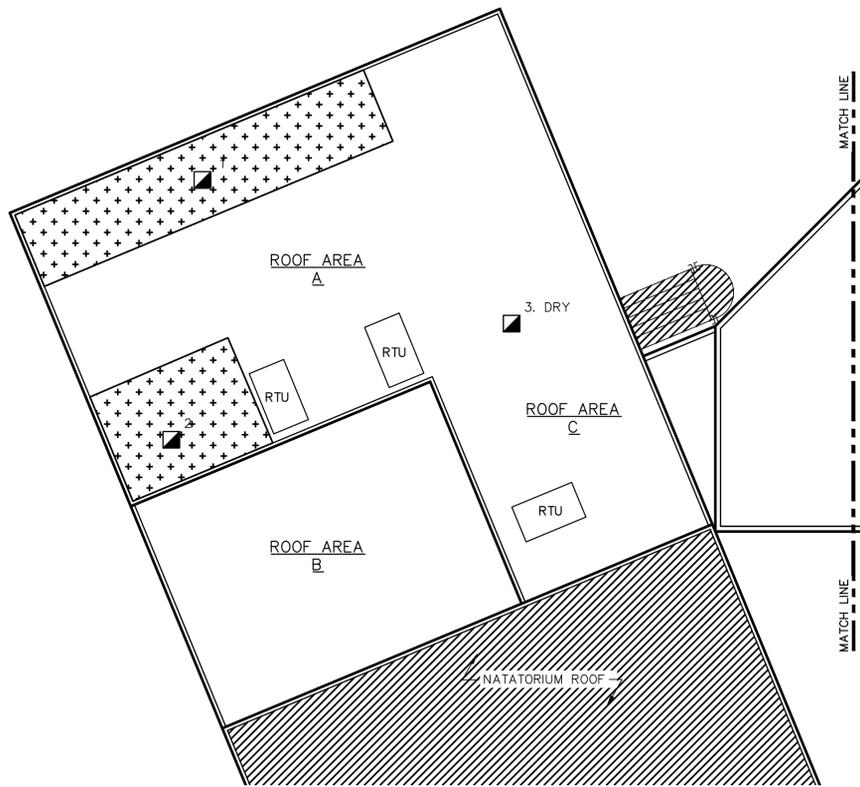
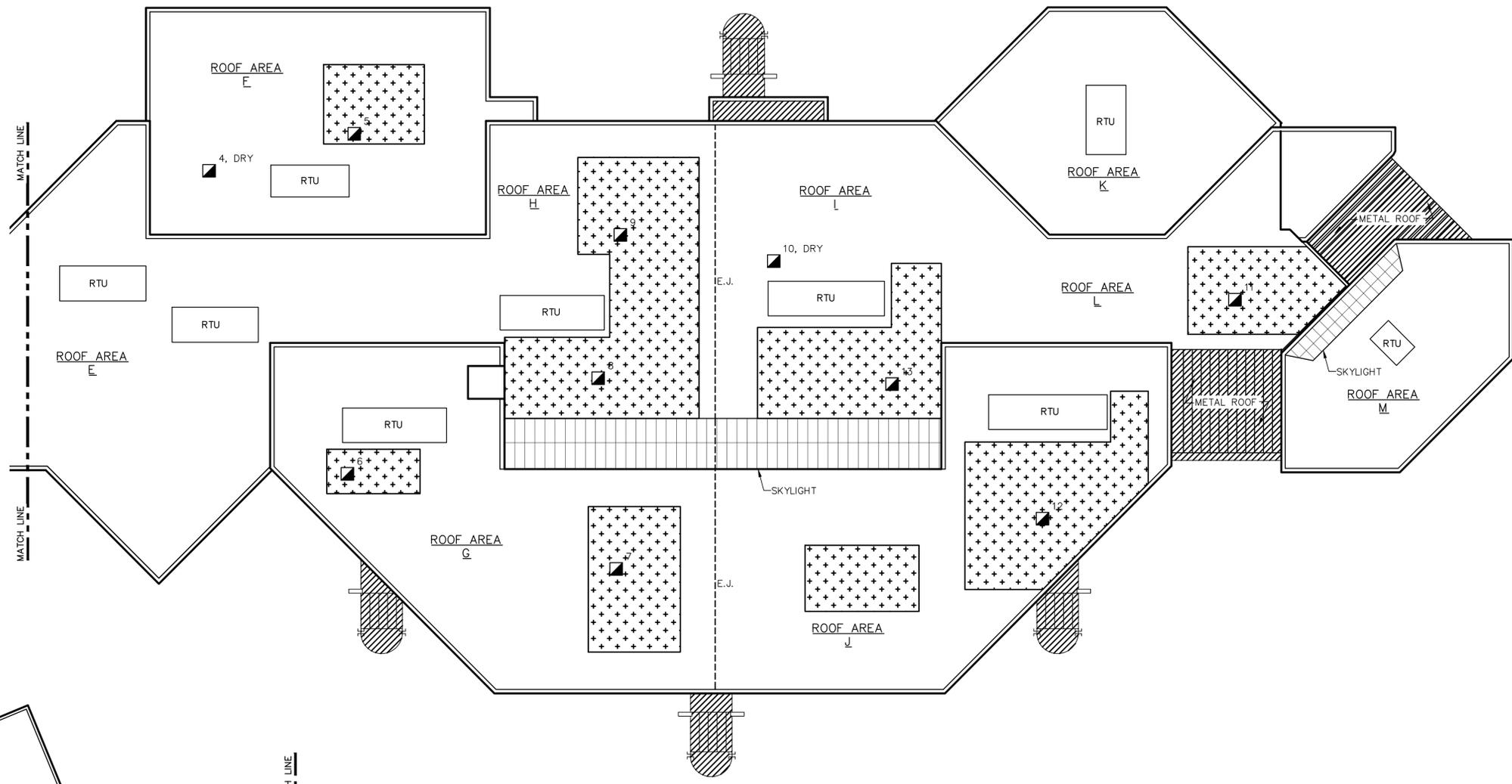


Photo 7 – Standing water was observed to be collecting within the flutes of the corrugated roof deck in select locations.



Photo 8 – In general, the skylight assembly appears to be in fair condition, but Gale observed that several fasteners do not appear to fully engage the mullion covers. The conditions could potentially provide a path for water to enter the building and roofing assembly.

APPENDIX B  
FARLEY MIDDLE SCHOOL ROOF AREA PLAN

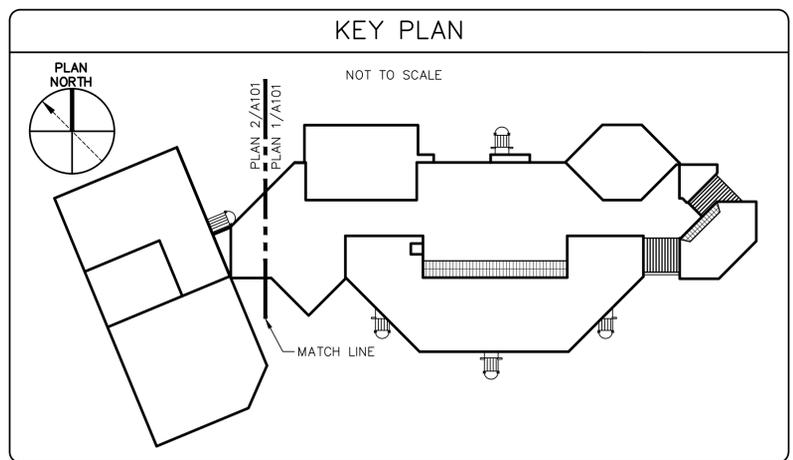


1 FARLEY BUILDING PARTIAL ROOF PLAN  
SCALE: 1/16"=1'-0"

2 FARLEY BUILDING PARTIAL ROOF PLAN  
SCALE: 1/16"=1'-0"

**LEGEND**

-  AREA OF MOIST ROOFING TO BE REPLACED
-  TEST CUT LOCATION
-  NOT IN CONTRACT



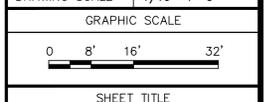
**GALE**  
Engineers and Planners  
163 LIBBEY PARKWAY | WEYMOUTH, MA 02189  
F 781.335.6465 F 781.335.6467 www.gainc.com  
Boston Baltimore Orlando Hartford

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PROJECT  
**ROOF EVALUATION AT THE FARLEY BUILDING FRAMINGHAM, MA**

OWNER  
**CITY OF FRAMINGHAM; FRAMINGHAM PUBLIC SCHOOLS  
73 MT WAYTE AVE  
FRAMINGHAM, MA 01702**

NO.	DATE	DESCRIPTION	BY
PROJECT NO.	837040		
CADD FILE	837040 A100s		
DESIGNED BY	DAW/BHN		
DRAWN BY	SWW		
CHECKED BY	BHN		
DATE			
DRAWING SCALE	1/16"=1'-0"		



SHEET TITLE  
**FARLEY BUILDING ROOF PLAN**

DRAWING NO.  
**A101**

**LEGEND**

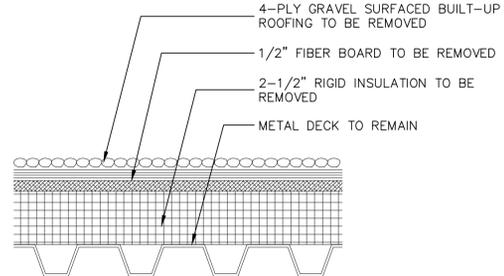
- ROOF EDGE
- E.J. EXPANSION JOINT
- LIGHTNING PROTECTION CABLE
- GUTTER WITH DOWNSPOUT
- MAIN ENTRANCE
- FAN
- LINE OF ROOF OR WALL BELOW OVERHANG
- TAPERED INSULATION SLOPE
- STRUCTURAL ROOF SLOPE
- LIGHTNING ROD
- CONDUIT
- RTU ROOF TOP MECHANICAL UNIT
- S SKYLIGHT
- SLEEPER
- J-VENT
- ROOF AREA NOT IN CONTRACT
- ELEV. = ' - " ± ROOF ELEVATION RELATIVE TO GRADE WHICH IS ASSUMED TO BE ZERO FEET
- NOTE DETAIL INDICATOR
- WATER SPIGOT
- LIGHTNING PROTECTION PENETRATION

**GENERAL NOTES**

1. THE INFORMATION SHOWN ON THIS DRAWING HAS BEEN COMPILED FROM VARIOUS SOURCES, AND MAY NOT REFLECT THE ACTUAL CONDITIONS AT THE TIME OF CONSTRUCTION.
2. FOR THE SAKE OF CLARITY, EACH INDIVIDUAL DETAIL ON THE ROOF PLAN HAS NOT BEEN INDICATED. INSTALLATION DETAILS HAVE BEEN INDICATED FOR TYPICAL COMPONENTS AT RANDOM LOCATIONS.
3. HATCH PATTERNS ARE FOR REPRESENTATION ONLY AND SHOULD NOT BE USED A MEANS FOR QUANTIFYING.
4. REMOVE ALL WET INSULATION PRIOR TO INSTALLATION OF NEW ROOF COMPONENTS.
5. DETAILS NOT DEPICTED SHALL BE CONSTRUCTED IN A MANNER CONSISTENT WITH THE DETAIL DRAWINGS.
6. THE DEFECTS NOTED INDICATE APPROXIMATE LOCATIONS. THEY ARE NOT INTENDED TO DEFINE LIMITS OF WORK. AREAS NOT NOTED ON THESE DRAWINGS EXHIBITING SIMILAR DEFECTS AS THOSE SHOWN SHALL BE REPAIRED IN A SIMILAR MANNER.

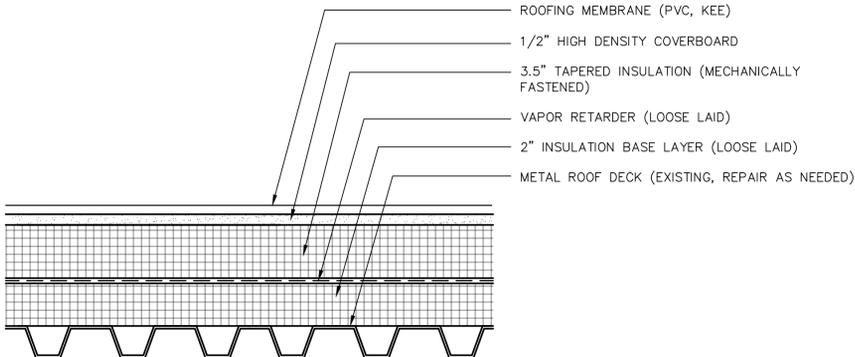
**CODE INFORMATION**

**EXISTING ROOF CROSS SECTIONS**

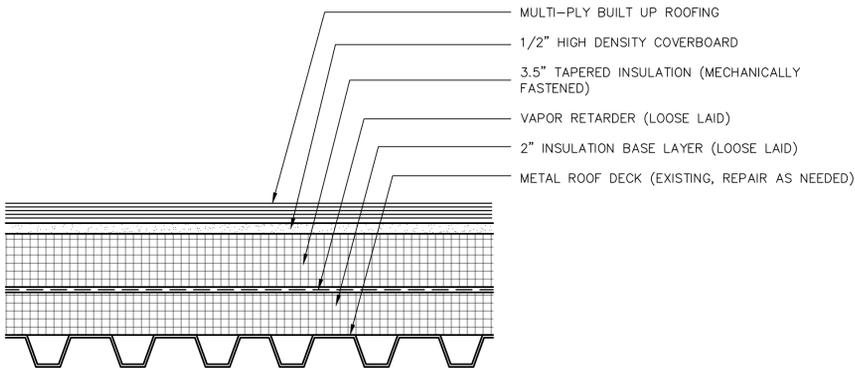


**FARLEY BUILDING  
EXISTING ROOF CROSS SECTION**  
SCALE: 3"=1'-0"  
NOTE: ALL ITEMS ARE EXISTING.

**PROPOSED ROOF CROSS SECTIONS**



**FARLEY BUILDING  
PROPOSED ROOF CROSS SECTION – TYPE 1**  
SCALE: 3"=1'-0"  
NOTE: ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING.



**FARLEY BUILDING  
PROPOSED ROOF CROSS SECTION – TYPE 2**  
SCALE: 3"=1'-0"  
NOTE: ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING.

**ROOFING NOTES**

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**PROJECT**  
ROOF EVALUATION AT THE FARLEY BUILDING FRAMINGHAM, MA

**OWNER**  
CITY OF FRAMINGHAM; FRAMINGHAM PUBLIC SCHOOLS  
73 MT WAYTE AVE  
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NO.	DATE	DESCRIPTION	BY
PROJECT NO.	837040		
CADD FILE	837040 G100's		
DESIGNED BY	DAW/BHN		
DRAWN BY	SWW		
CHECKED BY	BHN		
DATE			
DRAWING SCALE	AS NOTED		

GRAPHIC SCALE

SHEET TITLE

**GENERAL NOTES**

DRAWING NO.  
**G101**

## City of Framingham FY23-27 Capital Improvement Program

### FY23 Recommended:

School Exterior Envelope Repairs for Walsh Middle School (Phase 2) \$1,161,705  
General Fund

School Department

Envelope Repairs for Walsh Middle School (Phase 2) include exterior walls, windows and sealant systems

Phase 2 repairs at Walsh Middle School include exterior walls, windows and sealant systems and associated components to be removed and replaced at Walsh Middle School.

Gale Associates, Inc. provided reports on existing conditions of the existing exterior walls, window and sealant systems and associated components at multiple Framingham Public School Facilities and has developed a scope of work with the following recommendations for the exterior walls, windows and sealant systems and associated components to be removed and replaced or repaired for Walsh Middle School. This request is to complete the portion of this project that was deferred in FY2022.

## **1. Exterior Envelope Evaluations - at Walsh Middle School**

### **FY23:**

This request for capital budget funding is for the continuation of exterior envelope repairs to the Walsh Middle School. The Department requested \$2,156,095 in FY2022 Capital Funding for this project but was approved for \$1,100,000 from the Mayor and City Council. This request will allow the Department to undertake the remaining repairs that were not funded during FY2022. This project will address many issues at Walsh Middle School, including failing window perimeter sealant systems; deteriorating expansion joints; deteriorating fascia; deteriorated mortar; foundation cracks and failure; spalling concrete; and associated components. This school was built in 1969 and is in need of these repairs to ensure the building is sealed off from the outdoors and continues to serve the youth of Framingham into the future.

### **Recommended Remaining Repairs**

- Walsh Middle School \$1,161,705

**Total Requested** **\$1,161,705**

PREPARED FOR:  
Framingham Public Schools  
Framingham, MA

FY 23 COST ESTIMATES

EXTERIOR ENVELOPE 10 YEAR SPREADSHEET

SCHOOL ID	Material and Labor Subtotal	Engineering Fee Construction Contingency 10%	Total	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	Recommended Repairs
Walsh Middle School	\$ 1,056,095	\$ 105,610	\$ 1,161,705	\$ 1,161,705	\$ 1,217,466	\$ 1,275,905	\$ 1,337,148	\$ 1,401,331	\$ 1,468,595	\$ 1,539,088	\$ 1,612,964	\$ 1,690,386	\$ 1,771,525	Window and Doors Replacement, Sealant Repairs
Framingham High School	\$ 107,195	\$ 16,379	\$ 123,574	\$ 123,574	\$ 129,506	\$ 135,722	\$ 142,237	\$ 149,064	\$ 156,219	\$ 163,718	\$ 171,576	\$ 179,812	\$ 188,443	Glazing Replacement, Masonry, Sealant, Concrete and Misc. Repairs
King Elementary School	\$ 1,175,700	\$ 179,647	\$ 1,355,347	\$ 1,355,347	\$ 1,420,404	\$ 1,488,583	\$ 1,560,035	\$ 1,634,917	\$ 1,713,393	\$ 1,795,635	\$ 1,881,826	\$ 1,972,154	\$ 2,066,817	Window and Doors Replacement, Masonry, Sealant, and Misc. Repairs
Dunning Elementary School	\$ 1,783,910	\$ 272,581	\$ 2,056,491	\$ 2,056,491	\$ 2,155,203	\$ 2,258,653	\$ 2,367,068	\$ 2,480,687	\$ 2,599,760	\$ 2,724,549	\$ 2,855,327	\$ 2,992,383	\$ 3,136,017	Window and Doors Replacement, Concrete Repairs
Thayer Campus of FHS	\$ 268,445	\$ 41,018	\$ 309,463	\$ 309,463	\$ 324,318	\$ 339,885	\$ 356,199	\$ 373,297	\$ 391,215	\$ 409,994	\$ 429,673	\$ 450,298	\$ 471,912	Window and Doors Replacement, Masonry, Sealant and Concrete Repairs
Juniper Hill Elementary School	\$ 575,730	\$ 87,972	\$ 663,702	\$ 663,702	\$ 695,559	\$ 728,946	\$ 763,935	\$ 800,604	\$ 839,033	\$ 879,307	\$ 921,514	\$ 965,746	\$ 1,012,102	Window and Doors Replacement, Masonry, Sealant, Concrete and Misc. Repairs
Brophy Elementary School	\$ 2,166,730	\$ 331,076	\$ 2,497,806	\$ 2,497,806	\$ 2,617,701	\$ 2,743,351	\$ 2,875,032	\$ 3,013,033	\$ 3,157,659	\$ 3,309,226	\$ 3,468,069	\$ 3,634,536	\$ 3,808,994	Window and Doors Replacement, Masonry, Sealant, Concrete, Wood and Misc. Repairs
Potter Road Elementary School	\$ 2,155,000	\$ 329,284	\$ 2,484,284	\$ 2,484,284	\$ 2,603,530	\$ 2,728,499	\$ 2,859,467	\$ 2,996,721	\$ 3,140,564	\$ 3,291,311	\$ 3,449,294	\$ 3,614,860	\$ 3,788,373	Window and Doors Replacement, Masonry, Sealant, Concrete and Misc. Repairs
<b>TOTAL</b>			\$ 10,652,372	\$ 10,652,373	\$ 11,163,686	\$ 11,699,543	\$ 12,261,122	\$ 12,849,655	\$ 13,466,439	\$ 14,112,828	\$ 14,790,244	\$ 15,500,175	\$ 16,244,184	
<b>TOTAL PROJECTS BY FISCAL YEAR</b>				\$ 1,161,705	\$ 1,549,910	\$ 2,598,538	\$ 906,172	\$ 3,013,033	\$ 3,140,564	TBD	TBD	TBD	TBD	

\*\*\*\*\* FY23 thru FY32 are costs with 4.8% escalation

**BUILDING EXTERIOR EVALUATION  
WALSH MIDDLE SCHOOL  
14 VERNON STREET  
FRAMINGHAM, MA 01701**

**GENERAL BUILDING INFORMATION**

Walsh Middle School (Walsh) was built in 1969. The two-story building is constructed with a combination of cast-in-place concrete and brick masonry. Walsh is middle school housing grades 6 through 8, and it contains a cafeteria, kitchen, gymnasium, auditorium, library, bathrooms, and assorted classrooms and offices.

Gale reviewed the existing building which is reported to be approximately 201,000 sq. ft. in area. Walsh is rectangular in shape with two courtyards in the center. The school has approximately 15,000 sq. ft. of 2.5 ft. wide painted steel framed punched windows with single pane glazing. Walsh also has sixty-two (62) hollow metal single or double access doors, some with sidelights and transoms. The building cladding is composed entirely of brick and mortar. Expansion joints are dispersed throughout the building at approximately 20 to 30 ft. intervals, and appear to be constructed with a silicone or butyl sealant. The perimeter sealant at windows and doors also appears to be silicone or butyl.

**REVIEW OF EXISTING DOCUMENTS**

To assist Gale in performing the evaluation of Walsh Middle School, representatives from Framingham Public Schools provided Gale with the following documents and drawings:

1. Walsh Middle School – Information sheets including contact information, building information, utility information, building features and transportation.
2. Walsh Middle School – Floor plans designed by Be Safe Technologies, Inc. The floor plans provided room and door numbers.
3. Walsh Middle School – Documents with photos of the school both from a ground view and an aerial view.



*Figure 1: Partial view of the South Elevation.*



*Figure 2: Partial view of the East Elevation.*



*Figure 3: Partial view of the North Elevation.*

## **EXISTING EXTERIOR CONDITIONS**

Gale performed a visual evaluation of the building's existing exterior cladding, doors, windows and associated components. The brick masonry appeared to be in fair condition overall. Step cracking, efflorescence and deteriorated mortar were observed occasionally throughout the brick walls. Stress cracking and spalling were observed occasionally in the concrete trim and concrete foundation of the building. Sealant at doors, windows and expansion joints is failed in areas. In addition, window glazing sealant has failed on approximately half of the building.

### **Exterior Observations:**

1. The existing window systems are non-thermally broken painted steel framed punched windows with single pane glazing.
2. Window glazing throughout the building is clear glass. Glazing appears to be in good condition overall.
3. The steel window frames are in fair to poor condition. Some frames are rusted at the sill where window perimeter sealant has failed (Fig. 4).
4. The existing door systems are approximately 3 foot wide, 7 foot tall hollow metal single or double doors. Some doors have sidelights and transoms. Doors appear to be in good condition overall.
5. Approximately 200 linear feet of expansion joint sealant throughout the building is in fair to poor condition. Poor condition is evident by cracking (cohesive failure) and dry, hard texture which has de-bonded from the brick masonry (adhesive failure) (Fig. 5).
6. Approximately 25% of all window, door and louver perimeter sealant has failed. This is evident by cracking (cohesive failure) and dry, hard texture which has de-bonded from the brick masonry (adhesive failure) (Fig. 6).



Figure 4: View of rusted window frame.



Figure 5: View of expansion joint in poor condition.



Figure 6: View of failed window perimeter sealant.

7. Approximately 50% of all window glazing sealant has failed. This is evident by cracking (cohesive failure) and dry, hard texture which has debonded from the window (adhesive failure) (Fig. 7).
8. Approximately 2% of mortar throughout the building is deteriorated (Fig. 8).
9. Approximately 300 square feet of efflorescence was observed throughout the building (Fig. 9).
10. Approximately 700 linear feet of stress cracking was observed throughout the building's concrete foundation (Fig. 10).
11. Approximately 150 square feet of spalling was observed throughout the building's concrete foundation and concrete trim (Fig. 11).
12. Approximately 50 linear feet of step cracking was observed throughout the building's brick walls (Fig. 12).
13. Approximately 24 square feet of bowed concrete trim was observed on the north elevation (Fig. 13).
14. Approximately 150 square feet of spider cracks were observed in the building's concrete foundation on the south and west elevations (Fig. 14).



Figure 8: View of deteriorated mortar.



Figure 9: View of efflorescence.



Figure 7: View of failed window glazing sealant.



Figure 10: View of stress cracking in the building's concrete foundation.



Figure 11: View of spalled concrete at cast-in-place concrete fascia.



Figure 14: View of spider cracks in concrete foundation.



Figure 12: View of step cracking.



Figure 13: View of bowed concrete fascia panel at north elevation.

## **DISCUSSION AND RECOMMENDATIONS**

Gale has evaluated the windows, exterior doors and cladding at Walsh in an effort to provide Framingham with a better understanding of their current condition and serviceability.

Please note the following exclusions:

- Hazardous materials testing was not conducted as part of this building evaluation.
- Door and window operation was not reviewed as part of this building evaluation, only exterior visual observations of the doors and windows have been included.

### Windows:

Based on Gale's visual observations of the window systems, it is our opinion that the existing steel framed windows are thermally inefficient and in poor condition. The aluminum window units are single glazed and do not have thermally broken frames or sashes. In addition, the noted deficiencies of the units are likely to allow air and moisture infiltration into the building.

Typically, steel window systems have a service life of approximately 30 to 40 years depending on the type of system, frequency of use, maintenance and exposure to weather. Gale could not locate a manufacturer's date stamp on the window frames or glass components and therefore the age of the existing windows is unknown. However, it does appear that the windows are original to the building and are nearing the end of their useful service life.

In general, the frame and glazing systems lack adequate air and moisture protection due to failed sealants and glazing components and cannot resist thermal transfer through the conductive metal due to the lack of a thermal break. Similarly, the single pane glazing's offer little resistance to thermal transfer, or control of solar gains and visible light. Therefore, due to the poor thermal performance of the frames, it is recommended that these systems be replaced within the next 3 - 5 years.

### Entrances:

The existing steel storefront entrance framing appears to be in fair condition, however it lacks adequate air and moisture protection due to failed sealants and glazing components and cannot resist thermal transfer through the conductive metal due to the lack of a thermal break. Similar to the windows, the single pane glazing offers little resistance to thermal transfer, or control of solar gains and visible light. Therefore, due to the poor thermal performance of the frames and glazing components, replacement of all storefront entrances may also be considered to occur within the next 3 - 5 years when the window renovations are performed, as it may be more cost effective to perform the window renovations under the same contract.

### Exterior Wall Cladding:

Based on Gale's visual observations of the brick masonry, and cast-in-place concrete wall cladding systems, it is our opinion that, while the masonry is generally in fair condition, there are several deficient conditions such as displaced precast panels, step cracking, deteriorated mortar conditions, and damaged or loose bricks that could allow the passage of moisture into the cavity wall.

The bowed concrete could potentially be due to poor form work during construction but should be reviewed by a structural engineer. Brick masonry units under this area appear loose and present a potential fall hazard to pedestrians.

Step cracking, deteriorated mortar joints, and damaged or loose bricks are a potential source of moisture infiltration. Long exposures to moisture may accelerate deterioration of the brick and mortar and can pose a concern of a freeze/thaw cycle. Note that spot repointing to address sections of deteriorated mortar joints may provide a "spotty" appearance to the wall surface.

Based on the current condition of the brick masonry wall system, it is recommended the previously noted deficiencies be repaired within the next 0 - 3 years.

**COST ESTIMATE**

The budget estimates presented in this report have been broken down for the recommendations listed for each option. These estimates, which are based on current construction costs, should be considered preliminary and should not be used for sensitive budgeting. All estimating was performed using historical and market trends to establish unit pricing. These estimates have been generated by various sources and may not reflect the actual conditions at the time of construction. These budget estimates do not include additional engineering evaluation or design services, construction administration services, or permitting costs. These budget estimates also do not include soft costs associated with Walsh’s project management, site supervision, designer fee’s or site renovations associated with the site logistics. The line items within the estimate include a ten-percent (10%) design and construction contingency, as a defined scope has not been determined, as well as to account for potential unforeseen conditions that may be encountered. Framingham may want to budget the recommended work as follows:

**Total Estimated Cost:** .....\$2,156,095

\*Please note that these budgets are based upon 2020 construction prices and escalation for delayed construction should be considered.

***Recommended Repairs:***

*Window and Doors Replacement, Sealant Repairs*

Material and Labor Subtotal.....	\$1,607,946
General Conditions, Mobilization, Bonds, Insurance, Overhead and Profit 15% .....	\$241,192
Design and Construction Contingency 10% .....	\$184,914

**Total Estimated Cost:** ..... \$2,156,095



**Framingham**

**PUBLIC SCHOOLS**

**Embracing differences. Inspiring futures.**

**FRAMINGHAM PUBLIC SCHOOLS  
CAPITAL BUDGET PROPOSAL**

# *EXTERIOR ENVELOPE IMPROVEMENTS – \$1,161,705*

## *Walsh Middle School FY2023 Capital Budget Proposal*



**These photos highlight stress cracking in the concrete foundation; failed window glazing sealant; failing fascia; and poor, rapidly failing condition of an expansion joint**



## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

School Roof Repairs for McCarthy and Dunning Elementary Schools \$565,000 (Design only) General Fund

School Department

School Roof Repairs for failing roofs at for McCarthy and Dunning Elementary Schools

Partial recommendation of \$5,643,437 requested for the design and construction for roof repairs at the McCarthy and Dunning Elementary Schools. The district was recently notified this project was not accepted in the MSBA's accelerated repair program.

Replacement of failing roofs at McCarthy (Phase I) and Dunning.

We have submitted a SOI to the MSBA for their accelerated roof repair program to potential help reduce the cost of these replacements for the City. We are awaiting a decision on whether the District has been accepted into the program. Both roofs are failing, experience moisture infiltration at numerous locations, fascia damage, and either expired warranties or warranty is set to expire within the next fiscal year.

**2. Roof Repairs/Replacements - Dunning and McCarthy Elementary (SOI's Submitted to MSBA)**

**FY23:**

This request for capital budget funding is for the design and construction of new roofs at Dunning and McCarthy Elementary (Phase I) Schools. These roofs are in poor condition and rapidly deteriorating. Additionally, the warranty for both phases at McCarthy Elementary have expired while the warranty for Dunning Elementary is set to expire in 2023. Both of these roofs are experiencing moisture infiltration and deterioration that is requiring full replacement in order to ensure the continued usage of the school. The Department has submitted a statement of interest to the MSBA for the accelerated repair program for both roofs, and is awaiting follow up from the MSBA on whether the City has been accepted into the program for these roofs. However, as part of the MSBA program, the City is required to allocate full project costs within a given timeline, which this funding request would accomplish.

**Recommended Repairs/Replacements**

- Dunning Elementary School \$1,871,500
- McCarthy Elementary School \$3,771,937

**Total Requested \$5,643,437**

**FRAMINGHAM PUBLIC SCHOOLS - ROOF REPAIRS AND REPLACEMENTS**  
**FISCAL YEAR 2022-2023 SNAPSHOT**

Scope Item	Bldg. Name	Construction	(SF)	Installation	Roof	Warranty #	Warranty	Solar Consultant (A)	Structural Evaluation (B)	Enclosure Consultant (C)	Consultant Total (A+B+C)	Material and Labor (D)	Bond, Insurance, Overhead, and Profit 15% (E)	Design and Construction Contingency 10% (F)	Construction Total (D+E+F+G)	Design, Bidding, and Construction Administration	FY23 Replacement Cost
		Date		Date	Age		Expiration										
1	Farley Middle School	1974	54,200	2002 / 2003	19 / 18	90782 / 97301	Feb 27 2017 / Mar 23 2018	\$7,000	\$12,000	\$257,450	<b>\$276,450</b>	\$2,059,600	\$308,940	\$205,960	<b>\$2,574,500</b>	<b>\$257,450</b>	<b>\$3,108,400</b>
2	Miriam McCarthy Elementary School - Phase I	1952	32,500	1999	22	77770	Oct 22 2014	\$7,000	\$12,000	\$154,375	<b>\$173,375</b>	\$1,235,000	\$185,250	\$123,500	<b>\$1,543,750</b>	<b>\$154,375</b>	<b>\$1,871,500</b>
3	Charlotte Dunning Elementary School	1965	65,841	1996	25	25231	Aug 31 2023	\$7,000	\$12,000	\$312,745	<b>\$331,745</b>	\$2,501,958	\$375,294	\$250,196	<b>\$3,127,448</b>	<b>\$312,745</b>	<b>\$3,771,937</b>
4	Potter Road Elementary School	1955	46,984	1996	25	25314	Aug 31 2023	\$7,000	\$12,000	\$223,174	<b>\$242,174</b>	\$1,785,392	\$267,809	\$178,539	<b>\$2,231,740</b>	<b>\$223,174</b>	<b>\$2,697,088</b>
5	Brophy Elementary School	1968	49,900	2002	19	95484	Sep 6 2022	\$7,000	\$12,000	\$237,025	<b>\$256,025</b>	\$1,896,200	\$284,430	\$189,620	<b>\$2,370,250</b>	<b>\$237,025</b>	<b>\$2,863,300</b>
6	King Elementary School	1957	45,803	1998	23	30611	Aug 31 2023	\$7,000	\$12,000	\$217,564	<b>\$236,564</b>	\$1,740,514	\$261,077	\$174,051	<b>\$2,175,643</b>	<b>\$217,564</b>	<b>\$2,629,771</b>
7	Barbieri Elementary School	1974	69,383	1998	23	29490	Aug 31 2023	\$7,000	\$12,000	\$329,569	<b>\$348,569</b>	\$2,636,554	\$395,483	\$263,655	<b>\$3,295,693</b>	<b>\$329,569</b>	<b>\$3,973,831</b>
8	Hemenway Elementary	1961	65,126	1996	25	25230	Aug 31 2023	\$7,000	\$12,000	\$309,349	<b>\$328,349</b>	\$2,474,788	\$371,218	\$247,479	<b>\$3,093,485</b>	<b>\$309,349</b>	<b>\$3,731,182</b>
9	Cameron Middle	2001	70,000	2001	20	78932	Aug 31 2023	\$7,000	\$12,000	\$332,500	<b>\$351,500</b>	\$2,660,000	\$399,000	\$266,000	<b>\$3,325,000</b>	<b>\$332,500</b>	<b>\$4,009,000</b>
10	Harmony Grove Elementary School	1998	58,000	1998	23	28470	Aug 31 2023	\$7,000	\$12,000	\$275,500	<b>\$294,500</b>	\$2,204,000	\$330,600	\$220,400	<b>\$2,755,000</b>	<b>\$275,500</b>	<b>\$3,325,000</b>
11	Juniper Hill - BLOCKS	1960	45,600	2001	20	88827	Sep 12 2021	\$7,000	\$12,000	\$216,600	<b>\$235,600</b>	\$1,732,800	\$259,920	\$173,280	<b>\$2,166,000</b>	<b>\$216,600</b>	<b>\$2,618,200</b>
12	Stapleton Elementary School	1922, 1956, 1976	30,200	2007	14	N/A	Dec 12 2027	\$7,000	\$12,000	\$143,450	<b>\$162,450</b>	\$1,147,600	\$172,140	\$114,760	<b>\$1,434,500</b>	<b>\$143,450</b>	<b>\$1,740,400</b>
13	Miriam McCarthy Elementary School - Phase II	1952	24,300	2007	14	121953	Dec 12 2027	\$7,000	\$12,000	\$115,425	<b>\$134,425</b>	\$923,400	\$138,510	\$92,340	<b>\$1,154,250</b>	<b>\$115,425</b>	<b>\$1,404,100</b>
14	Walsh Middle School	1969	119,800	2005	16	106406	May 16 2025	\$7,000	\$12,000	\$569,050	<b>\$588,050</b>	\$4,552,400	\$682,860	\$455,240	<b>\$5,690,500</b>	<b>\$569,050</b>	<b>\$6,847,600</b>
15	Framingham High	1963, 2006	215,000	2006	15	96668	May 24 2026	\$7,000	\$12,000	\$1,021,250	<b>\$1,040,250</b>	\$8,170,000	\$1,225,500	\$817,000	<b>\$10,212,500</b>	<b>\$1,021,250</b>	<b>\$12,274,000</b>
16	New Fuller Middle School	2021	137,000	2021	0	N/A	Sept 1 2041	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

**FRAMINGHAM PUBLIC SCHOOLS - ROOF REPAIRS AND REPLACEMENTS  
FISCAL YEAR 2023-2032 10-YEAR PROJECTED COSTS**

**Projected cost of roof at each location in Fiscal Year 2023 - Fiscal Year 2032\***

Location	FY 23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	Scope of Project/Notes
Farley Middle School	\$3,108,400	\$3,257,603	\$3,413,968	\$3,577,839	\$3,749,575	\$3,929,554	\$4,118,173	\$4,315,845	\$4,523,006	\$4,740,110	Current roof was installed in 2002 and replacement is anticipated to address leaks in the building Project proposed for Mid-Year FY2022 Capital Funding
Miriam McCarthy Elementary	\$1,871,500	\$1,961,332	\$2,055,476	\$2,154,139	\$2,257,537	\$2,365,899	\$2,479,462	\$2,598,477	\$2,723,203	\$2,853,917	Current roof was installed in phases in 1998 and 2007. Phase 1 submitted to MSBA ARP program June 2021 Project Proposed for FY2023 Capital Funding
Charlotte Dunning Elementary School	\$3,771,937	\$3,952,990	\$4,142,733	\$4,341,585	\$4,549,981	\$4,768,380	\$4,997,262	\$5,237,131	\$5,488,513	\$5,751,962	Current roof is under extended warranty until 2023. Submitted to MSBA ARP program June 2021. Project Proposed for FY2023 Capital Funding
Potter Road Elementary School	\$2,697,088	\$2,826,548	\$2,962,223	\$3,104,409	\$3,253,421	\$3,409,585	\$3,573,245	\$3,744,761	\$3,924,509	\$4,112,886	Current roof is under extended warranty until 2023 and replacement is anticipated at that time.
Brophy Elementary School	\$2,863,300	\$3,000,738	\$3,144,774	\$3,295,723	\$3,453,918	\$3,619,706	\$3,793,452	\$3,975,537	\$4,166,363	\$4,366,349	MSBA funding eligibility in 2023, based on current MSBA age of roof eligibility
King Elementary School	\$2,629,771	\$2,756,000	\$2,888,288	\$3,026,926	\$3,172,218	\$3,324,485	\$3,484,060	\$3,651,295	\$3,826,557	\$4,010,232	Current roof is under extended warranty until 2023 and replacement is anticipated at that time.
Barbieri Elementary School	\$3,973,831	\$4,164,575	\$4,364,474	\$4,573,969	\$4,793,520	\$5,023,609	\$5,264,742	\$5,517,450	\$5,782,287	\$6,059,837	Current roof is under extended warranty until 2023 and replacement is anticipated at that time.
Hemenway Elementary School	\$3,731,182	\$3,910,279	\$4,097,972	\$4,294,675	\$4,500,819	\$4,716,858	\$4,943,268	\$5,180,545	\$5,429,211	\$5,689,813	Current roof is under extended warranty until 2023 and replacement is anticipated at that time.
Cameron Middle School	\$4,009,000	\$4,201,432	\$4,403,101	\$4,614,450	\$4,835,943	\$5,068,068	\$5,311,336	\$5,566,280	\$5,833,461	\$6,113,467	Current roof is under extended warranty until 2023 and replacement is anticipated at that time.
Harmony Grove Elementary School	\$3,325,000	\$3,484,600	\$3,651,861	\$3,827,150	\$4,010,853	\$4,203,374	\$4,405,136	\$4,616,583	\$4,838,179	\$5,070,411	Current roof is under extended warranty until 2023 and replacement is anticipated at that time.
Juniper Hill - BLOCKS	\$2,618,200	\$2,743,874	\$2,875,580	\$3,013,607	\$3,158,261	\$3,309,857	\$3,468,730	\$3,635,229	\$3,809,720	\$3,992,587	Current roof is not eligible for MSBA funding as it is Pre-K. MSBA is K-12.
Stapleton Elementary School	\$1,740,400	\$1,823,939	\$1,911,488	\$2,003,240	\$2,099,395	\$2,200,166	\$2,305,774	\$2,416,451	\$2,532,441	\$2,653,998	Current roof is under warranty until 2027 and replacement is anticipated at that time.
Miriam McCarthy Elementary School - Phase 2	\$1,404,100	\$1,471,497	\$1,542,129	\$1,616,151	\$1,693,726	\$1,775,025	\$1,860,226	\$1,949,517	\$2,043,094	\$2,141,162	Current roof was installed in phases in 1998 and 2007. Phase 2 roof - 2007 - is under warranty until 2027.
Walsh Middle School	\$6,847,600	\$7,176,285	\$7,520,746	\$7,881,742	\$8,260,066	\$8,656,549	\$9,072,063	\$9,507,522	\$9,963,884	\$10,442,150	Current roof is under warranty until 2025 and replacement is anticipated at that time.
Framingham High School	\$12,274,000	\$12,863,152	\$13,480,583	\$14,127,651	\$14,805,779	\$15,516,456	\$16,261,246	\$17,041,786	\$17,859,791	\$18,717,061	Current roof is under warranty until 2026 and replacement is anticipated at that time.
New Fuller Middle School	TBD	<i>New Fuller Middle School constructed in 2021 replaced old Fuller Middle School</i>									

<b>Total Cost for all projects</b>	\$56,865,309	\$59,594,844	\$62,455,396	\$65,453,255	\$68,595,012	\$71,887,572	\$75,338,176	\$78,954,408	\$82,744,220	\$86,715,942	
<b>Recommended FY Cost</b>	\$5,643,437	\$5,827,287	\$7,252,762	\$4,294,675	\$4,835,943	\$4,203,374	\$5,774,504	\$1,949,517	\$9,963,884	\$18,717,061	
<b>Location</b>	FY 23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	
*FY23 thru FY32 are costs with 4.8% escalation											

	\$89,832 4.80%	\$183,976 9.38%	\$282,639 13.75%	\$386,037 17.92%	\$494,399 21.90%	\$607,962 25.70%	\$726,977 29.32%	\$851,703 32.78%	\$982,417 36.08%
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**ROOF SYSTEM EVALUATION  
AT DUNNING ELEMENTARY SCHOOL  
FRAMINGHAM PUBLIC SCHOOLS  
73 MOUNT WAYT AVENUE, SUITE 5  
FRAMINGHAM, MA 01702**

**October 20, 2020**

**Evaluation Report**

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**Prepared For:**

**Mr. Matt Torti  
Director of Buildings and Grounds  
Framingham Public Schools  
73 Mount Wayt Avenue, Suite 5  
Framingham, MA 01702**

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**ROOF SYSTEM EVALUATION  
AT THE DUNNING ELEMENTARY SCHOOL  
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**Appendices:**

- Appendix A – Photographic Documentation
  - Appendix B – Farley Middle School Roof Area Plan
-



### ***Executive Summary***

In accordance with our contract, Gale Associates, Inc. (Gale) has prepared a roof condition survey for the Framingham Public Schools (FPS). This submission relates specifically to the existing condition of the low-sloped roof areas at the Charlotte A. Dunning Elementary School (DES), located at 48 Frost St. Framingham, Massachusetts. This report includes descriptions of the existing conditions, photo documentation, and provides roof remediation options.

The existing roofing systems at DES consists of multi-ply built-up roofing assembly adhered to 2 inches of rigid polyisocyanurate insulation. The roof deck at the DES was observed to consist of sloped light weight concrete. Based on our observations, reported leaks and test cuts, portions of the roof system components are wet and allowing moisture infiltration and reported leaks. The system appears to be approaching the end of its useful service life.

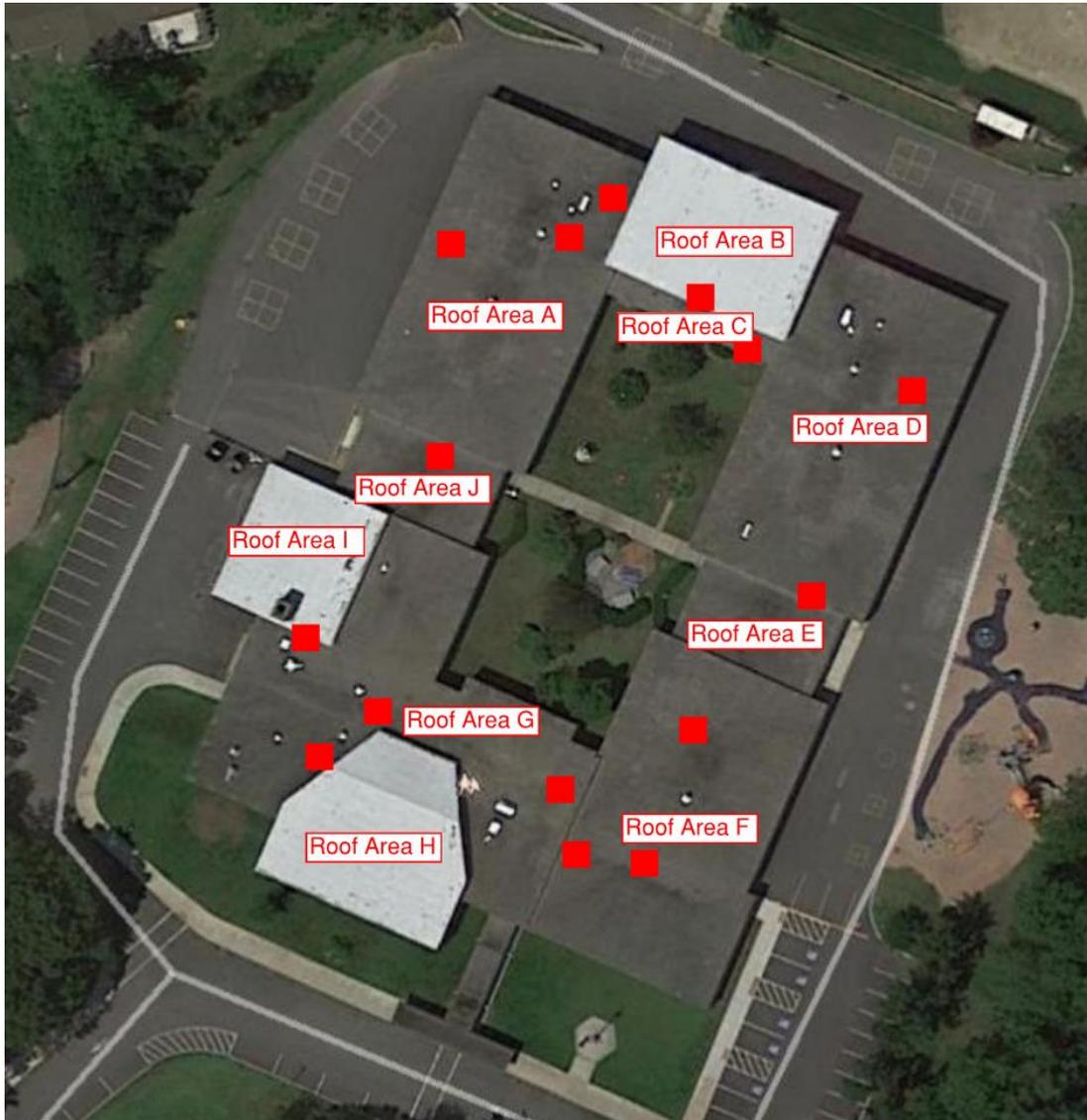
As part of the evaluation, a thermographic infrared roof scan and exploratory test cuts were performed and based on the results, Gale recommends a partial roofing system replacement and full roof edge perimeter remediation be considered at the Dunning Elementary School. Additional deficiencies observed include the lack of effective slope to direct moisture to the drains resulting in areas of ponding water, deteriorated roofing lap seams between reinforcing plies, deteriorated perimeter roof/ expansion joint flashing transitions and the presence of water within the roofing system in select locations.

- Roof Area F appeared to exhibit the most widespread signs of moisture within the roofing system. It is Gale's opinion that Roof Area F be considered for immediate removal and replacement.
- Select areas within Roof Areas A and G where also found to contain moisture within the roofing system components in the location where test cuts were performed. Although the areas of discovered moisture appear to be isolated, the underlying deteriorating condition of the existing roofing system components has contributed to the moisture infiltration.
- Its Gale's opinion that Roof Areas A, B, C, D, E, G, H, I, and J also be considered for replacement based on the discovery of moisture within the roofing system in areas of previous repairs, evidence of widespread water ponding, and the observations of deteriorating roofing membrane condition where gravel surfacing has been displaced. Continued exposure to moisture can affect the underlying structural components of the roof.

Please note that the estimated cost noted below does not include any special permitting fees which may or may not be required for this project, additional engineering fees, Framingham's monitoring of the project, interior renovations beyond those that are described within this report, a construction trailer/office space, or soft costs associated with working with Framingham Public Schools. Again, these recommended budgets are preliminary, and should not be used for sensitive budgeting, as the final scope of work, and detailing has not been confirmed at this time.

#### **Estimated Remediation Cost:**

- Limited System Replacement with a Multi-ply Built-up Roofing System: \$2,000,000
- Full System Replacement with a Multi-ply Built-up Roofing System: \$3,650,000
- Full System Replacement with a Single-ply PVC Roofing Membrane: \$2,600,000
- Full System Replacement with a Single-ply Kee Roofing Membrane: \$2,650,000



*Figure 1: Dunning Elementary School Roof Area Plan*

### **Background**

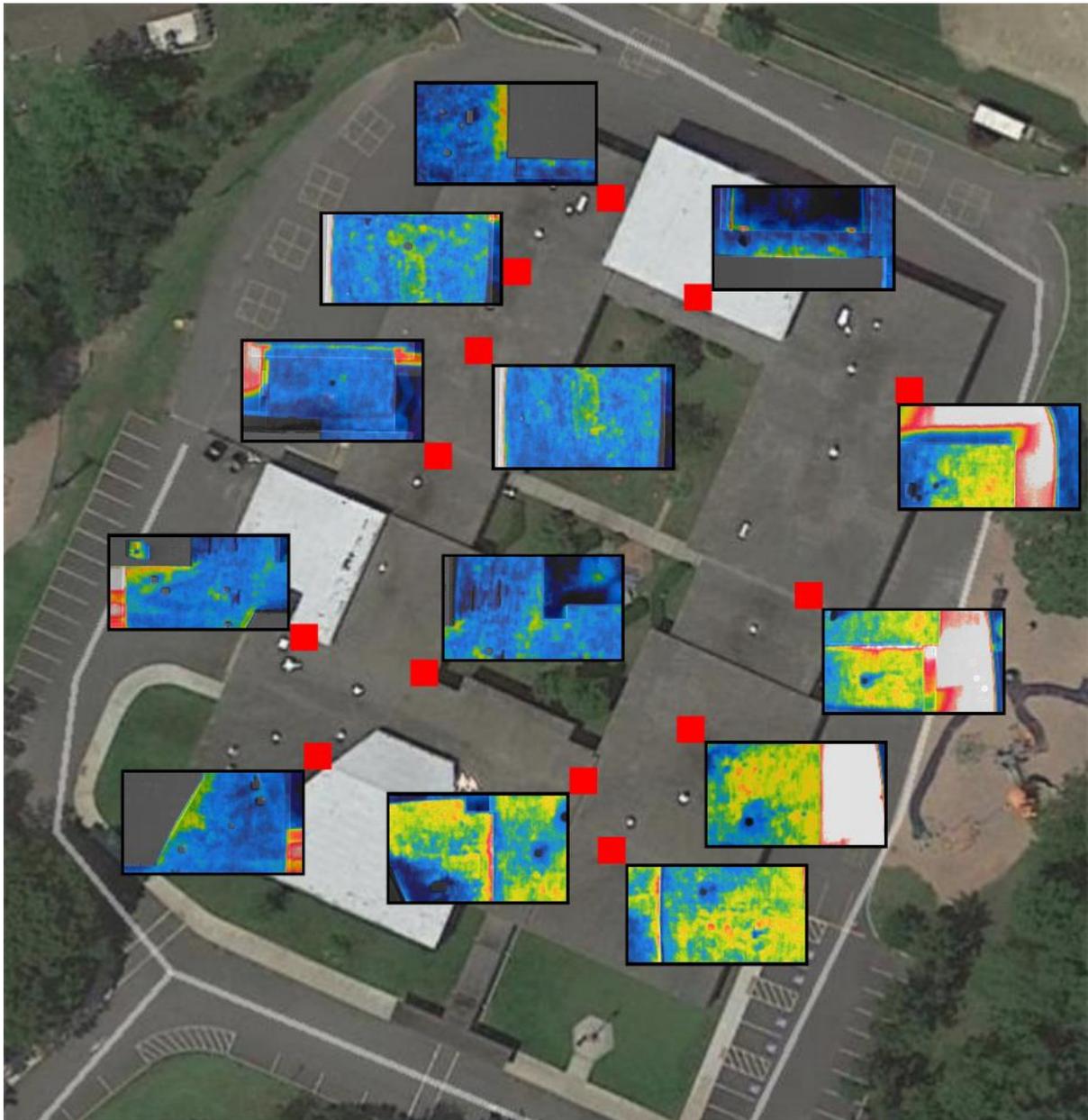
The Charlotte Dunning Elementary School (Dunning) was built in 1965. The single-story building is constructed with a combination of concrete masonry units (CMU) and brick masonry. Dunning is an elementary school housing grades K through 5, and it contains a cafetorium, kitchen, gymnasium, library, bathrooms, and assorted classrooms and offices. The rectangular shaped building is clad in a composite of aluminum storefront windows, hollow metal access doors, and brick and mortar exterior walls.

The existing approximately 61,500 sq. ft. roof area at the DES includes low sloped and limited areas of steep sloped roofs. The areas of steep sloped roofs consist of an aluminum coating clad, multiply built up roofing assembly. The low sloped roof system consists of gravel surface built-up roofing assemblies incorporating multiple plies of reinforcing fabric that are adhered with an asphaltic based

adhesive to the top facer of flat stock, 2-inch polyisocyanurate rigid insulation. The roofing system is installed on a sloped light weight concrete deck with penetrations for several small air conditioners units and HVAC vents located within the roof areas.

**Visual Evaluation**

As part of the evaluation, Gale conducted a visual evaluation of the DES’s roof areas to observe the extent and location of defects as well as locate areas of potential moisture infiltration using non-destructive capacitance metering and infrared thermography. The following is a synopsis of the observations made during our visual evaluation.



**Figure 2: Dunning Elementary School Roof Area Plan with Infrared Images Overlaid**



Low Sloped Roofs, Roof Areas A, C, D, E, F, G, and J

Gale's general observations include but are not limited to the following:

1. The existing roof drains generally consist of lead and okum set cast iron assemblies that appear to be in fair condition however, they exhibit surface rust in the bowls and on drain hardware. Cast iron strainers are generally in good condition but are dislodged from the clamping rings at some locations.
2. Numerous previously performed repairs were evident based on the quantity of stripped-in membrane seams and roof patches that were observed in the field of the roof and at roof-to-wall flashings. The repairs appear to be in fair condition, but the presence of the stone ballast created difficulties in confirming the extent of the repairs and condition of the patch perimeters which are typically more susceptible to failure and allowing moisture infiltration.
3. The roof to wall, roof expansion joints and roof transitions between roof areas were observed to be heavily deteriorated. The roof to wall and roof expansion joint conditions appear to have been painted with a reflective coating that was observed to be failing.
4. The current roof flashing heights were generally observed to meet or exceed the industry recommended standard of 8" minimum. The addition of insulation may affect limited areas around select rooftop unit curbs.
5. An area of exposed roofing membrane reinforcing plys were observed to be exposed within a select area within Roof Area C.
6. Roof access ladders to Roof Areas B and H were observed to be heavily deteriorated and rusted.
7. Results of the roof infrared (IR) thermographic survey revealed areas of thermal anomalies and potential wet insulation at the following locations:
  - a. Several limited areas within Roof Areas A, E, G, and J where anomalies were identified could potentially indicate wet roofing system components.

Steep Sloped Roof Areas B, I, and H

1. Due to the presence of the reflective coating over the roof membrane, Gale was unable to utilize the infrared camera to review the integrity of the sloped Roof Areas B, I, and H for areas of potential moisture due to interference caused by the presence of the reflective coating applied to the existing roofing.
2. Roof membrane laps were observed to be opening and showing signs of delamination.

**Destructive Testing**

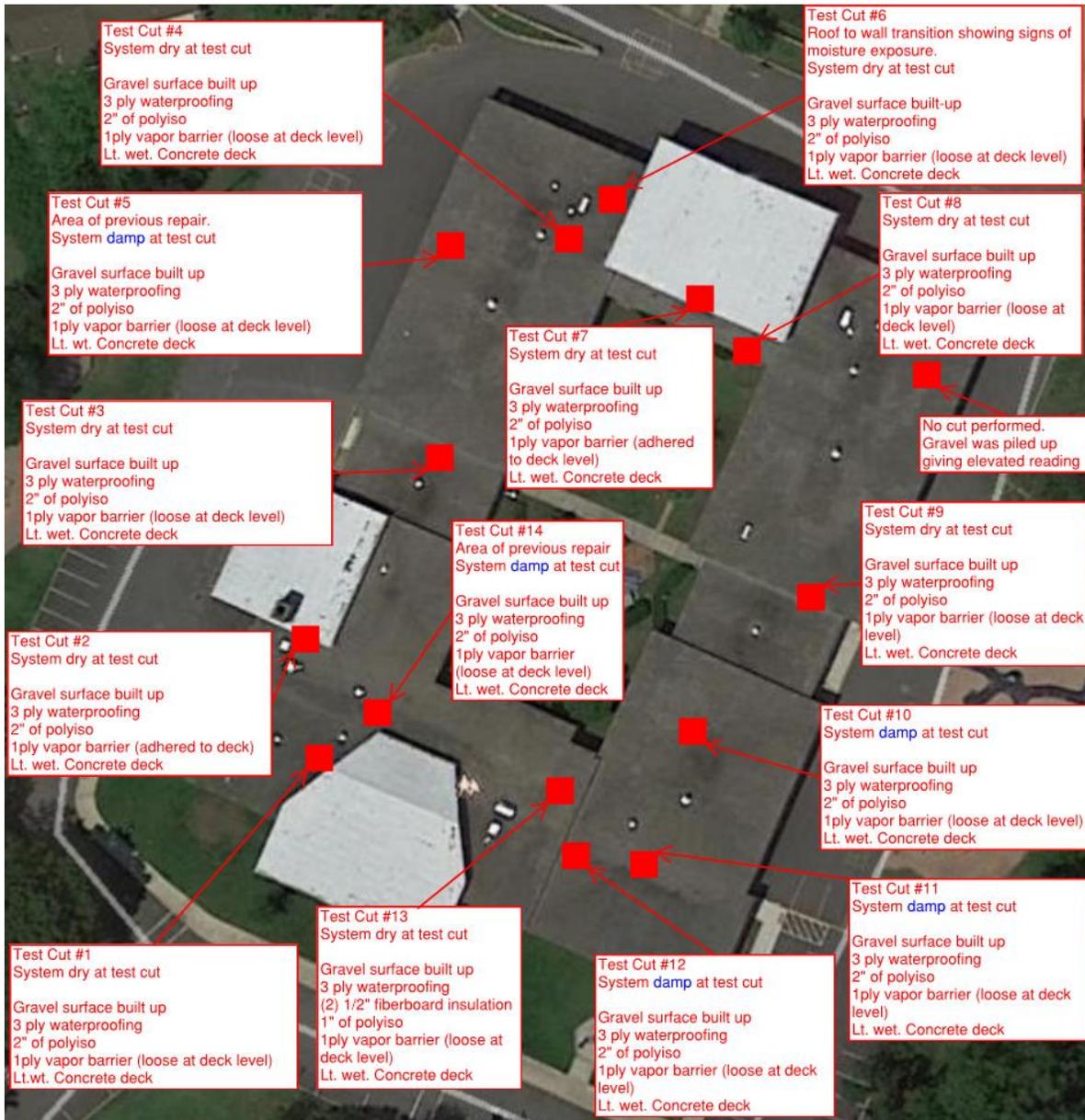
On Wednesday, September 9, 2020, a representative from Gale coordinated with Greenwood Industries to perform destructive test cuts to determine existing conditions at select areas of the low sloped roofs. Test cuts were performed to document representative existing details and as-built conditions, as well as subsurface conditions at the roof openings. In total, fourteen (14) test cuts, most of which were approximately 6” square in size, were performed on the existing low sloped roof systems. Test cut locations were patched by Greenwood following Gale’s review of the test cut locations. Please note that the test cuts we observed were representative of details that were observed during the evaluation, and not indicative of each detail condition that may exist on the building. Refer to the following roof plan for approximate test cut locations, Figure 3.

Test cuts on low sloped roofs revealed the following cross section from top to bottom: stone ballast, multi-ply built-up roofing, 2 inches of flat stock polyisocyanurate (polyiso) insulation, adhesive attached single-ply vapor barrier installed over a sloped light weight concrete roof deck.

Test cuts on low sloped roofs revealed the following cross section from top to bottom:

- Stone ballast
- Multi-ply built-up roofing
- 2 inches of flat stock polyisocyanurate (polyiso) insulation
- Loose laid single ply reinforcing sheet installed over a fully adhered single-ply vapor barrier
- Light weight concrete deck

Test Cut #	Roof Area	Observed Condition	
1	G	Dry	System components dry at test cut location
2	G	Dry	System components dry at test cut location
3	J	Dry	System components dry at test cut location
4	A	Dry	System components dry at test cut location
5	A	Wet	System damp at test cut location
6	A	Dry	System components dry at test cut location
7	C	Dry	System components dry at test cut location
8	C	Dry	System components dry at test cut location
9	D	Dry	System components dry at test cut location
10	F	Wet	System damp at test cut location
11	F	Wet	System damp at test cut location
12	F	Wet	System damp at test cut location
13	G	Dry	System components dry at test cut location
14	G	Wet	System damp at test cut location



**Figure 2: Dunning Elementary School – Partial Roof Area Plan – Approximate Test Cut Locations**

## DESIGN CONSIDERATIONS

New construction, as well as repair and alteration of existing buildings in Massachusetts, is regulated by 780 CMR, Massachusetts State Building Code (MSBC), and 521 CMR, The Architectural Access Board (AAB). The code review was based on the proposed renovations being constructed under the 9th Edition of the MSBC which is based upon the *International Building Code 2015* (IBC) and the Massachusetts Amendments. The 9<sup>th</sup> Edition is reportedly based upon the 2015 versions of the International Building Code (IBC), International Existing Building Code (IEBC), 2018 International Energy Conservation Code (IECC), and along with Massachusetts amendments.

Under the 9<sup>th</sup> edition of the MSBC *Chapter 34 Existing Structures* refers to the *International Existing Building Code 2015* (IEBC) as modified by the Massachusetts Amendments. This section of the code applies when there are repairs, alterations, additions or a change in use to existing buildings and generally refers to other sections of 780 CMR for specific requirements. Alterations to existing buildings including the removal and replacement of building elements with a continuation of the same use group (as is the case for the roof replacement at the FHS) are governed by *Chapter 6, Alterations – Level 1*:

- *Section 602: Building Elements and Materials* – Generally, existing buildings must be modified in a manner that does not decrease safety.
- *Section 603: Fire Protection* – At this time, Gale does not anticipate any modifications to the existing fire protection system.
- *Section 604: Means of Egress* – It is Gale’s understanding that the building is fully compliant with egress requirements. No modifications to egress components are anticipated.
- *Section 605: Accessibility* – Gale recommends that FPS confirm that the building conforms with the MAAB requirements or perform a compliance study.

Based on the current scope of work and anticipated costs, FPS should confirm that the renovations do not exceed 30% of the full and fair cash value of the facility and will not require additional accessibility improvements. As the project will exceed \$500,000, a minimum accessible entrance and bathroom will be required if not already present. Gale recommends that FPS confirm that the building conforms with the MAAB requirements or perform a compliance study.

- *Section 606: Structural* – This section of the code outlines requirements of the alterations of work where reroofing is required. As part of the evaluation of the existing roofing system, Gale completed a gravity load code review of the existing FHS building’s roof framing in accordance with Chapter 34: Existing Structures, of 780 CMR, the MSBC. Based on our review and calculations, the following is a summary of our findings:
  - As this building appears to be Seismic Design Category B, it is Gale’s opinion this section of the code does not apply for this project.
  - Because the basic wind speed for the City of Framingham is 130 mph and the building appear to be classified as Occupancy Category III, this section of the code does not appear to apply for this project.
  - The proposed replacement at FMS building is not anticipated to increase the roof dead and live load capacity more than 5%.

Due the presence of stone ballast and the potential for displacing stones down the drain, Gale was not able to confirm the exact sizes and locations of all roof drains and therefore was not able to confirm the capacity of the existing roof drainage system. However, based on our visual observations, the existing roof drains of the low slope roof areas appear to provide adequate drainage, but evidence of ponding water suggests that low lying areas are collecting and retaining moisture following rain events. A full review of the existing drainage to confirm the capacity of the existing roof drainage system for compliance with the Massachusetts State Plumbing Code (MSPC) should be performed during the design phase of the roof replacement. Additional crickets should

be provided to facilitate drainage from low areas. Secondary overflow drainage may be recommended at some locations.

## **DISCUSSION AND OPINIONS**

### ***Low Sloped Roofs***

Based on our limited evaluation of the low sloped roofs, select areas of the roof were found to have experience water infiltration. The limited areas should be removed and replaced to a point that dry roofing system components can be identified. Roof Area F appears to suffer the most from water infiltration as moisture was discovered in the roofing system components as well as on the roof deck. It is Gale opinion that roof areas found to contain moisture should be considered for replacement. Adding to the presence of moisture within the roofing system, areas of exposed roofing membrane are showing its age based on the numerous roofing system patches throughout the roof. Aside from the areas where moisture was discovered in the roofing system components, the Owner can select to preserve portions of the roofing, but the system overall should be considered for remediation to preserve the service life of the building.

### **Low Sloped Roof Systems**

Based on the observed conditions previously noted, there are five (5) types of roof coverings which could be considered for the low-slope replacement roof systems at this facility. Each system has its own chemical and physical properties and proven performance characteristics. Refer to the appropriate building section for discussions of unique conditions, and how they may affect the final design recommendations. These membrane systems are as follows:

1. Gravel Surfaced Built-Up Roofing (GSBUR) membranes are alternating layers of asphalt, reinforcing felts (organic or non-organic) and gravel surfacing similar to the current roof system. Of the systems discussed herein for low slope applications, the GSBUR is the most time proven. Properly designed and installed, these systems have shown good longevity. GSBUR systems are field fabricated and therefore, considered more workmanship dependent, and can be susceptible to problems during construction. GSBUR can be applied with hot asphalt or cold mastics. Hot applied systems are accompanied by the odor of asphalt and use of 450°F to 500°F asphalt on the roof. The asphalt acts as the waterproofing materials while the fabric and felts provide the strength. Hot asphalt used to install the system can have logistic implications due to the strong fumes associated with the asphalt and the possibility of a fire hazard created by the asphalt kettle application. "Cold-process" built-up systems avoid temperature application of asphalt, and as such, have less odor. The cold process systems offer superior resistance to vandalism but can be difficult to repair. Manufacturers of this type of system offer 10-20 and sometimes 30-year material and workmanship guarantees.
2. Styrene – Butadiene – Styrene Granular Surfaced Modified-Bitumen Roof Membranes (SBS) are field fabricated and installed in multi-ply (minimum of two) configurations. SBS membranes can be set in hot asphalt or cold adhesive, or they can be torch applied. With its thick, puncture resistant, granular surfaced cap sheet, SBS exhibits excellent puncture and impact resistance similar to the BUR systems. As with cold and hot applied BUR systems, modified-bitumen membranes are workmanship dependent and can be susceptible to problems during construction for contractors not proficient with the installation

requirements. Hot applied systems are accompanied by the odor of asphalt and use of 450°F to 500°F asphalt on the roof. The asphalt acts as the waterproofing material while the plies provide the strength. Hot asphalt used to install the system can have logistic implications due to the strong fumes associated with the asphalt and the possibility of a fire hazard created by the asphalt kettle or torch application. Cold process systems avoid temperature application of asphalt, and as such, have less odor and would be a good alternative for this site. The manufacturers of SBS membrane systems offer 15-20 year and sometimes 30-year material and workmanship warranties that are similar with other membrane system manufacturers.

3. Elastomeric Roof Membranes (EPDM - Ethylene Propylene Diene Terpolymer) are single-ply synthetic rubber membranes which can be installed as a fully adhered or mechanically attached system. EPDM roof coverings are field fabricated with the seams of the membrane adhered with adhesive or a two-sided adhesive seam tape. The adhered membrane seams require specific preparation work to conform to the manufacturer's requirements. It has been Gale's experience that the seams of EPDM systems are prone to delamination within the warranty period and unless leaks occur, are not repaired under warranty. Proper slope to drain is required to effectively remove water from the membrane surface, and is critical for extended surface life and warranty coverages. Some EPDM warranties have specific limitations excluding ponded water as a result of seam adhesive degeneration when exposed to prolonged moisture. EPDM sheets are prefabricated off-site in the manufacturer's plants by making large sheets of membrane that are installed in "panels" on the site. Each of these panels are then adhered together using the bonding adhesives or pre-manufactured tapes to provide a watertight roof. These systems have a lower puncture resistance compared to the SBS, but their reparability is good and can easily be performed by certified maintenance personnel.

Gale is aware of 15-year-old EPDM systems which are currently performing satisfactorily. However, it is Gale's experience that after seven to ten years, maintenance in the form of seam repairs will be required. Manufacturers of this type of system typically offer 10 to 20-year materials and workmanship warranties and have recently promoted thicker membranes that carry a 30-year warranty. Gale would recommend stripping-in all field fabricated seams if EPDM is specified, as well as designing for complete removal of all water through proper slope to drain (i.e. additional tapered insulation).

4. Single-ply thermoplastic polyolefin (TPO) roof membranes are also single-ply membranes that are available from several manufacturers. TPO membranes are manufactured in wide rolls similar to that of the EPDM sheets and can be adhered with a bonding adhesive, or in some cases with a self-adhesive backing, to the insulation system. TPO membrane seams are thermally fused (hot air welded or in some cases solvent welded depending on the manufacturer's requirements) to form a monolithic sheet that does not rely on adhesives for a watertight bond. Warranties that are competitive with SBS and EPDM systems are available. TPO warranties do not typically contain a ponded water exclusion as a result of the thermally fused seams. Similar to the EPDM systems, the puncture resistance of the TPO membrane is lower than that of SBS. It should be noted that repairs to TPO membrane can often be difficult as the top surface of the membrane ages, making future welding problematic. Also, there are multiple manufacturers of TPO systems, with multiple

formulations and differing material characteristics. These different characteristics do not allow for accurate monitoring of the product's track record. It should also be noted that there have been several reports of premature aging and failures of TPO systems, which is assumed to be a direct result of modifying the formulations in an attempt to modify the final roofing product. Should TPO's be considered, additional walkway pads should be used as the membrane becomes very slippery when exposed to accumulated precipitation.

5. Single-ply thermoplastic (polyvinyl chloride – PVC, or Elvaloy based) roof membranes are another option. PVC/Elvaloy membrane systems are available from several manufacturers. Based on our experience, it is Gale's opinion that the reinforced coated systems offer satisfactory chemical/physical properties. PVC/Elvaloy membranes can be installed as a fully adhered, mechanically attached or a loose laid and ballasted application. Similar to the EPDM and TPO membranes, the PVC/Elvaloy membrane is manufactured in wide rolls. However, the PVC/Elvaloy membrane seams are thermally fused by hot air welds only to form a monolithic sheet that does not rely on adhesives for a watertight bond. Warranties that are competitive with GSBUR and EPDM systems are available. PVC/Elvaloy warranties do not typically contain a ponded water exclusion as a result of the thermally fused seams. Similar to the EPDM systems, the puncture resistance of the PVC/Elvaloy membrane is lower than that of SBS, but is easy to repair using handheld heat welding equipment. Gale is aware of several membrane assemblies in New England which have been performing successfully for over 20 years. There are European installations of these products reported to be in excess of 25-years old. Similar to the TPO system, additional walkway pads should be considered on this membrane as it becomes very slippery when wet.

### **Coverboards**

As standard polyisocyanurate insulation systems are typically susceptible to puncture from falling objects, can be crushed if uneven weight is applied, or can allow sharp objects such as tools to damage the roof membranes proposed, Gale recommends that a dense coverboard be utilized between the polyisocyanurate and roof membrane components. This coverboard can vary from manufacturer and roof system, but would either be a moisture resistant gypsum board such as that manufactured by Georgia-Pacific, a high density isocyanurate as supplied by several single ply manufactures, or a wood fiberboard insulation as required by the manufacturers of GSBUR or SBS systems.

It is however the experience of this office that the moisture resistant gypsum and fiberboard coverboards are more susceptible to moisture accumulation over long periods of time should water infiltration or vapor drive issues occur under the roof membrane. Therefore, Gale recommends that a high density, polyisocyanurate insulation be fully adhered over the attached roof insulation system to provide a more durable substrate for the roof membrane, as well as reduce the potential of damage to the roof membrane as a result of potential fastener back-out should the fasteners be in direct contact with the roof membrane. Some additional review of these products may be required during the design phase to confirm the intent of the installation requirements.



## Insulation

There are several types of roof insulation boards that may be considered suitable for application on these roofs. In a conventional, insulated roof system, only polyisocyanurate insulation has a higher thermal resistance (R-Value) per inch requiring much less overall insulation thicknesses over its competitors. Due to the existing positive slope of the roof deck, the use of flat stock insulation should be considered. The greater thicknesses of insulation may result in additional wood blocking and raising rooftop equipment to accommodate flashing heights.

As referenced, areas where moisture was discovered within the roofing system components the system remediation would consist of the installation of an adhesively attached system including a high-density insulation cover board, rigid flat and tapered insulation. Full roofing system replacement could incorporate the existing vapor barrier given all deficiencies are corrected prior to the placement of the new roofing system. For areas where the existing roofing insulation was found to be dry, remediation could include, but not be limited to removal of all loose gravel surfacing, repairing any observed damages to the existing roofing system multiply roofing, mechanical attachment of rigid insulation and adhesive attachment of a multiply built-up roof waterproofing and granular surfaced cap sheet. Roof remediation would also include new membrane and sheet metal flashings along the perimeter and around rooftop penetrations. Based on the age of the drains, FPS should consider replacement of drain assemblies in conjunction with the roof replacement.

Thank you for your attention. Should you have any questions or comments, please do not hesitate to contact us at this office.

Best regards,

GALE ASSOCIATES, INC.

*Derick Wiaderski*

Derick A. Wiaderski  
Staff Engineer

DAW:

Attachments: Roof Plans

cc: Jason Wagner – Gale  
Brian Neely – Gale

I:\837040\01 Evaluation\report\837040 Framingham Schools Dunning Roof Condition Evaluation 2020 1019.docx

**PHOTOS**



Photo 1 – The initial appearance of the existing conditions at the Dunning Elementary School Building appear to indicate a reasonably sound roofing system. The presence of stone ballast reduces the ability to identify deficiencies through visual evaluation alone.

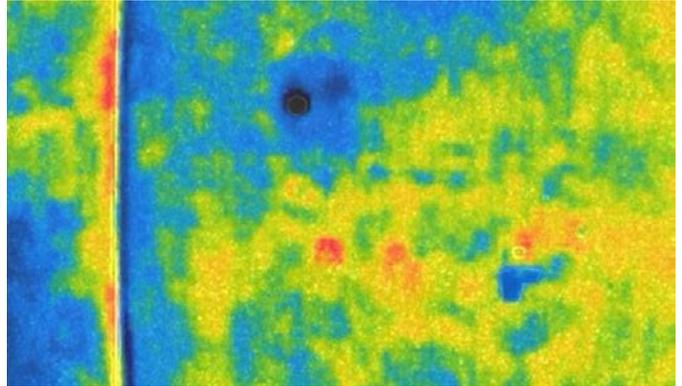


Photo 2 – Through the use of unmanned aerial drones equipped with infrared camera technology, Gale identified several areas with the potential of containing moisture within the roofing assembly.



Photo 3 – In conjunction with the infrared roof scan, Gale utilized capacitance testing to determine the locations of test cuts.



Photo 4 – Fourteen (14) individual test cut locations were selected based on the gather data. In general, the roofing system at the test locations consists of a gravel surface built-up roofing membrane installed over Polyiso rigid insulation, vapor retarder and a sloped light weight concrete deck.



Photo 5 – The presence of moisture within the roofing system components was confirmed with the use of moisture sensitive test strips. Varying levels of moisture were observed at each of the test locations where moisture was found.



Photo 6 – Typical deteriorated roof to wall flashing condition.



Photo 7 – Roofing system degradation resulting in exposed reinforcing fabric that could provide a path for water to enter into the roofing system.



Photo 8 – Damaged and deteriorated roof access ladder to access Roof Areas B and H.



**LEGEND**

- ROOF EDGE
- E.J. EXPANSION JOINT
- LIGHTENING PROTECTION CABLE
- GUTTER WITH DOWNSPOUT
- ▲ MAIN ENTRANCE
- F FAN
- LINE OF ROOF OR WALL BELOW OVERHANG
- TAPERED INSULATION SLOPE
- STRUCTURAL ROOF SLOPE
- LIGHTNING ROD
- CONDUIT
- RTU ROOF TOP MECHANICAL UNIT
- S SKYLIGHT
- SLEEPER
- J J-VENT
- ▨ ROOF AREA NOT IN CONTRACT
- ELEV. = ' - " ± ROOF ELEVATION RELATIVE TO GRADE WHICH IS ASSUMED TO BE ZERO FEET
- A50 NOTE DETAIL INDICATOR
- ⊙ WATER SPIGOT
- ⊗ LIGHTNING PROTECTION PENETRATION

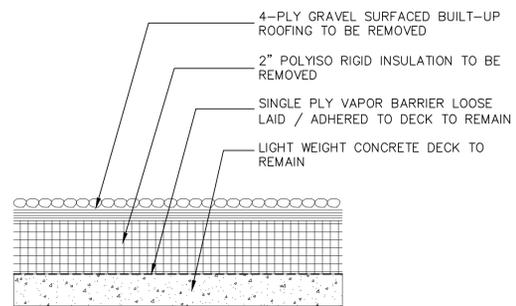
**GENERAL NOTES**

1. THE INFORMATION SHOWN ON THIS DRAWING HAS BEEN COMPILED FROM VARIOUS SOURCES, AND MAY NOT REFLECT THE ACTUAL CONDITIONS AT THE TIME OF CONSTRUCTION.
2. FOR THE SAKE OF CLARITY, EACH INDIVIDUAL DETAIL ON THE ROOF PLAN HAS NOT BEEN INDICATED. INSTALLATION DETAILS HAVE BEEN INDICATED FOR TYPICAL COMPONENTS AT RANDOM LOCATIONS.
3. HATCH PATTERNS ARE FOR REPRESENTATION ONLY AND SHOULD NOT BE USED A MEANS FOR QUANTIFYING.
4. REMOVE ALL WET INSULATION PRIOR TO INSTALLATION OF NEW ROOF COMPONENTS.
5. DETAILS NOT DEPICTED SHALL BE CONSTRUCTED IN A MANNER CONSISTENT WITH THE DETAIL DRAWINGS.
6. THE DEFECTS NOTED INDICATE APPROXIMATE LOCATIONS. THEY ARE NOT INTENDED TO DEFINE LIMITS OF WORK. AREAS NOT NOTED ON THESE DRAWINGS EXHIBITING SIMILAR DEFECTS AS THOSE SHOWN SHALL BE REPAIRED IN A SIMILAR MANNER.

**ROOFING NOTES**

**CODE INFORMATION**

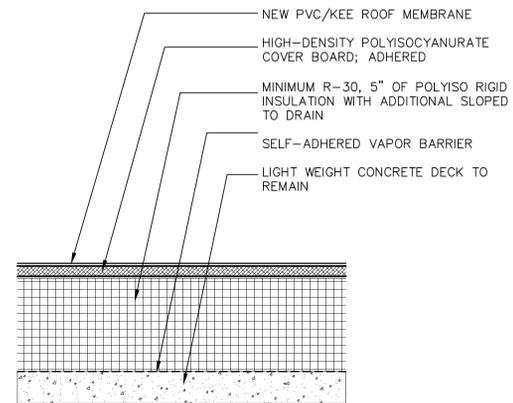
**EXISTING ROOF CROSS SECTIONS**



**DUNNING ELEMENTARY SCHOOL  
EXISTING ROOF CROSS SECTION**

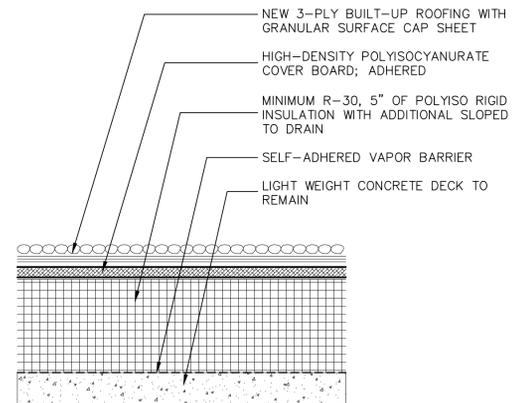
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**PROPOSED ROOF CROSS SECTIONS**



**DUNNING ELEMENTARY SCHOOL  
PROPOSED ROOF CROSS SECTION – TYPE 1**

SCALE: 3"=1'-0"  
NOTE: ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING.



**DUNNING ELEMENTARY SCHOOL  
PROPOSED ROOF CROSS SECTION – TYPE 2**

SCALE: 3"=1'-0"  
NOTE: ALL ITEMS ARE NEW UNLESS DESIGNATED AS EXISTING.



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PROJECT  
**ROOF EVALUATION AT THE  
DUNNING BUILDING  
FRAMINGHAM, MA**

OWNER  
**CITY OF FRAMINGHAM; FRAMINGHAM PUBLIC SCHOOLS  
73 MT WAYTE AVE  
FRAMINGHAM, MA 01702**

NO.	DATE	DESCRIPTION	BY
PROJECT NO.		837040	
CADD FILE		837040 G100's	
DESIGNED BY		DAW/BHN	
DRAWN BY		SWW	
CHECKED BY		BHN	
DATE			
DRAWING SCALE		AS NOTED	

GRAPHIC SCALE

SHEET TITLE

**GENERAL NOTES**

DRAWING NO.  
**G101**



**Framingham**

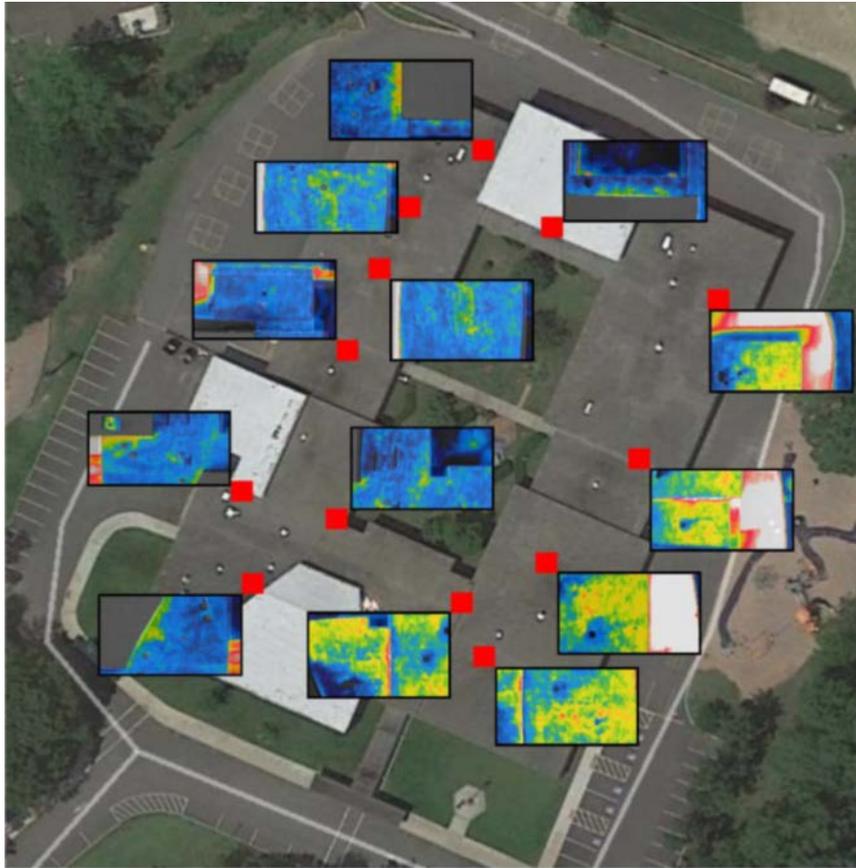
**PUBLIC SCHOOLS**

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CAPITAL BUDGET PROPOSAL**

# ***ROOF REPAIRS/REPLACEMENT - \$5,643,437***

*Dunning and McCarthy Elementary (SOI's Submitted to MSBA) - FY2023 Capital Budget Proposal*



**Infrared Scans Showing Moisture Infiltration Of Roof - Dunning**



**Test Pit At Roof Exposing Water Infiltration**



**Roofing System Degradation Resulting in Exposed Reinforcing Fabric**

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

School ADA Upgrades at Walsh Middle and Framingham High School \$300,000  
General Fund

School Department

Continuation of ADA upgrades throughout the district specifically at Walsh Middle and Framingham High School

Continued access upgrades throughout the district, specifically at Walsh and FHS.

This request includes installation of a chair lift at FHS, and replacement of the failing lift at Walsh Middle School. Additionally, the Department will complete additional improvements at District School's with remaining funding to continue accessibility improvements.

#### **4. ADA Compliance Upgrades - District-wide Improvements**

##### **FY23:**

This request for capital budget funding is for the continued improvements focused on eliminating architectural barriers related with accessibility at all Public School Buildings. The Buildings & Grounds Department has undertaken a number of upgrades and improvements District-wide focused on providing accessibility to School facilities for all. The FY2023 proposal includes replacement of the aging chair lift at Walsh Middle School, and installation of a new chair lift at Framingham High School. The lift at Walsh Middle School is one of the oldest lifts within District schools and provides access to two levels within the library. Due to its age and deteriorating condition, it is not a piece of equipment that can be relied upon for much longer. It is the Department's goal to replace this needed piece of equipment prior to complete failure, which would leave the main level of the library inaccessible to students and staff. Additionally, there is a lack of an accessible lift at Framingham High School. The purchase and installation of a lift at FHS would help eliminate architectural access barriers and provide all students, staff, and parents with additional access points to the second floor. The Disabilities Commission has generously contributed \$20,000 to this project, helping to lower the cost carried onto taxpayers. The Department will also undertake additional ADA compliance upgrades District-wide if funding is remaining on this project.

**Total Requested**

**\$300,000**



Carol Brodeur &lt;cbrodeur@framingham.k12.ma.us&gt;

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## 2008: wheelchair lift at FHS construction documents

---

Paul Lieneck &lt;paul@hlsdesign.com&gt;

Wed, Aug 25, 2021 at 3:33 PM

To: "Carol Brodeur (cbrodeur@framingham.k12.ma.us)" &lt;cbrodeur@framingham.k12.ma.us&gt;

Cc: "Matt Torti (mtorti@framingham.k12.ma.us) (mtorti@framingham.k12.ma.us)" &lt;mtorti@framingham.k12.ma.us&gt;, "Lincoln Lynch (llynch@framingham.k12.ma.us)" &lt;llynch@framingham.k12.ma.us&gt;

Carol,

Attached are drawings and specifications for the vertical wheelchair lift at Framingham High School that are ready for bidding. Based on recent bidding results, it is no longer possible to determine an estimated contract amount without contacting suppliers for major materials, and then, the amount are only valid for a short period of time. We previously had an estimated contract amount of \$85,000 based on a similar project from pre-COVID. Estimated contract amounts from pre-COVID are now bidding at 50 percent to 100 percent more depending on the scope of work. Currently anything fabricated of metal or imported from another country are being bid very high to cover contingencies in obtaining raw materials, fabrication, and shipping.

The wheelchairs are metal products so there are issues with obtaining materials, fabrication, and shipping. Most wheelchairs are made in Canada by Garaventa or Savaria and, while the relationship between countries was good in the past, the current COVID related conditions and importing are not conducive to the flow of products or materials.

If the project is bid now, I would recommend that the estimate contract amount will be over \$150,000 which requires Filed Sub-bids. My understanding is that wheelchair lifts are not included in the ELEVATOR Filed Sub-bid category and, accordingly, there would not be any Filed Sub-bids and the attached documents can be used as submitted with the proper bidding information included by the City.

Not knowing the issues behind the need for the lift, I suggest that is may be worth considering the timing or the project to see if bidding conditions improve over the next year.

Paul

Paul S. Lieneck, AIA

Haynes, Lieneck, and Smith, Inc.

[10 Common Road](#)

Post Office Box 128

Ashby, Massachusetts 01431-0128

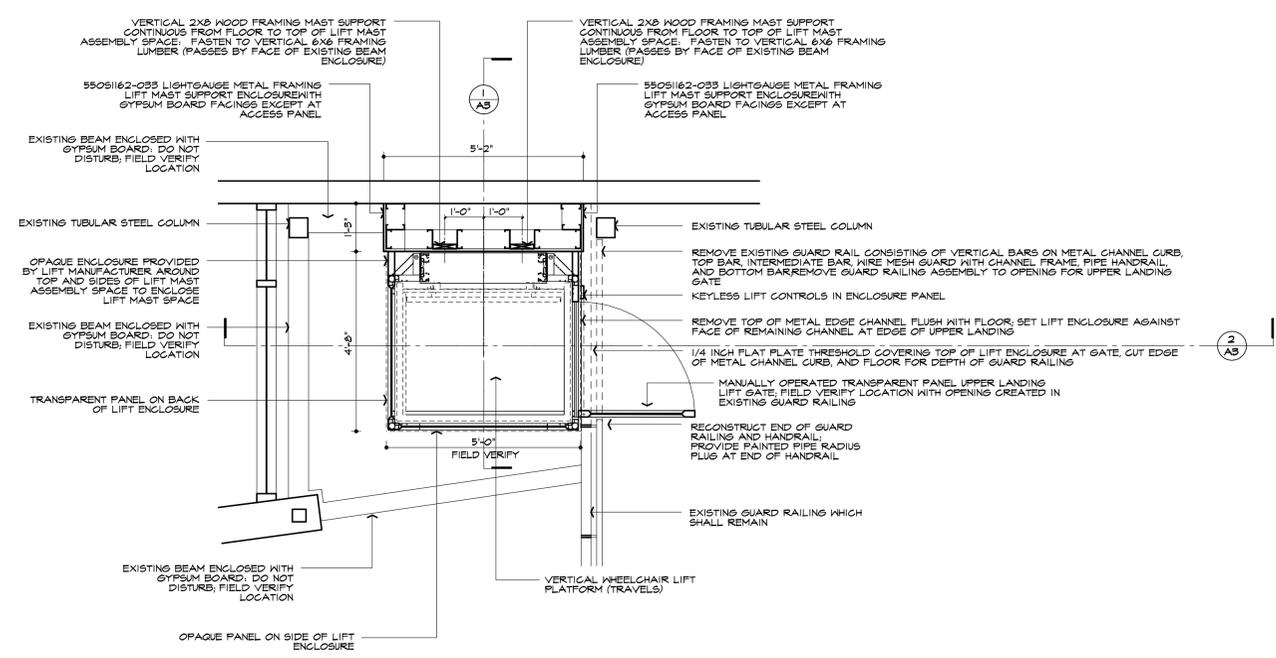
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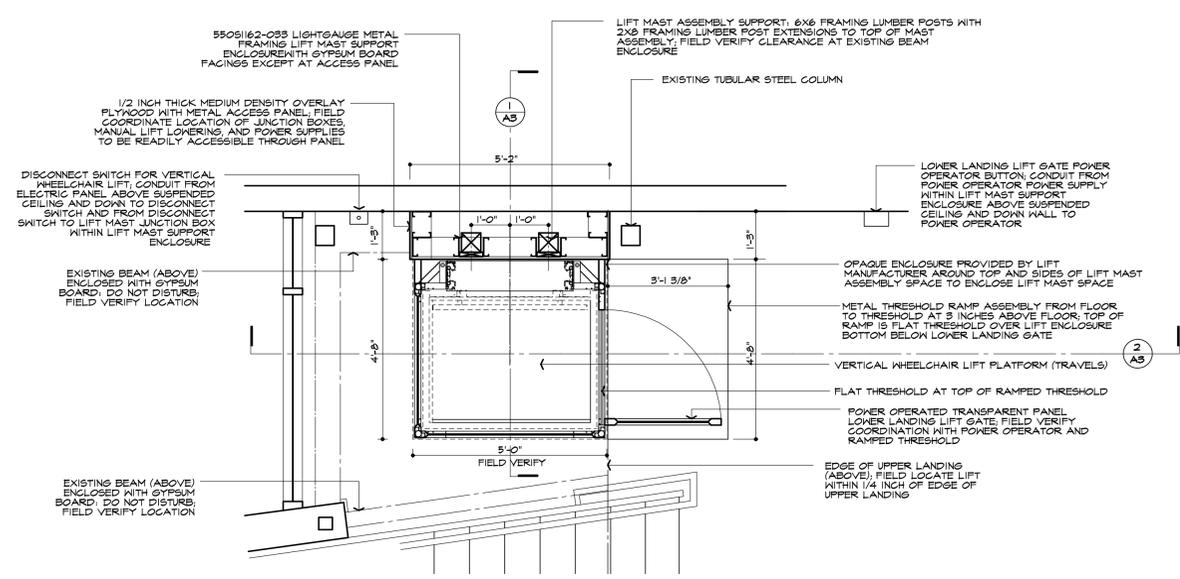
**2 attachments**



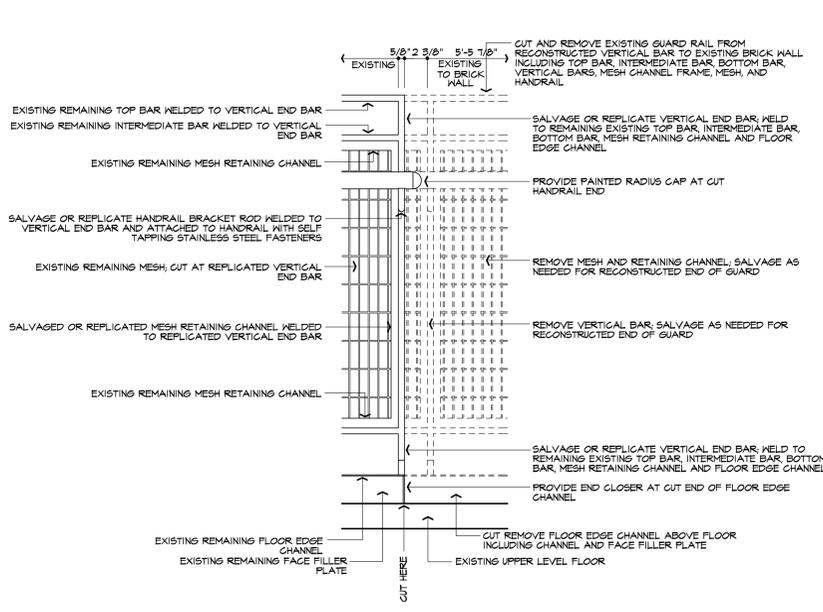




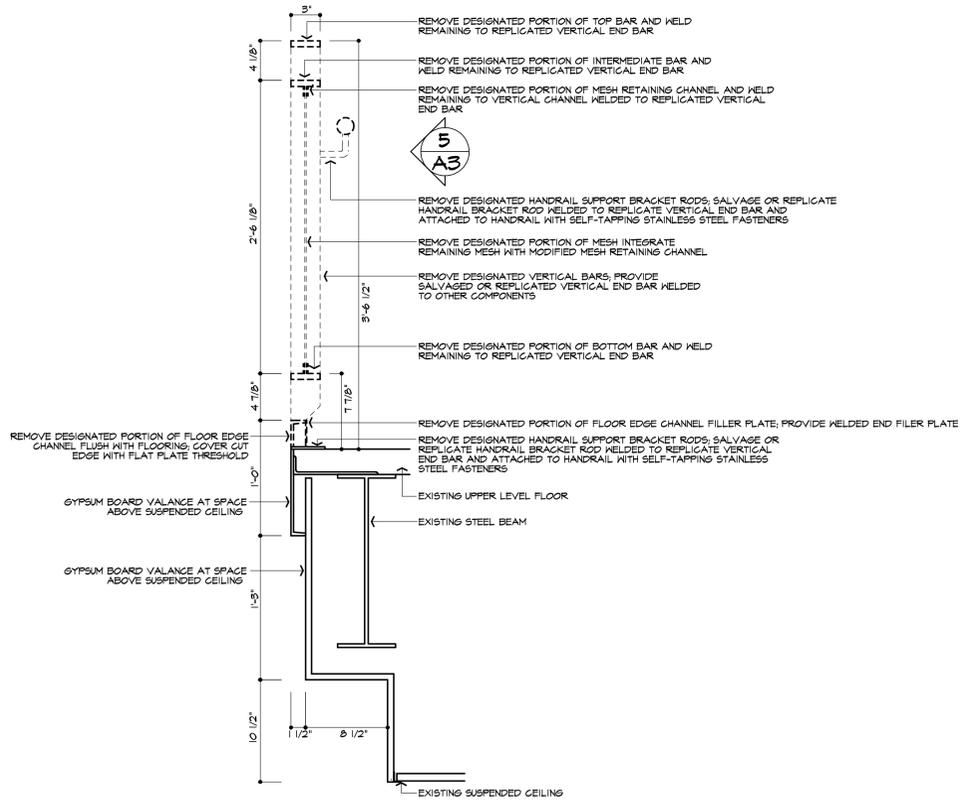
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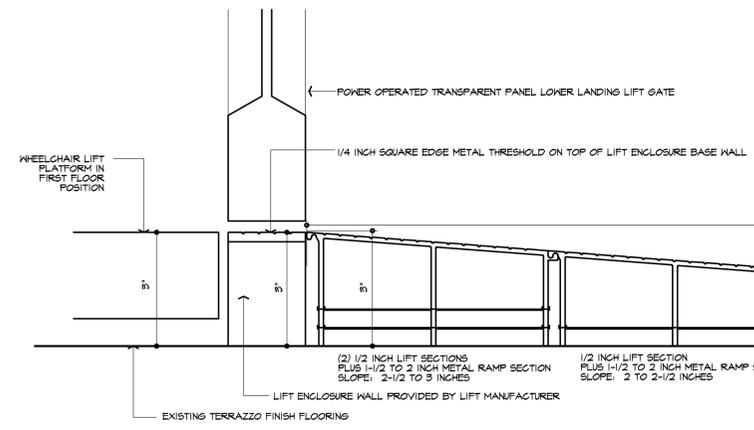
FLOOR PLAN: LOWER LANDING  
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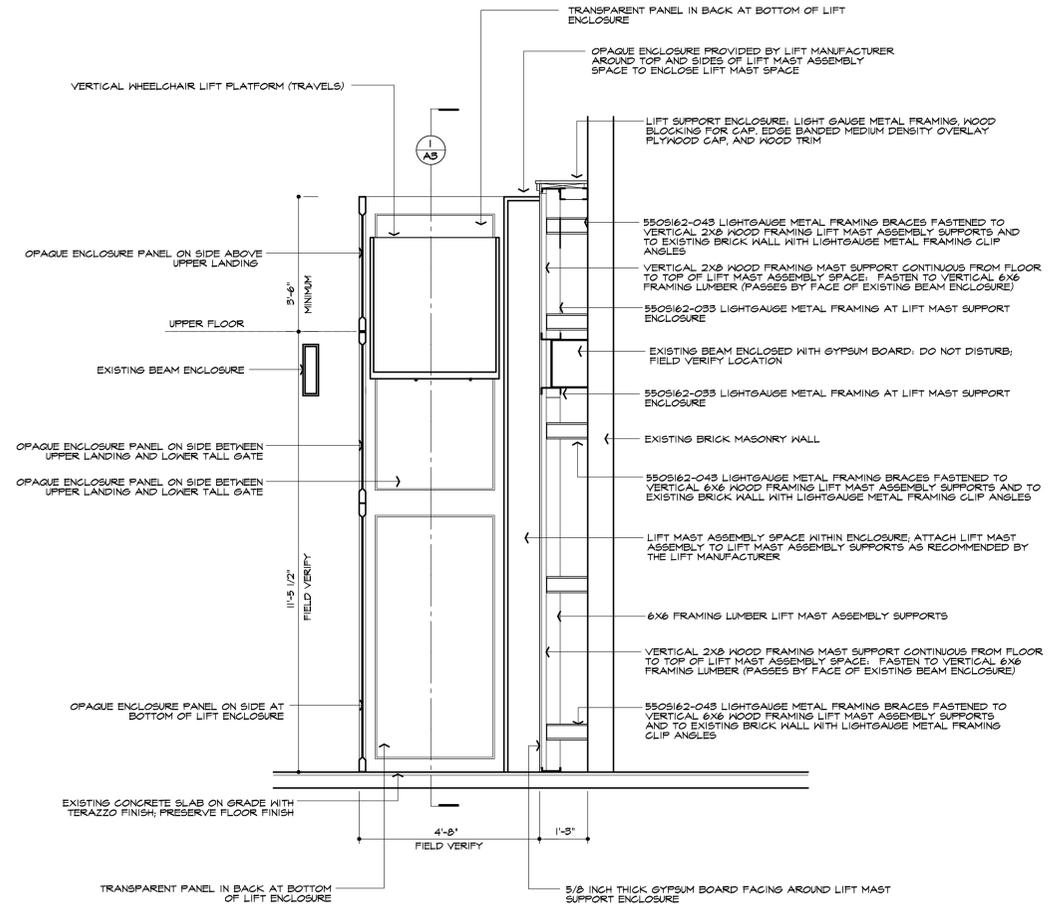
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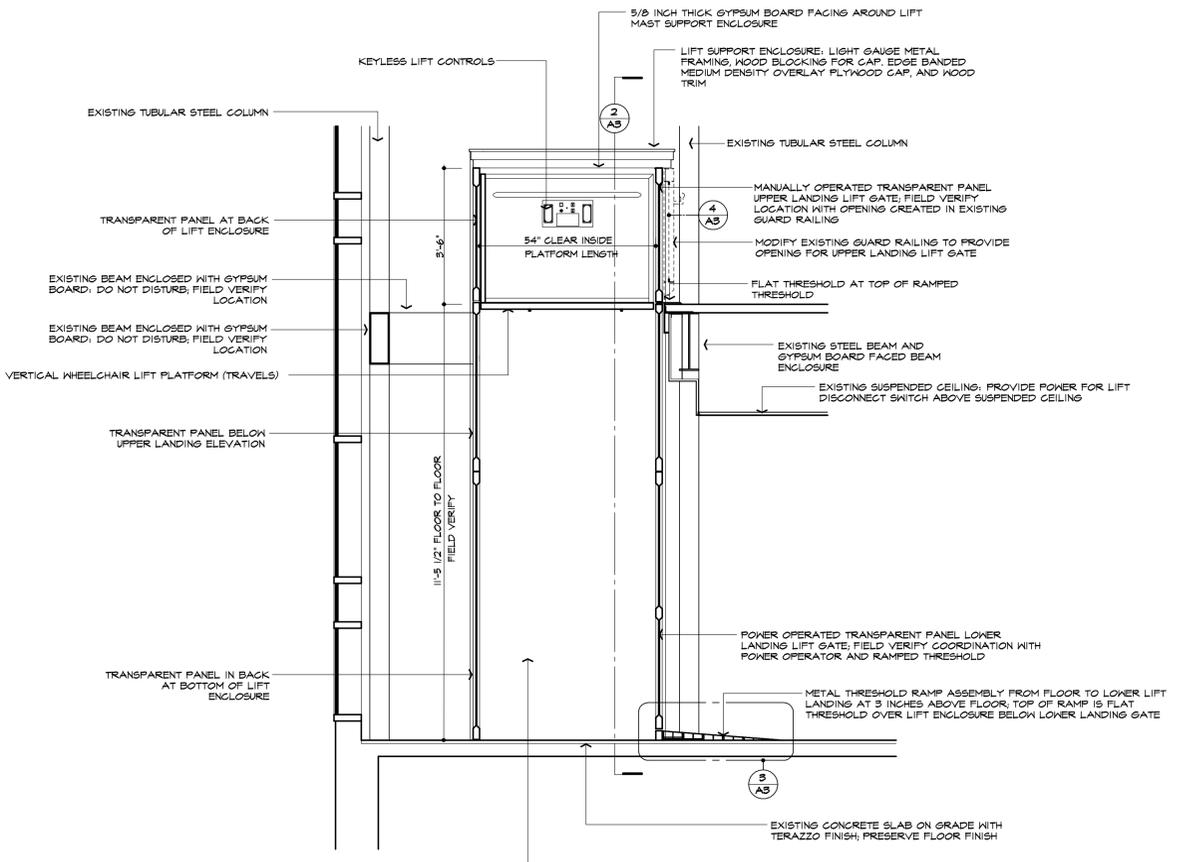
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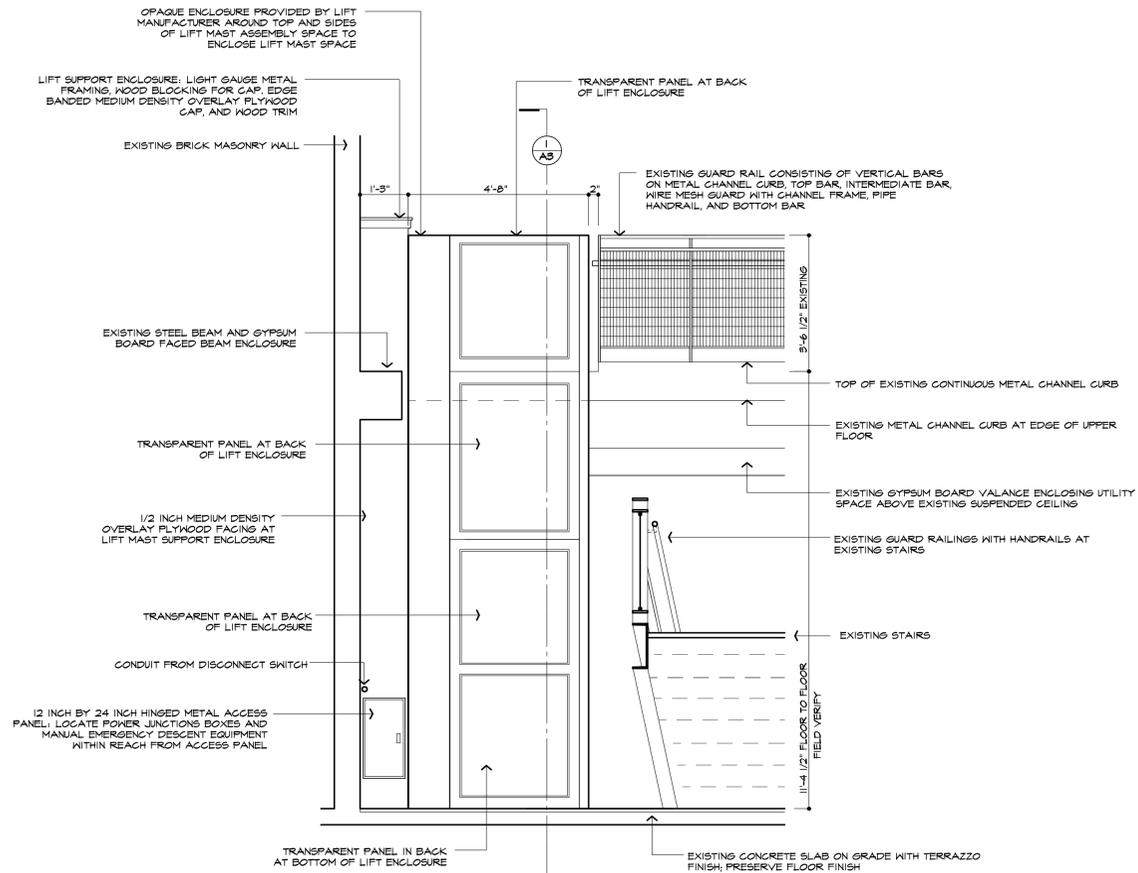
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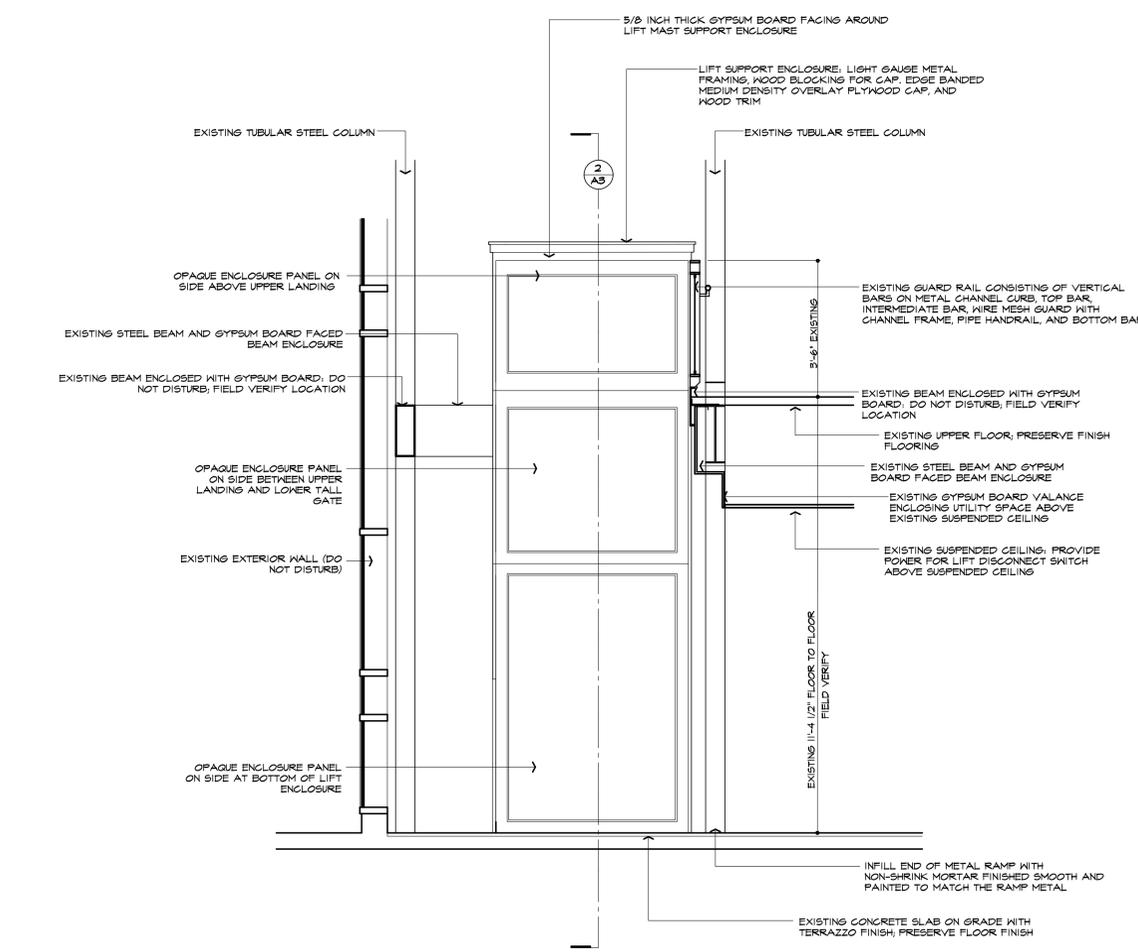
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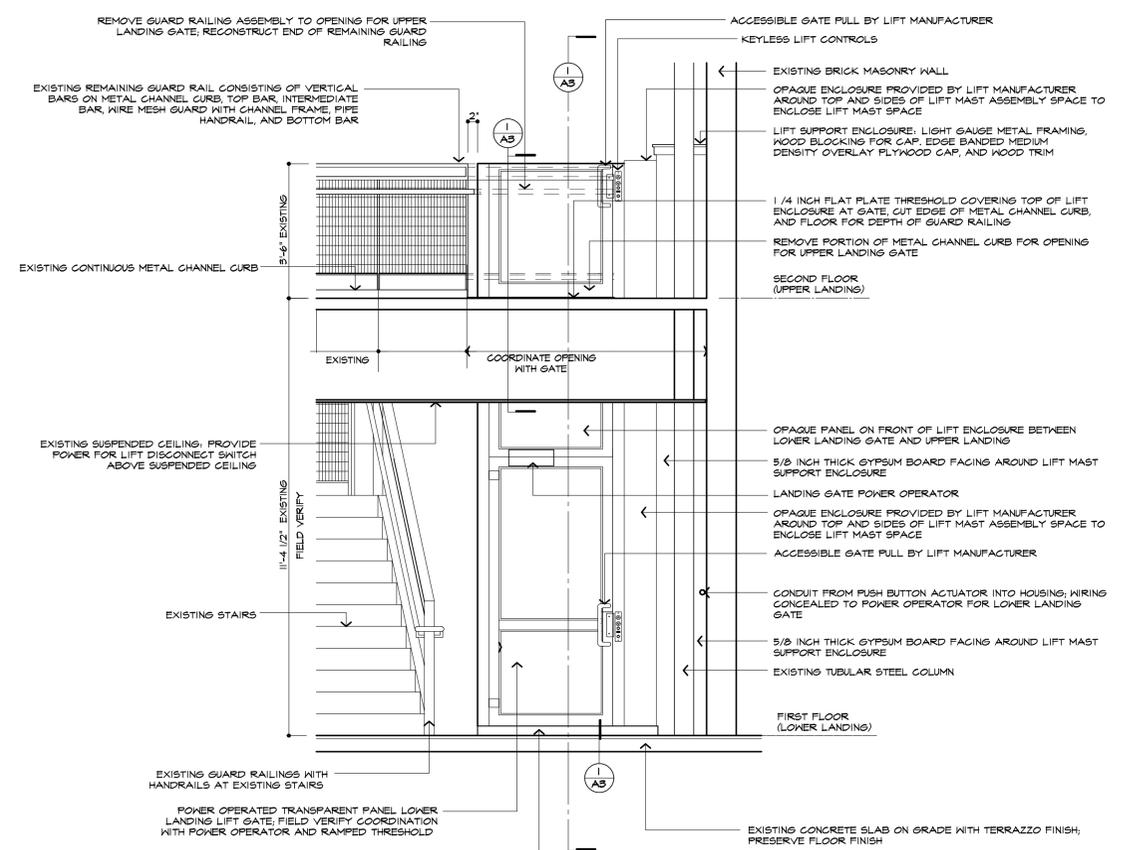
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1/2" = 1'-0"



1 ELEVATION  
1/2" = 1'-0"



3 ELEVATION  
1/2" = 1'-0"



2 ELEVATION  
1/2" = 1'-0"



**Framingham**

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CAPITAL BUDGET PROPOSAL**

# ***ADA COMPLIANCE UPGRADES - \$300,000***

***Installation of Accessible Chair Lift at Framingham High School (\$20,000 - Disabilities Commission Contribution)***



**Proposed Chair Lift at Framingham High School**

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Barracuda Appliance Replacement \$499,000 General Fund

Technology Department

Replacement of hardware and subscriptions for web filter, spam filter, mail archiver and backup solution

Replacement of existing hardware and subscriptions for web filter, spam filter, mail archiver and backup solution

The city utilizes four separate appliances from Barracuda to provide web filtering, spam filtering, email archiving with cloud replication and backup of all datasets which includes offsite cloud replication. These appliances and subscriptions were purchased in FY19 and will be out of warranty and subscription services in FY23. To renew subscriptions for one year on all four appliances would be \$142,500 annually; these subscriptions include hardware warranty with instant replacement, firmware, spam and web filtering engine updates, backup and mail archiver cloud replication and the ability to operate servers in their cloud environment. To keep the hardware up to date and include 5 years of subscription services, the cost would be \$499,000, or \$166,333/year for 3 years. This includes a discount from the vendor of over 50%. At \$142,500/year for renewal of the existing subscriptions and hardware, this would save the City \$212,501 over the course of 5 years if we purchase the new appliances. By purchasing new equipment, we are better positioned for the always evolving threat landscape and future growth requirements.

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Firewall Replacement \$406,782 General Fund

Technology Department

Firewall replacement for current system at end of life and end of support

Our current ASA/Firewall will be end of life/end of support. The ASA/Firewall is used to protect the network from intrusion and is also used to manage remote access to the network (VPN). At this time our current equipment can't keep up with the threat landscape.

We have diligently kept up with our firewall and Security technology, however presently we have been reaching some hurdles we cannot currently overcome. We keep hitting limitations on the software and hardware options due to our current hardware Platform. The software in use, Firepower, was not originally written for our hardware. The software was re-engineered and adapted to the ASA platform; however, we are not capable of running all of the next-generation features available to us. No new software is being written for the ASA platform, but Cisco will continue to provide critical security patches and definition updates until our existing hardware goes end of support. Our existing firewalls are 6 years old; they have gone end of sale. There is an end of support date from Cisco of September 30, 2025.

In today's world of network security and requirements, the entire network is your security platform. Framingham has made impressive progress in these areas with our addition of Cisco AMP (desktop/server Anti-Virus), Cisco Umbrella (DNS inspection and Blocking), Cisco DUO (multifactor Authentication), and Foresite logging and Monitoring through ePlus. All these products integrate and interact with each other enhancing our security foot print all the way out to our remote desktop and 'edge' systems.

Upgrading our Firewalls to new Firepower based hardware and software will improve integration with these products, thus improving our security posture and increasing the benefits of our investment. In addition, we will be able to implement SSL decryption (This is decryption of traffic at the packet level for HTTPS connections). 99% of all web sites are SSL encrypted for security, however our current firewalls are not capable of deep inspection of this traffic, which is becoming increasingly necessary.

Working with Cisco, ePlus and Foresite we have a recommendation for a firewall replacement, this would be for a HA (high availability) firepower pair of firewalls capable of running all of the next generation firewall options including SSL decryption with tighter integrations into our existing security posture. Some additional enhancements and improvements are: SecureX security platform included, SSL decryption, Ransomware defense, support enhancements for the remote workforce, to name a few. Without this investment and the changes in the threat landscape and numerous ransomware attacks

that are targeting local Municipalities and K-12 Schools, the City of Framingham is at a high risk.

In addition, it is recommended that we migrate our Cisco security products into a security EA (Enterprise Agreement) with Cisco, gaining us a substantial saving over a three (3) year period and better flexibility on licensing growth.



Customer Name: CITY OF FRAMINGHAM

Quote No: 22661184

Quote Name:

Quotation Date: 06/07/2021

Sales Support Contact: RUSS GAVLAK

Sales Support Phone: 603-263-3506

Sales Support Email: RGAVLAK@EPLUS.COM

Account Executive: G HASTINGS

Account Executive Phone: 781-615-1344

Account Executive Email: g Hastings@eplus.com

Customer PO No:

Order No:

Expiration Date: 07/03/2021

**External Notes:**

“The following terms from Cisco apply to Customer’s use of the products and services on this quote (the “Licensed Services”): the Cisco End User License Agreement and any applicable Supplemental End User License Agreements and Offer Descriptions at <https://www.cisco.com/c/en/us/about/legal/cloud-and-software/software-terms.html> or such other terms as agreed between Cisco and Customer. By purchasing the Licensed Services through ePlus, Customer consents to ePlus and Cisco sharing Customer data with each other to the extent required to provide the Licensed Services.”

ST of MA contract# ITT72

Line No.	Part Number	MFG	Description/Line Notes	QTY	Unit Price	Ext. Price
EA Security Subscription						
001	ELA2-M	CISCO	CISCO EA BUNDLE  <b>Line Note:</b> Initial Term - 36.00 Months   Auto Renewal Term - 0 Months   Billing Model - Prepaid Term   Requested Start Date - 16-Jul-2021   Requested End Date - 15-Jul-2024   Advance Drawdown - 0	36	0.00	0.00
002	E2F-SEC-AMP4EP	CISCO	CISCO EA 2.0 CHOICE - SECURITY SUITES - AMP4E ESSENTIALS	36	0.00	0.00
003	E2SF-P-AMP-EP-10	CISCO	SEC EA 2.0 CHOICE AMP ENDPOINTS ESSENTIALS 10PK QTY- 85	36	1,065.92	38,373.12
004	SVS-EA2-AMPE-SUP-E	CISCO	ENHANCED SUPPORT FOR AMP END POINTS	36	248.47	8,944.92
005	E2F-SEC-ANYCONN	CISCO	CISCO EA 2.0 CHOICE - SECURITY SUITES- ANYCONNECT	36	0.00	0.00
006	E2SF-A-AC-APEX-10	CISCO	SECURITY EA 2.0 CHOICE ANYCONNECT APEX LICENSE 10PK QTY- 23	36	52.22	1,879.92
007	SVS-EA2-ANYC-SUP-E	CISCO	ENHANCED SUPPORT FOR ANYCONNECT WITH FTD ONLY	36	11.96	430.56
008	E2F-SEC-DUO-MFA	CISCO	CISCO EA 2.0 CHOICE - SECURITY SUITES - DUO MFA SUITE	36	0.00	0.00
009	E2SF-DUO-MFA	CISCO	EA CHOICE - DUO MFA EDITION QTY- 800	36	1,449.41	52,178.76
010	SVS-EA2-DUO-SUP-P	CISCO	PREMIUM SUPPORT FOR DUO	36	796.08	28,658.88
011	E2F-SEC-NGFW	CISCO	CISCO EA 2.0 CHOICE - SECURITY SUITES- NGFW	36	0.00	0.00
012	E2SF-F-FPR4112T	CISCO	SEC EA 2.0 CHOICE FPR4112 THREAT DEFENSE THREAT, MALWARE,URL QTY- 2	36	1,790.02	64,440.72
013	SVS-EA2-NGFW-SUP-E	CISCO	ENHANCED SUPPORT FOR NEXT-GEN FIREWALL	36	576.79	20,764.44
						<b>347</b>

014	E2F-SEC-UMBDNSA	CISCO	CISCO EA 2.0 CHOICE - SECURITY SUITES-UMBRELLA DNS ADVANTAGE	36	0.00	0.00
015	E2SF-U-DNS-R-ADV	CISCO	SEC EA 2.0 CHOICE UMBRELLA RECONSTRUCTION DNS ADVANTAGE QTY- 450	36	873.51	31,446.36
016	E2SF-UA-MULTIORG	CISCO	SECURITY EA 2.0 CHOICE - MULTI-ORG CONSOLE DNS ADV ADD-ON	36	0.00	0.00
017	SVS-EA2-SIG-SUPT-E	CISCO	UMBRELLA SUPPORT FOR DNS/SIG PACKAGES - ENHANCED	36	131.41	4,730.76

**Sub-Total (USD) 251,848.44**

### Firewall

018	SF-FMC-VMW-2-K9	CISCO	CISCO FIREPOWER MANAGEMENT CENTER, (VMWARE) FOR 2 DEVICES	1	200.00	200.00
019	CON-PSBU-SFMMCVWK	CISCO	PSS SWSS UPGRADES CISCO FIREPOWER MANAGEMENT CENTER, (VMWA	1	231.94	231.94
020	FPR4112-NGFW-K9	CISCO	CISCO FIREPOWER 4112 NGFW APPLIANCE, 1U, 2 X NETMOD BAYS	2	25,302.29	50,604.58
021	CON-PSUT-FPR41FWK	CISCO	PRTNR SUP 8X5XNBD CISCO FIREPOWER 4112 NGFW APPLIANCE, 1U,	2	16,699.82	33,399.64
022	FPR4K-PWR-AC-1100	CISCO	FIREPOWER 4000 SERIES 1100W AC POWER SUPPLY	2	1,322.96	2,645.92
023	SF-F4K-TD6.6-K9	CISCO	CISCO FIREPOWER THREAT DEFENSE SOFTWARE V6.6 FOR FPR4100	2	0.00	0.00
024	SF-F4KFXOS2.8.1-K9	CISCO	CISCO FIREPOWER EXTENSIBLE OPERATING SYSTEM V2.8.1 - FPR4100	2	0.00	0.00
025	CAB-TA-NA	CISCO	NORTH AMERICA AC TYPE A POWER CABLE	4	0.00	0.00
026	FPR4K-NM-BLANK	CISCO	FIREPOWER 4000 SERIES NETWORK MODULE BLANK SLOT COVER	4	0.00	0.00
027	FPR4K-PWR-AC-1100	CISCO	FIREPOWER 4000 SERIES 1100W AC POWER SUPPLY	2	0.00	0.00
028	FPR4K-S-FAN-	CISCO	FIREPOWER 4000 SERIES FAN - SIINGLE	12	0.00	0.00
029	FPR4K-RACK-MNT	CISCO	FIREPOWER 4000 SERIES RACK MOUNT KIT	2	0.00	0.00
030	FPR4K-ACC-KIT2	CISCO	FPR4K HARDWARE ACCESSORY KIT	2	0.00	0.00
031	GLC-TE	CISCO	1000BASE-T SFP TRANSCEIVER MODULE FOR CATEGORY 5 COPPER WIRE	2	0.00	0.00
032	FPR4K-SSD400-	CISCO	FIREPOWER 4000 SERIES 400GB SSD FOR FPR-4125	2	0.00	0.00
033	FPR-MSP-SSD	CISCO	CISCO FIREPOWER MALWARE STORAGE PACK, SSD	2	1,985.27	3,970.54
034	R-ISE-PIC-VM-K9=	CISCO	ISE PASSIVE IDENTITY CONNECTOR VIRTUAL MACHINE 3000 SESSIONS	2	562.50	1,125.00
035	CON-PSBU-RISEPIVM	CISCO	PSS SWSS UPGRADES IDENTITY SERVICES ENGINE PASSIVE IDENTIT	2	463.89	927.78
036	SFP-10G-LR-AO	ADDON	SFP+ LC XCVR CISCO SFP-10G-LR COMP TAA	16	137.36	2,197.76

**Sub-Total (USD) 95,303.16**

037	EPLUS PROFESSIONAL SERVICES	EPLUS	EPLUS MANAGED SERVICES	1	6,000.00	6,000.00
Professional Services						
038	SERVICES- FRAMINGHAM	EPLUS	FIREWALL SERVICES	1	53,630.00	53,630.00

**Totals** 406,781.60

	<b>Sub Total (USD):</b>	<b>406,781.60</b>
	<b>Tax (USD):</b>	<b>TBD if Applicable</b>
	<b>Shp&amp;Hnd (USD):</b>	<b>0.00</b>
	<b>Total (USD):</b>	<b>406,781.60</b>

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Thank you for your inquiry. Recent US govt tariffs on certain imports are causing price increases for many IT products, with little or no notice, and beyond ePlus' control. As a result, this quote is subject to change without notice, even before the expiration date reflected above. Please confirm pricing prior to order placement. Unless freight amount is indicated, or is zero, freight will be added to the invoice. Unless Bill-To company is exempt from Sales Tax, it will be added to the invoice. Recognizing that the global pandemic has disrupted operations for many organizations, ePlus will ship products for delivery in accordance with customer's written ship-to instructions and products will be deemed delivered notwithstanding any failure of customer personnel to sign for receipt due to facility closing or otherwise.

<p><b>Customer Acceptance</b></p> <p>Signature: _____</p> <p>Name: _____</p> <p>Title: _____</p> <p>Date: _____</p> <p>Customer PO #: _____</p>	<p><b>Bill To</b></p> <p>CITY OF FRAMINGHAM</p> <p>MEMORIAL BUILDING BASEMENT</p> <p>150 CONCORD ST</p> <p>FRAMINGHAM MA 01702</p> <p>UNITED STATES</p> <p>TECHNOLOGY SERVICES R</p>	<p><b>Ship To</b></p> <p>CITY OF FRAMINGHAM</p> <p>MEMORIAL BUILDING BASEMENT</p> <p>150 CONCORD ST</p> <p>FRAMINGHAM MA 01702</p> <p>UNITED STATES</p> <p>TECHNOLOGY SERVICES RM#B-25</p>
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## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Consolidated Vehicle and Equipment Replacements \$275,000 Sewer Enterprise Fund

Sewer Department

Replacement of four (4) vehicles:

2011 Ford 11,000 GVW 4WD Pickup with Plow \$50,000

2012 Ford 11,000 GVW 4WD Cab and Chassis with Service Body and Plow \$75,000

2011 Ford 11,000 GVW 4WD Cab and Chassis with Service Body and Plow \$75,000

2012 Ford 11,000 GVW 4WD Cab and Chassis with Service Body and Plow \$75,000

Partial recommendation for request of \$685,000 for the replacement of nine (9) pieces of equipment and vehicles.

<b>Priority</b>	<b>Department</b>	<b>Type</b>	<b>Cost</b>
1	Sewer	2011 Ford 11,000 GVW 4WD Pickup w/Plow	\$ 50,000
2	Sewer	2012 Ford 11,000 GVW 4WD C&C w/service body and plow	\$ 75,000
3	Sewer	2011 Ford 11,000 GVW 4WD C&C w/service body and plow	\$ 75,000
4	Sewer	2012 Ford 11,000 GVW 4WD C&C w/service body and plow	\$ 75,000
5	Sewer	2012 Ford 11,000 GVW 4WD C&C w/service body and plow	\$ 75,000
6	Sewer	2011 Ford 11,000 GVW 4WD Pickup w/Plow	\$ 50,000
7	Sewer	2012 Ford 15,000 GVW 4WD C&C w/rack body and plow	\$ 95,000
8	Sewer	CAT Generator	\$ 90,000
9	Sewer	Goodwin 6" Pump	\$ 100,000
		Total	\$ 685,000

Vehicle and equipment per Public Work's vehicle management and replacement schedule. The procurement and upkeep of equipment is a significant factor in providing cost-effective and reliable service for systems operation, maintenance, repair, rehabilitation and replacements.

All vehicles and equipment are managed through the Fleet Department and included within a replacement schedule according to specific criteria, such as age, mileage, and major repairs needed for continued reliable service. Industry and Framingham DPW experience indicates that above those thresholds maintenance increases substantially to assure service reliability, as do major repairs, none of which provide a return on investment, and they are not sustainable with the current DPW facility and staffing. In addition to daily service for the various Divisions, nearly all vehicles and equipment are used for the Department's snow and ice management program which is particularly destructive to vehicles.

**Wastewater Enterprise Fund FY23 Vehicle Replacement**

<b>Year</b>	<b>Make</b>	<b>Description</b>	<b>Cost</b>
2011	Ford	11,000 GVW 4WD pickup W/Plow	\$50,000
2012	Ford	11,000 GVW 4 WD C&C W/service body & Plow	\$75,000
2011	Ford	11,000 GVW 4 WD C&C W/service body & Plow	\$75,000
2012	Ford	11,000 GVW 4 WD C&C W/service body & Plow	\$75,000
2012	Ford	11,000 GVW 4 WD C&C W/service body & Plow	\$75,000
2012	Ford	15,000 GVW 4 WD C&C W/rack body & Plow	\$95,000
2003	Goodwin	6" pump	\$100,000
2003	CAT	Generator	\$90,000
2012	Ford	11,000 GVW 4 WD Pickup & Plow	\$50,000
		Total	\$685,000

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Various Sewer Improvements \$403,700 Sewer Enterprise Fund

Sewer Department

Systematic improvements and replacement of sewer mains and manholes

This appropriation provides funding for the DPW to perform systematic improvements and replacement to sewer mains and manholes and to respond to unanticipated sewer system failures.

Replacement and improvements are needed to assure continuing sewer service to ratepayers and compliance with regulations, to reduce costly emergency repairs and system maintenance, and delaying need for major capital investments.



# CITY OF FRAMINGHAM

DEPARTMENT OF PUBLIC WORKS | OPERATIONS

**Blake D. Lukis**  
Director  
**Diane M. Conner**  
Deputy Director of Administration  
**William R. Sedewitz, P.E.**  
Chief Engineer

508-532-6060  
wastewater@framinghamma.gov  
www.framinghamma.gov

**OPERATIONS CENTER**  
100 Western Avenue  
Framingham, MA 01702

## Priorities for Wastewater Improvements FY23

The Wastewater Division conducts routine investigations of the City's sewer pipe infrastructure daily. The Division utilized a closed-circuit television video (CCTV) inspection method with a robotic camera to capture video and photographic footage of underground sewer pipes. This investigative technology enables the City to locate sewer system defects. Common sewer pipe defects include holes, cracks, sags, offset joints, tree roots, and frequent blockages, which lead to a more significant failure if not addressed.

### **Wastewater mains with found defects to be replaced with FY23 funding if approved:**

Anticipated work consists of existing pipe removal and replacement with polyvinyl chloride (PVC) pipe.

- Angelica Drive – 380' of asbestos pipe from 1968
- Barber Road – 500' of 6" vitrified clay from 1929
- Fenton Street – 210' of 8" vitrified clay from 1951
- Trafton Road – 200' of 8" vitrified clay from 1951
- Yorks Rd – 132' of 8" vitrified clay from 1953
- Waverley Street – 400' of 15" Cast Iron from 1913
- Paxton Road – 260' of 10" vitrified clay from 1956
- Fenwood Street – 800' of 8" vitrified clay from 1950

**Please Note:** Anticipated priorities listed above are subject to change

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Replacement/Upgrades Sewer Pump Station Equipment \$545,600 Sewer Enterprise Fund

Sewer Department

Replacement and upgrades of equipment at older wastewater pumping stations

This appropriation will provide for the replacement and upgrades of equipment at older wastewater pumping stations. The project includes the planned replacement of pumps, motors, controls and others, as well as emergency replacements.

The lifespan and reliability of these stations can be extended a decade or more through the replacement of component parts as they become worn and inefficient, thereby reducing the near-term need for significant capital expenditures.



# CITY OF FRAMINGHAM

DEPARTMENT OF PUBLIC WORKS | OPERATIONS

**Blake D. Lukis**  
Director  
**Diane M. Conner**  
Deputy Director of Administration  
**William R. Sedewitz, P.E.**  
Chief Engineer

508-532-6060  
wastewater@framinghamma.gov  
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**OPERATIONS CENTER**  
100 Western Avenue  
Framingham, MA 01702

## Priorities for Sewer Pump Station Equipment Replacements FY23

The Wastewater Division pump station staff conduct routine inspections of all wastewater pump stations. During these inspections minor defects are discovered and repaired and general maintenance is performed. Larger scale defects are also discovered where multiple components need replacement. These larger defects require designing, planning, procuring, and constructing with in house staff or sometimes a contractor or consultant. These larger projects are usually a longer-term project as opposed to a routine replacement. Common projects include but are not limited to pump motor, pumps, check valves, motor starters, gate valves, air compressors, electrical, manifold piping, rail systems, and building or site upgrades.

### Pump stations with found defects to be replaced with FY23 funding if approved:

- Mt. Wayte pump station – Eliminate phase converter, replace motors, replace check valves, replace heater, add generation connection with transfer switch
- John McQuinn Pump Station – New electrical service, replace air compressors, replace pump motors, replace motor starters
- Nine Ninety – Install remote monitoring system
- Overlook pump station – Replace motor starters, replace check valves, replace gate valves, install heat, replace bearings and windings on pumps
- Cushing pump station – New electrical service and cabinet, replace 2 pumps and rail system, replace manifold piping
- Kittredge Pump Station – Paving and landscape improvements after current mechanical and electrical upgrades
- Woodland pump station – Replace 2 pumps, replace stands and piping, replace gate valves, replace check valves
- Knob Hill, Chalis, Michaud pump stations- Replace pumps
- New York Ave pump station – Replace gate valves
- Fenwick pump station – Begin design of Pulse Air System

**Please Note:** Anticipated priorities listed above are subject to change

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Cedar Street Sewer Improvements \$110,000 Sewer Enterprise Fund

Sewer Department

Cured in Place Pipe (CIPP) lining of the sewer main and sealing of manholes on Cedar Street

This funding will provide the ability to CIPP line the sewer main on Cedar St as well as seal all the manholes. This is important in stopping and preventing infiltration as well as repairing minor defects and extending the life of the sewer system on this street.

This work would coincide with the water main replacement as well as the roadway improvements resulting in a complete top to bottom restoration of Cedar Street. Eversource already replaced the gas main in preparation for this project. Reducing infiltration helps keep the MWRA cost down of treating clean ground water. Repairing minor defects now with CIPP lining will extend the life of the sewer main reducing the need for significant capital costs in the near future.



# CITY OF FRAMINGHAM

## DEPARTMENT OF PUBLIC WORKS | OPERATIONS

**Blake D. Lukis**  
Director  
**Diane M. Conner**  
Deputy Director of Administration  
**William R. Sedewitz, P.E.**  
Chief Engineer

508-532-6050  
water@framinghamma.gov  
www.framinghamma.gov

**OPERATIONS CENTER**  
100 Western Avenue  
Framingham, MA 01702

September 1, 2021

Mr. William R. Sedewitz, P.E.  
Chief Engineer  
Department of Public Works  
110 Western Avenue  
Framingham, MA 01702

Re: FY2023 Funding for Cedar Street Water Main Replacement & Sewer Lining

Dear Bill:

This letter provides a brief summary of the flow conditions observed during unidirectional flushing of the Cedar Street water main, and results of the cctv inspection of the Cedar street sewer main, and offers recommendations for improvements and estimated associate costs.

### Location

The Cedar Street water and sewer mains run north-south on Cedar Street between Waverly Street and Cypress Street. The water main is just over 1,800 feet long and is a six-inch diameter, cast-iron main installed in 1909. The sewer main is approximately 1,500 feet long and is an eight-inch diameter, vitrified clay main installed in 1914. Cedar Street is located in zoning district "General Residence" (G) which has a principal building or use of one- or two-family detached dwellings with any other principal use. The lot size range is 8,000 to 43,560 square feet with a minimum landscaped open space surface ratio of 30% to 50%. Cedar Street is primarily densely-constructed single family and multifamily residential properties, with the section between Waverly Street and Claflin Street having mixed residential and commercial/industrial use. Cedar Street is located in south Framingham and in located in District 8.

### Unidirectional Flushing & Water Main Evaluation

The Cedar Street water main is included in Phase 2B of the City's Water Distribution System Unidirectional Flushing Program. Unidirectional flushing of Phase 2B was completed in the Fall of 2019. Flushing of Cedar Street was completed in two parts, flowing north from the intersection of Cedar Street and Pine Street to a hydrant at the intersection of Cedar Street and Waverly Street (hydrant 1784), then flowing south from the intersection of Cedar Street and Pine Street to the first hydrant located on Cypress Street, after the intersection of Cedar and Cypress Streets.

Cedar Street was flushed from Pine Street to Waverly Street for thirty minutes, during which time the flow from hydrant 1784 was recorded at 500 gallons per minute (gpm). The section of Cedar Street from Pine Street to Cypress Street was also flushed for thirty minutes, and a flow rate from hydrant 1956 on Cypress Street was recorded at 300 gpm. Based on the American Water Works Association Manual M31, fire protection for one- and two-family dwellings not to exceed two stories the required fire flow rate is as follows:



# CITY OF FRAMINGHAM

DEPARTMENT OF PUBLIC WORKS | OPERATIONS

## AWWA Distribution System Requirements for Fire Protection for One- and Two-Family Dwellings not to exceed two stories

<i>Distance between buildings (feet)</i>	<i>Required flow rate (gpm)</i>
>100	500
31-100	750
11-30	1,000
<11'	1,500

Source: AWWA Manual M31 Distribution System Requirements for Fire Protection

The City's zoning district and observed building proximity would place the required flow rate for Cedar Street at 1,000 gpm, which is also the flow rate below which the Water Division provides notice of low flow water mains to the Fire Department. At the time of unidirectional flushing, the Cedar Street water main north of Pine Street experienced a fire flow deficit of 500 gpm, and south of Pine Street experienced a fire flow deficit of 700 gpm. The Water Division notified the Fire Department of the flow deficiency on Cedar Street following completion of unidirectional flushing of Phase 2B along with all other discovered deficiencies. Fire flow deficits have been discovered throughout the City and have been evaluated under separate cover.

### Water Main Recommendations

The Cedar Street water main was identified as a water main that requires replacement in order to eliminate fire flow deficits and restore domestic pressure and flow to ratepayers. We have been informed by the Highway Division that Cedar Street is scheduled for necessary roadway improvements so work to repair the Cedar Street water main before the roadway improvements begin is a priority. This water main replacement work is being scheduled in coordination with roadway improvements and sewer lining on Cedar Street in order to minimize disturbances to the street following completion of new paving. Due to the expeditious schedule and nature of the work, we recommend that water main replacement work be completed by the Water Division's on-call contractor. Replacement of this water main shall include installation of a new 8-inch diameter cement-lined ductile iron water main, fittings, hydrants, valves, services, and appurtenances. We have prepared the following estimated cost for construction using the Water Division's on-call contractor as follows.



# CITY OF FRAMINGHAM

DEPARTMENT OF PUBLIC WORKS | OPERATIONS

## Estimated Water Construct Costs

<i>Construction Administration</i>	\$	11,000
<i>Construction Oversight</i>	\$	60,000
<i>Construction</i>	\$	1,300,000
<i>Contingency</i>	\$	234,000
<i>DPW Costs</i>	\$	160,500
<b><i>TOTAL ESTIMATED COST</i></b>	<b>\$</b>	<b>1,765,500</b>

It should be noted that the Cedar Street water main is identified in the City's 2017 Water System Master Plan as a recommended improvement in year eight of the plan, or 2026. Including the Cedar Street water main in the Department's capital appropriation request for Cedar Street improvements in fiscal year 2023 will allow this improvement to occur on schedule, address the recently-discovered fire flow deficit, and complete this work before the scheduled roadway improvements.

Elimination of cast-iron water mains that are over 100 years old from the water distribution system is a priority of the Water Division. In addition to having restricted flow and pressure, in general, aged cast-iron water mains are prone to breaks and requires emergency repairs more frequently. Performing repair work on active water mains in the distribution system can be a significant challenge for Water Division staff and can frequently lead to extended disruptions to the water service of our customers. Elimination of water mains that are well beyond their design life is both prudent and necessary to avoid major infrastructure failures, avoid costly disruptions to our customers, and provide adequate fire protection for property-owners and residents of the City.

### Closed Caption Television (CCTV) Inspection & Sewer Main Evaluation

In advance of the anticipated roadway work, the Sewer Division performed CCTV inspection of the sewer main and manholes located on Cedar Street. The Sewer Division cleaned and inspected each section of sewer main and each manhole to evaluate condition. It was determined that the unlined sections of the Cedar Street sewer main and associated manholes do not contain major failures, misalignments, or evidence of size constraints of concern.

### Sewer Main Recommendations

While the age of the Cedar Street sewer main is advanced, the condition of the mains and manholes is favorable for Cured-in-Place-Pipe (CIPP) lining and manhole sealing in lieu of sewer replacement. CIPP lining is also preferred because there is an existing natural gas main located above the sewer main in the street. Excavation of this sewer would resultantly be challenging and not advised until which time as the sewer main is determined to have capacity concerns or is failing.

As with aged water mains, deferring work on a sewer main of this age and material is not recommended. Vitrified clay sewer mains of advanced age are known areas of infiltration and inflow, and require more frequent repairs. CIPP lining and manhole sealing can extend the life of the sewer collection system on Cedar Street and prevent untimely excavation of the newly-paved roadways for sewer repair work.



# CITY OF FRAMINGHAM

DEPARTMENT OF PUBLIC WORKS | OPERATIONS

We recommend that sewer main replacement work be completed by the Sewer Division's CIPP lining contractor. The proposed work shall include CIPP lining of six 8-inch diameter sections (1,350 linear feet) of sewer main on Cedar Street and one connecting section at the intersection of Pine and Cedar Streets, cutting out 35 sewer laterals, and sealing five manholes totaling 43 linear feet of manhole sealing. We have prepared the following estimated cost for construction using the Sewer Division's CIPP lining contractor as follows.

### Estimated Sewer Construct Costs

<i>Construction Administration</i>	\$	4,800
<i>Construction Oversight</i>	\$	28,000
<i>Construction</i>	\$	56,000
<i>Contingency</i>	\$	11,200
<i>DPW Costs</i>	\$	10,000
<b><i>TOTAL ESTIMATED COST</i></b>	<b>\$</b>	<b>110,000</b>

Should you wish to discuss further, please feel free to reach out.

Sincerely,

Stephanie Tarves, P.E.  
Senior Water & Wastewater Engineer  
City of Framingham



**FIRE FLOW DEFICIT  
500 GPM**

**FIRE FLOW DEFICIT  
700 GPM**

**SEWER MAIN LINING**

**CYPRESS SEWER  
PUMP STATION**

**Legend**

Sewer Pump Station

**TYPE**

Sewer Manhole

**Sewer Edge**

**Type**

SIPHON

FORCE MAIN

TRUNK

COLLECTOR

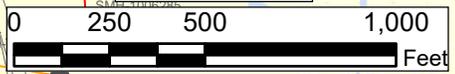
**Framingham Water System**

Water Mains

**Water Main Improvement**

Cedar Street

1 inch = 500 feet



**Cedar Street Water Distribution & Sewer Collection Systems  
Proposed Improvements Map**  
Date: 9/9/2021

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Sewer Defect Repairs Phase 3 Design & Construction \$300,000 Sewer Enterprise Fund

Sewer Department

Phased and ongoing repairs and construction of high priority sewer main and manhole defects

Partial recommendation of request for \$1,063,450 with consideration of availability of the Massachusetts Water Resource Authorities' (MWRA) Infiltration/Inflow Local Financial Assistance Program 75% grant and 25% 10-year interest free loan for eligible projects. \$300,00 represents the portion of the project that would not be eligible for this program. This project is contingent upon approval of the MWRA program and will not move forward otherwise.

This funding request will allow the city to continue addressing high priority sewer main and manhole defects. Whenever possible, pipes will be rehabilitated using cured-in-place pipe (CIPP) or lining techniques. This is more cost effective and doesn't require excavation of the road. When lining is not possible, sections of pipe will be replaced. Manholes can also be lined in many cases but would be replaced when necessary.

Framingham has evaluated the condition of approximately 50% of its sewer system within the last decade, with a focus on identifying high priority sewer repairs. These high priority repairs include rectifying defects that contribute to infiltration, as well as spot repairs and rehabilitation that will extend the reliable service life of the sewer assets. Infiltration is clean water, such as groundwater, that enters the sanitary sewer system and, in turn, reduces the capacity for wastewater flow. This capacity reduction can result in system backups and overflows, as well as fee increases from the MWRA, which is based on total wastewater flow from Framingham.

The City has \$3.954M available through the MWRA's Infiltration/Inflow (I&I) Local Financial Assistance program. This phase of their program provides 75% grant funds and 25% 10-year interest free loans for eligible projects. This project meets the eligibility criteria. The next phase (Phase 13) of the MWRA I&I financial assistance program provides \$2.75M as ten-year interest free loans (there is no grant component to this phase) for eligible projects.

# SEWER PIPES I&I CIPP (prices under current contract 2021)

ALL NEW CIPP - I/I LOCATIONS															
LOCATION	LENGTH	EST GPM	PIPE SIZE	DEPTH	NOTES	CIPSR	CIPP	Lat. Re-instate	Grout T&S	Lat. Grout	Clean & TV/Day	Manhole Lining	Date Complete	SSES	Est. Costs
upper joclun (whole st)	1300	2+brk	8	8	vcp main-8 pipe segents- 16 lats-10 m.h.s from 1000767 to 1000771		\$ 41,000.00	\$ 4,000.00				\$ 12,000.00			\$ 57,000.00
joclun rd -easment to merlin	1000	5+brk	8	7	vcp main-5 pipe segents-20 lats-5 m.h.s-from 1000773 to 1000785		\$ 32,000.00	\$ 4,000.00				\$ 6,000.00			\$ 42,000.00
scott dr to brook(easment)	1300	5+ro	10	6	ACP main-6 pipe segments-no lats-7 m.h.s -from 1005885 to 1002362		\$ 44,000.00	na				\$ 8,000.00			\$ 52,000.00
spruce to audrea (easment)	850	5+ro	8	8	vcp main-5 pipe segments-5 lats-6 m.h.s-from 1002313 to 1002318		\$ 28,000.00	\$ 1,000.00				\$ 7,000.00			\$ 36,000.00
wood terr (whole street)	650	brks	8	7	vcp main-3 pipe segments-12 lats-4 m.h.s-from 1003895 to 1008347		\$ 21,000.00	\$ 2,000.00				\$ 3,000.00			\$ 26,000.00
saxony terr	310	3+r	8	7	vcp main-1 pipe segent-4 lats-2 m.h.s--1003480 to 1005403		\$ 10,000.00	\$ 700.00				\$ 2,000.00			\$ 12,700.00
brook to salvi(double esmt)	700	4+brks	8	5	truss main-4 pipe segments-5 lats-5 m.h.s-from 1006020 to 1006905 to1002953		\$ 23,000.00	\$ 1,000.00				\$ 5,000.00			\$ 29,000.00
singaltary rd (easment)	1900	4+ro	8	5	ACP main-8 pipe segments-3 lats-9 m.h.s-from 1001792 TO 1001786		\$ 60,000.00	\$ 500.00				\$ 12,000.00			\$ 72,500.00
hodder rd (easment)	1200	3+brks	8	6	ACP main-5 pipe segents-6 lats-6 m.h.s -from 1001833 TO 1001796		\$ 38,000.00	\$ 1,200.00				\$ 8,000.00			\$ 47,200.00
griffin rd (easment aquaduct)	400	2+brks	10	6	vcp main-2 pipe segments-2 lats-3 .m.h.s.-from 1008288 to 1000378		\$ 13,000.00	\$ 330.00				\$ 2,500.00			\$ 15,830.00
griffin to joseph (easment)	600	8+ brks	10	8	vcp main-3 pipe segments-4 lats- 4 m.h.s -from 1003313 to 1003654		\$ 20,000.00	\$ 800.00				\$ 5,000.00			\$ 25,800.00
hirum (easment #5-#29)	1700	4+ro	8	7	ACPmain-7 pipe segments-3 lats-8 m.h.s-from 1002200 to 1005831		\$ 54,000.00	\$ 500.00				\$ 9,200.00			\$ 63,700.00
hirum (easmtculdesac to woods)	350	4+Bbrks	8	8	ACP main-2 pipe segments-lats-na-m.h.s.-3-from-1006827 to 1006338		\$ 11,000.00	na				\$ 2,000.00			\$ 13,000.00
janebar to hemingway p/s	1200	8+	8	7	ACP main-6 pipe segents-1 lat-7 m.h.s-from 1001828 to 1007330		\$ 39,000.00	\$ 165.00				\$ 8,000.00			\$ 47,165.00
mcAdas to westview	700	4=ro	8	7	ACP main-2 pipe segments-2 lats-3 m.h.s.-from 1001999 to 1001600		\$ 22,000.00	\$ 330.00				\$ 3,000.00			\$ 25,330.00
westview to lyman(easent)	900	4+brks	8	8	ACP main-5 pipe segments-1 lat--6 m.h.s-from 1001600 to 1001582 to 1001577		\$ 30,000.00	\$ 165.00				\$ 10,000.00			\$ 40,165.00
ruthellen to edgell(easment)	1100	4+brks	10	6	ACP main-5 pipe segments-3 lats-6 m.h.s.-from-1001313 to 100589		\$ 35,000.00	\$ 500.00				\$ 6,000.00			\$ 41,500.00
pleasant to masspike (easment)	900	4+brks	12	8	vcp main-3 pipe segments-2 lats-4 m.h.s- from 1005040 to 1000275 (teple)		\$ 30,000.00	\$ 330.00				\$ 5,000.00			\$ 35,330.00
sunvally @pike to e/bcavatorata	1300	4+brks	12	8	vcp main-7 pipe segments-8 lats-8 m.h.s.-from-1005192 to 1001297		\$ 42,000.00	\$ 1,500.00				\$ 10,000.00			\$ 53,500.00
donovan dr( easment)	1500	6+brks	12	8	ACP main--7 pipe segments-7-lats-8 m.h.s.- from 1007213 to 1001829		\$ 49,000.00	\$ 1,200.00				\$ 15,000.00			\$ 65,200.00
whiting ave (easment)	600	4+brks	8	7	ACP main-2 pipe segments-2-lats-3 m.h.s.-from-1002287 to 1000331		\$ 20,000.00	\$ 330.00				\$ 2,500.00			\$ 22,830.00
pleasantview to bosworth(esmt)	550	2+brks	8	6	ACP main-3 pipe segments-3 lats -4 m.h.s-from 1001069 to 1000808		\$ 19,000.00	\$ 500.00				\$ 5,000.00			\$ 24,500.00
union ave terr-(whole st)	450	brks	15	8	vcp main-3 pipe segments-9 lats -4 m.h.s.-from 1008342 to 1000117		\$ 26,000.00	\$ 1,500.00				\$ 3,000.00			\$ 30,500.00
rte 9 (natick line crossover)	140	2+brks	10	7	vcp main-1 pipe segent-no lats-2 m.h.s-from 1005268 to 1005427		\$ 5,000.00	na				\$ 3,000.00			\$ 8,000.00
beaver st leland to bridge	2400	3+brks	8	8	vcp m ain -14 pipe segments-45 lats-15 m.h.s-from 1005813 to 1006517		\$ 77,000.00	\$ 900.00							\$ 77,900.00
beaver st @ bridge to park lot	400	2+brks	10	7	vcp main -2 pipe segments-4 lats-3 m.h.s.-from 1006208 to 1006205		\$ 14,000.00	\$ 800.00				\$ 4,000.00			\$ 18,800.00
														<b>FY2023 Construction Cost</b>	<b>\$ 983,450.00</b>
														<b>FY2023 DPW Costs</b>	<b>\$ 80,000.00</b>
														<b>TOTAL APPROPRIATION REQUEST</b>	<b>\$ 1,063,450.00</b>

## City of Framingham FY23-27 Capital Improvement Program

### FY23 Recommended:

Gates Street Sewer Pump Station Rehabilitation Design & Construction \$2,250,000  
Sewer Enterprise Fund

Sewer Department

Repairs to Gates Street Pump Station which was constructed in 1953 and last rehabilitated in 1984

The Gates Street Pump station was constructed in 1953, last rehabilitated in 1984, and is in critical need of significant repairs. This budget request is intended to address specific needs within the station to keep the facility from deteriorating to the point of needing much more costly full replacement. This request is to take the project from preliminary design (35% complete) through construction. The proposed project includes repairs of significant corrosion in the wet well area, replacement of pipe and pumps, structural improvements to improve safety and maintenance accessibility, installation of an emergency generator, electrical and control upgrades, ventilation improvements and odor control improvements. Construction on this station will require that pumps and piping be taken off line for replacement. As a result, one of the key cost components within this budget request will be full bypass pumping during construction.

The station has key safety and operational issues that require immediate attention. The existing pumps plug regularly and should be replaced with new state-of-the-art pumps equipped to minimize plugging. Structural modifications are needed to improve safety and functionality of accessing the pumps for regular maintenance. The aged suction and discharge piping in the building need to be replaced to accommodate dimensions and configuration of replacement pumps. The ventilation system in the wet well is not functional, and its inability to provide sufficient air flow has led to significant operational problems and safety issues. There is corrosion in the wet well, concrete spalling from the walls, and corrosion of electrical switches, door handles and safety railings. Major station rehabilitations are typically required after about 25 years of operation, but this station was last rehabilitated 35 years ago. Proceeding with this project will allow the City to avoid having to undertake a much costlier full replacement in the near future.



August 26, 2021

Ms. Alison L. Eliot, P.E., A.R.P.  
Senior Project Manager  
Framingham DPW  
110 Western Avenue  
Framingham, MA 01702

Re: FY2023 Capital Budget Request – City of Framingham, MA  
Gates St. Wastewater Pumping Station – Design and Construction Services

Dear Ms. Eliot:

This letter serves to recommend that the Department request \$2,250,000 in design and construction funding and provide justification for the above referenced project.

The Gates Street Wastewater Pumping Station was originally constructed in 1953 and was last rehabilitated 35 years ago. Major station rehabilitations are typically required after approximately 25 years of operations. Proceeding with this rehabilitation project will allow the City to avoid a more costly pumping station replacement project in the near future.

There are key safety and operational issues that require immediate attention. The existing pumps plug regularly, requiring constant maintenance by the DPW staff to maintain functionality. The ventilation system in the wet well is not functional and has not been in service continuously for many years. The system's inability to properly ventilate the wet well has led to significant corrosion issues within the space (concrete walls, electrical switches, door handles, safety railings, etc.), resulting in major safety hazards.

Proposed improvements include new pumps specifically equipped to minimize plugging, replacement of the aged piping within the station to accommodate the new pump dimensions and configurations, and replacement of the building's HVAC system for proper ventilation. Additionally, structural modifications will be evaluated to improve the safety and functionality of accessing the pumps for routine maintenance.

We trust this information meets your current needs. If we can be of any further assistance regarding this matter, please contact me at our Lincoln, RI office.

Regards,  
BETA Group, Inc.

Nicholas J. Corvello, P.E.  
Senior Associate

**Gates Street Wastewater Pump Station  
Preliminary Opinion of Probable Construction Cost  
August 2021**

Description	Unit Meas.	Qty.	Unit Price	Aug-21 Estimate
Erosion Control/Site Preparation	LS	1	\$5,440	\$5,440
Bypass Setup/Breakdown	LS	1	\$43,520	\$43,520
Bypass Rental and Pumping	Month	4	\$21,760	\$87,040
Site Improvements/Paving	LS	1	\$10,880	\$10,880
<i>Wet Well Improvements</i>	<i>ALLOW</i>	1	<i>\$108,800</i>	<i>\$108,800</i>
Odor Control System	LS	1	\$16,320	\$16,320
Equipment Demolition	LS	1	\$38,080	\$38,080
Wastewater Pumps	EA	2	\$54,400	\$108,800
Interior Piping and Valves	LS	1	\$81,600	\$81,600
<i>Architectural &amp; Structural</i>	<i>ALLOW</i>	1	<i>\$217,600</i>	<i>\$217,600</i>
Plumbing	LS	1	\$5,440	\$5,440
HVAC	LS	1	\$87,040	\$87,040
Electrical	LS	1	\$239,360	\$239,360
Contractors Bonds, Insurance, OH&P	LS	1	\$157,760	\$157,760
<b>SUBTOTAL</b>				<b>\$1,208,000</b>
<b>Construction Contingency (30%)</b>				<b>\$363,000</b>
<b>Construction Subtotal</b>				<b>\$1,571,000</b>
<b>Engineering (40%)</b>				<b>\$628,400</b>
<b>TOTAL</b>				<b>\$2,199,400</b>

*subtotal*    \$2,200,000  
*DPW OT & Legal*    \$50,000  
**USE**    \$2,250,000

**Notes:**

1. Revised to include electrical costs for standby engine-generator, including U/G ductbank /conduit per the City's request.
2. Architectural & Structural allowance includes replacement of exterior doors and interior painting. Allowance also includes potential structural improvements required for removal of some/all of 1st floor ceiling.
3. Engineering includes final design services, bidding and construction phase administration services, and full-time resident engineering services.
4. August 2021 estimate = August 2020 estimate escalated per ENR CCI Index. (August 2020 index = 11455; August 2021 index = 12463. Escalation = 8.8%)

Gates Street Sewer Pumping Station, Design and Construction– FY23 Capital Project Submission – Framingham Public Works



*Existing pump station conditions (from left to right) exterior building, dry well, and wet well.*

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Sewer System Evaluation Study (SSES) Report Phase 7 \$500,000 Sewer Enterprise Fund

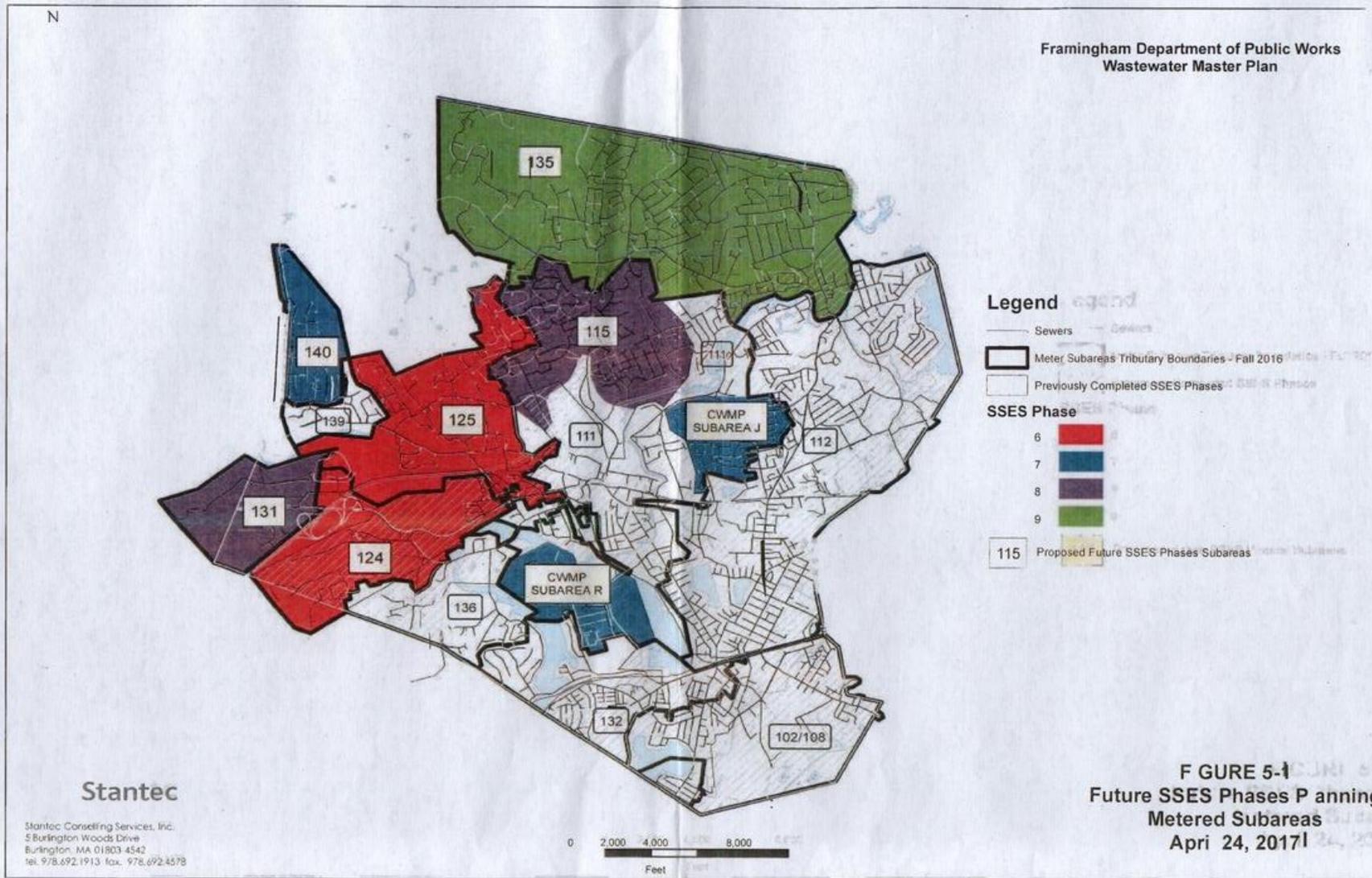
Sewer Department

SSES Phase 7 includes 96 linear feet of sewer main at the locations of Angelica Drive and Lanewood area, the area bounded by Winter Street/Mt Wayte Avenue, and the area bounded by Central, Concord and Summer Streets

The SSES Phase 7 area includes the Angelica Dr./ Lanewood area; the area bounded by Winter St. & Mt. Wayte Ave.; and the area bounded by Central St., Concord St., & Summer St. These three areas combine to account for 96,000 linear feet of sewer main. The proposed work for SSES Phase 7 includes (a) flow isolation and CCTV to identify infiltration and (b) smoke testing, dye testing, and building inspections to identify inflow.

As part of a 2007 Massachusetts Department of Environmental Protection (DEP) Administrative Consent Order (ACO), the city is required by DEP to identify sources of rainwater runoff and groundwater that enter the sanitary sewer system. The addition of clean water from improper sources uses valuable sewer pipe capacity and can cause sewer back-ups into homes or sewer overflows onto public streets and into rivers/ponds during wet weather events. The City of Framingham has approximately 62 miles of gravity sewer and force main and 240 manholes. Work conducted under SSES Phases 1-5 has resulted in the estimated removal of 50% of the 392,000 gallons per day (gpd) of identified infiltration. Phase 6 is currently ongoing. Phase 7 is a continuation of this DEP mandated program. Sewer miles and manholes within this study area consist of 96,000 linear feet.

# SSES Phase 7 – FY23 Capital Project Submission – Framingham Public Works



## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Consolidated Vehicle and Equipment Replacements \$350,000 Water Enterprise Fund

Water Department

Replacement of two (2) vehicles:

2012 Ford 15,000 GVW 4WD Cab and Chassis with Service Body, Gate Turner and Mini Vactor \$150,000

2011 Freightliner 35,000 GVW Cab and Chassis with Construction Service Body \$200,000

Partial recommendation for request of \$665,000 for the replacement of six (6) pieces of equipment and vehicles.

<b>Priority</b>	<b>Department</b>	<b>Type</b>	<b>Cost</b>
1	Water	2012 Ford 15,000 GVW 4WD C&C w/service body, Gate Turner and M	\$ 150,000
2	Water	2011 Freightliner 35,000 GVW C&C w/construction service body	\$ 200,000
3	Water	2012 Ford 11,000 GVW 4WD C&C w/service body and plow	\$ 75,000
4	Water	2012 Ford 11,000 GVW 4WD C&C w/service body and plow	\$ 75,000
5	Water	2015 Ford 11,000 GVW 4WD C&C w/Service Body	\$ 70,000
6	Water	2003 Goodwin 6" Pump	\$ 95,000
		Total	<b>\$ 665,000</b>

Vehicle and equipment per Public Work's vehicle management and replacement schedule. The procurement and upkeep of equipment is a significant factor in providing cost-effective and reliable service for systems operation, maintenance, repair, rehabilitation and replacements.

All vehicles and equipment are managed through the Fleet Department and included within a replacement schedule according to specific criteria, such as age, mileage, and major repairs needed for continued reliable service. Industry and Framingham DPW experience indicates that above those thresholds maintenance increases substantially to assure service reliability, as do major repairs, none of which provide a return on investment, and they are not sustainable with the current DPW facility and staffing. In addition to daily service for the various Divisions, nearly all vehicles and equipment are used for the Department's snow and ice management program which is particularly destructive to vehicles.

**Water Enterprise Fund FY23 Vehicle Replacement**

<b>Year</b>	<b>Make</b>	<b>Description</b>	<b>Cost</b>
2015	Ford	11,000 GVW 4 WD C&C W/Service body	\$70,000
2012	Ford	15,000 GVW 4 WD C&C W/ Service body, Gate turner, & Mini vactor	\$150,000
2012	Ford	11,000 GVW 4 WD C&C W/service body & Plow	\$75,000
2012	Ford	11,000 GVW 4 WD C&C W/service body & Plow	\$75,000
2003	Goodwin	6" Pump	\$95,000
2011	Freightliner	35,000 GVW C&C W/ Construction service body	\$200,000
		Total	\$665,000

## City of Framingham FY23-27 Capital Improvement Program

### FY23 Recommended:

Fire Flow Restoration and Improvement Program \$550,000 Water Enterprise Fund

Water Department

Design and Replacement of Water Mains and Appurtenances at locations in the water system identified as having restricted volume and pressure; areas considered include Avon Street, Berry Street, Brackett Road, Draper Road, George Street, Guild Road, Hearth Street, Hollis Court, Lindsay Street, Morse Road and Waushakum Boulevard

Partial recommendation for request of \$1,100,000 for fire flow restoration and improvement program.

This appropriation will provide funds for the design and replacement of water mains and appurtenances at locations in the water system identified as having restricted volume and pressure. The work includes replacement of insufficiently performing water mains, fire hydrants, and valves by in-house staff and the City's on-call utility contractor. The FY2023 appropriation will continue to fund the Fire Flow Restoration and Improvement Plan previously funded by the Annual Various Water Improvements and the annual various Hydrants and Valves improvements. FY23 improvements shall include replacement of water mains and appurtenances, as needed on Avon Street, Berry Street, Brackett Road, Draper Road, George Street, Guild Road, Hearth Street, Hollis Court, Lindsay Street, Morse Road, and Waushakum Boulevard. This appropriation will also allow the Water Division to replace clusters of old fire hydrants throughout neighborhoods City-wide as well as deficient hydrants and valves identified by the Water Division's unidirectional flushing program.

Elimination of significant pressure and flow restrictions in the water distribution system is needed to ensure the Fire Department can provide adequate fire protection to properties throughout the City, and to improve pressure and volume for domestic water service to ratepayers.

Replacement of old and/or deficient fire hydrants throughout entire neighborhoods enhances the Fire Department's ability to efficiently and effectively fight fires. Replacement of old hydrants with newer-style hydrants allow Water Division staff to repair broken or damaged internal components of hydrants, avoiding an excavation. This is a much less invasive, cost-effective repair that cannot be completed on older hydrants.

Valve replacements allow older leaking or non-functional valves to be removed from the distribution system and limit water service interruptions when isolations are required for

planned and emergency work. Valve replacements allow the Water Division to better maintain the distribution system and impact fewer ratepayers when shutdowns are necessary.

# **Fire Flow Restoration and Improvement Program - FY23**

## **Funding Source: Water Enterprise Fund**

### **Supporting Documentation**

	Page No.
1) Fire Department Letter	2
2) Photos of restricted pipe	3
3) Memorandum on reduced fire flow mains	4



*City of Framingham, Massachusetts 01702*

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**Fire Department Headquarters**

**Michael D. Dutcher**  
Fire Chief

10 Loring Drive  
TEL: (508) 532-5930

Stephanie Tarves P.E.  
Senior Water & Wastewater Engineer  
City of Framingham

August 26, 2021

Dear Stephanie,

The Framingham Fire Department is in full support of your "Fire Flow Restoration and Improvement Program." Sufficient and reliable water flow is one of our most important tools when fighting a fire. Inability to get adequate water flow from hydrants hinders the Fire Department's ability to protect occupants, provide safety to firefighters and to mitigate damage to property. The close working relationship between our Department's is critical in maintaining our high level of service. Because of this close relationship, the Fire Department is aware that there are several areas within the City, that are "low flow" areas. While knowing that these low flow areas exist is important, it is vital that the water system be replaced in these underperforming districts.

Please let me know how I can be of additional assistance.

Respectfully,

Michael D. Dutcher  
Fire Chief

Replacement old, undersized, and severely restricted water mains will increase flow and pressure to residents and businesses for improved quality of life and fire protection.



These are examples of severely corroded (tuberculated) pipes removed from a recent DPW improvement project on Wood Terrace. Over time, deposits form in the pipes, sometimes almost totally restricting flow. Many of these pipelines are only 6" to begin with, which is smaller than the current industry standard of 8" minimum diameter.

# Fire Flow Restoration and Improvement Program

## Technical Memorandum

Designed By: Stephanie Tarves, P.E., Senior Water & Wastewater Engineer  
Reviewed By: Ashley Dunn, P.E., Assistant Director of Engineering

Drafted: 9/23/2020  
Revised: 9/8/2021

Framingham Water Department  
100 Western Ave  
Framingham, MA 01702  
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## SECTION 1: Introduction

### 1.1 Background

In 2017, the Framingham Water Department worked with BETA Group, Inc. to develop a town-wide unidirectional flushing program. The effort required extensive modeling, flow tests, and mapping to create an effective plan that Water Department staff could follow in a step wise manner. Unidirectional flushing is a distribution management best practice. The activity aims to clear sediment and biofilm from the water distribution system in a systematic fashion, beginning at the water source and progressing through to the outer reaches of the distribution system. These efforts promote better water quality and system maintenance.

Prior to 2018, the Water Department performed annual flushing on dead-end mains and in areas known to have increased water age or regular water quality complaints, but did not have an optimized City-wide program. Utilizing a computerized model of the distribution system, the unidirectional flushing program provided for a more thorough flushing of the distribution system by isolating flushing paths, and controlling the direction of flow along those paths.

As the implementation of a comprehensive City-wide flushing program requires significant planning, effort, (and at times disruption of service), it was decided that the program would be rolled out over a 4-year period. The plan requires operation of valves and hydrants across the City, of which many may not have been operated for years prior to the start of the program. It was expected through the initial rollout of the program that system deficiencies would be identified, but there was no means to estimate the extent of those deficiencies without performing the work.

In the first year, deficiencies were found including:

- Failed valves, before their expected service life;
- Dead-end water mains, thought to be looped; and
- Significant fire flow deficiencies, often related to tuberculation in aged pipes.

Upon identification of the fire flow deficiencies, the Water Department began addressing these deficiencies through the Annual Various appropriations. As the flushing program has progressed the extent of deficiencies identified has greatly exceeded the available funding. At the beginning of fiscal year 2022, the Water Department had completed flushing in six of eight zones of the first round of City-wide flushing. The memorandum that follows serves to summarize the findings of these first six zones and to set forth a plan to begin addressing these deficiencies. We expect that as the Department continues to execute the flushing program the list of deficiencies will grow, identifying the majority of deficiencies through completion of the first full round of flushing, and fewer new deficiencies identified in the subsequent rounds. It is anticipated that the fire flow restoration plan's priority improvements will warrant reprioritization after each successful year of flushing.

Further, it is worth noting, that the City's Water Master Plan was completed in 2017 – before these system data became available. An exercise should be undertaken to reconcile the fire flow restoration priorities with the capital improvement plan as outlined in the 2017 Water Master Plan. These priorities will be reconciled in the next revision of the Water Master Plan, anticipated in 2027. It is the Water Department's opinion that these significant flow deficiencies should be given the highest priority. The text that follows outlines the plan used by the Water Department to prioritize the deficiencies identified to date and going forward.

## 1.2 Objective

An analysis of the water main segments identified as having low flow through the unidirectional flushing program has been assembled herein. The purpose of this memorandum is to identify the limits of the low flow water mains and to quantify the priorities of each main replacement based on data such as fire flow, pipe diameter, age, material, and zoning (to account for population and structure density) where the mains are located, as well as summarize a plan to address these deficiencies.

Results of the analysis provide quantifiable data used to assign priority to each recommended improvement, referred to herein as “Pipe Score.” Pipe Scores were used, in conjunction with estimated construction costs and relative proximity of each improvement to define a ten-year plan for elimination of the known fire flow deficits from the water system.

As the City completes its first full round of the unidirectional flushing program, it is anticipated that more deficiencies will be identified. Any newly identified pipes will be assessed on the same criteria described herein and a Pipe Score will be calculated. This will likely become an annual exercise to ensure the greatest deficiencies are addressed first, to the extent possible.

The objective of this analysis is to develop a prioritized plan for replacing insufficiently performing water mains to improve and restore water volume and pressure throughout the water system.

## 1.3 Actions Taken and Remediation Plan

Promptly following discovery of any fire flow deficit, the Water Department has notified the Fire Department of the impacted hydrants.

The extent of repairs identified are too numerous for the in-house Water Department staff to replace on their own, in a timely manner. As such, the Department proposes to replace water mains in kind to the extent practical with the support of the on-call water and wastewater contractor. This is a service that is bid regularly. In order to make valuable progress on these known deficiencies an annual request for funding specific to these known fire flow deficiencies is proposed starting in FY23, hereafter referred to as the “Fire Flow Restoration and Improvement Program.” The following sections provide the means by which the program was developed.

In some cases, where the extent of the replacement is deemed to be extensive, or other know improvements are needed in the area of the area of work, a capital appropriation will be sought through the Capital Program, so the project will have the with the support of a comprehensive engineering design and evaluation. These areas have been outlined separately as the identified water mains may be in close proximity to other significantly aged City-owned infrastructure or significant traffic impacts may result. These projects will be more expensive and will benefit greatly from additional planning efforts.

## SECTION 2: Evaluation Criteria

### 2.1 Flow Deficit Identification

The unidirectional flushing program led the Water Department to identify a number of insufficiently-performing water mains within each flushed zone. These mains produce flows less than the minimum standard fire protection flow rates. This flow rate is typically 1,000 gallons per minute for the locations flushed through the spring of 2021. The thresholds based upon building spacing for one and two family dwellings are outlined in Table 2.1 below.

Table No. 2.1  
AWWA Distribution System Requirements for Fire Protection  
for One- and Two-Family Dwellings not to exceed two stories

<i>Distance between buildings (feet)</i>	<i>Required flow rate (gpm)</i>
>100	500
31-100	750
11-30	1,000
<11'	1,500

Source: AWWA Manual M31 Distribution System Requirements for Fire Protection

The standard additionally requires that all system locations should be capable of providing the minimum flow rate under maximum day demands without any system pressures dropping below 20 psi. While pressures at the flowing hydrants were recorded during the unidirectional flushing program, it is not customary to take pressure readings throughout the system while conducting main flushing. Further, it is not customary to do system flushing during peak flow periods. As such, there may be additional volume or pressure deficiencies that have not yet been identified.

Water mains identified as producing less than 1,000 gpm during execution of the unidirectional flushing program in 2018 through 2021 are highlighted red in Figure 1, included herewith.

Historic information for these water mains, including pipe diameter, material, and installation year, as summarized in the City's asset management inventory were utilized to further categorize these water mains. Pipe with the same age, size and material installed adjacent to the problematic sections will also be considered for replacement under this program and are included. These adjacent pipes have been highlighted in orange in Figure 1. Together, the red and orange constitute the proposed limits of water main replacement under this program.

## 2.2 Pipe Score

After the extent of each water main replacement was determined, prioritization of each was performed by creating a Pipe Score. A Pipe Score Worksheet was developed, wherein the following contributing categories were defined: Fire Flow Deficit, Diameter, Age, Material, and Zoning District Scores. Each Pipe Score category was assigned a weighting based on the assigned level of relative priority. The category weightings serve to quantify the comparative urgency of each consideration for replacement of the water main. A Pipe Score for each insufficiently-performing main was calculated using the weighted average of each Pipe Score category. As follows:

$$\text{Bulk Pipe Score} = W_F S_F + W_D S_D + W_A S_A + W_M S_M + W_Z S_Z$$

where:

$W_n$ = Category Weighting	$S_A$ = Pipe Age Score
$S_F$ = Fire Flow Deficit Score	$S_M$ = Pipe Material Score
$S_D$ = Pipe Diameter Score	$S_Z$ = Zoning District Score

The final Pipe Score was determined using the Bulk Pipe Scores for each segment and dividing each by the maximum Bulk Pipe Score calculated. This simplified the analysis as the Pipe Score becomes a percentage. A score of 100 indicates the pipe segments requiring the most urgent replacement, and lower scores represent pipes of proportionally lesser urgency:

$$\text{Pipe Score} = PS/PS_{max} * 100\%$$

where:

$PS$	= Bulk Pipe Score
$PS_{max}$	= Maximum Possible Bulk Pipe Score.

Pipe Scores were used to assign replacement priority to each proposed water main replacement. The sections that follow describe in detail the calculation of each of the Pipe Score categories defined on the Pipe Score Worksheet and weightings assigned to each.

### 2.2.1 Fire Flow Deficit Score

Fire Flow Deficit Scores were defined for fire flow deficits ranging from 0 gpm to greater than 1000 gpm. The fire flow deficit ranges and corresponding scores, as well as category weighting are defined as follows:

**Table No. 2.2  
Fire Flow Deficit Score**

<i>Weighting</i>	<i>Fire Flow Deficit (gpm)</i>	<i>Score</i>
10	>1,000	10
	999-900	9
	899-800	8
	799-700	7
	699-600	6
	599-500	5
	499-400	4
	399-300	3
	299-300	2
	199-100	1
	99-0	0

Fire Flow Deficit Score was assigned a weighting of ten, the highest weighting of all pipe score categories. The Water Department identified fire flow deficit as the most critical characteristic when determining replacement priority.

### 2.2.2 Pipe Diameter Score

Pipe Diameter Scores were defined for pipe diameters ranging from 2 inches to greater than 24 inches. The Pipe Diameter Scores and category weighting are defined as follows:

**Table No. 2.3  
Pipe Diameter Score**

<i>Weighting</i>	<i>Diameter "D" (inches)</i>	<i>Score</i>
3	D < 2	9
	$2 \leq D < 3$	8
	$3 \leq D < 5$	7
	$5 \leq D < 6$	6
	$6 \leq D < 8$	5
	$8 \leq D < 10$	4
	$10 \leq D < 12$	3
	$12 \leq D < 18$	2
	$18 \leq D < 24$	1
	D $\geq$ 24	0

Pipe Diameter Score was assigned a weighting of three, the second highest weighting. Prior to this investigation, the Water Department established as a priority eliminating pipes less than six inches in diameter from the water system. As the majority of pipes experiencing fire flow deficits are those with

diameters six inches or less, the smallest diameter water mains experiencing fire flow deficits were assigned higher replacement priority.

### 2.2.3 Pipe Age Score

Pipe Age Scores were defined for pipes installed from before 1900 to after 1980. Only one water main experiencing flow deficits was installed after 1980, and the average installation year was 1927. The Pipe Age Scores and category weighting are defined as follows:

**Table No. 2.4  
Pipe Age Score**

<i>Weighting</i>	<i>Pipe Installation Year</i>	<i>Score</i>
2	< 1900	9
	1900-1909	8
	1910-1919	7
	1920-1929	6
	1930-1939	5
	1940-1949	4
	1950-1959	3
	1960-1969	2
	1970-1979	1
	>1980	0

Pipe Age Score was assigned a weighting of two, below the weighting for Fire Flow Deficit Score and Pipe Diameter Score. The Water Department as a rule intends to eliminate pipes past their design life from the water system. The Pipe Age Score category provides for the oldest pipes with fire flow deficits to be prioritized above those newer pipes in similar condition.

### 2.2.4 Pipe Material Score

Pipe Material Scores were defined based on known pipe material present within the water system that are experiencing low flows. The Pipe Material Scores and category weighting are defined as follows:

Table No. 2.5  
Pipe Material Score

<i>Weighting</i>	<i>Pipe Material</i>	<i>Score</i>
2	Asbestos Cement (AC)	3
	Galvanized Iron (GALV)	2
	Iron Pipe (IP)	2
	Cast Iron (CI)	1
	Cement-lined Cast Iron (CLCI)	1
	Plastic (PL)	0
	Polyvinylchloride (PVC)	0
	Ductile Iron (DI)	0
	Cement-lined Ductile Iron (CLDI)	0

Pipe Material Score was assigned a weighting of two, below the weighting for Fire Flow Deficit Score and Pipe Diameter Score, and equal to Pipe Age Score. While the vast majority of insufficiently-performing water mains are made from cast iron, the Water Department as a rule intends to eliminate asbestos cement pipe and any remaining lead-containing pipes from their water system. The Pipe Material Score category provides for pipes with fire flow deficits that are comprised of undesirable materials to be prioritized above those pipes made from preferred materials, in similar condition.

#### 2.2.5 Zoning District Score

Zoning District Scores were defined based on the municipal Zoning District most prevalent along each water main route. Zoning District Scores are comprised of average scores assigned to a Zoning District, if the water main route serves multiple Zoning Districts. This category was included to account for population and structure density of the areas served by insufficiently-performing water mains. The Zoning District Scores and category weighting are defined as follows:

Table No. 2.6  
Zoning District Score

<i>Weighting</i>	<i>Zoning District</i>	<i>Abbreviation</i>	<i>Score</i>
2	Single Family Residence (8,000 SF Lots)	R-1	5
	General Residence	G	5
	Central Business	CB	4
	Community Business	B-2	4
	Business	B	3
	Single Family Residence (20,000 SF Lots)	R-3	3
	Single Family Residence (43,560 SF Lots)	R-4	3
	Light Manufacturing	M-1	2
	Office and Professional	P	2
	General Manufacturing	M	2

Zoning District Score was assigned a weighting of two, equal to Pipe Age Score and Pipe Material Score. Zoning District Scores prioritize insufficiently-performing mains in areas serving more densely-populated areas, and those with the smaller distances between structures. Where housing and businesses are located in closest proximity, failure to provide adequate fire protection is likely to directly impact more members of the community, and contribute to wider-spread damage to structures. The Water Department has prioritized eliminating fire flow deficits in areas that may be more vulnerable in a fire emergency due to population and structure density.

## SECTION 3: Fire Flow Restoration and Improvement Program Development

### 3.1 Asset Grouping

Using the City of Framingham's GIS water main database, insufficiently-performing water mains were assessed for proximity to one another, and proximate water mains were grouped into an Asset Grouping. The Water Department intends to perform work of this program efficiently by minimizing the number of mobilizations to any particular area and, to the greatest extent possible, completing proximate work within the same year of the program. Asset Groupings are those water mains that are intended to be completed at one time, or as one project.

### 3.2 Estimated Cost Development

Cost estimates for each insufficiently-performing water main were calculated using the length of each water main multiplied by an average estimated per linear foot cost of \$350. This per linear foot cost was estimated based on FY2022 costs for comparable work performed by Framingham's current on-call contractor, Russo Brothers, Inc. To account for inflation, a two percent per year cost increase was assessed on each improvement based on the assigned fiscal year. The assignment of fiscal years to Asset Grouping is described hereafter in 3.3 Asset Group Ranking.

Projects with estimated costs in excess of one million dollars and those determined to be best included as part of a known larger Capital Improvement project were placed into a separate Capital Improvements Grouping, and ranked separate from the other Asset Groupings. An estimated per linear foot cost of \$650 multiplied by the length of each water main was used to calculate the estimated replacement cost of water mains in the Capital Improvements Group. The per linear foot cost of Capital Improvements Grouping work was based on costs associated with similar work performed in FY2022, for the City of Framingham through the Capital Improvement Program.

### 3.3 Asset Group Ranking

Through this program, the Water Department intends to remove and replace all volume- and pressure-restricted water mains identified during the unidirectional flushing. To date, the City has completed flushing in six of eight flushing zones and anticipates more insufficiently-performing mains will be identified. The remaining flushing zones are located in sections of the City where water infrastructure is newer and anticipate fewer flow deficits than have already been identified. The Fire Flow Restoration and Improvement Program to date includes over \$35 million in water main replacement projects, and is projected to reach \$40 million once the first round of City-wide unidirectional flushing is complete. As such, the work of the Fire Flow Restoration and Improvement Program is proposed to be distributed over

a period of 20 years, including approximately \$1-2 million of improvements each year, beginning in FY2022 (which was deferred) and extending through FY2042, however reduced and deferred appropriations will extend this schedule beyond the projected period.

Asset Groupings were ranked and grouped, providing for \$1-2 million in water main replacements each year over a span of approximately 20 years. It is advisable, the City prioritize fire flow restoration whenever possible to shorten the 20-year program duration, keeping in mind any future-identified fire flow deficit remediation work shall be added to the existing list, potentially extending the duration of the program.

Asset Groupings were ranked according to the highest Pipe Score within their group, and sorted into each fiscal year, balancing Pipe Score, estimated cost, and proximity in each fiscal year. Figure No. 2: Fire Flow Restoration Plan Map, included herewith depicts the assigned fiscal year of each Asset Grouping. The current Fire Flow Restoration and Improvement Program tabulated list of Asset Group Rankings is attached hereto in Attachment A.

### 3.4 Future Flow Deficit Identification

It is the Water Department's intent to perform the analysis described herein on all subsequently-identified insufficiently-performing water mains. Pipe Scores will be calculated for all future-identified water mains, and estimated costs and Asset Groupings will be determined. Finally, future-identified Asset Groupings will be ranked and assigned a fiscal year based on the Asset Group Rankings. Thus, as the unidirectional flushing program progresses, the assigned fiscal year for any individual improvement may shift based on the relative urgency of any future-identified insufficiently-performing water mains. The Water Department intends to analyze newly-identified mains with flow deficits each year following completion of that year's unidirectional flushing program, and make adjustments to the Fire Flow Restoration and Improvement Program accordingly.



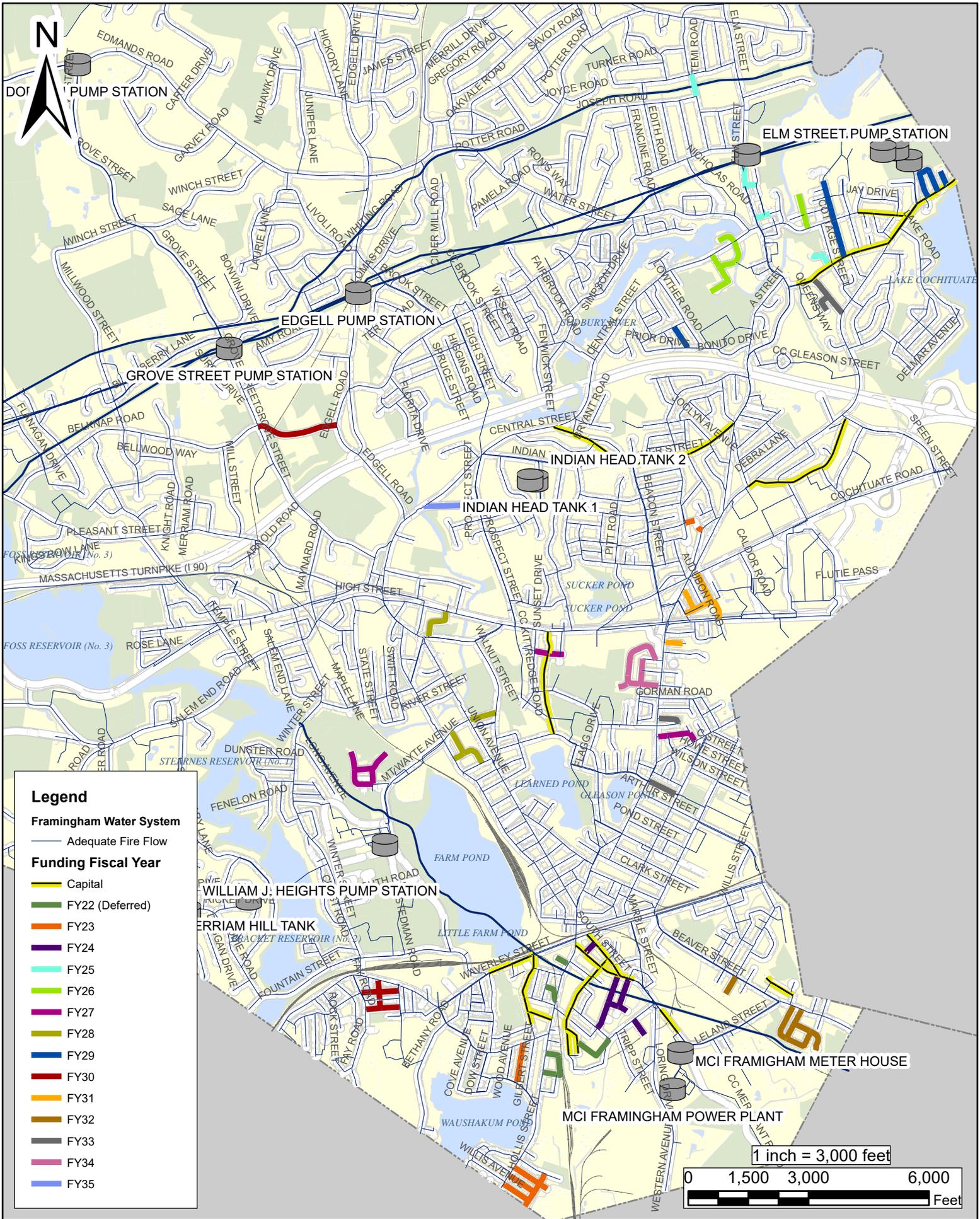


Figure No. 2

# City of Framingham Water Distribution System Fire Flow Restoration Plan Map

## ATTACHMENT A: Year by Year Fire Flow Restoration Plan FY22-FY35

The following plan is subject to review and revision based on further fire flow deficit discovery, deteriorating conditions, advancement of other utility and roadway work, or determination of additional information that may impact prioritization.

FY2023 (includes deferred FY2022 and FY2023 Streets); Install 8,201 LF 8" DI Water Main, \$1.1

<u>Street Name</u>	<u>From</u>	<u>To</u>	<u>Description</u>	<u>Year Installed</u>	<u>Length</u>
George Street	Hollis Street	Lindsay Street	6" CI	1910	463
Lindsay Street	Hollis Street	George Street	6" CI	1910	796
Avon Street	Hollis Street	Hayes Street	6" CI	1897	509
Berry Street	Winthrop Street	Nipmuc Road	6" CI	1925	981
Hearth Street	Campbell Road	Herbert Street	6" CI	1913	1,121
Draper Road	Hollis Street	Brackett Road	6" CI	1940	746
Guild Road	Hollis Street	Brackett Road	6" CI	1947	985
Hollis Court	Hollis Street	end	6" CI	1950	317
Wauhakum Boulevard	Hollis Street	Brackett Road	6" CI	1916	13
Wauhakum Boulevard	Hollis Street	Brackett Road	6" CI	1968	757
Morse Road (Dead End Main)	Old Conn. Path	Cherry Road	6" CI	1927	569
Brackett Road	Bates Road	End	6" CI	1955	944

FY2024 Install 3,464 LF 8" DI Water Main, \$1.3M

<u>Street Name</u>	<u>From</u>	<u>To</u>	<u>Description</u>	<u>Year Installed</u>	<u>Length</u>
Wellington Avenue	Herbert Street	end	4" CI	1925	470
Wellington Avenue	Summit Street	end	2" IP	1900	232
Wellington Avenue	Alexander Street	Summit Street	6" CI	1900	277
Alexander Street	Irving Street	Wauhakum Street	6" CI	1897	1,419
Summit Street	Wellington Avenue	Irving Street	6" CI	1900	746
Columbia Street	South Street	Irving Street	6" CI	1924	320

FY2025 Install 2,859 LF 8" DI Water Main, \$1.1M

<u>Street Name</u>	<u>From</u>	<u>To</u>	<u>Description</u>	<u>Year Installed</u>	<u>Length</u>
North Street	School Street	end	4" CI	1920	610
Elm Street	Dead End Main over aqueduct		8" CI	1940	529
Elm Street (6")	Edwards Church Driveway	Hydrant at #115	6" CI	1909	782
Chestnut Street	Elm Street	8" DI (Edwards Street)	6" CI	1907	386
Bradford Road near Griffin	Dead End Main over aqueduct		8" CI	1958	552

FY2026 Install 3,622 LF 8" DI Water Main, \$1.4M

<u>Street Name</u>	<u>From</u>	<u>To</u>	<u>Description</u>	<u>Year Installed</u>	<u>Length</u>
Stearns Street	Danforth Street	end	6" CI	1907	889
Johnson Street	Purchase Street	end	6" CI	1931	1,285
Purchase Street	Watson Place	Central Street	6" CI	1910	978
Centennial Place	Central Street	end	6" CI	1935	469

FY2027 Install 4,356 LF 8" DI Water Main, \$1.7M

<u>Street Name</u>	<u>From</u>	<u>To</u>	<u>Description</u>	<u>Year Installed</u>	<u>Length</u>
Harrison Place	Harrison Street	Hartford Street	6" CI	1915	227
Harrison Street	Concord Street	Harrison Place	6" CI	1915	796
Chautauqua Avenue	Dunning Avenue	Mt. Wayte Avenue	6" CI	1926	387
Mt. Wayte Avenue	Chautauqua Avenue	end	6" CI	1930	1,227
Dunning Avenue	Chautauqua Avenue	Mt. Wayte Avenue	6" CI	1950	446
Sherwin Terrace	Chautauqua Avenue	end	6" DI	1991	531
Leslie Road	Fraser Road	end	2" CI	1951	98
Leslie Road	Fraser Road	Stonybrook Road	6" CI	1947	643

FY2028 Install 3,134 LF 8" DI Water Main, \$1.3M

<u>Street Name</u>	<u>From</u>	<u>To</u>	<u>Description</u>	<u>Year Installed</u>	<u>Length</u>
Buckminster Street	Walnut Street	8" DI	6" CI	1900	657
Curve Street	Main Street	8"	6" CI	1914	927
Curve Street	6"	Worcester Road	8" CI	1910	8
Stevens Road	Mt. Wayte Avenue	Day Hill Road	6" CI	1953	627
Day Hill Road	Newton Place	Franklin Street	6" CI	1949	915

FY2029 Install 4,423 LF 8" DI Water Main, \$1.8M

<u>Street Name</u>	<u>From</u>	<u>To</u>	<u>Description</u>	<u>Year Installed</u>	<u>Length</u>
Meadow Street	Danforth Street	School Street	6" CI	1910	1,969
Maureen Road	Carling Road	Prior Drive	6" CI	1956	619
Brossi Circle	Old Connecticut Path	end	8" CI	1961	394
Birch Road	Old Connecticut Path	6" DI Main	6" CI	1954	529
Birch Road	6" CI Main	Old Connecticut Path	6" DI	1991	912

FY2030 Install 4,470 LF 8", 10" DI Water Main, \$1.3M

<u>Street Name</u>	<u>From</u>	<u>To</u>	<u>Description</u>	<u>Year Installed</u>	<u>Length</u>
Belknap Road	Edgell Road	Grove Street	6" CI	1936	1,605
Belknap Road	Edgell Road	Grove Street	8" DI	1936	91
Belknap Road	Edgell Road	Grove Street	10" CI	1975	340
Benson Avenue	Fay Road	Dayton Avenue	6" CI	1917	925
Seminole Avenue	Fay Road	Dayton Avenue	6" CI	1937	835
Palmetto Avenue	Waverley Street	Seminole Avenue	6" CI	1924	674

FY2031 Install 3,655 LF 8" DI Water Main, \$1.1M

<u>Street Name</u>	<u>From</u>	<u>To</u>	<u>Description</u>	<u>Year Installed</u>	<u>Length</u>
Stevens Road	Mt. Wayte Avenue	Day Hill Road	6" CI	1953	627
Sewell Street	Concord Street	8"	6" CI	1930	434
Landseer Avenue	Richwood Street	Concord Street	6" CI	1933	545
Walsh Street	Richwood Street	Cochituate Road	6" CI	1927	1,248
Richwood Street	Landseer Avenue	Walsh Street	6" CI	1925	801

FY2032 Install 4,186 LF 8" DI Water Main, \$1.3M

<u>Street Name</u>	<u>From</u>	<u>To</u>	<u>Description</u>	<u>Year Installed</u>	<u>Length</u>
America Street	Curtis Road	Kendall Avenue	6" CI	1926	819
Curtis Road	Victor Road	Kendall Avenue	6" CI	1955	1,846
Victor Road	America Street	Curtis Road	6" CI	1955	452
Victor Road Extension	Victor Road	end	6" CI	1970	580
Second Street	Short end from Beaver Street	end	8" CI	1952	489

FY2033 Install 2,891 LF 8" DI Water Main, \$1.1M

<u>Street Name</u>	<u>From</u>	<u>To</u>	<u>Description</u>	<u>Year Installed</u>	<u>Length</u>
Duffet Road	Concord Street	Thelma Road	6" CI	1962	558
Burdette Avenue	Concord Street	8" DI	6" CI	1912	729
Jackson Place	Hamilton Street	end	6" CI	1950	483
Hamilton Street	School Street	Old Connecticut Path	8" CI	1910	1,122

FY2034 Install 3,274 LF 8" DI Water Main, \$1.2M

<u>Street Name</u>	<u>From</u>	<u>To</u>	<u>Description</u>	<u>Year Installed</u>	<u>Length</u>
Guadalcanal Road	Saint Lo Street	Arsenal Road	6" CI	1948	772
Arsenal Road	Corregidor Road	Guadalcanal Road	6" CI	1950	636
Saint Lo Street	Corregidor Road	end	6" CI	1950	1,866

FY2035 Install 1,364 LF 8" DI Water Main, \$500K

<u>Street Name</u>	<u>From</u>	<u>To</u>	<u>Description</u>	<u>Year Installed</u>	<u>Length</u>
Kellogg Street	Prospect Street	8"	6" CI	1922	192
Kellogg Street	6"	Central Street	8" CI	1927	1,172

Capital Improvements Requiring Full Design & Bid; Install 29,181 LF  
Various Sizes DI Water Main, \$19M (without inflation)

<u>Street Name</u>	<u>From</u>	<u>To</u>	<u>Description</u>	<u>Year Installed</u>	<u>Length</u>
Arlington Street	Pratt Street	Arlington Place	6" CI	1885	654
Arlington Street	Wauhakum Street	end	8" CI	1885	2,099
Charles Street	Hollis Street	Cedar Street	6" CI	1920	642
Cedar Street	Waverley Street	Cypress Street	6" CI	1909	1,817
Campbell Road	6"	end	4" CI	1912	279
Campbell Road	Arlington Street	4"	6" CI	1912	487
Waverley Street	Cedar Street	Mellen Street	8" CI	1900	1,192
Irving Street (when isolated)	Hollis Street	Phipps Street	6" CI	1900	494
Irving Street (when isolated)	Hollis Street	Phipps Street	8" CI	1900	1,227
Irving Street (when isolated)	Loring Drive	8"	6" CI	1900	735
South Street (when isolated)	Waverley Street	Irving Street	6" CI	1930	1,339
Oaks Road	Worcester Road	Leslie Road	8" CI	1935	2,595
Newbury Street	Speen Street	Hardy Street	6" CI	1922	3,370
Summer Street	Central Street	Concord Street	8" CI	1914	4,985
Carlson Road + CC Carlson Road	Glen Street	Beaver Street	6" CI	1954	1,114
Danforth Street	Hialeah Lane	Old Conn. Path	6" CI	1911	1,251
Old Connecticut Path	Danforth Street	Town Line	6" CI	1911	2,368
School Street	Meadow Street	Old Conn. Path	8" CI	1907	2,533

## City of Framingham FY23-27 Capital Improvement Program

FY23 Recommended:

Cedar Street Area Water Improvements \$1,765,500 Water Enterprise Fund

Water Department

Replacement of approximately 1900' of water main on Cedar Street and 800' of water main on Charles Street

This project will include the replacement of approximately 1900' of water main on Cedar Street and 800' of water main on Charles Street. This includes all appurtenances such as hydrants, valves, and services to the property line.

This appropriation will allow for the replacement of undersized 6" CI pipe from 1909 on Cedar St and undersized 6" CI pipe from 1920 on Charles St. These streets have 500gpm and 300gpm of fire flow respectively. This is insufficient flow for firefighting. The project will coincide with the sewer work and roadway improvements to allow for a complete top to bottom restoration of Cedar Street. Eversource has already replaced the gas main and realigned it out of the way of the water main in anticipation of this work.



# CITY OF FRAMINGHAM

## DEPARTMENT OF PUBLIC WORKS | OPERATIONS

**Blake D. Lukis**  
Director  
**Diane M. Conner**  
Deputy Director of Administration  
**William R. Sedewitz, P.E.**  
Chief Engineer

508-532-6050  
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**OPERATIONS CENTER**  
100 Western Avenue  
Framingham, MA 01702

September 1, 2021

Mr. William R. Sedewitz, P.E.  
Chief Engineer  
Department of Public Works  
110 Western Avenue  
Framingham, MA 01702

Re: FY2023 Funding for Cedar Street Water Main Replacement & Sewer Lining

Dear Bill:

This letter provides a brief summary of the flow conditions observed during unidirectional flushing of the Cedar Street water main, and results of the cctv inspection of the Cedar street sewer main, and offers recommendations for improvements and estimated associate costs.

### Location

The Cedar Street water and sewer mains run north-south on Cedar Street between Waverly Street and Cypress Street. The water main is just over 1,800 feet long and is a six-inch diameter, cast-iron main installed in 1909. The sewer main is approximately 1,500 feet long and is an eight-inch diameter, vitrified clay main installed in 1914. Cedar Street is located in zoning district "General Residence" (G) which has a principal building or use of one- or two-family detached dwellings with any other principal use. The lot size range is 8,000 to 43,560 square feet with a minimum landscaped open space surface ratio of 30% to 50%. Cedar Street is primarily densely-constructed single family and multifamily residential properties, with the section between Waverly Street and Claflin Street having mixed residential and commercial/industrial use. Cedar Street is located in south Framingham and in located in District 8.

### Unidirectional Flushing & Water Main Evaluation

The Cedar Street water main is included in Phase 2B of the City's Water Distribution System Unidirectional Flushing Program. Unidirectional flushing of Phase 2B was completed in the Fall of 2019. Flushing of Cedar Street was completed in two parts, flowing north from the intersection of Cedar Street and Pine Street to a hydrant at the intersection of Cedar Street and Waverly Street (hydrant 1784), then flowing south from the intersection of Cedar Street and Pine Street to the first hydrant located on Cypress Street, after the intersection of Cedar and Cypress Streets.

Cedar Street was flushed from Pine Street to Waverly Street for thirty minutes, during which time the flow from hydrant 1784 was recorded at 500 gallons per minute (gpm). The section of Cedar Street from Pine Street to Cypress Street was also flushed for thirty minutes, and a flow rate from hydrant 1956 on Cypress Street was recorded at 300 gpm. Based on the American Water Works Association Manual M31, fire protection for one- and two-family dwellings not to exceed two stories the required fire flow rate is as follows:



# CITY OF FRAMINGHAM

DEPARTMENT OF PUBLIC WORKS | OPERATIONS

## AWWA Distribution System Requirements for Fire Protection for One- and Two-Family Dwellings not to exceed two stories

<i>Distance between buildings (feet)</i>	<i>Required flow rate (gpm)</i>
>100	500
31-100	750
11-30	1,000
<11'	1,500

Source: AWWA Manual M31 Distribution System Requirements for Fire Protection

The City's zoning district and observed building proximity would place the required flow rate for Cedar Street at 1,000 gpm, which is also the flow rate below which the Water Division provides notice of low flow water mains to the Fire Department. At the time of unidirectional flushing, the Cedar Street water main north of Pine Street experienced a fire flow deficit of 500 gpm, and south of Pine Street experienced a fire flow deficit of 700 gpm. The Water Division notified the Fire Department of the flow deficiency on Cedar Street following completion of unidirectional flushing of Phase 2B along with all other discovered deficiencies. Fire flow deficits have been discovered throughout the City and have been evaluated under separate cover.

### Water Main Recommendations

The Cedar Street water main was identified as a water main that requires replacement in order to eliminate fire flow deficits and restore domestic pressure and flow to ratepayers. We have been informed by the Highway Division that Cedar Street is scheduled for necessary roadway improvements so work to repair the Cedar Street water main before the roadway improvements begin is a priority. This water main replacement work is being scheduled in coordination with roadway improvements and sewer lining on Cedar Street in order to minimize disturbances to the street following completion of new paving. Due to the expeditious schedule and nature of the work, we recommend that water main replacement work be completed by the Water Division's on-call contractor. Replacement of this water main shall include installation of a new 8-inch diameter cement-lined ductile iron water main, fittings, hydrants, valves, services, and appurtenances. We have prepared the following estimated cost for construction using the Water Division's on-call contractor as follows.



# CITY OF FRAMINGHAM

DEPARTMENT OF PUBLIC WORKS | OPERATIONS

## Estimated Water Construct Costs

<i>Construction Administration</i>	\$	11,000
<i>Construction Oversight</i>	\$	60,000
<i>Construction</i>	\$	1,300,000
<i>Contingency</i>	\$	234,000
<i>DPW Costs</i>	\$	160,500
<b><i>TOTAL ESTIMATED COST</i></b>	<b>\$</b>	<b>1,765,500</b>

It should be noted that the Cedar Street water main is identified in the City's 2017 Water System Master Plan as a recommended improvement in year eight of the plan, or 2026. Including the Cedar Street water main in the Department's capital appropriation request for Cedar Street improvements in fiscal year 2023 will allow this improvement to occur on schedule, address the recently-discovered fire flow deficit, and complete this work before the scheduled roadway improvements.

Elimination of cast-iron water mains that are over 100 years old from the water distribution system is a priority of the Water Division. In addition to having restricted flow and pressure, in general, aged cast-iron water mains are prone to breaks and requires emergency repairs more frequently. Performing repair work on active water mains in the distribution system can be a significant challenge for Water Division staff and can frequently lead to extended disruptions to the water service of our customers. Elimination of water mains that are well beyond their design life is both prudent and necessary to avoid major infrastructure failures, avoid costly disruptions to our customers, and provide adequate fire protection for property-owners and residents of the City.

### Closed Caption Television (CCTV) Inspection & Sewer Main Evaluation

In advance of the anticipated roadway work, the Sewer Division performed CCTV inspection of the sewer main and manholes located on Cedar Street. The Sewer Division cleaned and inspected each section of sewer main and each manhole to evaluate condition. It was determined that the unlined sections of the Cedar Street sewer main and associated manholes do not contain major failures, misalignments, or evidence of size constraints of concern.

### Sewer Main Recommendations

While the age of the Cedar Street sewer main is advanced, the condition of the mains and manholes is favorable for Cured-in-Place-Pipe (CIPP) lining and manhole sealing in lieu of sewer replacement. CIPP lining is also preferred because there is an existing natural gas main located above the sewer main in the street. Excavation of this sewer would resultantly be challenging and not advised until which time as the sewer main is determined to have capacity concerns or is failing.

As with aged water mains, deferring work on a sewer main of this age and material is not recommended. Vitrified clay sewer mains of advanced age are known areas of infiltration and inflow, and require more frequent repairs. CIPP lining and manhole sealing can extend the life of the sewer collection system on Cedar Street and prevent untimely excavation of the newly-paved roadways for sewer repair work.



# CITY OF FRAMINGHAM

DEPARTMENT OF PUBLIC WORKS | OPERATIONS

We recommend that sewer main replacement work be completed by the Sewer Division's CIPP lining contractor. The proposed work shall include CIPP lining of six 8-inch diameter sections (1,350 linear feet) of sewer main on Cedar Street and one connecting section at the intersection of Pine and Cedar Streets, cutting out 35 sewer laterals, and sealing five manholes totaling 43 linear feet of manhole sealing. We have prepared the following estimated cost for construction using the Sewer Division's CIPP lining contractor as follows.

### Estimated Sewer Construct Costs

<i>Construction Administration</i>	\$	4,800
<i>Construction Oversight</i>	\$	28,000
<i>Construction</i>	\$	56,000
<i>Contingency</i>	\$	11,200
<i>DPW Costs</i>	\$	10,000
<b><i>TOTAL ESTIMATED COST</i></b>	<b>\$</b>	<b>110,000</b>

Should you wish to discuss further, please feel free to reach out.

Sincerely,

Stephanie Tarves, P.E.  
Senior Water & Wastewater Engineer  
City of Framingham



Cedar Street Water Distribution & Sewer Collection Systems  
 Proposed Improvements Map

Date: 9/9/2021

## City of Framingham FY23-27 Capital Improvement Program

### FY23 Recommended:

Merriam Hill and Goodnow Water Tank Rehabilitation \$300,000 Water Enterprise Fund

Water Department

Repair of Merriam Hill and Goodnow Water Storage Tank necessary to maintain structural integrity of tanks and promote and maintain good drinking water quality

Partial recommendation for \$300,000 of the \$2,430,000 requested to begin the tank rehabilitation project.

The Merriam Hill and Goodnow Water Storage Tanks were recently inspected in 2020. The Merriam Hill Water Storage Tank was constructed in 1962. It is a welded steel structure and has the capacity to store 3.5 million gallons of potable water. The work that has been identified to rehabilitate the Merriam Hill Tank and extend its service life includes taking the tank out of service, cleaning, welding repairs, installing mixing system, replacement of the interior and exterior coatings, and disinfection. The existing coating is lead based and will require full containment for sand blasting and removal.

The Goodnow Tank was constructed in 1976. It is a Corten steel structure, a steel that naturally forms a protective rust layer, and requires no painting. The Goodnow Tank is a legged elevated tank with the capacity of 300,000 gallons of potable water. The work identified to repair the Goodnow Tank and maintain it in good working order includes taking the tank out of service, cleaning, spot-repair of interior metal corrosion, minor structural roof repairs, and disinfection.

The recent inspections in 2020 were completed while the tanks were in service with the use of submersible cameras. As such, additional work may be identified once the tanks are out of service and workers are able to enter the space. In general, repair of the Merriam Hill and Goodnow Tanks are necessary maintain the structural integrity of the tanks and promote main good drinking water quality.

The inspection of the Merriam Hill Tank concluded that the tank is in generally good structural condition. It is evident when comparing the 2020 inspection to the most recent prior inspection (2015) that the corrosion of the Merriam Hill Tank is continuing to advance. The tank has been in service for nearly 60 years, and the expected life cycle for welded steel tanks is 50-70 years. Taking action to rehabilitate this tank now will extend the life of the tank at least another 20 years. Coating failures on the interior and exterior of the Merriam Hill Tank are contributing to metal loss, and on some surfaces medium to heavy corrosion is evident. Over time this corrosion will continue to degrade the structural integrity of the tank. In order to rehabilitate the current tank and avoid a full tank replacement, the work required includes taking the tank out of service, cleaning, welding repairs, installing mixing system, replacement of the interior and exterior coatings, and disinfection. An active mixer is proposed to be installed to reduce icing in winter and tank stratification in summer. Timely action to rehabilitate the

Merriam Hill tank will stave off the need a full tank replacement, which has more associated risk and cost.

The 2020 online inspection of the Goodnow Tank concluded that the tank is in good structural condition. The tank is constructed of Corten steel - also known as weathered steel - which naturally oxidizes to form a protective rust patina, and does not require painting. The inspection concluded that the steel surface on the interior and exterior of the tank were generally in good condition. Spot repairs of corroded surfaces on the tank interior and minor exterior structural repairs are recommended. The work to repair the Goodnow Tank includes taking the tank out of service, cleaning, spot-repair of interior metal corrosion, minor structural roof repairs, and disinfection. The Goodnow Tank has been in service for 45 years. Over time, corrosion will result in metal loss, and impaired structural integrity of the tank if left untreated. Performing the repair work to the Goodnow tank will prevent further metal loss. The work associated with the Goodnow Tank is complicated by the height of the tank, with an overflow elevation nearly 440 feet above grade.



August 26, 2021

Ms. Stephanie L. Tarves  
Senior Water & Wastewater Engineer  
City of Framingham  
Department of Public Works  
100 Western Avenue  
Framingham, MA 01702

Subject: Recommendation for  
Tank Rehabilitation Budgets

Dear Ms. Tarves:

This is a recommendation for rehabilitation of the Merriam Hill and Goodnow tanks. We have reviewed the two inspections reports and offer the following.

#### **Background**

The Merriam Hill and Goodnow Water Storage Tanks were recently inspected in 2020. The Merriam Hill Water Storage Tank was constructed in 1962. It is a welded steel structure and has the capacity to store 3.5 million gallons of potable water. Work has been identified to rehabilitate the Merriam Hill Tank and extend its service life by taking the tank out of service, cleaning, welding repairs, installing mixing system, replacing interior and exterior coatings, and disinfecting. The existing coating is lead-based and will require full containment for sand blasting and removal.

The Goodnow Tank was constructed in 1976. It is a Corten steel structure, a steel that naturally forms a protective rust layer, and requires no painting. The Goodnow Tank is a legged elevated tank with the capacity of 300,000 gallons of potable water. Work identified to rehabilitate the Goodnow Tank and maintain it includes taking the tank out of service, cleaning, spot-repair of interior metal corrosion, minor structural roof repairs, and disinfecting.

#### **Justification**

The most recent tank inspections in 2020 were completed while the tanks were in service with the use of submersible cameras. As such, additional work may be identified once the tanks are out of service and workers are able to enter the space. In general, repairs of the Merriam Hill and Goodnow Tanks are necessary to maintain the structural integrity of each tank and to promote good drinking water quality. The inspection of the Merriam Hill Tank concluded that the tank is in generally good structural condition. It is evident when comparing the 2020 inspection to the most recent prior inspection (2015) that the corrosion of the Merriam Hill Tank is continuing to advance. The tank has been in service for nearly 60 years, and the expected life cycle for welded steel tanks is 50-70 years. Taking action to rehabilitate this tank now will extend the life of the tank at least another 20 years. Coating failures on the interior and exterior of the Merriam Hill Tank are contributing to metal loss, and on some surfaces medium to heavy corrosion is evident. Over time this corrosion will continue to degrade the structural integrity of the tank. To rehabilitate the current tank and avoid a full tank replacement, the work noted

above needs to be conducted. An active mixer is proposed to be installed to reduce icing in winter and tank stratification in summer. Timely action to rehabilitate the Merriam Hill tank will stave off the need a full tank replacement, which has more associated risk and cost.

The 2020 inspection of the Goodnow Tank concluded that the tank is in good structural condition. The tank is constructed of Corten steel - also known as weathered steel - which naturally oxidizes to form a protective rust patina that does not require painting. The inspection concluded that the steel surface on the interior and exterior of the tank were generally in good condition. Spot repairs of corroded surfaces on the tank interior and minor exterior structural repairs were recommended. Work to repair the Goodnow Tank was noted above. The Goodnow Tank has been in service for 45 years. Over time, corrosion will result in metal loss, and impaired structural integrity of the tank if left untreated. Performing the repair work to the Goodnow tank will prevent further metal loss. The work associated with the Goodnow Tank is complicated by the height of the tank, with an overflow elevation nearly 440 feet above grade.

The Merriam Hill Tank is one of the last to be rehabilitated or replaced, and the Goodnow Tank has had needed repairs identified in 2009, yet to be completed. Investing now into the preservation of these tanks is prudent, particularly in the case of the Merriam Hill Tank, because the repairs proposed are vital to extending the service life of the tanks and avoiding complete tank replacement that could cost the City upwards of \$10M. A complete tank replacement of the Merriam Hill Tank and repair of the Goodnow Tank were both identified in the City's 2017 Water Master Plan, recommended between 2020 and 2022. The estimated cost associated with replacement of the Merriam Hill Tank in the Master Plan was \$14M. Rehabilitation of the Merriam Hill Tank now realizes cost savings to the City of over \$10M.

#### **Recommendation**

Based on our review of the inspection reports, we offer the following detailed recommendation for each tank:

##### Merriam Hill Tank

We recommend that the finishes be abrasive blast cleaned to SP-6 on the exterior and SP-10 on the interior. Pit and linear weld repairs. Coating for the exterior consists of 4 (four) coats of Zinc/Epoxy/Flouropolymer (Tnemec Series 700) using Class 1A lead containment and the interior consists of 1 (one) coat of Zinc/Epoxy VOC free.

Recommendations were made regarding safety, sanitary, security, and structure by Suez. We agree with the recommendations.

A question was raised as to our opinion regarding rehabilitation vs. replacement of the tank. The existing tank is structurally sound with no major issues at the foundation level of the tank. Further metal loss is not significant enough to justify complete demolition and replacement of the tank; therefore, our opinion would be for the City to rehabilitate the tank rather than replace.

##### Goodnow Tank

The Goodnow tank is constructed of Corten steel, which provides a natural layer of protection via a uniform layer of rust. Based on the results of the inspection, that layer is generally in good shape on both the interior and exterior surfaces. There were some observed areas where corrosion was noted on

the interior surface. These locations should be spot treated to SP-11 and coated with an Epoxy 100% solids by brush or drywall knife.

Recommendations were made regarding safety, sanitary, security, and structure by Suez. We agree with the recommendations.

Rehabilitation Costs

To provide a complete cost for the rehabilitation of both tanks; design, bidding, etc. should be included in your budget. We would recommend the following:

Design	\$40,000
Bidding	\$5,000
Construction Administration	\$40,000
Construction Oversight	\$100,000 (Subcontractor)
Construction	\$2,100,000 (\$1.7m Merriam Hill; \$0.4m Goodnow)
Construction Contingency	\$145,000

**Total Budget Recommendation \$2,430,000**

Tank Maintenance

A maintenance proposal was prepared for the City by a third-party vendor that included recommended maintenance costs to be performed by the third-party vendor. We have reviewed the proposal and have prepared under separate cover a recommendation for the City regarding entering into a third-party tank maintenance program versus performing in-house tank maintenance with contracting specific tasks outside the City's ability or expertise. We recommend the City continue performing in-house maintenance, using a contractor as needed for necessary tasks outside the City's capability to perform.

We recommend the City consider budgeting separate funds for annual maintenance of all City-owned tanks. Comparable communities of your size and number of tanks spend around \$30,000 on average per year on tank maintenance activities. In reviewing your recent inspection reports from 2020 for all tanks, we recommend the City budget \$35,000 annually to continue to effectively maintain all the City's tanks plus \$20,000 - \$30,000 for known needed repairs. It should be noted, tanks of advanced age (at or beyond their design life) will require more costly repairs and may require greater maintenance, repair, and rehabilitation costs beyond the estimate provided.

Please let me know if you need any further information on tank rehabilitation.

Very truly yours,  
BETA Group, Inc.



Robert T. Mackie, PE, BCEE  
Vice President

**Utility Service Company Inc**

Scott Kelley

24 Fellow Rd

Brentwood, NH 03833

Scott.Kelley@suez.com



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# **Goodnow Tank 300,000 Gallon Elevated Tank Inspection Report**

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Dept. of Public Works, Framingham, MA



**Prepared For:**

Blake D. Lukis

Director of Public Works

City of Framingham

150 Concord Street

Framingham, MA 01702

**Inspection Performed** May 26, 2020

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## TANK DATA

<b>TANK NAME:</b>	Goodnow Tank				
<b>TANK DESIGN:</b>	Legged Elevated	<b>CONSTRUCTION TYPE:</b>	Welded Steel		
<b>LOCATION:</b>	60 Goodnow Road				
	<b>CITY:</b>	Framingham	<b>STATE:</b>	MA	
<b>CAPACITY:</b>	300,000	<b>HEIGHT:</b>	102' HWL	<b>DIAMETER:</b>	30'
<b>BUILDER:</b>	NA	<b>YEAR:</b>	1976	<b>CONTRACT #</b>	NA
<b>EXT. COATING:</b>	Corten steel, limited Fluoropolymer	<b>LEAD:</b>	<20 mg/kg	<b>CHROMIUM:</b>	30 mg/kg
<b>INT. COATING:</b>	Epoxy	<b>LEAD:</b>	6 mg/kg	<b>CHROMIUM:</b>	22 mg/kg
<b>INSPECTOR(S):</b>	MA Service Center		<b>DATE:</b>	May 26, 2020	

## SUMMARY

The overall structural and sanitary condition of the subject tank is still remains in very good condition with no significant progression in degradation since our last inspection of 2015. The only immediate concerns are the (2) areas of leaks located within the outer roof knuckle as further detailed within the "Structural" section below as well as the attached report.

The exposed Corten steel along the exterior surfaces of the tank is still maintaining a uniform protective layer of rust which has prohibited any noticeable progression in corrosive activity or furtherance in metal loss of the referenced surfaces. In addition, the painted components along the exterior of the tank such as the sway rods, radial rods, anchor bolts and overflow assembly were also noted to be in generally the same condition as reported during the 2015 inspection. The coatings along these surfaces remain very good condition with no evidence of any significant progression in the degradation of the referenced coatings observed from either the supporting structure access ladder or from the ground. Even the previously reported corrosive activity along the backside of several leg column anchor bolts has not significantly progressed since our last inspection.

The coatings along the visible interior surfaces of the tank were also found to still be in generally very good condition with at least 98% of the coatings still intact and providing sound protection to the underlying steel substrate. The remaining surfaces along the underside of the roof, knuckle, shell interior surfaces as well as the visible surfaces of the upper bowl appeared to be exhibiting a slight progression in the overall extent and severity of corrosive currently taking place. There appears to be a slight increase in medium to heavy rusting along the roof support structure as well as an increase in rust tubercle formations along the painter's angle/stiffener and shell surfaces immediately adjacent to the angle. As previously reported, there is also evidence of at least slight metal loss along areas of some of the rust tubercles however no significant progression in metal loss was noted. The existing coatings still appear to exhibiting sound adhesion to the substrate with no evidence of blistering or other signs of degradation other than the slight progression in overall extent of degradation

noted above. Therefore, the opportunity to perform spot maintenance to the referenced surfaces in order to prohibit any further metal loss and extend the serviceable life of the existing coatings still appears to exist. However, be advised that a comprehensive assessment of the lower bowl surfaces as well as the interior of the riser has not been performed due to the presence of sediment masking the bowl surfaces as well as the limited access to the riser. If the interior surfaces are to be spot maintained provisions for removal of all sediment and re-assessment of both the bowl and riser interior in order to assess prevailing conditions along these surfaces should be included in the scope of work performed. This would allow for possible modifications as to the scope of work required to properly rehabilitate the interior surfaces in question.

## **INTERIOR COATING RECOMMENDATIONS**

If spot maintenance is to be performed along the interior surfaces of the tank, particularly the painter's angle/stiffener and immediately adjacent surfaces, then the following scope of work should be considered. All areas of failure to the substrate and/or corrosion should be power tool cleaned in accordance with SSPC-SP #11 Power Tool Cleaning to Bare Metal with Profile standards. The peripheral areas surrounding the spot cleaned areas should be feathered back at least 1/2" to ensure a smooth transition to tight existing coating and proper profiling to ensure good interfacial adhesion. All areas cleaned to bare metal loss should then receive (1) coat of an NSF approved 100% solids epoxy coating applied by brush or drywall knife to a minimum of 25-30 mils or in accordance with manufactures recommendations.

## **STRUCTURAL RECOMMENDATIONS**

The overall structural integrity of the subject tank appears to be in excellent condition, however, there are (2) small penetrations within the roof knuckle which are currently plugged with what appears to be self-tapping screws and gaskets but the gasket is leaking. The leaks should be re-sealed as soon as possible. If the repairs outlined above are to be performed consideration should be given to permanently sealing these leaks by spot welding both interior and exterior faces then cleaning and painting the interior faces as outlined above. If a welding repair is not performed, then at a minimum, the leaks should be temporarily re-sealed with at least new tapping plugs and gaskets.

## **SANITARY RECOMMENDATIONS**

As previously stated, the overall sanitary condition of the subject tank appears to be very good with no remedial repairs or modifications required at this time.

## **SAFETY & SECURITY RECOMMENDATIONS**

The safety and security of the tank is also in very good condition with no remedial work or improvements required.

# WATER STORAGE TANK CONDITION ASSESSMENT REPORT

SUEZ Advanced Solutions



<b>Date:</b> 05/26/20	<b>Project:</b> 151355	<b>Task:</b> 1.01
<b>Tank Name:</b> Goodnow Tank		
<b>Address:</b> 60 Goodnow Ln	<b>City:</b> Framingham	<b>State:</b> MA
<b>County:</b> Middlesex	<b>Lat:</b> 42.290188	<b>Long:</b> -71.480640
<b>Capacity:</b> 300,000 gallons	<b>Tank Type:</b> Elevated	<b>Construction:</b> Welded Steel
<b>HWL:</b> 102'	<b>LWL:</b> 76'	<b>Diameter:</b> 30'
<b>Yr Built:</b> 1976	<b>By:</b> NA	<b>Contract #:</b> NA
<b>Exterior Last Painted:</b> 2008	<b>Exterior Color:</b> Brown	<b>Interior Last Painted:</b> 2008
		<b>Interior Color:</b> white

**Exterior Roof Conditions:** All questions are Yes / No / NA / NR unless listed (G/F/P) for Good / Fair / Poor / NA / NR

Tank Area	Item of Concern	Status	Comments
<b>Roof Coating</b>	Coating visual assessment? (G/F/P)	NA	<b>Coating Type:</b> No coating <b>Lead Bearing:</b> NA <b>DFT:</b> NA The exterior surfaces of the roof as well as the outer roof knuckle is constructed of Corten steel with no coating present. The referenced surfaces have uniformly rusted to a medium grade as per design. There is no evidence of any aggressive corrosion or measurable metal loss currently taking place
	Actionable checking / delamination?	NA	
	Actionable corrosion / deterioration?	No	
	Is there any graffiti paint or etchings?	No	
	Coating adhesion assessment? (G/F/P)	NA	
	Does soiling impact visual appearance?	No	
	Will antenna equipment impact recoat?	Yes	
<b>Roof Structure</b>	Structural visual assessment? (G/F/P)	Good	The roof and knuckle are in sound structural and sanitary condition. however, as previously reported during our last inspection, there are (2) small drilled holes along the outer edge of the roof which are approximately a quarter of an inch in diameter and are currently plugged with rubber washers and bolts. These holes are not completely water tight and when water level was raised up to overflow height and water started to slowly seep from the holes. If these holes serve no purpose, consideration should be given to permanently sealing these holes.
	Are all plate seams sealed?	Yes	
	Significant pitting or metal loss visible?	No	
	Rigging holes / access ports sealed?	No	
	Other unsealed penetrations present?	No	
	Is the roof perimeter watertight?	No	
<b>Roof Vent</b>	Design meets state standards?	Yes	<b>Finial Stub OD:</b> 30 inch Tank is equipped with a old style vent comprised of a domed cap attached to a center stub with a vertical framed venting area. The venting area is secured with a wide mesh screen that is intact and adequately secured in place.
	Screen intact?	Yes	
	Vacuum pallet functional?	NA	
	Unsealed penetrations present?	No	
<b>Roof Access</b>	At least two hatches to WC present?	Yes	The roof is equipped with (3) 30" diameter roof hatches with raised necks and hinged, downward overlapping, lockable covers. There is also (1) 24" diameter roof hatch with a flanged neck and bolted in place flat cover. All of the referenced roof hatches were found to be intact, structurally sound and in good sanitary condition. All hatch covers were closed and either locked or secured with bolts post inspection
	Primary meets state standards?	Yes	
	Additional meet state standards?	Yes	
	All roof access points secured?	Yes	
	Antenna equipment affects roof entry?	No	
<b>Roof Safety</b>	Is there a roof ladder / stair present?	Yes	The roof is equipped with a stainless steel access ladder which extends up from the shell ladder to the roof center dollar plate. The ladder is intact, structurally sound and is equipped with a notched rail fall prevention device. There are no handrails present however there are (2) whip antennas mounted to the roof access ladder as previously reported during our last inspection
	Is there a guardrail system present?	No	
	Required fall arrest system present?	Yes	
	Are the roof FAA lights operational?	NA	

**Exterior Shell, Bowl & Riser Conditions:** All questions are Yes / No / NA / NR unless listed (G/F/P) for Good / Fair / Poor / NA / NR

Tank Area	Item of Concern	Status	Comments
<b>Shell Coating</b>	Coating visual assessment? (G/F/P)	NA	<b>Coating Type:</b> No coating <b>Lead Bearing:</b> NA <b>DFT:</b> NA The exterior surfaces of the shell and balcony are constructed of Corten steel with no coating present. The referenced surfaces have uniformly rusted to a medium grade as per design with no evidence of any aggressive corrosion or measurable metal loss currently taking place along any of the referenced surfaces.  The bowl and riser exterior surfaces are also constructed of uncoated Corten steel which remains uniformly rusted with no aggressive corrosion or evidence
	Actionable checking / delamination?	NA	
	Actionable corrosion / deterioration?	No	
	Logo visual assessment? (G/F/P)	NA	
	Is there any graffiti paint or etchings?	No	
	Coating adhesion assessment? (G/F/P)	NA	
	Balcony visual assessment? (G/F/P)	Good	

	Bowl coating assessment? (G/F/P)	NA	of any measurable metal loss currently taking place. In all, there has been no evidence of any significant furtherance in corrosion along any of the previously referenced surfaces since our last inspection of 2015.
	Riser coating assessment? (G/F/P)	NA	
	Does soiling impact visual appearance?	No	
	Will antenna equipment impact recoat?	Yes	
<b>Shell Structure</b>	Structural visual assessment? (G/F/P)	Good	The overall structural condition of the shell, bowl and riser surfaces is in very good to excellent condition with no evidence of any measurable metal loss, leaks or any other deficiencies observed during this inspection.
	Are all plate seams sealed?	Yes	
	Significant pitting or metal loss visible?	No	
	Unsealed penetrations present?	No	The balcony is also in very good condition and is equipped with a 42" tall hand rail which is intact and structurally sound.
	Painter's angle or rigging rail present?	No	
	Balcony structural damage / failure?	No	There are (4) sections of conduit that run up the ladder leg through the balcony and up onto the roof for antennas. There is another one that runs up the leg to the left of the ladder and houses the lightning protection ground wire.
	Riser base plate condition? (G/F/P)	Good	
	Any active leakage observed?	No	
<b>Riser Foundation</b>	Structural visual assessment? (G/F/P)	Good	The bottom of the riser is secured in place by (4) 1-1/2" diameter anchor bolts with 4-1/2" x 4-1/2" x 15" high chairs which are intact and structurally sound. The anchor bolts themselves are coated, with the coatings still in generally good condition with only very minor degradation evident. The grout between the riser base plate and foundation as well as the foundation itself is in very good condition with no appreciable degradation evident.
	Riser anchor bolts in sound condition?	Yes	
	Grout or sealer in sound condition?	NA	
	Does grade promote good drainage?	Yes	
	Failure or undermining of foundation?	No	
<b>Shell Access</b>	At least two manholes present?	Yes	The shell is equipped with a single 18" x 24" oval manhole with an externally hinged cover, secured in place by (2) retention bolt and clamp assemblies. The bottom ring of the riser is also equipped with (1) 18" x 24" oval manhole with a externally hinged cover secured in place by (2) retention clamp assemblies. Both manhole assemblies are intact and structurally sound with no leaks evident
	Balcony manhole meets state standard?	Yes	
	Riser manhole meets state standard?	Yes	
	Secondary balcony or riser manhole?	No	
	Structural damage / leakage visible?	No	
<b>Shell Safety</b>	Balcony handrail meets standards?	Yes	<b>Balcony Handrail Height:</b> 42" <b>Safety Climb Type:</b> Notched Rail  The shell is equipped with a fixed in place stainless steel ladder which is intact, structurally sound and in generally very good condition. The ladder is also equipped with a notched rail fall prevention device which also extends up to and along the roof ladder. This device appears intact, functional and in generally good condition.
	Water retention on balcony walkway?	No	
	Required shell ladder present?	Yes	
	Required safety climb system present?	Yes	
	Is shell ladder equipped with a cage?	No	
	Are there rest platforms present?	No	
	Actionable corrosion / deterioration?	No	
	Crossover platform handrails sound?	Yes	
	Do antennas / cables impact climbing?	No	
<b>Overflow</b>	Extends to near ground level?	Yes	<b>Pipe OD:</b> 8"  The tank is equipped with an overflow assembly with exits out through the top of the roof knuckle then travels down the entire length of the tank to within 22" of grade were it transitions into a 90° elbow then travels above grade terminating at a 45° elbow located directly above a grated drainage basin. The discharge opening of the pipe is fitted with a bolted flange in which a stainless steel fine mesh screen is installed. The overflow pipe and supports are coated, with all coatings found to be in very good condition with only minor degradation and rusting observed along the bolting flange. This degradation was reported during our last inspection and has not significantly progressed since then.
	External weir box sealed / secured?	NA	
	Actionable corrosion / deterioration?	No	
	Unsealed penetrations present?	No	
	Required air gap present?	Yes	
	Screen is intact or was replaced?	Yes	
	Flapper is functional or was replaced?	NA	
	Drain, spillway or rip-rap present?	Yes	

**Support Structure Conditions:** All questions are Yes / No / NA / NR unless listed (G/F/P) for Good / Fair / Poor / NA / NR

Tank Area	Item of Concern	Status	Comments
<b>Support Structure Coatings</b>	Column / strut coatings? (G/F/P)	NA	<b>Coating Type:</b> No coating <b>Lead Bearing:</b> NA <b>DFT:</b> NA
	Actionable checking / delamination?	NA	The leg columns and horizontal struts are constructed of Corten steel and therefore not coated. The referenced surfaces were found to be uniformly rusted as per design with no aggressive corrosive activity evident. The radial rods, sway rods, turnbuckles, yokes, retention pins and connecting brackets were found to be coated and in very good condition with minimal degradation evident
	Actionable corrosion / deterioration?	NA	
	Support rod conditions? (G/F/P)	Good	
	Rod connection conditions? (G/F/P)	Good	

<b>Support Structure</b>	Column / strut visual condition? (G/F/P)	Good	<b>Column #:</b> 5 <b>Strut Level #:</b> 2  The supporting structure is structurally sound with no visible deficiencies evident. All sway rods connections appear sound and the rods are adequately tensioned. The horizontal struts are also intact and structurally sound
	Are sway rods taught?	Yes	
	Are radial rods taught?	Yes	
	Sway rod connections secure?	Yes	
	Radial rod connections secure?	Yes	
<b>Column Footings</b>	Column shoe / base conditions? (G/F/P)	Good	The concrete footings as well as the grout located at the base of the leg columns were all noted to still be in very good condition with no appreciable degradation taking place. The concrete grout and footings however, are heavily stained from runoff from the leg columns. The anchor bolt assemblies along the base of the leg columns were also noted to be coated and in very good condition with minimal degradation evident.
	Actionable corrosion / deterioration?	No	
	Failure or undermining of footings?	No	
	Grout or sealer in sound condition?	Yes	
	Does grade promote good drainage?	Yes	
<b>Support Structure Safety</b>	Actionable corrosion on column ladder?	No	<b>Safety Climb Type:</b> Notched Rail  The support structure is equipped with a stainless steel access ladder and cage assembly which extends from the balcony down one of the leg columns to within 15' of grade. The bottom opening of the cage is fitted with a hinged, lockable aluminum gate assembly. The ladder assembly is structurally sound however, the gate doesn't swing correctly and requires one of the hinges to be replaced.
	Required safety climb system present?	Yes	
	Is ladder equipped with cage / platform?	Yes	
	Functional security gate present?	Yes	
	Do antennas / cables impact climbing?	No	

**Interior Roof Conditions:** All questions are Yes / No / NA / NR unless listed (G/F/P) for Good / Fair / Poor / NA / NR

Tank Area	Item of Concern	Status	Comments
<b>Roof Coating</b>	Coating visual assessment? (G/F/P)	Good	<b>Coating Type:</b> Epoxy <b>Lead Bearing:</b> <b>DFT:</b>  The coatings along the underside of the roof and interior of the roof knuckle appear to still be in very good condition with only isolated areas of light to medium rusting evident. This rusting appears to be primarily emanating out from lap seams and the junction between the rafters and roof plates as well as along the top faces of the bottom flanges of the (2) L-angle rafters. This degradation represents only a slight progression since our last inspection of 2015
	Actionable blistering / delamination?	No	
	Actionable corrosion / deterioration?	No	
	Coating adhesion assessment? (G/F/P)	Good	
	Rafter visual assessment? (G/F/P)	Good	
	Roof to shell junction? (G/F/P)	Good	
<b>Roof Structure</b>	Structural visual assessment? (G/F/P)	Good	The underside of the roof was found to be in sound structural and sanitary condition with no aggressive corrosion, metal loss or other deficiencies evident. There are however, (2) plugged penetrations within the roof knuckle which leak when tank is at high water level as previously referenced in the roof exterior section of this report.
	Are all plate seams sealed?	Yes	
	Significant metal loss on plates visible?	No	
	Significant metal loss on rafters visible?	No	
	Roof bolted connections sound?	Yes	
	Light leaks visible from the interior?	No	

**Interior Shell & Bowl Conditions:** All questions are Yes / No / NA / NR unless listed (G/F/P) for Good / Fair / Poor / NA / NR

Tank Area	Item of Concern	Status	Comments
<b>Shell &amp; Bowl Coatings</b>	Coating visual assessment? (G/F/P)	Good	<b>Coating Type:</b> Epoxy <b>Lead Bearing:</b> <b>DFT:</b>  The coatings along the interior surfaces of the shell and visible surfaces of the bowl were found to be in good condition with the exception of the junction with the painter's/stiffener angle as well as a few isolated areas along the lower shell
	Actionable blistering / delamination?	No	
	Actionable corrosion / deterioration?	No	
	Coating adhesion assessment? (G/F/P)	Good	
<b>Shell &amp; Bowl Structure</b>	Structural visual assessment? (G/F/P)	Good	The shell surfaces appear to be in very good structural and sanitary condition with no aggressive corrosion or metal loss evident. The only exception is along the spot welded junction of the painter's/stiffener angle assembly located along the top of the shell. There is evidence of aggressive corrosion and potential for at least slight to moderate metal loss at the junction of the angle and shell wall as shown in the attached photographs.  The bowl has sediment covering it which made it difficult to determine the overall condition of the bowl surfaces or it's coating.
	Are all plate seams sealed?	Yes	
	Significant pitting or metal loss visible?	No	
	Bowl plate assessment? (G/F/P)	Good	
	Riser transition in sound condition?	Good	
	Painter's angle or spider rods present?	Yes	
	Safety bars or grate present over riser?	Yes	
<b>Shell Safety</b>	Is an interior shell ladder present?	No	<b>Safety Climb Type:</b> NA  The interior of the shell is not equipped with and access ladder, there is however a hand grade located just above the shell manhole. This grade appeared intact, structurally sound and in generally good condition.
	Required safety climb system present?	NA	
	Actionable corrosion / deterioration?	NA	
	Internal balcony or platform present?	No	

<b>Water Quality</b>	Water quality visually acceptable?	Yes	The water within the tank was exhibiting low turbidity and there was very little, if any, staining along the shell and upper bowl surfaces. The lower bowl surfaces were covered with a uniform, but relatively thin layer of sediment which impeded visual assessment of the referenced surfaces however, did not appear to significantly impact water quality.
	Significant staining or biofilm present?	No	
	Significant floor sediment present?	Yes	
	Is there a mixing system present?	No	
	Is there a cathodics system present?	No	
	Is there a level indicator present?	No	

**Interior Riser Conditions:** All questions are Yes / No / NA / NR unless listed (G/F/P) for Good / Fair / Poor / NA / NR

Tank Area	Item of Concern	Status	Comments
<b>Riser</b>	Is the tank equipped with a dry riser?	No	<b>Riser OD: 5'</b> <b>Fill Pipe OD: NR</b>  Due to the presence of a grate covering the riser only the upper cone and top ring of the riser were visible during this inspection. The coatings along these visible surfaces appeared to be in very good condition with no appreciable degradation, failure or rusting evident.
	Coating visual assessment? (G/F/P)	NR	
	Actionable corrosion / deterioration?	NR	
	Structural visual assessment? (G/F/P)	NR	
	Assessment of the mud valve (G/F/P)?	NR	
<b>Riser Safety</b>	Is an interior riser ladder present?	NR	<b>Safety Climb Type: NA</b>  The opening of the riser is secured with a grating, therefore access to the interior of the by ROV was not possible. The access gate within the grating over the riser opening was closed and appeared to be intact and functional.
	Required safety climb system present?	NR	
	Actionable corrosion / deterioration?	NR	
	Is the riser equipped with a floor drain?	NR	

**Site Conditions:** All questions are Yes / No / NA / NR unless listed (G/F/P) for Good / Fair / Poor / NA / NR

Tank Area	Item of Concern	Status	Comments
<b>Site</b>	Is site equipped with a security fence?	Yes	The perimeter fencing was found to be intact and in generally good condition as was the vehicle access gate.
	Any signs of damage to the fence?	No	
	Are fence gates secured with locks?	Yes	There is various monitoring equipment, electrical equipment, a valve vault as well as a free standing hose bib enclosure located directly underneath the subject tank. All items appeared to be in generally good condition and secured.
	Is a vault or pump house present?	Yes	
	Sample tap onsite?	Yes	
	Is there telemetry / SCADA onsite?	Yes	There is also a secured utility building and a functional hydrant located within the fenced enclosure.
	Is there non-tank pooling water onsite?	No	
	Is there electrical service onsite?	Yes	Staging area for cleaning and painting equipment and vehicles is limited and could be very tight if exterior containment was ever required.
	Are there power lines near the tank?	No	
	Is there a non-tank water source onsite?	Yes	
	Is the tank located in a coastal area?	No	
	Site utility during tank rehab (G/F/P)?	Fair	

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



Overall view of the Goodnow 300KG Elevated tank located in Framingham, MA



Showing roof finial vent assembly to be intact and structurally sound



Showing exterior surfaces of finial vent assembly to be uniformly corroded with no metal loss evident



Showing lightning protection mounted to the exterior of the finial vent



Stainless steel screening along finial vent to be intact and in very good sanitary condition



Showing the center stub of the finial vent to be 30" ID

**Goodnow 300KG Elevated located in Framingham, MA**  
**Inspection conducted 05/26/20**



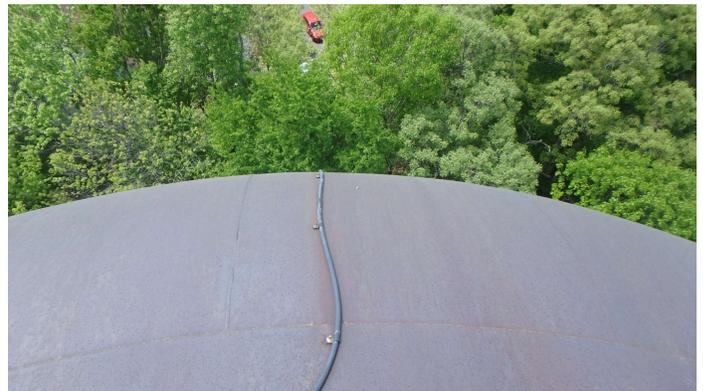
Showing exterior surfaces of roof and knuckle to be uniformly corroded with no metal loss evident



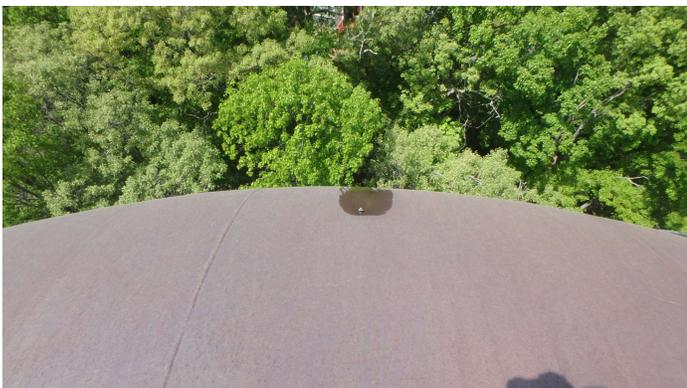
Showing exterior surfaces of roof and knuckle to be uniformly corroded with no metal loss evident



Showing area of leakage along (1) of (2) holes which appear to have been previously sealed by bolts and/or expandable plugs



Showing exterior surfaces of roof and knuckle to be uniformly corroded with no metal loss evident



Showing area of leakage along 2nd of (2) holes which appear to have been previously sealed by bolts and/or expandable plugs



Showing close-up view of leakage along 2nd of (2) holes which appear to have been previously sealed

**Goodnow 300KG Elevated located in Framingham, MA**  
**Inspection conducted 05/26/20**



Showing the 1st of (3) 30" diameter roof hatch assemblies all of which appear intact, structurally sound and in good sanitary condition



Showing roof hatch to measure 30" in diameter and equipped with a raised neck and hinged downward overlapping cover



Showing the 2nd of (3) 30" diameter roof hatch assemblies all of which appear intact, structurally sound and in good sanitary condition



Showing roof hatch cover grounded to lightning protection system and equipped with an entry alarm



Showing the 3rd of (3) 30" diameter roof hatch assemblies all of which appear intact, structurally sound and in good sanitary condition



Showing the presence of a 4th roof access hatch located near center of the roof

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



The 4th roof hatch is 24" in diameter and equipped with a bolting flange in which a flat cover is bolted into place



Showing 4th roof hatch cover also grounded to lightning protection system and equipped with an entry alarm



Showing exterior surfaces of roof and knuckle to be uniformly corroded with no metal loss evident



Showing lightning protection secured to the exterior of the tank roof



The exterior surfaces of roof were showing no evidence of any measureable metal loss



Showing Ultra-sonic thickness testing performed along roof revealing no significant metal loss

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



Showing Ultra-sonic thickness testing performed along roof revealing no significant metal loss



Showing Ultra-sonic thickness testing performed along roof revealing no significant metal loss



Showing Ultra-sonic thickness testing performed along roof revealing no significant metal loss



Showing Ultra-sonic thickness testing performed along roof revealing no significant metal loss



Showing Ultra-sonic thickness testing performed along roof revealing no significant metal loss



Showing Ultra-sonic thickness testing performed along roof revealing no significant metal loss

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



Showing no visible metal loss observed along the exterior surfaces of the roof



Showing Ultra-sonic thickness testing performed along roof revealing no significant metal loss



Showing Ultra-sonic thickness testing performed along roof revealing no significant metal loss



Showing Ultra-sonic thickness testing performed along roof revealing no significant metal loss



Showing minor light rusting along interior surfaces of roof hatch neck



Showing ROV and umbilical cord being disinfected prior to entering the tank

**Goodnow 300KG Elevated located in Framingham, MA**  
**Inspection conducted 05/26/20**



Showing ROV and umbillical cord being disinfected prior to entering the tank



Coating along the underside of the roof is in very good condition with only very minor degradation and rusting evident



Coating along the underside of the roof is in very good condition with only very minor degradation and rusting evident



Coating along the underside of the roof is in very good condition with only very minor degradation and rusting evident

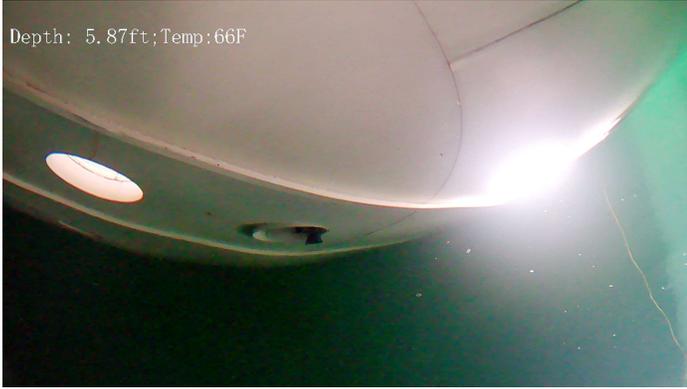


Coating along the underside of the roof is in very good condition with only very minor degradation and rusting evident

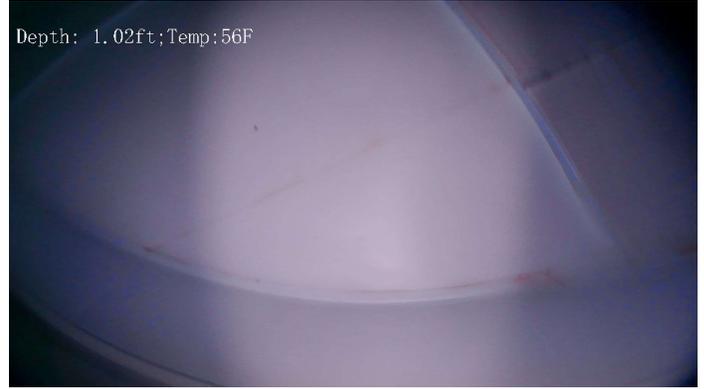


Showing overflow assembly to be intact, structurally sound and in very good condition

**Goodnow 300KG Elevated located in Framingham, MA**  
**Inspection conducted 05/26/20**



Showing very minor coating degradation or rusting along underside of the roof as viewed from the ROV



Showing very minor coating degradation or rusting along underside of the roof as viewed from the ROV



Showing very minor coating degradation or rusting along underside of the roof as viewed from the ROV



Showing very minor coating degradation or rusting along underside of the roof as viewed from the ROV

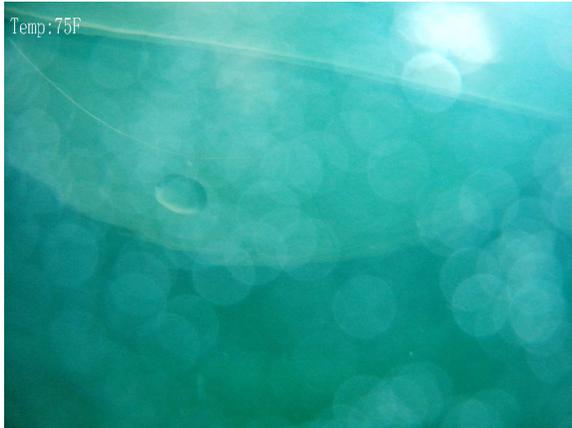


Showing very minor coating degradation or rusting along underside of the roof as viewed from the ROV



Showing very minor coating degradation or rusting along underside of the roof as viewed from the ROV

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



Showing very minor coating degradation or rusting along underside of the roof as viewed from the ROV



Coatings along the shell surfaces are in very good condition with no deterioration evidence except along surfaces immediately adjacent to painter's angle



Coatings along the shell surfaces are in very good condition with no deterioration evidence except along surfaces immediately adjacent to painter's angle



Coatings along the shell surfaces are in very good condition with no deterioration evidence except along surfaces immediately adjacent to painter's angle



Showing extent of corrosion taking place along painter's angle and immediately adjacent shell surfaces



Showing extent of corrosion taking place along painter's angle and immediately adjacent shell surfaces

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



Showing extent of corrosion taking place along painter's angle and immediately adjacent shell surfaces



Showing evidence of very minor corrosion along interior horizontal seam of shell



Showing coating along interior surfaces of shell manhole and surround surfaces to be in very good condition



Coatings along the interior surfaces of the upper bowl are in very good condition with no appreciable degradation or rusting evident



Showing the interior surfaces of the lower bowl to be covered by sediment and not visible



Showing no evidence of any appreciable coating degradation or rusting along visible bowl interior surfaces

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



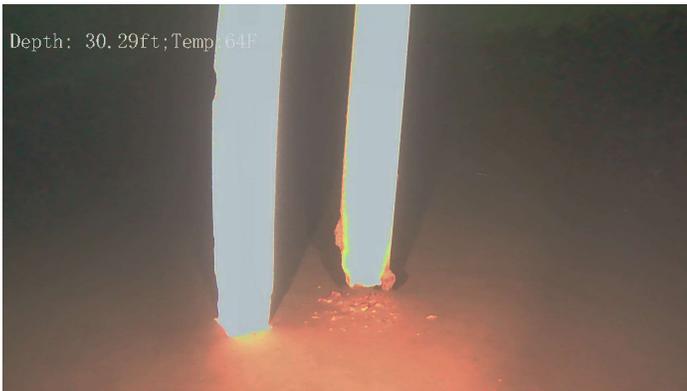
Depth: 28.25ft;Temp:66F

Showing safety grating over riser opening and siphon line within bowl interior to be intact and structurally sound



Depth: 29.01ft;Temp:66F

Showing areas of scattered corrosion along the siphon line located within the bowl interior



Depth: 30.29ft;Temp:64F

Showing areas of scattered corrosion along the siphon line located within the bowl interior



Depth: 21.12ft;Temp:69F

Showing bowl surfaces to be covered in a layer of sediment, impeding visual assessment of underlying surfaces



Depth: 26.96ft;Temp:65F

Showing safety grating atop riser opening to be intact, structurally sound and in very good condition



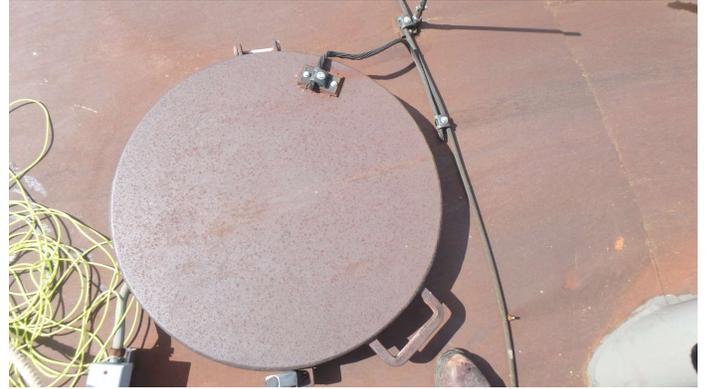
Depth: 27.19ft;Temp:64F

Showing coating along the visible interior surfaces of the riser to be in very good condition

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



Showing minor rusting taking place along interior surfaces of the roof hatch neck



Showing roof hatch cover closed and locked post inspection



Showing roof hatch cover closed and locked post inspection



Show water running down shell surfaces from (1) of (2) leaks located along the roof knuckle



Shell exterior surfaces are uniformly rusted with no evidence of any visible metal loss taking place



Shell exterior surfaces are uniformly rusted with no evidence of any visible metal loss taking place

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



Shell exterior surfaces are uniformly rusted with no evidence of any visible metal loss taking place



Showing uniform rusting throughout shell and balcony surfaces however, no evidence of any appreciable metal loss



Showing uniform rusting throughout shell and balcony surfaces however, no evidence of any appreciable metal loss



Showing uniform rusting throughout shell and balcony surfaces however, no evidence of any appreciable metal loss



Showing the tank surfaces constructed of Corten steel uniformly rusted as per design



The supporting structure stainless steel access ladder assembly is intact and structurally sound

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



The security gate at the bottom of the supporting structural access ladder was closed and locked post inspection



The security gate at the bottom of the supporting structural access ladder was closed and locked post inspection



The supporting structure surfaces were found to be uniformly rusted with no evidence of any appreciable metal loss taking place



The supporting structure surfaces were found to be uniformly rusted with no evidence of any appreciable metal loss taking place



Showing coating along overflow pipe to be in very good condition and the pipe discharging directly over drainage basin



Showing discharge opening of overflow pipe fitted with an internal screen which appears intact

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



Showing overflow pipe to measure 8" in diameter



Showing overflow pipe discharging directly over a grated drainage basin



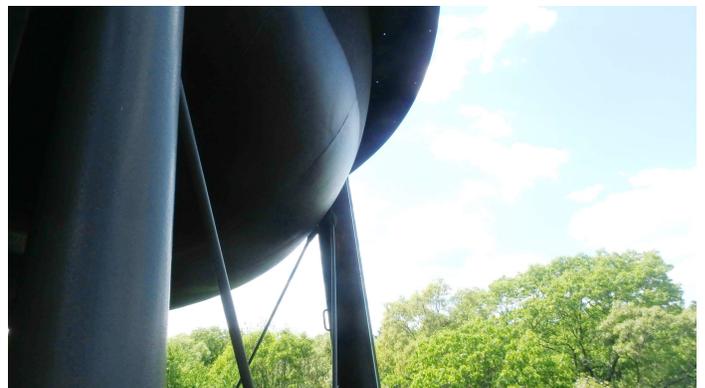
Showing area surrounding the drainage basin



Showing exterior surfaces of the bowl and riser to be uniformly rusted with no evidence of any appreciable metal loss taking place

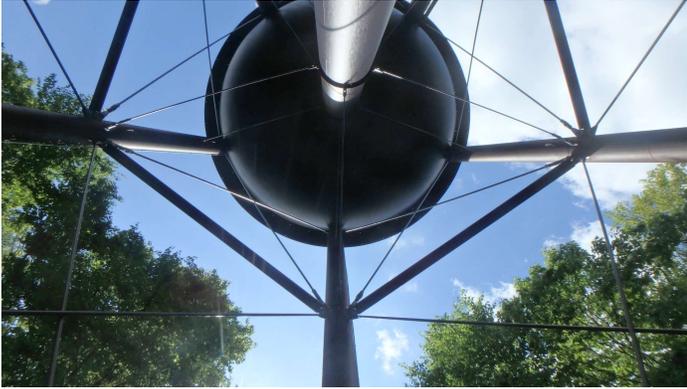


Showing sway rods, connection plates and clevises to be intact and structurally sound



Showing sway rods, connection plates and clevises to be intact and structurally sound

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



Showing supporting structure sway rods to be intact and properly tensioned



Showing lockable cabinet attached to the base of the riser to be intact, structurally sound and secured.



Riser manhole appears to be in sound structural and sanitary condition



Showing riser manhole assembly to be intact and structurally sound



The shell manhole opening was measured to be 18" x 24"



Showing the horizontal struts of the tank support structure to be intact and structurally sound

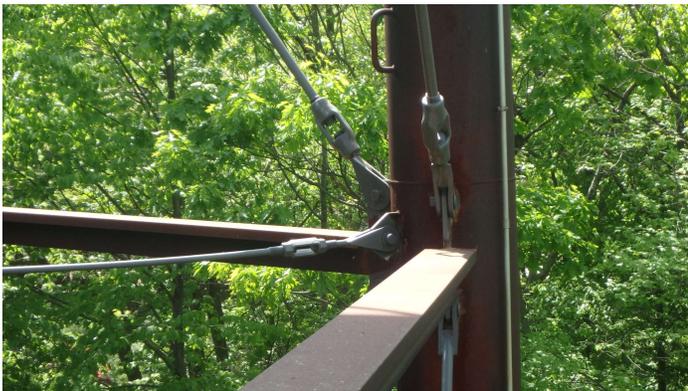
**Goodnow 300KG Elevated located in Framingham, MA**  
**Inspection conducted 05/26/20**



Showing the coatings along the radial rods, sway rods and turnbuckles to be intact and in very good condition



Showing the horizontal struts of the tank support structure to be intact and structurally sound



Showing the coatings along the radial rods, sway rods and turnbuckles to be intact and in very good condition



Showing the coatings along the radial rods, sway rods and turnbuckles to be intact and in very good condition



Showing the base of the leg columns and the anchor bolt assemblies to be intact and structurally sound



Showing the base of the leg columns and the anchor bolt assemblies to be intact and structurally sound

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



Showing the base of the leg columns and the anchor bolt assemblies to be intact and structurally sound



Showing the anchor bolt assemblies to be intact, structurally sound and coated



Showing concrete footings along the base of the leg columns to be in good structural condition



Showing the present of electrical cabinets located near the base of the tank risere



Showing control cabinet also located near base of the tank riser



Showing pipe vault access hatch to be intact and structurally sound

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



Showing interior surfaces of the valve vault cover equipped with an entry alarm



Showing pipe and valve surfaces to be uniformly rusted



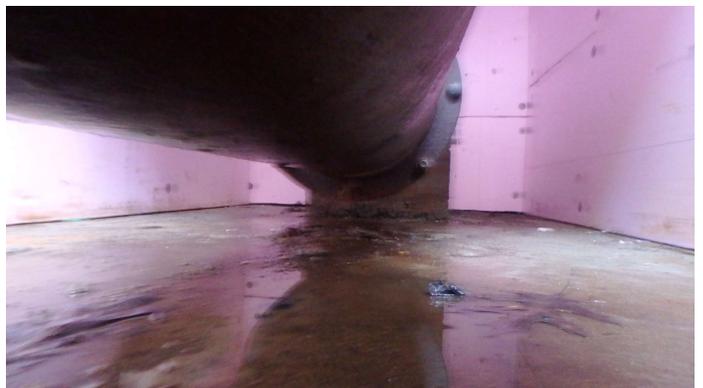
Showing no coating present along valve and pipe surfaces



Showing medium to heavy rusting taking place along majority of piping within vault



Showing medium to heavy rusting taking place along majority of piping within vault



Showing minor water accumulations along vault floor

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



Showing the presence of a drainage sump located within the vault floor



Showing telemetry located within the pipe vault



Showing electrical components located within the vault



Showing vault hatch cover closed and locked post inspection



Showing free standing, lockable hose bib enclosure located near the riser of the tank



Showing hose bib and sample tap to be visually intact and functional

**Goodnow 300KG Elevated located in Framingham, MA  
Inspection conducted 05/26/20**



Showing enclosure closed and locked post inspection



Showing a functional hydrant located within the fenced perimeter



Showing gate with perimeter fence to be closed and locked post inspection



Showing gate with perimeter fence to be closed and locked post inspection



# Eastern Analytical, Inc.

professional laboratory and drilling services

Lara Anderson  
Utility Service Group  
PO Box 1350  
Perry, GA 31069-1330



Subject: Laboratory Report

Eastern Analytical, Inc. ID: 211059  
Client Identification: Goodnow Tank 300,000 Elevated / Town of Framingham  
Date Received: 6/2/2020

Dear Ms. Anderson :

Enclosed please find the laboratory report for the above identified project. All analyses were performed in accordance with our QA/QC Program. Unless otherwise stated, holding times, preservation techniques, container types, and sample conditions adhered to EPA Protocol. Samples which were collected by Eastern Analytical, Inc. (EAI) were collected in accordance with approved EPA procedures. Eastern Analytical, Inc. certifies that the enclosed test results meet all requirements of NELAP and other applicable state certifications. Please refer to our website at [www.easternanalytical.com](http://www.easternanalytical.com) for a copy of our NELAP certificate and accredited parameters.

The following standard abbreviations and conventions apply to all EAI reports:

- Solid samples are reported on a dry weight basis, unless otherwise noted
- < : "less than" followed by the reporting limit
- > : "greater than" followed by the reporting limit
- %R : % Recovery

Eastern Analytical Inc. maintains certification in the following states: Connecticut (PH-0492), Maine (NH005), Massachusetts (M-NH005), New Hampshire/NELAP (1012), Rhode Island (269), Vermont (VT1012) and New York (12072).

The following information is contained within this report: Sample Conditions summary, Analytical Results/Data, Quality Control data (if requested) and copies of the Chain of Custody. This report may not be reproduced except in full, without the the written approval of the laboratory.

If you have any questions regarding the results contained within, please feel free to directly contact me or the chemist(s) who performed the testing in question. Unless otherwise requested, we will dispose of the sample (s) 30 days from the sample receipt date.

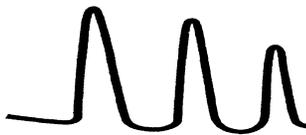
We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

*Lorraine Olashaw*  
Lorraine Olashaw, Lab Director

6-8-20  
Date

3  
# of pages (excluding cover letter)



# SAMPLE CONDITIONS PAGE

EAI ID#: 211059

Client: **Utility Service Group**

Client Designation: **Goodnow Tank 300,000 Elevated / Town of Framingham**

**Temperature upon receipt (°C): 24.3**

**Received on ice or cold packs (Yes/No): N**

Acceptable temperature range (°C): 0-6

Lab ID	Sample ID	Date Received	Date Sampled	Sample Matrix	% Dry Weight	Exceptions/Comments (other than thermal preservation)
211059.01	RAC 151355 Exterior Paint	6/2/20	5/26/20	solid		Adheres to Sample Acceptance Policy
211059.02	RAC 151355 Interior Wet	6/2/20	5/26/20	solid		Adheres to Sample Acceptance Policy

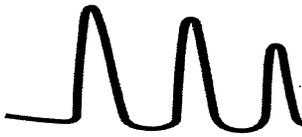
*Samples were properly preserved and the pH measured when applicable unless otherwise noted. Analysis of solids for pH, Flashpoint, Ignitability, Paint Filter, Corrosivity, Conductivity and Specific Gravity are reported on an "as received" basis.*

*Immediate analyses, pH, Total Residual Chlorine, Dissolved Oxygen and Sulfite, performed at the laboratory were run outside of the recommended 15 minute hold time.*

*All results contained in this report relate only to the above listed samples.*

*References include:*

- 1) EPA 600/4-79-020, 1983
- 2) Standard Methods for Examination of Water and Wastewater, 20th, 21st, 22nd & 23rd Edition or noted Revision year.
- 3) Test Methods for Evaluating Solid Waste SW 846 3rd Edition including updates IVA and IVB
- 4) Hach Water Analysis Handbook, 4th edition, 1992



# LABORATORY REPORT

EAI ID#: **211059**

Client: **Utility Service Group**

Client Designation: **Goodnow Tank 300,000 Elevated / Town of Framingham**

Sample ID:	RAC 151355 Exterior Paint	RAC 151355 Interior Wet					
Lab Sample ID:	211059.01	211059.02					
Matrix:	solid	solid					
Date Sampled:	5/26/20	5/26/20					
Date Received:	6/2/20	6/2/20					
Chromium	<b>30</b>	<b>22</b>	Analytical Matrix	Units	Date of Analysis	Method	Analyst
Lead	< 20	<b>6</b>	SolAsRec	mg/kg	6/3/20	6020	DS
			SolAsRec	mg/kg	6/3/20	6020	DS





**Sales Department  
Paint Chip Identification Request**

\*Date: 06/01/20  
 \*City or County: Framingham  
 \*State: MA  
 Customer: Town of Framingham  
 Tank Name: Goodnow Tank  
 Tank Type & Size: Elevated 300,000  
 USCI Sample No: RAC 151355  
 \*Submitted By: Rachel Coccia/Bryan Morrow  
 Employee Dept. No.: 319

(\*) Denotes Required Information for proper identification by Analytical Lab

To: **Tnemec Company Inc.**  
 101 W 26th Avenue  
 North Kansas City, MO 64116  
 Attn: Technical Service Analytical Lab

**1. Interior Sample**

Sample Location: (i.e.: Roof, Sidewall, Floor) Interior Wet  
 This sample should reflect the majority of the tested area, please avoid Touch-Up areas.  
 Topcoat Color that needs to be identified: White  
 FTIR Generic Topcoat Analysis: Epoxy

**2. Exterior Sample**

Sample Location: (i.e.: Roof, Sidewall, Floor) Shell  
 This sample should reflect the majority of the tested area, please avoid Touch-Up areas.  
 Topcoat Color that needs to be identified: White  
 \* Please check for clear coat:  
 FTIR Generic Topcoat Analysis: Fluoro polymer

**3. Additional Sample**

Sample Location: (i.e.: Roof, Sidewall, Floor) 0  
 This sample should reflect the majority of the tested area, please avoid Touch-Up areas.  
 Topcoat Color that needs to be identified: 0  
 FTIR Generic Topcoat Analysis: \_\_\_\_\_

Analytical Use Only: 

1	2	3

 No evidence of coating. (Inorganic/Rust Material)  
 Missing Information.  
 Not enough samples in bag for proper identification.

Fax Results To: Lara Anderson, Sales Coordinator @ 478-987-2991

Email to: **Bryan Morrow**      bryan.morrow@suez.com  
**Lara Anderson**      lara.anderson@suez.com  
**Rachel Coccia**      rachel.coccia@suez.com

**Utility Service Company Inc**

Scott Kelley

24 Fellow Rd

Brentwood, NH 03833

Scott.Kelley@suez.com



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# **Merriam Hill 3,000,000 Gallon Ground Storage Tank Inspection Report**

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Dept. of Public Works, Framingham, MA



**Prepared For:**

Blake D. Lukis

Director of Public Works

City of Framingham

150 Concord Street

Framingham, MA 01702

**Inspection Performed** May 27, 2020

## TANK DATA

<b>TANK NAME:</b>	Merriam Hill				
<b>TANK DESIGN:</b>	GST	<b>CONSTRUCTION TYPE:</b>	Welded Steel		
<b>LOCATION:</b>	35 Checkerberry Lane				
	<b>CITY:</b>	Framingham	<b>STATE:</b>	MA	
<b>CAPACITY:</b>	3,000,000	<b>HEIGHT:</b>	45'	<b>DIAMETER:</b>	115'
<b>BUILDER:</b>	CB&I	<b>YEAR:</b>	1962	<b>CONTRACT #</b>	NA
<b>EXT. COATING:</b>	Alkyd	<b>LEAD:</b>	44000 mg/kg	<b>CHROMIUM:</b>	6200 mg/kg
<b>INT. COATING:</b>	Epoxy	<b>LEAD:</b>	130 mg/kg	<b>CHROMIUM:</b>	20 mg/kg
<b>INSPECTOR(S):</b>	MA Service Center		<b>DATE:</b>	May 27, 2020	

## SUMMARY

Due to the extensive coating failure taking place along the exterior roof surfaces, as well as the extent and the aggressive nature of the corrosive activity taking place along the interior shell surfaces, consideration should be given to scheduling the tank for complete rehabilitation as soon as feasible to do so. At that time, it is recommended that the scope of work outlined below be performed as a minimum consideration.

## EXTERIOR COATING RECOMMENDATIONS

Due to age of the existing coating systems, the extensive coating degradation along the exterior roof surfaces and evidence of interfacial adhesion problems along the shell surfaces it is recommended that exterior surfaces of the tank, inclusive of all appurtenances, be abrasive blast cleaned to a SSPC-SP #6 Commercial blast grade followed by the application of a (4) coat Zinc/Epoxy/Urethane coating system which consists of (2) finish coats of an Acrylic polyurethane material. Laboratory analysis of the coatings has indicated that there are actionable levels of lead and chromium present within the exterior coatings therefore it will be necessary to completely encapsulate localized areas of the tank, if not the entire tank structure, within a class 1A containment structure during the abrasive blast cleaning operations so as not to adversely impact or contaminate the surrounding area or grounds. This containment structure should conform to the guidelines set forth within SSPC-Guide 6 (Guide for Containing Surface preparation Debris during Paint Removal Operations) with strict limits on emissions. Both pre and post soil sampling should be performed around the perimeter of the tank in order to determine existing, as well as, post maintenance soil conditions and air quality monitoring should be performed during the abrasive blast cleaning phase of the tank rehabilitation to ensure there is no impact to the surrounding community.

## INTERIOR COATING RECOMMENDATIONS

Due to the extent of blistering, delamination and complete failure to the substrate it is recommended that all interior surfaces, inclusive but not limited to, the roof, roof supporting structure, shell, and floor be completely abrasive blast cleaned to an SSPC-SP #10 Near-White Metal grade. The underside of the roof plates as well as the roof support structure should then receive (1) full coat of a NSF approved Zinc Primer applied at 2.5-3.5 mils, (1) stripe coat of a NSF approved high solids Epoxy applied at 4.0-6.0 mils to all lap seams angles and bolted connections followed by (2) full coats of the same Epoxy material applied at 3.0-5.0 mils per coat for a minimum DFT of 12.0 mils for the completed system. The shell and floor surfaces should receive (1) full coat of a NSF approved Zinc Primer applied at 2.5-3.5 mils, (1) stripe coat of a NSF approved high solids Epoxy applied at 4.0-6.0 mils to all weld seams angles and/or bolted connections followed by (1) coat of an NSF approved 100% solids Epoxy coating applied at 25-30 mils.

## STRUCTURAL RECOMMENDATIONS

The overall structural integrity of the subject tank still appears to be good however the aggressive nature of the corrosive activity along the shell surfaces would suggest the possibility of active metal loss in the form of pitting and/or loss of weldment both of which may require remedial repairs. It is therefore strongly recommended that provisions for welding repairs, such as linear welding and pit welding and/or plating, be incorporated within the scope of work to be performed. It is recommended that all areas of metal loss in the form of pitting representing a 35% or greater reduction in corresponding plate thickness along both the shell and floor surfaces be spot welded in such a manner so as to ensure 100% fusion with the base metal and bring the pit at least flush with the original plate surface. For the purpose of establishing base line costs it is recommended that a quantity of (500) pits be included in the scope of work to be performed, along with a unit cost per pit to be added or subtracted from the lump sum number based on the final count. There is also localized areas of heavy corrosion and stratified rust formations along the roof lap seams, the junctions with the roof rafters, as well as rafter connections to shell support clips which represent the areas with the greatest possibility of actionable metal loss to be present. Therefore provisions for linear welding and patch plates should also be included in the project specifications in order to address these potential issues as well. The shell is equipped with a single 18" x 24" oval shell manhole. At such time as the subject tank is scheduled for complete rehabilitation consideration should be given to installing a minimum of (1) additional shell manhole in order to aid in compliance with current OSHA Confined Space Regulations. It is recommended that this shell manhole be 30" in diameter and be equipped with a hinged or davit supported cover.

## SANITARY RECOMMENDATIONS

The roof is equipped with (82) 2" diameter rigging couplings of which are currently sealed. However, any and all rigging couplings which are found to be deteriorated and/or damaged to the degree in which they will not properly seal should be replaced as necessary prior to the completion of all scheduled cleaning and painting.

## SAFETY & SECURITY RECOMMENDATIONS

The existing ladder gate offers very little protection against unauthorized access to the roof due to the close proximity of the ladder to grade and the large spacing between the vertical slats of the ladder cage. It is therefore recommended that the ladder be cut off at a higher elevation and the existing ladder gate re-installed, or at least the bottom (2) sections of ladder cage be removed so as to allow for the installation of a new hinged ladder gate which completely encapsulates at least the bottom 8' of the access ladder and is capable of being locked in place. In addition, consideration should be given to replacing the existing fall prevention device on the ladder with a flexible cable system.

# WATER STORAGE TANK CONDITION ASSESSMENT REPORT

SUEZ Advanced Solutions

<b>Date:</b> 05/27/20	<b>Project:</b> 151359	<b>Task:</b> 1.01
<b>Tank Name:</b> Merriam Hill		
<b>Address:</b> 35 Checkerberry Lane	<b>City:</b> Framingham	<b>State:</b> MA
<b>County:</b> Middlesex	<b>Lat:</b> 42.279475	<b>Long:</b> -71.446946
<b>Capacity:</b> 3,000,000 gallons	<b>Tank Type:</b> GST	<b>Construction:</b> Welded Steel
<b>Height:</b> 45'	<b>Diameter:</b> 115'	<b>Yr Built:</b> 1962
<b>Exterior Last Painted:</b> Spotted 2011	<b>Exterior Color:</b> Sky Blue	<b>Interior Last Painted:</b> NR
		<b>Interior Color:</b> White



**Exterior Roof Conditions:** All questions are Yes / No / NA / NR unless listed (G/F/P) for Good / Fair / Poor / NA / NR

Tank Area	Item of Concern	Status	Comments
<b>Roof Coating</b>	Coating visual assessment? (G/F/P)	Poor	<b>Coating Type:</b> Alkyd <b>Lead Bearing:</b> Yes <b>DFT:</b> 7.8-17.75 mils The coatings along the exterior surfaces of the roof are in poor condition with severe weathering and extensive degradation resulting in widespread thinning, crazed cracking and coating delamination exposing several difference coating interfaces as shown in the attached photographs. In addition, at least 15% of the roof surfaces are also experiencing complete delamination resulting in the exposure of the steel substrate and medium to heavy surface rusting. This degradation represents only a slight progression since 2015
	Actionable checking / delamination?	Yes	
	Actionable corrosion / deterioration?	Yes	
	Is there any graffiti paint or etchings?	No	
	Coating adhesion assessment? (G/F/P)	Poor	
	Does soiling impact visual appearance?	No	
	Will antenna equipment impact recoat?	Yes	
<b>Roof Structure</b>	Structural visual assessment? (G/F/P)	Good	The overall structural and sanitary condition of the roof exterior surfaces appears to be very good with no aggressive corrosion, metal loss or unsealed penetrations evident.  The roof is equipped with (6) concentric rows of 2" diameter rigging couplings uniformly spaces throughout the roof. The couplings appear to be in sound structural condition and all are currently sealed with threaded plugs
	Are all plate seams sealed?	Yes	
	Significant pitting or metal loss visible?	No	
	Rigging holes / access ports sealed?	Yes	
	Other unsealed penetrations present?	No	
	Is the roof perimeter watertight?	Yes	
<b>Roof Vent</b>	Design meets state standards?	Yes	<b>Finial Stub OD:</b> 24" The roof is equipped with a freeze/vacuum resistant vent assembly bolted to a steel receiver flange. The vent, expanded metal screen as well as the screen and solid PVC pallets are all intact and in very good sanitary condition
	Screen intact?	Yes	
	Vacuum pallet functional?	Yes	
	Unsealed penetrations present?	No	
<b>Roof Access</b>	At least two hatches to WC present?	Yes	The roof is equipped with (5) 24" diameter roof hatches, each with raised necks and hinged, downward overlapping, lockable covers. All of the roof hatch assemblies were found to be intact, structurally sound and fully functional. All hatch covers were closed and secured with locks prior to and after this inspection
	Primary meets state standards?	Yes	
	Additional meet state standards?	Yes	
	All roof access points secured?	Yes	
	Antenna equipment affects roof entry?	No	
<b>Roof Safety</b>	Is there a roof ladder / stair present?	Yes	There is a fixed in place roof ladder which is intact, structurally sound and in generally good condition. The roof is equipped with a handrail assembly which is set back approximately 18' from the edge of the roof and extends around the outer peripheral of the roof. The handrail is 48" in height, intact, structurally sound however, the coatings are in poor condition as reported for the roof.
	Is there a guardrail system present?	Yes	
	Required fall arrest system present?	No	
	Are the roof FAA lights operational?	NA	

**Exterior Shell Conditions:** All questions are Yes / No / NA / NR unless listed (G/F/P) for Good / Fair / Poor / NA / NR

Tank Area	Item of Concern	Status	Comments
<b>Shell Coating</b>	Coating visual assessment? (G/F/P)	Poor	<b>Coating Type:</b> Alkyd <b>Lead Bearing:</b> Yes <b>DFT:</b> 13.07-22.59 The coatings along the shell surfaces are still providing an acceptable level of protection to the underlying steel surfaces however, the existing coatings, inclusive of previously spot cleaned and re-coated surfaces are exhibiting significant surface degradation and evidence of compromised inter-facial adhesion as indicated by scattered areas of top coat delamination. In addition, adhesion testing revealed weak adhesion at different interfaces suggesting that these surfaces no longer provide a suitable substrate for additional spot maintenance and overcoating.
	Actionable checking / delamination?	Yes	
	Actionable corrosion / deterioration?	No	
	Logo visual assessment? (G/F/P)	NA	
	Is there any graffiti paint or etchings?	No	
	Coating adhesion assessment? (G/F/P)	Poor	
	Does soiling impact visual appearance?	Yes	
	Will antenna equipment impact recoat?	Yes	

<b>Shell Structure</b>	Structural visual assessment? (G/F/P)	Good	The overall structural integrity of the shell exterior surfaces appears to be very good with no aggressive corrosion, metal loss or leaks evident.  The top shell ring is equipped with a painter's rail which also appears intact and structurally sound at least as viewed from the ground and the shell ladder. As previously reported during our past inspection, the rail is equipped with (2) rigging trolleys which appear intact however, functionality and safety is highly questionable therefore, the angle as well as trolleys should be closely inspected prior to use.
	Are all plate seams sealed?	Yes	
	Significant pitting or metal loss visible?	No	
	Unsealed penetrations present?	No	
	Floor plate extension condition? (G/F/P)	Good	
	Any active leakage observed?	No	
	Painter's angle or rigging rail present?	Yes	
<b>Foundation</b>	Structural visual assessment? (G/F/P)	Good	The concrete foundation was still found to be structurally sound with no appreciable degradation evident. The mastic sealer between the foundation and floor plate however is exhibiting significant degradation and/or is completely missing. At such time as the exterior surfaces of the subject tank are next maintained the existing mastic sealer should be completely removed and replaced with an elastomeric sealant
	Anchor bolt corrosion / separation?	NA	
	Grout or sealer in sound condition?	No	
	Does grade promote good drainage?	Yes	
	Failure or undermining of foundation?	No	
<b>Shell Access</b>	At least two manholes present?	No	The bottom shell ring is equipped with (1) 18" x 24" oval manhole with a reinforcement pad. The manhole assembly appears structurally sound and in good sanitary condition however, the hinge assembly which originally supported the cover when in the open position has been removed.
	Primary meets state standards?	No	
	Additional meet state standards?	NA	
	Structural damage / leakage visible?	No	
<b>Shell Safety</b>	Required shell ladder present?	Yes	<b>Safety Climb Type:</b> NA  The shell access ladder assembly is intact and structurally sound however, the coating is in only fair condition with evidence of scattered medium to heavy rusting taking place primarily along bolted connections of the cage and ladder support brackets. The ladder is equipped with what appears to be a non-conventional fall prevention system consisting of a galvanized flat bar material bolted to the ladder rungs. The manufacturer of this system is unknown and it was not determined if a safety sleeve assembly was available
	Required safety climb system present?	No	
	Is shell ladder equipped with a cage?	Yes	
	Are there rest platforms present?	Yes	
	Actionable corrosion / deterioration?	Yes	
	Functional security gate present?	Yes	
	Do antennas / cables impact climbing?	No	
<b>Overflow</b>	Extends to near ground level?	Yes	<b>Pipe OD:</b> 10"  The shell is equipped with a sealed weir box and overflow pipe assembly which extends down to within 12" of grade, then travels above grade to a drainage basin where it discharges through a 90 degree elbow only 3" above the basin grating. The overflow assembly appears intact and structurally sound however, the coating is exhibiting some degradation and rusting particularly along the U-bolts which secure the pipe to the shell support brackets. The discharge opening of the pipe is fitted with a rubber boot and an expanded aluminum outer screen and a stainless steel inner fine mesh screen which appears to be torn.
	External weir box sealed / secured?	Yes	
	Actionable corrosion / deterioration?	No	
	Unsealed penetrations present?	No	
	Required air gap present?	Yes	
	Screen is intact or was replaced?	Yes	
	Flapper is functional or was replaced?	NA	
	Drain, spillway or rip-rap present?	Yes	

**Interior Roof Conditions:** All questions are Yes / No / NA / NR unless listed (G/F/P) for Good / Fair / Poor / NA / NR

Tank Area	Item of Concern	Status	Comments
<b>Roof Coating</b>	Coating visual assessment? (G/F/P)	Good	<b>Coating Type:</b> Epoxy <b>Lead Bearing:</b> No <b>DFT:</b> 9.11-59.19  The coatings along the underside of the roof are in generally good condition with 90% of the coatings still intact. The remaining surfaces are exhibiting scattered areas of medium to heavy rust and stratified rust formations along lap seams and unsealed junctions with roof supporting structure as well as the roof to shell junction. There also appears to be a significant degree of corrosion along the top face of the bottom rafter flanges and connections with the shell.
	Actionable blistering / delamination?	No	
	Actionable corrosion / deterioration?	No	
	Coating adhesion assessment? (G/F/P)	Fair	
	Rafter visual assessment? (G/F/P)	Good	
	Roof to shell junction? (G/F/P)	Good	
<b>Roof Structure</b>	Structural visual assessment? (G/F/P)	Good	The overall structural integrity of the roof plates and roof support structure still appears to be good however, evidence of at least localized areas of heavy stratified rust formations along areas noted above suggest the strong probability that at least slight to moderate metal loss may be taking place along the affected surfaces. The potential for metal loss was noted during our last inspection and it appears to have at least noticeably progressed since that inspection
	Are all plate seams sealed?	Yes	
	Significant metal loss on plates visible?	No	
	Significant metal loss on rafters visible?	No	
	Roof bolted connections sound?	Yes	
	Light leaks visible from the interior?	No	

**Interior Shell & Floor Conditions:** All questions are Yes / No / NA / NR unless listed (G/F/P) for Good / Fair / Poor / NA / NR

Tank Area	Item of Concern	Status	Comments
<b>Shell &amp; Floor Coatings</b>	Coating visual assessment? (G/F/P)	Fair	<b>Coating Type:</b> Epoxy <b>Lead Bearing:</b> NR <b>DFT:</b> NR  Coatings along the shell interior are exhibiting scattered areas of failure resulting in medium to heavy rust and rust tubercle formations occurring along weld seams and main plate surfaces mostly within the bottom (5) shell rings.
	Actionable blistering / delamination?	No	
	Actionable corrosion / deterioration?	Yes	
	Coating adhesion assessment? (G/F/P)	Fair	
<b>Shell &amp; Floor Structure</b>	Structural visual assessment? (G/F/P)	Good	The shell interior surfaces appear to be in good structural condition however, there is potential for scattered areas of at least slight to moderate metal loss as well as at least isolated areas of significant metal loss all primarily in the form of pitting along both main plate surfaces and weld seams as shown in attached photographs.  The floor surfaces were covered in less than 2" of sediment which impeded detailed visual inspection of these surfaces however, our last inspection of 2015 did reveal what appeared to be rust tubercles protruding up through the silt at that time. This would suggest the probability of active corrosion and potential metal loss along the floor surfaces as well.
	Are all plate seams sealed?	Yes	
	Significant pitting or metal loss visible?	No	
	Column or wall conditions? (G/F/P)	NA	
	Shell to floor junction? (G/F/P)	Good	
	Fill line opening in sound condition?	Yes	
	Is there a silt stop present?	Yes	
	Is a separate floor drain present?	No	
<b>Shell Safety</b>	Is an interior shell ladder present?	No	<b>Safety Climb Type:</b> NA  The interior of the shell is not equipped with an access ladder nor is one required or recommended
	Required safety climb system present?	NA	
	Actionable corrosion / deterioration?	NA	
	Internal balcony or platform present?	No	
<b>Water Quality</b>	Water quality visually acceptable?	Yes	The water supply is exhibiting slight to moderate turbidity however there is only very slight staining or sediment along the shell surfaces expect for the bottom ring which was exhibiting moderate staining and light sediment clinging to the surfaces. The floor was uniformly covered in what appeared to be less than a 2" layer of light silt
	Significant staining or biofilm present?	Yes	
	Significant floor sediment present?	Yes	
	Is there a mixing system present?	No	
	Is there a cathodics system present?	No	
	Is there a level indicator present?	No	

**Site Conditions:** All questions are Yes / No / NA / NR unless listed (G/F/P) for Good / Fair / Poor / NA / NR

Tank Area	Item of Concern	Status	Comments
<b>Site</b>	Is site equipped with a security fence?	Yes	The perimeter fence appears to be generally intact however, there is some barbed wire along the top of the fence where is broken and/or missing.  There is medium to heavy rusting present along 15-20% of the pipe and valve surfaces located within the vault.  The free standing enclosure located at the base of the tank houses a sample tap. The enclosure was locked prior to inspection and was not opened during this inspection.
	Any signs of damage to the fence?	Yes	
	Are fence gates secured with locks?	Yes	
	Is a vault or pump house present?	Yes	
	Sample tap onsite?	Yes	
	Is there telemetry / SCADA onsite?	Yes	
	Is there non-tank pooling water onsite?	No	
	Is there electrical service onsite?	Yes	
	Are there power lines near the tank?	No	
	Is there a non-tank water source onsite?	No	
	Is the tank located in a coastal area?	No	
	Site utility during tank rehab (G/F/P)?	Good	

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Overall view of the Merriam Hill 3.0MG GST located in Framingham, MA



Roof exterior: showing roof equipped with an aluminum freeze/vacuum resistant vent assembly



Roof exterior: showing finial vent assembly to be in very good structural and sanitary condition



Roof exterior: showing finial vent internal screened pallet to be intact and in very good condition



Roof exterior: showing vacuum pallet within finial vent to be properly seated



Roof exterior: showing center stub of the finial vent to be 24" inside diameter

**Merriam Hill 3.0MG GST located in Framingham, MA  
Inspection conducted 05/27/20**



Roof exterior: showing rigging plugs within center dollar plate to be in sound structural and sanitary condition



Roof exterior: showing paint sample being procured from roof ladder surfaces



Roof exterior: showing roof access ladder to be intact and structurally sound



Roof exterior: showing extent of coating degradation and rusting taking place along roof plate and handrail surfaces



Roof exterior: showing extent of coating degradation and rusting taking place along roof plate and handrail surfaces



Roof exterior: showing extent of coating degradation and rusting taking place along roof plate and handrail surfaces

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Roof exterior: showing extent of coating degradation and rusting taking place along roof plate and handrail surfaces



Roof exterior: showing extent of coating degradation and rusting taking place along roof plate and handrail surfaces



Roof exterior: showing extent of coating degradation and rusting taking place along roof plate and handrail surfaces



Roof exterior: showing extent of coating degradation and rusting taking place along roof plate and handrail surfaces



Roof exterior: showing extent of coating degradation and rusting taking place along roof plate and handrail surfaces



Roof exterior: showing extent of coating degradation and rusting taking place along roof plate and handrail surfaces

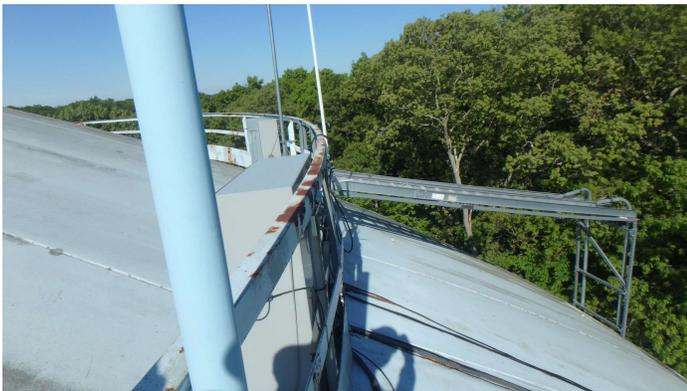
**Merriam Hill 3.0MG GST located in Framingham, MA**  
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Roof exterior: showing extensive coating failure and corrosion along handrail surfaces



Roof exterior: showing extensive coating failure and corrosion along handrail surfaces



Roof exterior: showing extensive coating failure and corrosion along handrail surfaces



Roof exterior: showing conduit mounted to cable tray which is intact and structurally sound



Roof exterior: showing extensive coating degradation and soiling along surfaces outside of handrail



Roof exterior: showing the 1st of (5) roof hatches along the outer roof perimeter all noted to be intact and structurally sound

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Roof exterior: showing the 2nd of (5) roof hatches along the outer roof perimeter all noted to be intact and structurally sound



Roof exterior: showing the 3rd of (5) roof hatches along the outer roof perimeter all noted to be intact and structurally sound



Roof exterior: showing the 4th of (5) roof hatches along the outer roof perimeter all noted to be intact and structurally sound



Roof exterior: showing significant coating degradation revealing several different interfaces and the steel substrate



Roof exterior: showing crewman measuring coating thickness



Roof exterior: coatings along roof measured between 7.87 to 17.75 mils

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Roof exterior: showing poor adhesion between finish coats however undercoats appear tight



Roof exterior: showing rigging coupling to be structurally sound and adequately sealed by threaded steel plugs



Roof exterior: showing the 5th of (5) roof hatches along the outer roof perimeter all noted to be intact and structurally sound



Roof interior: showing recorded coating thickness between 9.11 to 59.19 mils



Roof interior: showing coatings along the roof plates to be in generally good condition



Roof interior: showing evidence of scattered medium to heavy rusting along support structure

**Merriam Hill 3.0MG GST located in Framingham, MA**  
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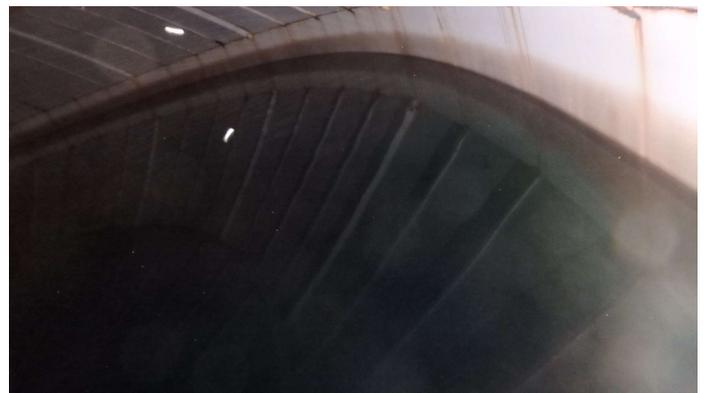
Roof interior: showing evidence of scattered medium to heavy rusting along support structure



Roof interior: showing evidence of heavy rust and stratified rusting along web and flanges of roof rafters



Shell interior: showing coating along top shell ring to be in generally good condition



Shell interior: showing coating along top shell ring to be in generally good condition



Roof interior: showing coatings along the roof plates to be in generally good condition as viewed from ROV



Roof interior: showing heavy corrosion taking place along bottom of rafter flanges and connections to shell

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Roof interior: showing heavy corrosion taking place along bottom of rafter flanges and connections to shell



Roof interior: showing evidence of extensive corrosion along the roof to shell junction



Shell interior: showing coatings to be in generally good condition with only light staining and soiling evident



Shell interior: showing coatings to be in generally good condition with only light staining and soiling evident



Shell interior: showing coatings to be in generally good condition with only light staining and soiling evident



Shell interior: showing coatings to be in generally good condition with only light staining and soiling evident

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Shell interior: showing coatings to be in generally good condition with only light staining and soiling evident



Shell interior: showing coatings to be in generally good condition with only light staining and soiling evident



Shell interior: showing scattered rust tubercle formations suggesting potential for metal loss in the form of pitting



Shell interior: showing scattered rust tubercle formations suggesting potential for metal loss in the form of pitting



Shell interior: showing scattered rust tubercle formations suggesting potential for metal loss in the form of pitting



Shell interior: showing localized areas of rust tubercles and pin-point rusting breaking through coating

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Shell interior: showing localized areas of rust tubercles and pin-point rusting breaking through coating



Shell interior: showing coating to be in generally good condition with no significant degradation evident



Shell interior: showing isolated areas of heavy rusting suggesting the potential for at least slight to moderate metal loss in the form of pitting



Shell interior: showing isolated areas of heavy rusting suggesting the potential for at least slight to moderate metal loss in the form of pitting



Shell interior: showing coating to be in generally good condition with no significant degradation evident



Shell interior: showing scattered areas of corrosion along horizontal weld seams

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Shell interior: showing scattered areas of corrosion along horizontal weld seams



Shell interior: showing scattered areas of corrosion along horizontal weld seams



Shell interior: showing scattered areas of corrosion along horizontal weld seams



Shell interior: showing scattered areas of corrosion along horizontal weld seams



Shell interior: showing coating to be in generally good condition with no significant degradation evident



Shell interior: showing coating to be in generally good condition with no significant degradation evident

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Shell interior: showing coating to be in generally good condition with no significant degradation evident



Shell interior: showing coating to be in generally good condition with no significant degradation evident



Shell interior: showing localized area of rust tubercles and pin-point rusting breaking through coating



Shell interior: showing localized area of rust tubercles and pin-point rusting breaking through coating



Shell interior: showing localized areas of rust tubercles and pin-point rusting breaking through coating



Shell interior: showing localized areas of pin-point rusting breaking through coating

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Shell interior: showing localized areas of rust tubercles and pin-point rusting breaking through coating



Shell interior: showing coating to be in generally good condition with no significant degradation evident



Shell interior: showing coating to be in generally good condition with no significant degradation evident



Shell interior: showing coating to be in generally good condition with no significant degradation evident



Shell interior: showing coating to be in generally good condition with no significant degradation evident



Shell interior: showing scattered medium to large rust tubercles along cover and neck of manhole

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Shell interior: showing scattered medium to large rust tubercles along cover and neck of manhole



Shell interior: showing presence of scattered rust tubercles formations along the bottom shell ring



Shell interior: showing rigging hook along bottom ring exhibiting localized corrosion



Shell interior: showing presence of scattered rust tubercles formations along the bottom shell ring



Shell interior: showing presence of scattered rust tubercles formations along the bottom shell ring



Showing a uniform layer of sediment and minor debris along the floor surfaces impeding visual assessment of the underlying surfaces

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Showing a uniform layer of sediment and minor debris along the floor surfaces impeding visual assessment of the underlying surfaces



Showing silt trap properly seated in place over inlet/outlet line



Showing silt trap to be intact, structurally sound and in generally fair to good condition



Roof exterior: showing roof hatch closed and locked post inspection



Roof exterior: showing roof hatch closed and locked post inspection



Shell exterior: showing access ladder assembly to be intact and structurally sound

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Shell exterior: showing bottom of access ladder cage equipped with a hinged, lockable security gate



Shell exterior: showing access ladder security gate closed and locked post inspection



Showing localized area of coating degradation and rusting along overflow pipe



Showing overflow pipe discharges directly over grated drainage basin



Showing discharge opening of overflow pipe fitted with and expanded metal screen and an interior fine mesh screen which is damaged



Showing overflow pipe discharging directly over the top of a grated drainage basin

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Showing evidence that spot maintenance has been performed along the shell exterior surfaces



Showing coatings along the shell exterior surfaces to be heavily weathered and soiled



Showing coatings and the exterior of the shell to still be providing sound protection to the underlying steel substrate



Showing scattered areas of cracked and delaminating top coats of paint along the shell exterior



Showing heavy soiling and mildew growth along the shell exterior



Showing coatings and the exterior of the shell to still be providing sound protection to the underlying steel substrate

**Merriam Hill 3.0MG GST located in Framingham, MA  
Inspection conducted 05/27/20**



Showing coatings and the exterior of the shell to still be providing sound protection to the underlying steel substrate



Showing scattered areas of cracked and delaminating top coats of paint along the shell exterior



Showing existing coatings along the shell exterior still providing adequate protection to the underlying steel surfaces



Showing shell manhole assembly to be in sound structural and sanitary condition



Showing shell manhole cover no longer supported by a hinged assembly



Showing evidence of scattered rusting along neck of shell manhole assembly

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Showing measured coating thicknesses along shell exterior to range from 13.07 to 22.59 mils



Showing adhesion testing being performed along the bottom shell ring



Showing adhesion testing being performed along the bottom shell ring



Adhesion testing along shell exterior indicating poor interfacial adhesion



Showing sealant along the floor to foundation to be in poor condition



Showing sealant along the floor to foundation to be in poor condition

**Merriam Hill 3.0MG GST located in Framingham, MA**  
**Inspection conducted 05/27/20**



Showing large areas of separation between floor plate and sealant



Showing large areas of separation between floor plate and sealant



Showing areas in which sealer between floor plate and foundation is completely missing



Showing piping within vault to be exhibiting scattered areas of corrosion



# Eastern Analytical, Inc.

professional laboratory and drilling services

Lara Anderson  
Utility Service Group  
PO Box 1350  
Perry, GA 31069-1330



Subject: Laboratory Report

Eastern Analytical, Inc. ID: 211060  
Client Identification: Merriam Hill 4,000,000 Ground Storage / Town of Framingham  
Date Received: 6/2/2020

Dear Ms. Anderson :

Enclosed please find the laboratory report for the above identified project. All analyses were performed in accordance with our QA/QC Program. Unless otherwise stated, holding times, preservation techniques, container types, and sample conditions adhered to EPA Protocol. Samples which were collected by Eastern Analytical, Inc. (EAI) were collected in accordance with approved EPA procedures. Eastern Analytical, Inc. certifies that the enclosed test results meet all requirements of NELAP and other applicable state certifications. Please refer to our website at [www.easternanalytical.com](http://www.easternanalytical.com) for a copy of our NELAP certificate and accredited parameters.

The following standard abbreviations and conventions apply to all EAI reports:

- Solid samples are reported on a dry weight basis, unless otherwise noted
- < : "less than" followed by the reporting limit
- > : "greater than" followed by the reporting limit
- %R : % Recovery

Eastern Analytical Inc. maintains certification in the following states: Connecticut (PH-0492), Maine (NH005), Massachusetts (M-NH005), New Hampshire/NELAP (1012), Rhode Island (269), Vermont (VT1012) and New York (12072).

The following information is contained within this report: Sample Conditions summary, Analytical Results/Data, Quality Control data (if requested) and copies of the Chain of Custody. This report may not be reproduced except in full, without the the written approval of the laboratory.

If you have any questions regarding the results contained within, please feel free to directly contact me or the chemist(s) who performed the testing in question. Unless otherwise requested, we will dispose of the sample (s) 30 days from the sample receipt date.

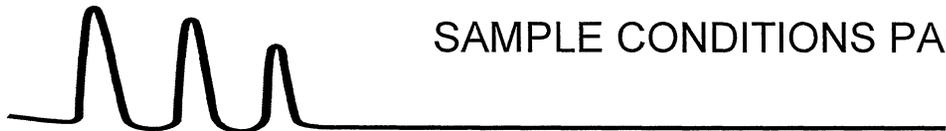
We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

*Lorraine Olashaw*  
Lorraine Olashaw, Lab Director

6.8.20  
Date

3  
# of pages (excluding cover letter)



# SAMPLE CONDITIONS PAGE

EAI ID#: 211060

Client: **Utility Service Group**

Client Designation: **Merriam Hill 4,000,000 Ground Storage / Town of Framingham**

Temperature upon receipt (°C): **24.3**

Received on ice or cold packs (Yes/No): **N**

Acceptable temperature range (°C): 0-6

Lab ID	Sample ID	Date Received	Date Sampled	Sample Matrix	% Dry Weight	Exceptions/Comments (other than thermal preservation)
211060.01	RAC 151359 Exterior	6/2/20	5/27/20	solid		Adheres to Sample Acceptance Policy
211060.02	RAC 151359 Interior	6/2/20	5/27/20	solid		Adheres to Sample Acceptance Policy

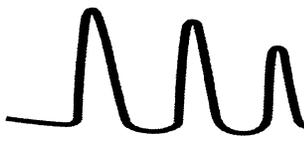
*Samples were properly preserved and the pH measured when applicable unless otherwise noted. Analysis of solids for pH, Flashpoint, Ignitability, Paint Filter, Corrosivity, Conductivity and Specific Gravity are reported on an "as received" basis.*

*Immediate analyses, pH, Total Residual Chlorine, Dissolved Oxygen and Sulfite, performed at the laboratory were run outside of the recommended 15 minute hold time.*

*All results contained in this report relate only to the above listed samples.*

*References include:*

- 1) EPA 600/4-79-020, 1983
- 2) Standard Methods for Examination of Water and Wastewater, 20th, 21st, 22nd & 23rd Edition or noted Revision year.
- 3) Test Methods for Evaluating Solid Waste SW 846 3rd Edition including updates IVA and IVB
- 4) Hach Water Analysis Handbook, 4th edition, 1992



# LABORATORY REPORT

EAI ID#: **211060**

Client: **Utility Service Group**

Client Designation: **Merriam Hill 4,000,000 Ground Storage / Town of Framingham**

Sample ID: RAC 151359 Exterior RAC 151359 Interior

Lab Sample ID:	211060.01	211060.02					
Matrix:	solid	solid					
Date Sampled:	5/27/20	5/27/20					
Date Received:	6/2/20	6/2/20					
Chromium	<b>6200</b>	<b>20</b>	Analytical Matrix	Units	Date of Analysis	Method	Analyst
Lead	<b>44000</b>	<b>130</b>	SolAsRec	mg/kg	6/3/20	6020	DS
			SolAsRec	mg/kg	6/3/20	6020	DS





**Sales Department  
Paint Chip Identification Request**

\*Date: 06/01/20  
 \*City or County: Framingham  
 \*State: MA  
 Customer: Town of Framingham  
 Tank Name: Merriam Hill  
 Tank Type & Size: Ground Storage 4,000,000  
 USCI Sample No: RAC 151359  
 \*Submitted By: Rachel Coccia/Bryan Morrow  
 Employee Dept. No.: 319

(\*) Denotes Required Information for proper identification by Analytical Lab

To: Tnemec Company Inc.  
 101 W 26th Avenue  
 North Kansas City, MO 64116  
 Attn: Technical Service Analytical Lab

**1. Interior Sample**

Sample Location: (i.e.: Roof, Sidewall, Floor) Interior  
 This sample should reflect the majority of the tested area, please avoid Touch-Up areas.  
 Topcoat Color that needs to be identified: White  
 FTIR Generic Topcoat Analysis: Epoxy

**2. Exterior Sample**

Sample Location: (i.e.: Roof, Sidewall, Floor) Exterior  
 This sample should reflect the majority of the tested area, please avoid Touch-Up areas.  
 Topcoat Color that needs to be identified: Green  
 \* Please check for clear coat:  
 FTIR Generic Topcoat Analysis: Alkyd

**3. Additional Sample**

Sample Location: (i.e.: Roof, Sidewall, Floor) 0  
 This sample should reflect the majority of the tested area, please avoid Touch-Up areas.  
 Topcoat Color that needs to be identified: 0  
 FTIR Generic Topcoat Analysis: \_\_\_\_\_

Analytical Use Only:

1	2	3

No evidence of coating. (Inorganic/Rust Material)  
 Missing Information.  
 Not enough samples in bag for proper identification.

Fax Results To: Lara Anderson, Sales Coordinator @ 478-987-2991

Email to: Bryan Morrow      bryan.morrow@suez.com  
 Lara Anderson      lara.anderson@suez.com  
 Rachel Coccia      rachel.coccia@suez.com