



CITY OF FRAMINGHAM

OFFICE OF THE CHIEF FINANCIAL OFFICER/
DIRECTOR OF ADMINISTRATION AND FINANCE

Jennifer Pratt
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MEMORIAL BUILDING
150 Concord Street, Room 123
Framingham, MA 01702

Memorandum

To: Dr. Yvonne M. Spicer, Mayor
Thatcher Kezer III, COO

From: Jennifer Pratt, Acting CFO

Date: September 29, 2021

Re: Appropriation Request in the amount of \$3,882,830.00 for Various Capital Projects (off the normal CIP cycle)

This is an appropriation request for various capital projects being brought forward off the normal Capital Improvement Cycle. There are three projects which include the Street Improvements to Rachel Road, Bonvini Drive, Sax Road and Harmony Lane; Farley School Roof Replacement and the Fleet Electrification Initiative which was recommended for FY22, but was not voted as approved by the City Council.

Appropriation Request of \$600,000 for Street Improvements to Rachel Road, Bonvini Drive, Sax Road and Harmony Lane

Based on an engineering review of the condition of Rachel Road, Bonvini Drive, Sax Road and Harmony Lane, the Department of Public Works (DPW) is requesting \$600,000 to accept these roads as public and to rehabilitate them to meet appropriate public road standards. The DPW recommends that the City Council appropriates the required funding concurrent with the public acceptance of the roads. Estimated cost for a 15 year bond at 2.9% is \$131,660.00.

Appropriation Request of \$3,108,400 for Farley Building Roof Replacement

The Farley Building roof system is in critically poor condition. In October 2020 a routine, full study and roof scan was performed by a consultant Gale Associates. This study found multiple deficiencies all pointing to a full system replacement. The school researched alternative funding sources such as the accelerated roof repair program offered by the MSBA, but this project does not meet the criteria required for approval of program funding. This project was requested by the School Department as part of their FY22 Capital Improvement Program, but was deferred. At that time the estimated cost was \$1,826,975 and due to various factors including inflation, increase in the cost of materials and labor, inclusion of structural analysis for future solar placement, and repairs to the copper roofs which were not included or needed in the initial FY22 request the estimated value to replace the roof is now \$3.1M with the expected costs only increasing over time and bringing this project to a more serious need to be addressed immediately. Estimated cost for a 15 year bond at 2.9% is \$682,087.00.



CITY OF FRAMINGHAM

Appropriation Request of \$174,430 for Fleet Electrification Initiative

This funding will support the deployment of public and fleet electric vehicle (EV) charging stations as well as the purchase of PHEVs and/or EVs to replace four (4) existing, inefficient fleet vehicles across the city specifically in the departments of Inspectional Services, Fire Department and the Public Works Department. The request includes eight (8) proposed EV charging ports at the locations of City Hall/Memorial Building, Fire Headquarters at 10 Loring Drive, and Public Works Headquarters at Western Avenue; with some of the ports being available for public use. The city will make all efforts to attain as much funding through various grant and incentive programs as possible to cover a portion of this project. Estimated cost for a 5 year bond at 2.9% is \$13,657.00.

This appropriation requires approval of the City Council and is on the City Council agenda for 10/05/2021.

Thank you for your consideration.

Additional information and a draft order is included as part of the background information.

CITY OF FRAMINGHAM
IN COUNCIL

ORDER NO. 2021-103-____

ORDERED: that \$3,882,830.00 is appropriated to pay costs of the following General Fund capital projects:

Department	Capital Project Name	Amount
Public Works	Street Improvements for Rachel Road, Bonvini Drive, Sax Road and Harmony Lane	\$600,000
Schools	Farley Building Roof Replacement	\$3,108,400
Facilities/Capital	Fleet Electrification Initiative	\$174,430

and for the payment of costs incidental and related thereto, to be spent under the direction of the Mayor or her designee, with the exception of the School Department projects, which will be spent under the direction of the School Superintendent or his designee; that the Mayor is authorized to acquire by gift, purchase or eminent domain, permanent easements and temporary construction easements or other interests in land for said projects; that the Mayor is authorized to take all actions necessary or convenient to carry out the purposes of this order; and, further, to meet this appropriation, the Treasurer is authorized, with the approval of the Mayor, to issue from time to time bonds or notes in such amount pursuant to the provisions of M.G.L. Chapter 44, or any other enabling authority. Any premium received by the City upon the sale of any bonds or notes approved by this vote, less any such premium applied to the payment of the costs of issuance of such bonds or notes, may be applied to the payment of costs approved by this vote in accordance with Chapter 44, Section 20 of the General Laws, thereby reducing the amount authorized to be borrowed to pay such costs by a like amount.

Introduced In City Council and Referred to Finance Committee: _____, 20__

Finance Committee Report Received by City Council: _____, 20__

Public Hearing Held: _____, 20__

Roll Call Vote of City Council Held: _____, 20__ (_____ yeas ([insert names of Councilors]), _____ nays ([insert names of Councilors]), _____ absent ([insert names of Councilors]))

Approved by the Mayor: _____, 20__

Mayor's Signature



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

508-532-6010
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www.framinghamma.gov

OPERATIONS CENTER
100 Western Avenue
Framingham, MA 01702

MEMORANDUM

Date: September 17, 2021

To: City Council

From: Eric Johnson, PE | FDPW

Copy: Mayor Yvonne M. Spicer, Thatcher Kezer III, Blake Lukis, William Sedewitz, Christopher Petrini, Amanda Zuretti, Kerry Reed

Re: Street Acceptances – September 2021

The Department of Public Works (DPW) is pleased to progress the street acceptance program. Roadways and streets that have not been formally accepted by the City as public roadways are not eligible for maintenance with public funds. As previously reported to the City Council, the intent of the current street acceptance program is to address roads that were constructed under subdivision control and that were intended to be accepted as public roads.

To support this effort, we respectfully request that the City Council consider an agenda item during their Council meeting on Thursday, September 23, 2021 to refer a capital request to the finance subcommittee and consider accepting the following roads as public: **Rachel Road, Bonvini Drive, Sax Road and Harmony Lane.**

Based on an engineering review of the condition of Rachel Road, Bonvini Drive, Sax Road and Harmony Lane, the DPW is requesting **\$600,000** to accept these roads as public and to rehabilitate them to meet appropriate public road standards. (Note: Capital requests for rehabilitation of Bonivini Drive, Sax Road and Harmony Lane were deferred by the Mayor's office in FY20 and FY22 and deferred by the City Council in FY21). The DPW recommends that the City Council appropriates the required funding concurrent with the public acceptance of the roads.

If the finance subcommittee deliberation and later City Council vote approves the capital request, then the City Council will hold a public hearing to refer the streets to the Planning Board and vote on the intention to layout these roads if it is in the public interest to accept the private roads as public ways, in accordance with the provisions of the General Laws of Massachusetts Chapters 79 and 82, and Chapter 410 of the Acts of 2014 ("Chapter 410"). Following a report by the Planning Board or after the passage of 45 days, whichever occurs first, the City Council would vote to adopt the layout of the roads. Following the second vote, the City Council would then submit a report of the City Council to the Mayor endorsing the street acceptances. This report will be prepared by the City Solicitor, be signed by both the City Council and the Mayor, and be recorded with the layout plans in the Registry of Deeds.

The DPW has advanced this program significantly over the last several years. There are a handful of streets constructed under subdivision control that remain to be accepted. We will address these roads as funding is available.

Please feel free to contact the Engineering Department if anyone has any questions or concerns.

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.

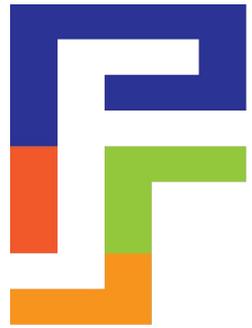
The Farley Building plays a vital role in the District's future vision. Starting in the summer of 2021, all central office Departments have begun relocating to the Farley Building. This includes,

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

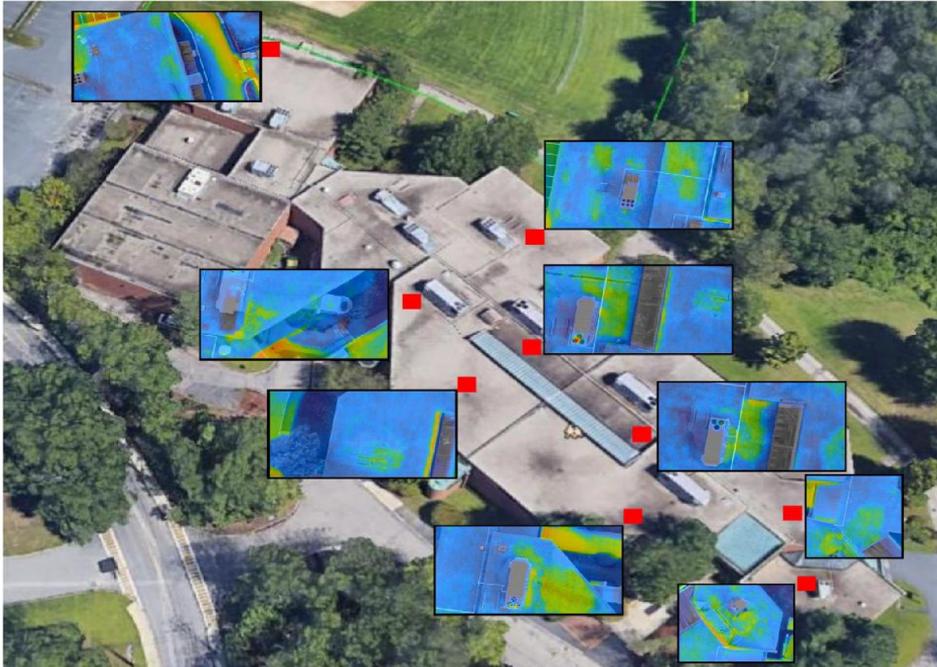
PUBLIC SCHOOLS

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



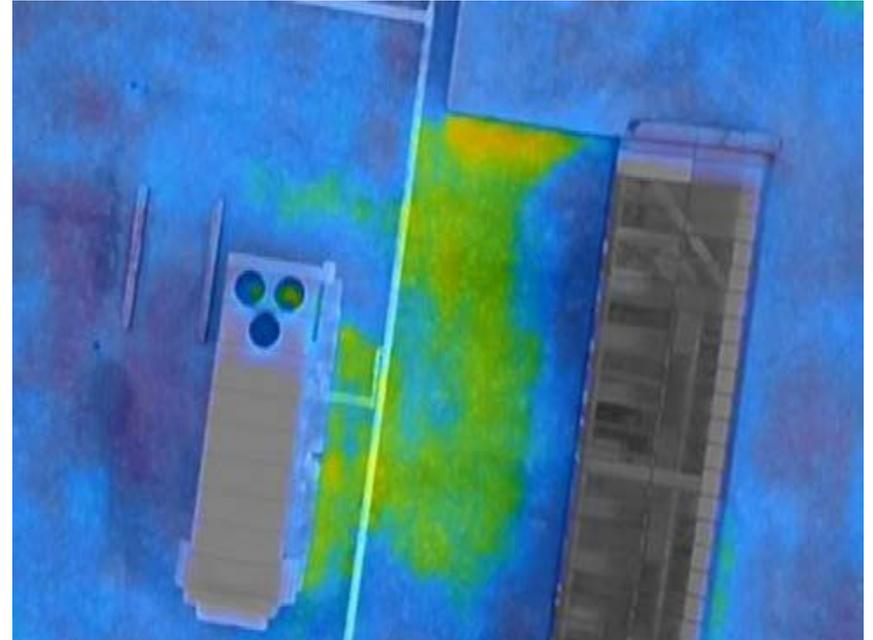
FARLEY BUILDING ROOF REPLACEMENT - \$3,108,400

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



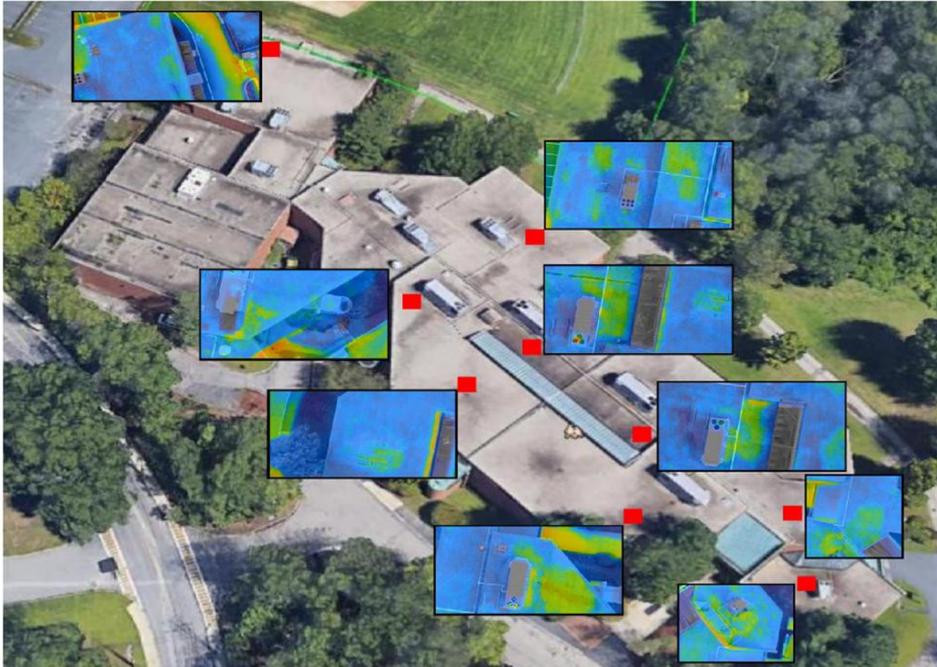
Framingham

PUBLIC SCHOOLS

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**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
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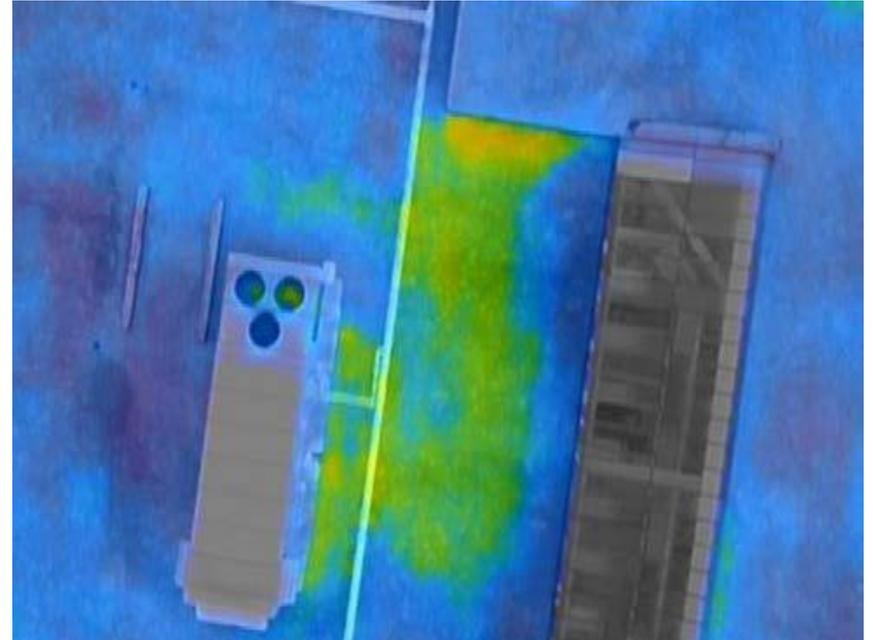
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FY2022 MID-YEAR CAPITAL

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FY2022 MID-YEAR CAPITAL



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FARLEY BUILDING ROOF REPLACEMENT - \$3,108,400
FY2022 MID-YEAR CAPITAL



Areas Where Plywood Siding Has Failed Due To Aging
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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

Prepared For:

**Mr. Matt Torti
Director of Buildings and Grounds
Framingham Public Schools
73 Mount Wayt Avenue, Suite 5
Framingham, MA 01702**



**ROOF SYSTEM EVALUATION
AT THE FARLEY MIDDLE SCHOOL
FRAMINGHAM PUBLIC SCHOOLS
73 MOUNT WAYT AVENUE, SUITE 5
FRAMINGHAM, MA 01702**

table of contents

1. Table of Contents	i
2. Executive Summary.....	1
3. Background	2
4. Visual Evaluation.....	3-4
5. Destructive Testing	4
6. Design Considerations	6-7
7. Discussion and Opinions	7

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.

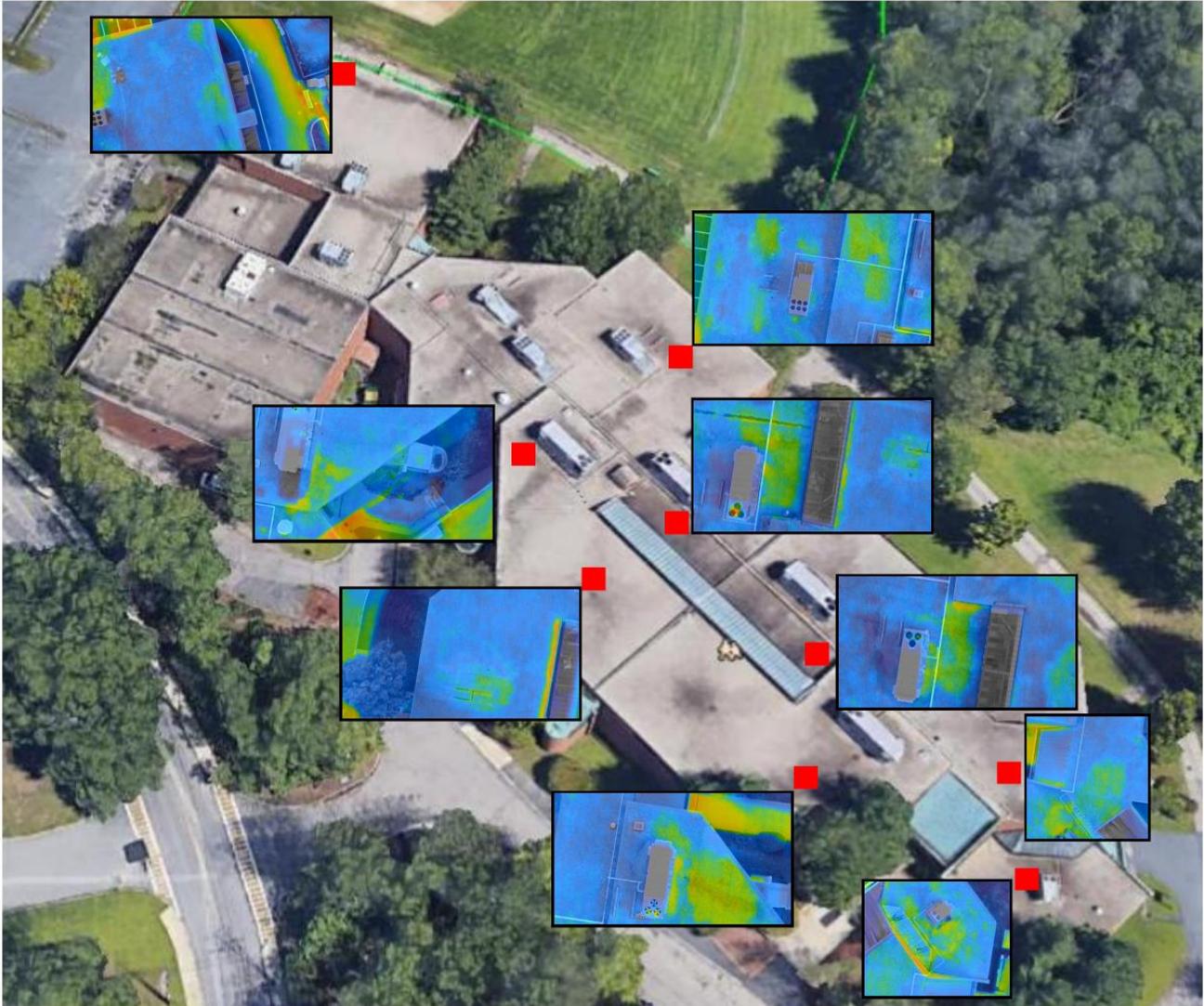


Figure 2: Farley Middle School Roof Area Plan with Infrared Images Overlaid

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.

Test Cut #	Roof Area	Observed Condition	
1	A	Wet	System damp at test cut location
2	A	Wet	System damp at test cut location. Moisture on metal deck
3	A	Dry	System components dry at test cut location
4	F	Dry	System components dry at test cut location
5	F	Wet	System damp at test cut location
6	E	Dry	System components dry at test cut location
7	G	Wet	System damp at test cut location
8	H	Wet	System damp at test cut location. Moisture on metal deck
9	H	Wet	System damp at test cut location
10	I	Dry	System components dry at test cut location
11	L	Wet	System damp at test cut location
12	J	Wet	System damp at test cut location. Moisture on metal deck
13	I	Wet	System damp at test cut location.

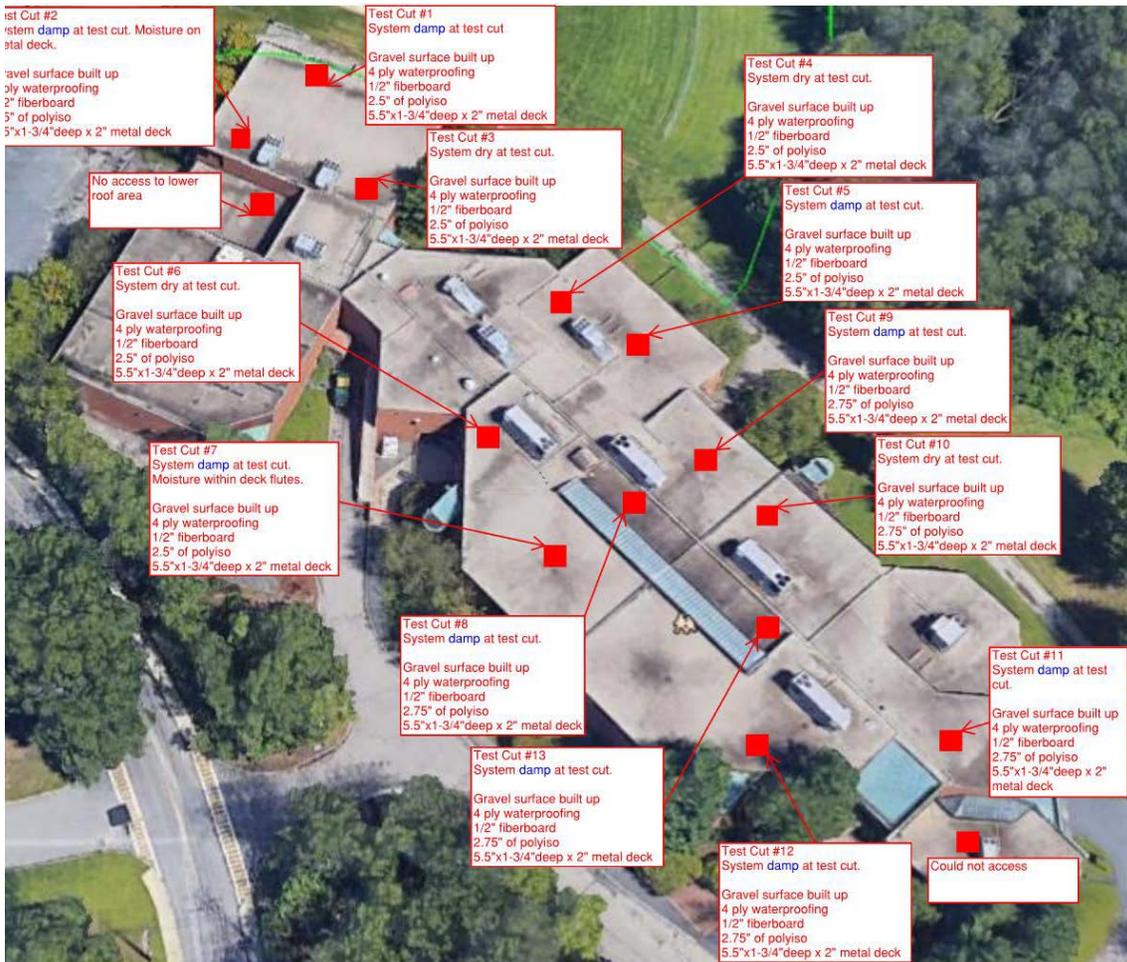


Figure 2: Framingham Farley School – Partial Roof Area Plan – Approximate Test Cut locations

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.

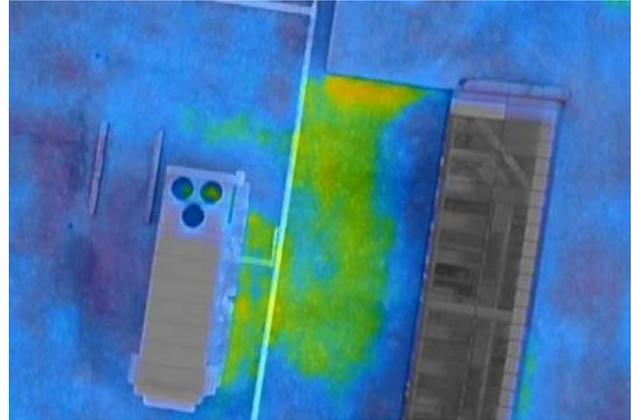


Photo 2 – Through the use of unmanned aerial drones equipped with infrared camera technology, Gale identified several areas with the potential of containing moisture within the roofing assembly.



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.



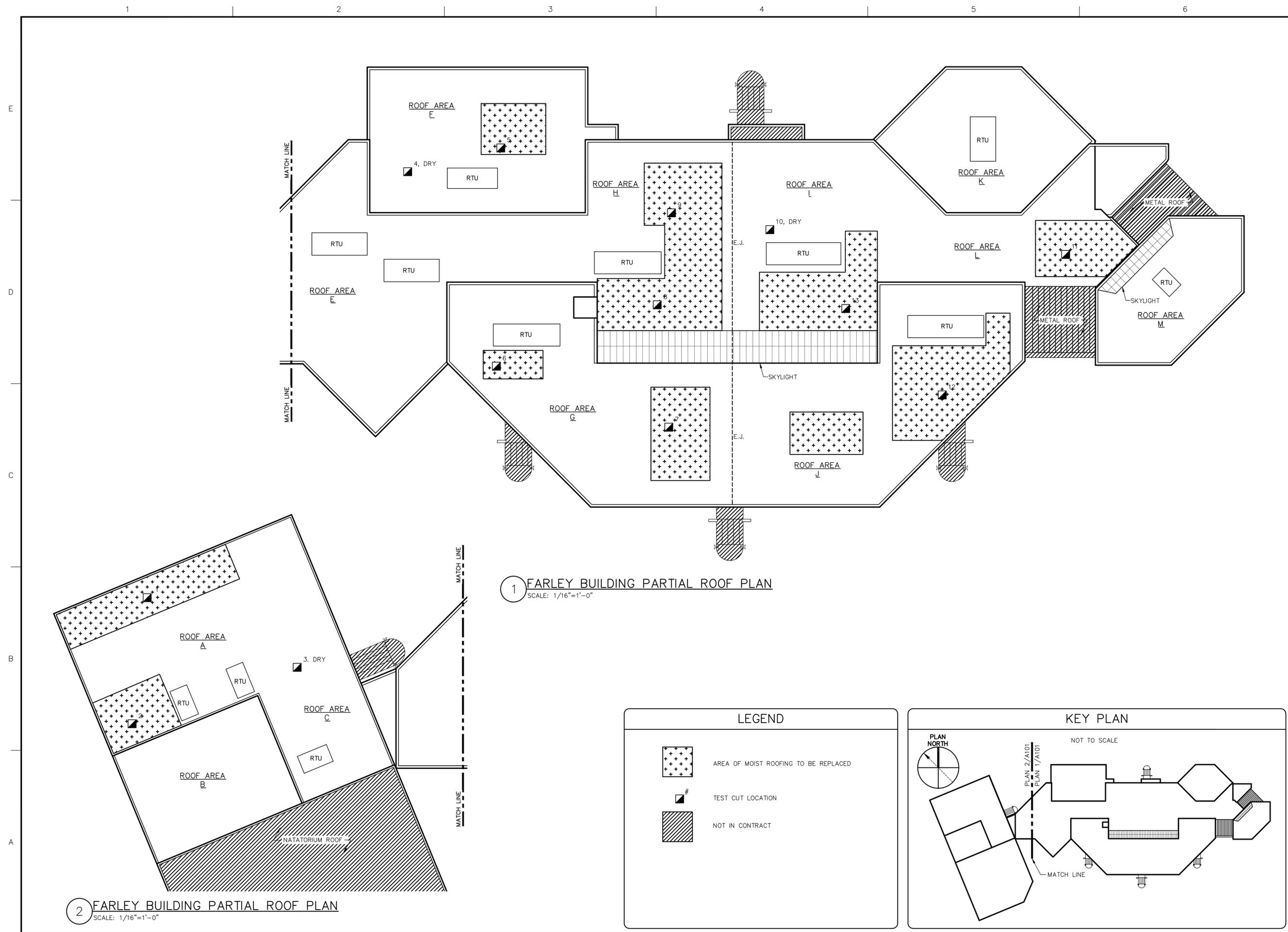
Photo 7 – Standing water was observed to be collecting within the flutes of the corrugated roof deck in select locations.



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

KEY PLAN
 NOT TO SCALE

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"		
GRAPHIC SCALE			
0 8' 16' 32'			

SHEET TITLE	
FARLEY BUILDING ROOF PLAN	
	DRAWING NO. A101

LEGEND

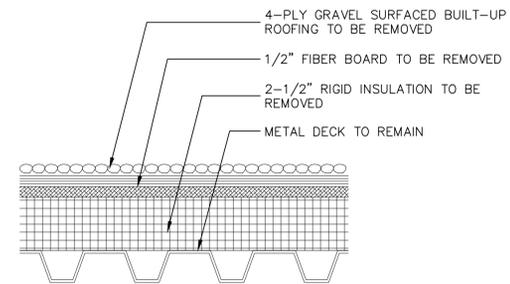
- ROOF EDGE
- E.J. EXPANSION JOINT
- LIGHTNING PROTECTION CABLE
- GUTTER WITH DOWNSPOUT
- MAIN ENTRANCE
- FAN
- LINE OF ROOF OR WALL BELOW OVERHANG
- TAPERED INSULATION SLOPE
- STRUCTURAL ROOF SLOPE
- LIGHTNING ROD
- CONDUIT
- RTU ROOF TOP MECHANICAL UNIT
- S SKYLIGHT
- SLEEPER
- J-VENT
- ROOF AREA NOT 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.

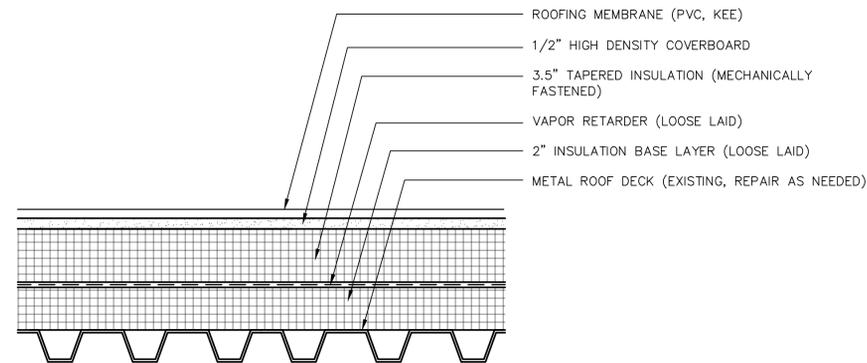
CODE INFORMATION

EXISTING ROOF CROSS SECTIONS

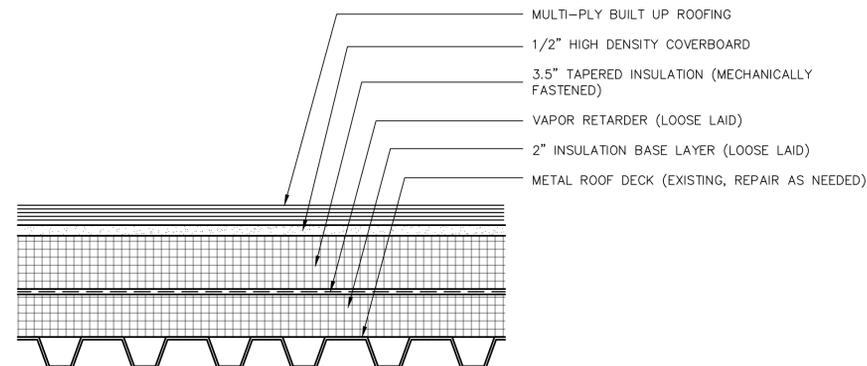


**FARLEY BUILDING
EXISTING ROOF CROSS SECTION**
SCALE: 3"=1'-0"
NOTE: ALL ITEMS ARE EXISTING.

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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Boston Baltimore Orlando Hartford

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PROJECT	OWNER
ROOF EVALUATION AT THE FARLEY BUILDING FRAMINGHAM, MA	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



FY 2022

Vehicle Electrification Initiative

Capital Projects and
Facilities Management



Vehicle Electrification Initiative



The requested funding will support the deployment of public and fleet electric vehicle (EV) charging stations as well as the purchase of PHEVs and/or EVs to replace existing, inefficient fleet vehicles across the Inspectional Services Department, Fire Department, and Department of Public Works.

FY 2022 Budget:

Recommended



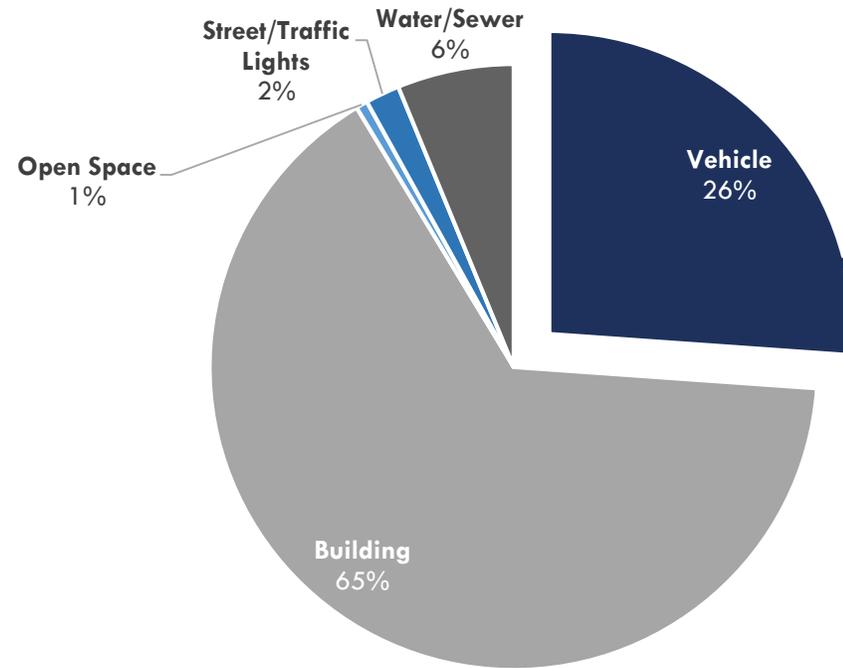
Updated Request:

\$174,429.65

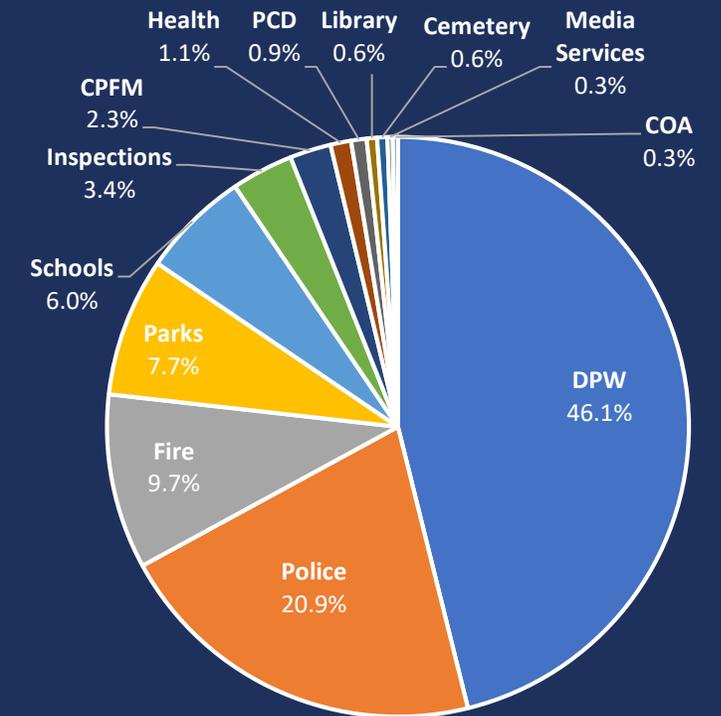




Municipal Vehicles: FY 2019 Energy Consumption and Fleet



Municipal Energy
Consumption by Use



Municipal Fleet Vehicles
by Department



Municipal EV Charging Network

Installed



12 Ports

- **Public**
 - Farm Pond Park
 - Fuller MS
 - McCarthy ES
 - Woodrow Wilson ES
- **Fleet**
 - DPW HQ

Proposed



8 Ports

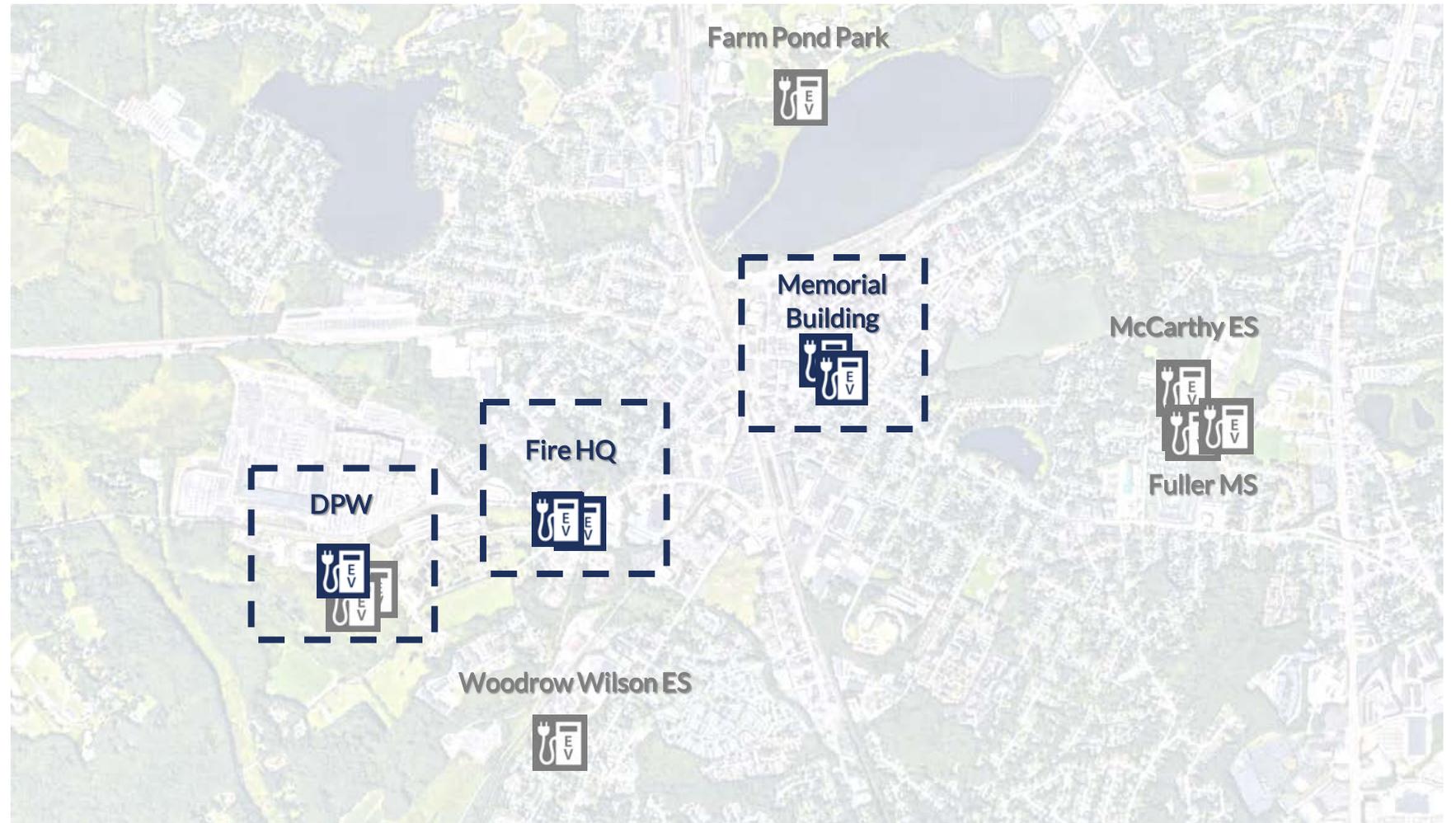
- **Public**
 - Memorial Building
- **Fleet**
 - Fire HQ
 - Memorial Building
 - DPW HQ

Municipal EV Charging Network

Proposed EV Stations



Existing EV Stations



Site Plan: Memorial Building



Site Plan: Fire Station Headquarters

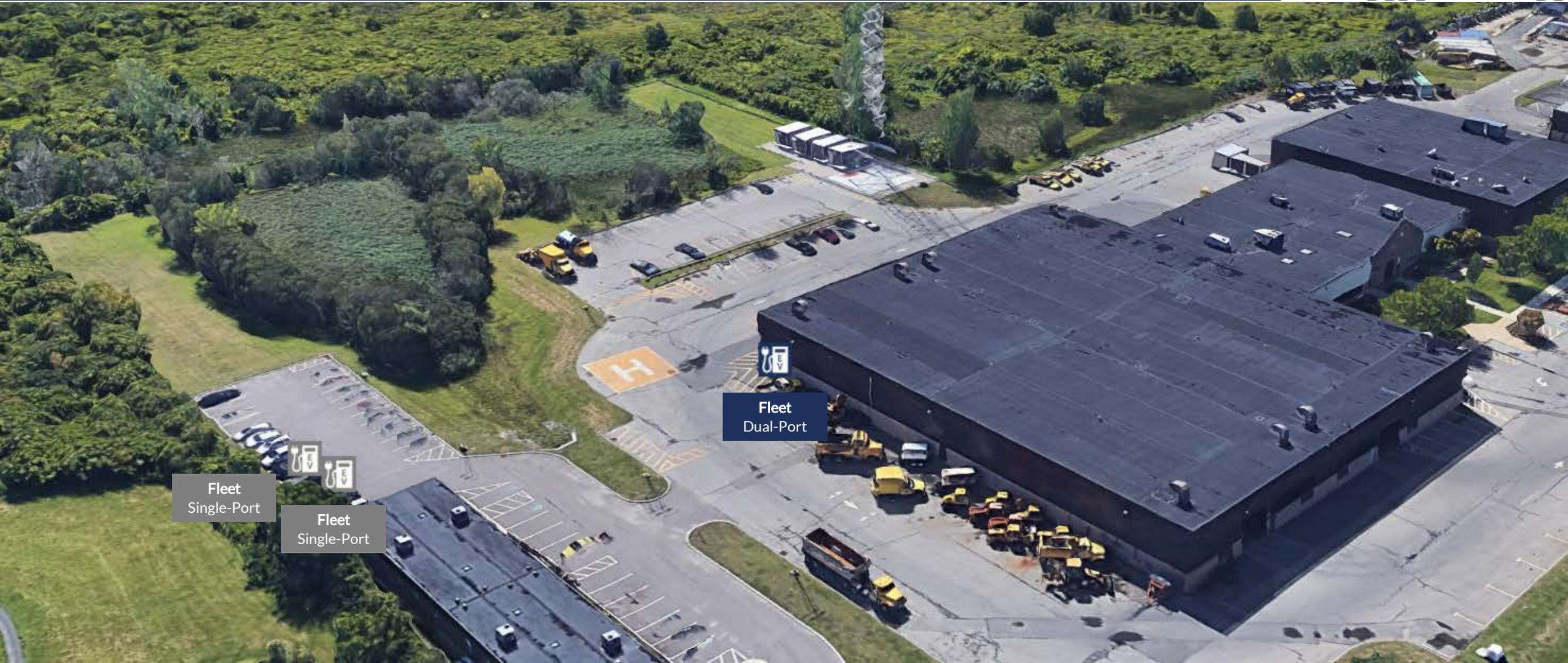


Fleet
Dual-Port



Fleet
Single-Port

Site Plan: DPW Headquarters





Existing Fleet Vehicles for Replacement

	Department	Division/Use	Year	Make & Model	Average MPG (FY 2019)
	Inspections	Inspector's Vehicle	2008	Ford Explorer	10.9
	Inspections	Inspector's Vehicle	2005	Ford Explorer	10.8
	DPW	Engineering Vehicle	2008	Ford Escape	12.7
	Fire	Station Vehicle	2008	Crown Victoria	6.2



Proposed Options for Replacements



VEH98 Pricing

	Chevy Bolt LT EV	Ford Escape PHEV
Costs		
Purchase Price	\$28,231.00	\$33,292.00
Annual Fuel	\$150.00	\$174.00
Annual Maintenance	\$93.00	\$90.00
Financing		
Mass EVIP Grant	(\$7,500.00)	(\$5,000.00)
Net Capital Cost	\$20,731.00	\$28,292.00
Long-Term O&M Costs	\$1,944.00	\$2,112.00
8-Year Cost	\$22,675.00	\$30,404.00

Compared to existing vehicles:



99 - 100%
reduction in gasoline
consumption



78 - 88% reduction
in total greenhouse gas
emissions (tailpipe and
upstream)



Comparison of Vehicles

Proposed Options for Replacements



Existing Vehicles



	Chevrolet Bolt LT EV	Ford Escape PHEV	2008 Ford Explorer	2008 Ford Escape	2008 Ford Crown Victoria	2005 Ford Explorer
EPA MPG / MPGe Rating	124	41/110	14	20	16	14
Vehicle Range (Miles)	268	38/492	N/A	N/A	N/A	N/A
Measured MPG <i>(MAPC Fleet Analysis Data)</i>	N/A	N/A	10.9	12.7	6.2	10.9
Tailpipe & Upstream GHG Emissions <i>(Grams/Mile)</i>	80	150	762	533	667	762
Annual Petroleum Consumption <i>(Barrels of Fuel)</i>	0	0.00238	4.7	3.3	4.1	4.7
Smog Scale <i>1 (Worst) - 10 (Best)</i>	10	10	6	5	5	1
Annual Fuel Cost*	\$150	\$174	\$550	\$350	\$450	\$550
Long-Term Fuel Cost <i>(8-Years)</i>	\$1,200	\$1,392	\$4,400	\$2,800	\$3,600	\$4,400



Grants & Incentives

Mass EVIP



EV Make Ready



- Provides grants for the purchase of electric vehicles (EVs) and plug-in hybrid electric vehicles (PHEVs) through a rolling application process on a first-come-first-serve basis.
 - Up to \$7,500 for EVs and \$5,000 for PHEVs.
- Provides grants to cover 60 – 100% of EV charging station and installation costs through a rolling application process on a first-come-first-serve basis.
- Depending on site location, EV Make Ready provides funding to cover EV infrastructure as well as EV charging stations for 100% of installation costs in a rolling application process.
- Phase 2 of the Eversource EV Make Ready Program is launching in 2022. Details are not yet finalized.

Project Budget

EV Charging Stations + Infrastructure	Stations	Total Capital Cost	Prospective Grant Funding	Net Capital Cost
Memorial Building	1 Dual-Port 1 Single-Port	\$15,253.25	\$5,551.56	\$9,701.69
Fire Station #3	1 Dual-Port 1 Single-Port	\$16,518.10	\$7,172.69	\$9,345.41
Department of Public Works	1 Dual-Port	\$9,490.30	\$4,177.34	\$5,312.96
Subtotal	8 Ports	\$41,261.65	\$16,901.59	\$24,360.06

Vehicles	Vehicles	Total Capital Cost	Prospective Grant Funding	Net Capital Cost
Vehicle Model: Ford Escape PHEV SE				
Memorial Building (<i>Inspectors' Vehicles</i>)	2 Vehicles	\$66,584.00	\$10,000.00	\$56,584.00
Fire Station #3 (<i>Station Vehicle</i>)	1 Vehicle	\$33,292.00	\$5,000.00	\$28,292.00
DPW Headquarters (<i>Engineering Vehicle</i>)	1 Vehicle	\$33,292.00	\$5,000.00	\$28,292.00
Subtotal	4 Vehicles	\$133,168.00	\$20,000.00	\$113,168.00

Total		Total Capital Cost	Prospective Grant Funding	Net Capital Cost
		\$174,429.65	\$36,901.59	\$137,528.06

Vehicle Electrification Initiative

Proposed EV Charging Station Sites

Memorial Building

Fleet/Public
Dual-Port

Public
Single-Port

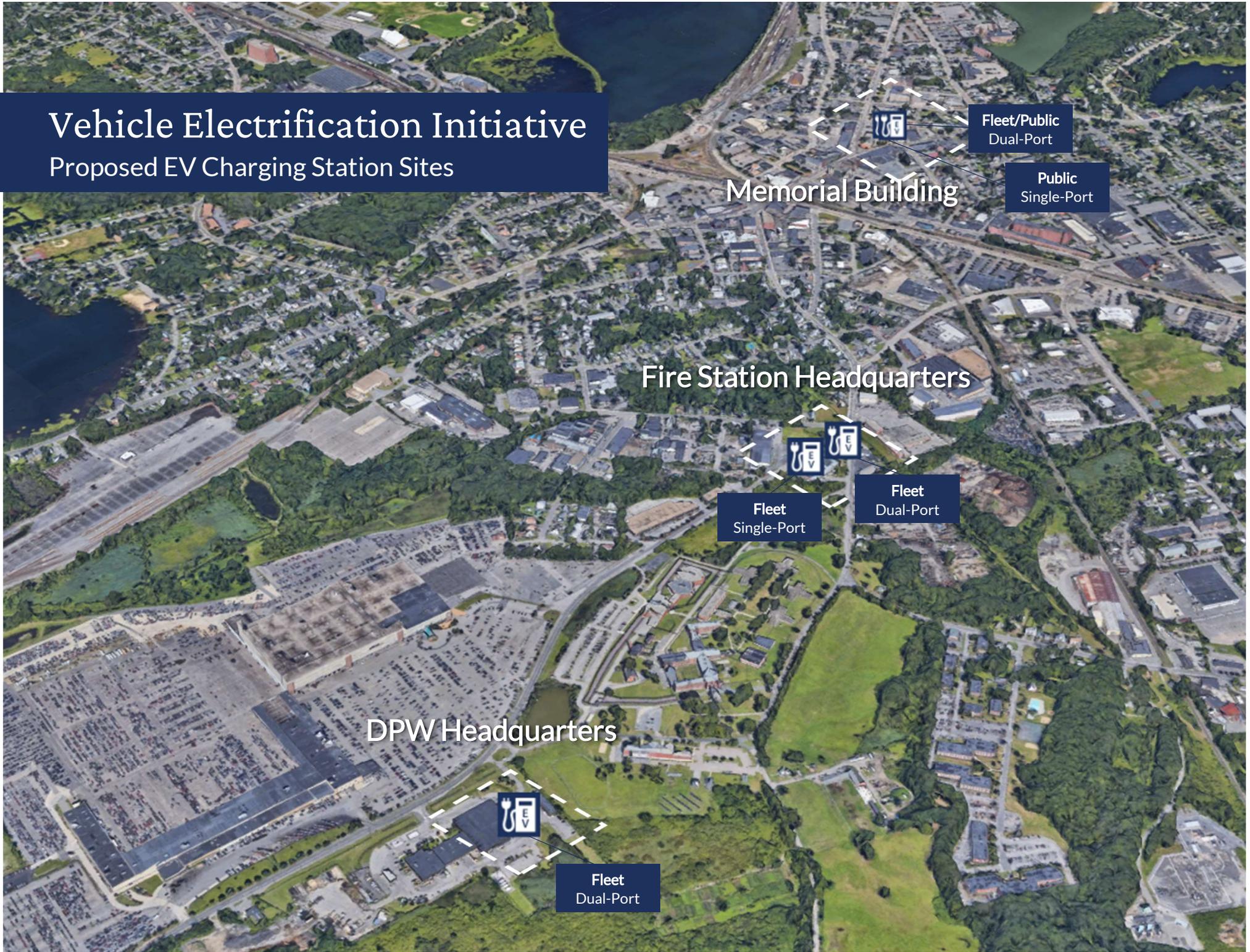
Fire Station Headquarters

Fleet
Single-Port

Fleet
Dual-Port

DPW Headquarters

Fleet
Dual-Port



Vehicle Electrification Initiative



Vehicle Electrification Initiative

The following attachments include pricing for equipment, materials, and labor required for the installation of EV charging stations and procurement of plug-in hybrid electric vehicles or electric vehicles.

CLIPPERCREEK, INC.

INNOVATIVE INFRASTRUCTURE FOR
ELECTRIC AND HYBRID VEHICLES



11850 Kemper Road Suite #E • Auburn, CA 95603 • (530) 887-1674 • Fax (530) 887-8527

www.clippercreek.net

Quotation
City of Farmingham
September 13, 2021

<i>Quantity</i>	<i>Product</i>	<i>Description</i>	<i>Retail Price (each)</i>	<i>Your Price (each)</i>	<i>Extended Cost</i>
2	Share2 Enabled HCS-40R (Ruggedized) Bundle	Charging Current: 32A charging max Vehicle Connector Type: J1772 connector Supply Power: 208/240V, 40A dedicated circuit Allows (2) HCS-40 units to share one dedicated 40A circuit Cable Length: 25 Feet Warranty: 5 Years Certifications: ETL, cETL, Energy Star Enclosure: NEMA 4; indoor/outdoor rated, fully sealed Dimensions: 19.7" L x 8.9"W x 5.3"D Installation: Hardwired Part# 0918-01-003-0900-14-000	\$1,698.00	\$1,698.00	\$3,396.00
4	ChargeGuard	HCS accessory kit, Lorlin, ChargeGuard access control, standard Part # 0900-08-000	\$78.00	\$78.00	\$312.00
1	HCS-40R	Charging Current: 32A charging Vehicle Connector Type: J1772 connector Supply Power: 208/240V, 40A dedicated circuit Cable Length: 25 Feet Warranty: 5 Years Certifications: ETL, cETL, Energy Star Enclosure: NEMA 4; indoor/outdoor rated, fully sealed Dimensions: 19.7" L x 8.9"W x 5.3"D Installation: Hardwired Part# 0918-01-003	\$665.00	\$665.00	\$665.00

CLIPPERCREEK, INC.

INNOVATIVE INFRASTRUCTURE FOR
ELECTRIC AND HYBRID VEHICLES



11850 Kemper Road Suite #E • Auburn, CA 95603 • (530) 887-1674 • Fax (530) 887-8527

www.clippercreek.net

Quote Terms

ClipperCreek equipment pricing valid for 30 days.

This quote is for equipment only and does not include responsibility for the installation or any other ongoing services.

Sales confer no rights or interest to ClipperCreek, Inc. intellectual property.

All sales are FOB Auburn, California.

Any shipping costs provided are estimates only and are subject to change.

This quote does not include sales tax.

Terms: Pre-Pay with Wire transfer, Check, or Credit Card (processing fee of 3% will be added for credit card transactions over \$2,000, or for credit card payments for discounted items); Net 30 on credit approval.

ClipperCreek Commercial Terms and Conditions of Sale

All products are quoted and shipped under ClipperCreek, Inc. Terms and Conditions of Sale.

These terms are available for review at the following link:

<https://www.clippercreek.com/terms-conditions-sale/>

All sales are subject to the ClipperCreek, Inc. Terms and Conditions, which Terms and Conditions are referenced in this quote. By Signature below, I have received the document CLIPPERCREEK, INC. TERMS AND CONDITIONS and accept the Terms and Conditions in initiating a purchase order.

Signature of Acceptance

Shawn M. Luz

From: Anthony Barrile <duramaxconstruction@gmail.com>
Sent: Wednesday, September 8, 2021 1:31 PM
To: Shawn M. Luz <sluz@framinghamma.gov>
Subject: Re: Excavation + Paving for Project Under Consideration

Shawn,

The work at both buildings would be billed under the Item 999.6 Equipment and Operator.

Memorial Hall- Excavate, Backfill, and Pave approx. 30'. \$3,000.00

Fire Station- Excavate, Backfill, and Pave approx. 95'. \$5,500.00

Hope this helps.

Thanks,
TJB



Home > Shopping Cart

Shopping Cart 2 Products, 9 Items

Quick Add ▼



Split Core CTs

\$35.00

SKU: 10mm 50A (J&D)

Current Rating: 50A

Inner Diameter: 10mm

Quantity:

Amount: \$210.00

[Edit](#) [Save for Later](#) [Remove](#)



eGauge Core (EG4015)

\$549.00

SKU: EG4015 - 64E (eGauge)

Quantity:

Quantity discounts available ▼

Amount: \$1,647.00

Order Summary	
SUBTOTAL 9 ITEMS	\$1,857.00
Ship to: United States ✕	
Shipping	\$0.00
ESTIMATED TOTAL	\$1,857.00

[Proceed to Checkout](#)

Check out with



FLO Services USA, Inc.
 75 South Clinton Ave. Suite 510
 Rochester NY 14604
 855-543-8356

Created Date 08/09/2021
 Expiration Date 01/12/2021
 Quote Number 00015900

Prepared By Rose Lenoff
 Email rlenoff@flo.com

Contact Name Shawn Luz
 Email sluz@framinghamma.gov

Bill To Name City of Framingham, MA
 Bill To Massachusetts
 United States

Ship To Name City of Framingham, MA
 Ship To 150 Concord Street (Memorial Hall)
 Framingham, Massachusetts 01702
 United States

Product Code	Quantity	Product	Sales Price	Total Price
COCH602EA1-FL-P07	3.00	CoRe+ L2 Charging Station - Standard - 21 Feet	\$1,800.00	\$5,400.00
C+V1-ANCHOR	1.00	CoRe+ pedestal anchor kit for onsite made concrete base	\$115.50	\$115.50
COPE000002	1.00	CoRe+ pedestal for one or two charging stations. ADA. For CoRe+ 21 FT	\$550.00	\$550.00
SPG2002001-FL	3.00	Global management service for one station for 1 year	\$150.00	\$450.00
SP-GE-C+-04	3.00	Extended warranty for one CoRe+ charging station for 4 years	\$200.00	\$600.00
SP-TRANS	1.00	Shipping fees	\$170.00	\$170.00

Subtotal \$7,285.50
 Total Price \$7,285.50
 Grand Total \$7,285.50

Notes One FLO CoRe+ Single Station (Wall-mounted) & One CoRe+ Dual Pedestal-Mounted Station
 FLO Services USA Inc.

[The terms and conditions referenced in this quote govern the sale of the above-listed products and services. Any additional terms and conditions in purchaser's purchase order that conflict with, vary or add to the terms will be of no force and effect, unless FLO has agreed to accept those terms and conditions in advance and in writing.](#) (Ver. 1.0)

- By placing your order, you CONFIRM your acceptance of the terms and conditions set out below.
- Please indicate the number of the present quote on your order.
- Prices are in US dollars and applicable taxes are extra.
- Payment terms are Net 30 upon approved credit.
- Unless otherwise specified the Incoterm is EXW Shawinigan (plant).
- The delivery time will generally be: SmartTWO / CoRe+ (4 weeks), SmartTWO curbside (8-10 weeks), SmartDC (4 months) or less. - The delivery time will be confirmed upon acceptance of the order.
- This quote is valid for a period of 30 days from its date of issue. The installation is not included.
- [The basic warranty of the products included in this quote is 1 year, and the extended warranty \(if any\) is consecutive to the basic warranty. Click here to access our Documentation Center where you can download a copy of our Limited Warranty.](#) (L2 Ver. 3.1)
- [If your order includes one or more services from the Global Management Service, for one or more Charging station\(s\), please note that your order confirmation also confirms the acceptance of the Global Management Service. Click here for details.](#) (Ver. 1.0)
- Click below to download the installation Guides allowing the customer to install the product properly, to ensure the validity of the warranty. [SmartTWO, CoRe+, Pedestal CoRe+, Communication Gateway, Cascading: Circuit 40A / Circuit150A.](#)



EW - FRAMINGHAM
 126 IRVING STREET
 FRAMINGHAM, MA 01702-7379
 508-620-2990
 Fax 508-620-2995

SOLD TO:

FRAMINGHAM BUILDING SERVICES
 150 CONCORD ST
 TOWN OF FRAMINGHAM
 FRAMINGHAM, MA 01702-8325



Acknowledgement

ORDER DATE	ORDER NUMBER	PAGE NO.
09/13/2021	S117746993	1 of 1
CUST PO#:	CITY HALL OPTION 2	
JOB/REL#:	JOE	

SHIP TO:

FRAMINGHAM BUILDING SERVICES
 150 CONCORD ST
 TOWN OF FRAMINGHAM
 FRAMINGHAM, MA 01702-8325

CUSTOMER NUMBER	CUSTOMER PHONE	ORDERED BY	SALESPERSON	
78693	508-532-5485	JOE CARON	HOUSE ACCOUNT	
WRITER	SHIP VIA	TERMS	SHIP DATE	FREIGHT EXEMPT
SETH SCIOTTO 860-522-3232	PICK UP	NET 15TH	09/14/2021	Yes
ORDER QTY	DESCRIPTION	UNIT PRICE	EXT PRICE	
100ft	PVC SCH 80 1" X 10' PIPE	234.700/c	234.70	
6ea	CLN UA9AFR-CTN 1" PVC SCH-40 90 DEGREE SWEEP ELBOW	151.840/c	9.11	
6ea	CLN UA7AF-CAR 1" PVC SCH-40 45 DEGREE ELBOW	42.030/c	2.52	
20ft	GALV 1" X 10' BLUE CAP	681.720/c	136.34	
1ea	MILB 6624-GSC3R-NK 2 3R SC WRWY NO KO	70.190/ea	70.19	
40ft	EMT 1-1/4" X 10'	421.040/c	168.42	
1ea	CRS LB45MTC 1-1/4" SERIES 5 ALUMINUM SET SCREW EMT/RIGID/IMC LB BODY W/COVER W/GASKET	1599.720/c	16.00	
2ea	BKUNL SQD QO230 2P 30A CIRCUIT BREAKER ***BREAKER BROKER***	32.050/ea	64.10	
70ft	EMT 3/4" X 10'	150.680/c	105.48	

Customer product returns for credit are subject to inspection and review prior to issuing credit. Material must be returned in resalable condition and all non-stock items are subject to restocking charges.

Subtotal	806.86
Shipping Chgs	0.00
Tax	0.00
Amount Due	806.86



EW - FRAMINGHAM
 126 IRVING STREET
 FRAMINGHAM, MA 01702-7379
 508-620-2990
 Fax 508-620-2995

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 TOWN OF FRAMINGHAM
 FRAMINGHAM, MA 01702-8325



Acknowledgement

ORDER DATE	ORDER NUMBER	PAGE NO.
09/13/2021	S117722979	1 of 2
CUST PO#:	FIRE STATION 3	
JOB/REL#:	JOE	

SHIP TO:

FRAMINGHAM BUILDING SERVICES
 150 CONCORD ST
 TOWN OF FRAMINGHAM
 FRAMINGHAM, MA 01702-8325

CUSTOMER NUMBER	CUSTOMER PHONE	ORDERED BY	SALESPERSON	
78693	508-532-5485	JOE CARON	HOUSE ACCOUNT	
WRITER	SHIP VIA	TERMS	SHIP DATE	FREIGHT EXEMPT
SETH SCIOTTO 860-522-3232	PICK UP	NET 15TH	09/23/2021	Yes
ORDER QTY	DESCRIPTION	UNIT PRICE	EXT PRICE	
130ft	PVC SCH 40 2" X 10' PIPE	299.690/c	389.60	
2ea	CLN UA9AJ 2" PVC SCH-40 90 DEGREE SWEEP ELBOW	362.070/c	7.24	
2ea	CLN E958J 2" PVC END CAP	414.830/c	8.30	
1ea	HIGHLI 1320H-1G2GE2 HDPE HANDHOLE 14X20X12 GREEN ELECTRIC COVER W/ 1 HEX BOLT	90.230/ea	90.23	
130ft	PVC SCH 40 3/4" X 10' PIPE	98.610/c	128.19	
2ea	CLN UA9AE 3/4" PVC SCH-40 90 DEGREE SWEEP ELBOW	89.760/c	1.80	
1ea	CLN E986E-CAR 3/4" PVC TYPE LB CONDUIT BODY	422.650/c	4.23	
2ea	MILB 12124-SC1-NK N1 SC BOX NO KO	24.380/ea	48.76	
10ft	EMT 2" X 10'	603.870/c	60.39	
2ea	CRS 455 2" STEEL SET SCREW EMT CONNECTOR	270.030/c	5.40	
2ea	CRS 465 2" STEEL SET SCREW EMT COUPLING	297.820/c	5.96	
2ea	GED THQB2130 30A 2P BOLT-ON 10KIC 120/240V CIRCUIT BREAKER	39.650/ea	79.30	
500ft	WCU THHN 10 CU STR BLACK 500' SPOOL	362.400/m	181.20	
500ft	WCU THHN 10 CU STR GREEN 500' SPOOL	362.400/m	181.20	
500ft	WCU THHN 10 CU STR RED 500' SPOOL	362.400/m	181.20	

** Continued on Next Page *

Subtotal	
Shipping Chgs	
Tax	
Amount Due	



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Acknowledgement

ORDER DATE	ORDER NUMBER	PAGE NO.
09/13/2021	S117722979	2 of 2
CUST PO#:	FIRE STATION 3	
JOB/REL#:	JOE	

SHIP TO:

FRAMINGHAM BUILDING SERVICES
 150 CONCORD ST
 TOWN OF FRAMINGHAM
 FRAMINGHAM, MA 01702-8325

CUSTOMER NUMBER	CUSTOMER PHONE	ORDERED BY	SALESPERSON	
78693	508-532-5485	JOE CARON	HOUSE ACCOUNT	
WRITER	SHIP VIA	TERMS	SHIP DATE	FREIGHT EXEMPT
SETH SCIOTTO 860-522-3232	PICK UP	NET 15TH	09/23/2021	Yes
ORDER QTY	DESCRIPTION		UNIT PRICE	EXT PRICE
1ea	CRS LB25MTC 3/4" SERIES 5 ALUMINUM SET SCREW EMT/RIGID/IMC LB BODY W/COVER W/GASKET		710.710/c	7.11
2ea	CRS 451 3/4" STEEL SET SCREW EMT CONNECTOR		39.880/c	0.80
60ft	EMT 3/4" X 10'		150.680/c	90.41
4ea	CRS TP403 4" SQ BOX 2-1/8" DEEP SQUARE CORNERS 1/2" & 3/4" KOS		176.510/c	7.06
6ft	LQT 3/4" UL GRAY METAL 500' REEL		168.630/c	10.12
2ea	CRS LT75 3/4" MALLEABLE IRON STRAIGHT LIQUIDTITE CONNECTOR		387.120/c	7.74

Customer product returns for credit are subject to inspection and review prior to issuing credit. Material must be returned in resalable condition and all non-stock items are subject to restocking charges.

Subtotal	1496.24
Shipping Chgs	0.00
Tax	0.00
Amount Due	1496.24

Framingham Fleet Efficiency Analysis

FEBRUARY 2021

Prepared for the **City of Framingham**
Prepared by the **Metropolitan Area Planning Council**
Funded by the **MA Department of Energy Resources**

Introduction

This memo covers the results of the Fuel Efficiency Analysis completed for the City of Framingham by the Metropolitan Area Planning Council (MAPC) during the summer and fall of 2020. Funded by the Massachusetts Department of Energy Resources' (DOER) Regional Energy Planning Assistance (REPA) program, MAPC conducted analysis of the City's vehicle inventory, identified priority areas for analysis of replacement with electric or fuel-efficient options, and developed recommendations for future replacements.

Analysis for the fleet efficiency study is based on the City's vehicle inventory as of August 2020. When available, City staff provided MAPC with data on each vehicle's annual gallons of gasoline or diesel consumed and miles driven for Fiscal Year 2019 (FY19). This data was used to calculate average miles per gallon (MPG) for each vehicle. Trailers, mobile vehicles, and motorcycles were excluded from the analysis. All analysis was completed using the publicly available Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Tool developed by Argonne National Laboratory.¹ MAPC used the 2019 version of AFLEET.

Understanding Framingham's Vehicle Fleet

The City fleet's consumption of gasoline and diesel fuel accounts for nearly 30% of the City's total energy consumption on an annual basis. As a designated Green Community, implementing measures to reduce the fleet's energy consumption is important strategy toward achieving the City's 20 percent energy reduction goal. Fuel efficiency measures and vehicle electrification can also bring along significant operational cost savings for Departments, particularly when high mileage and low efficiency vehicles are strategically targeted for replacement.

As of August 2020, the City's vehicle fleet is made up of 349 vehicles from 13 City Departments. Department of Public Works (DPW) vehicles made up nearly half of the vehicle fleet, while the Police, Fire, Parks, and School Department vehicles made up a majority of the other half of the fleet (See *Figure 1*). Vehicle age (i.e., model year) across the fleet spans three decades, with a majority of fleet vehicles between model years 2012 and 2020 (See *Figure 2*). A large number of vehicles were also purchased in the 2008 model year.

City staff were able to provide annual fuel consumption and mileage for 207 of the 349 vehicles (vehicles missing vehicle specific data are primarily made up of police cruisers from the Police Department and

¹ Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Tool, Argonne National Laboratory, 2019, https://greet.es.anl.gov/afleet_tool

larger work trucks from the DPW). The City also provided historical fuel costs from FY19 and FY20 to inform the assumptions used in the analysis.²

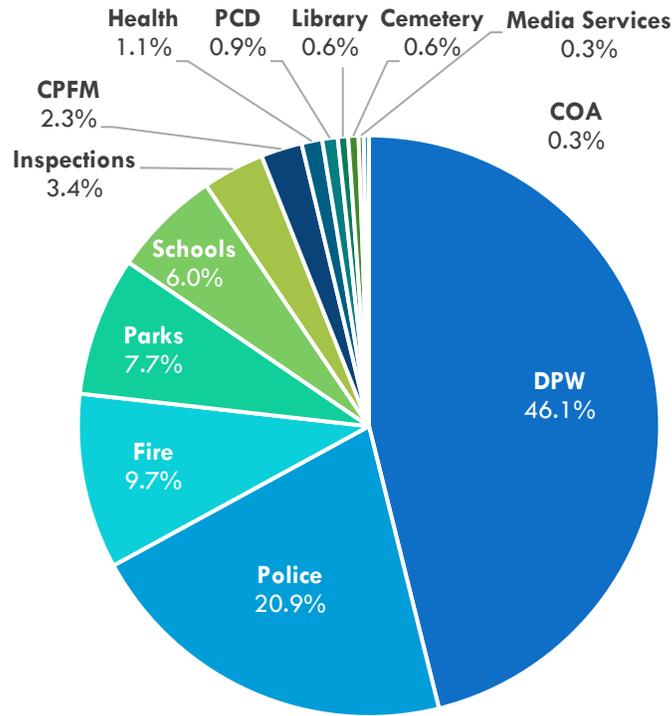


FIGURE 1: CITY OF FRAMINGHAM VEHICLE FLEET, BY DEPARTMENT

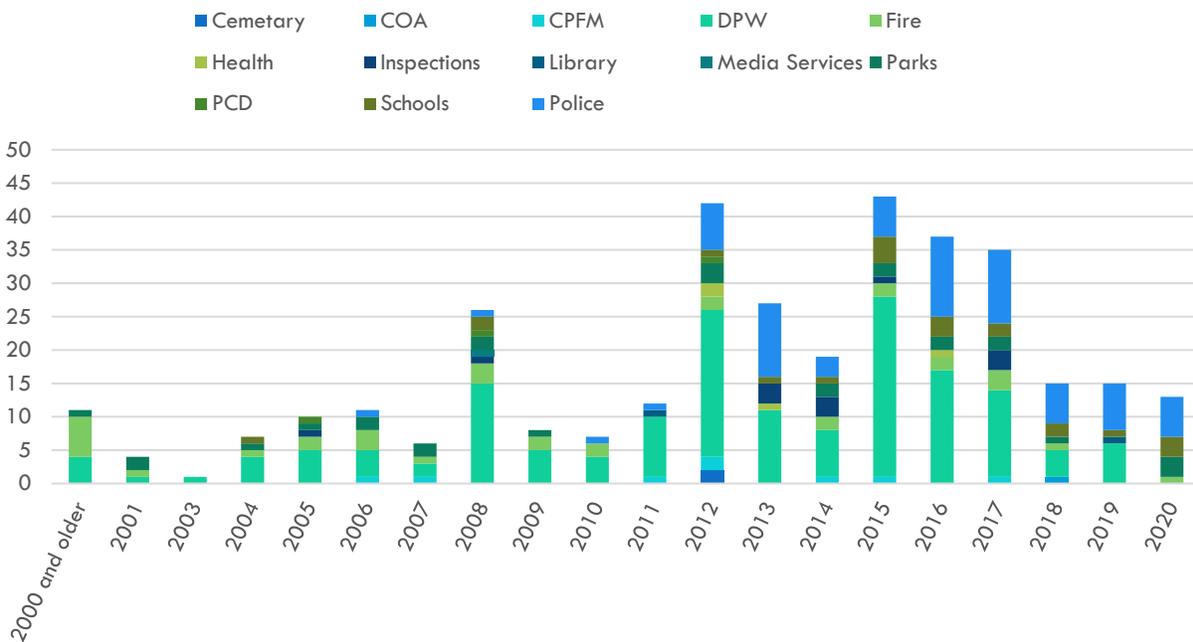


FIGURE 2: CITY OF FRAMINGHAM VEHICLE FLEET, BY MODEL YEAR AND DEPARTMENT

² Average fuel costs for FY2019 and FY2020 were \$2.46/gasoline gallon, \$2.09/diesel gallon, and \$0.18/kWh.

TABLE 1: AVERAGE VEHICLE EFFICIENCY AND FUEL CONSUMPTION, BY DEPARTMENT

Department	# of Vehicles with Data	Average Calculated MPG	Total Miles Driven (FY19)	Average Annual Miles per Vehicle	Total Gasoline Gallons (FY19)	Total Diesel Gallons (FY19)
Cemetery	2	3.6	4,464	2,232	1,295	-
DPW	118	6.1	715,454	6,063	51,482	99,605
COA	1	7.4	8,182	8,182	1,102	-
Fire	29	7.5	145,611	5,021	7,030	19,074
Parks	19	8.3	61,381	3,231	1,520	6,545
Schools	14	8.8	73,567	5,255	8,794	-
Library	2	8.8	5,675	2,838	823	-
CPFM	7	9.6	30,404	4,343	3,363	-
Inspections	10	14.6	47,186	4,719	3,230	-
PCD	1	14.8	2,100	2,100	142	-
Health	4	17.2	3,379	845	205	-
Total Fleet	207	7.5	1,097,403	5,301	78,985	125,224

An examination of a specific vehicle’s drive cycle is necessary to understand the potential for energy and cost savings potential. However, there are some high-level characteristics that can be identified from the departmental analysis provided in Table 1. DPW vehicles by far log the most annual vehicle miles driven of any City department and have one of the lowest average calculated miles per gallon (MPG) across the departments. The low fuel efficiency rating is likely attributable to the characteristics of predominant vehicle classes of the DPW vehicles (i.e., medium, heavy, and extra heavy-duty trucks). While there are not currently a wide array of electric or hybrid options for these vehicle classes, the market is quickly evolving and this segment of the City’s fleet represents a significant opportunity for cost and energy savings when those options become commercially practicable. This same recommendation applies for many of the School and Fire Department vehicles that also log high annual mileage per vehicle, with low average fuel efficiency ratings.

The remaining departments on average report relatively low annual mileage numbers, which will impact the payback periods for replacement of these vehicles and the scale of impact upgrades in fuel economy will have on operating costs and energy savings. The remainder of this memo goes into detail on replacement calculations for four key opportunity areas within the City’s fleet.

Opportunity Area Analysis

Sedan and SUV Analysis and Recommendations

There are 14 sedans and 25 SUVs within the City’s vehicle fleet incorporated in this analysis. Sedans are spread across the DPW Engineering and Highway Divisions and Health, Inspections, Fire, and Capital Projects and Facilities Management (CPFM) Departments. SUVs are primarily within the Fire Department, Inspections Department and DPW Divisions (Engineering, Streetlights, Wastewater, Sanitation, and Water).

Sedans

Sedans included in this analysis consumed 3,460 gallons of gasoline in FY19. Across nearly all vehicles, the sedan fleet has calculated MPG ratings (i.e., those based on actual gallons consumed) that are 12 to 67 percent less efficient than the rated combined MPG listed on FuelEconomy.gov, suggesting that many of

these vehicles may be idling for a portion of the day thereby reducing their overall fuel efficiency. Vehicle age ranges from 2008 to 2016 – making all of the sedans potential candidates for replacement in the next one to five years (if assuming a vehicle life span of 10 to 12 years). However, a portion of the sedan fleet (primarily the Health Department vehicles) are very low mileage – which can challenge the economics of replacement with more costly battery electric vehicles.

Vehicle Electrification Scenarios

Simple payback analysis in AFLEET for the sedan fleet is based on replacement of the existing gasoline fueled sedans with 2020 Nissan Leafs (with a 62-kW battery). For both sedan electrification scenarios, vehicles #157 (Highway Division, high mileage outlier) and #426 (Health Department, hybrid electric) are removed from the calculation to avoid skewing the data.

TABLE 2A: SEDAN VEHICLE ELECTRIFICATION SCENARIO INPUTS

SCENARIO	MAKE/MODEL	NUMBER OF VEHICLES	AVG. ANNUAL MILES DRIVEN	MPG	AVERAGE MSRP
SCENARIO 1: ALL VEHICLES REPLACED	Existing Sedan Fleet	12	2,222	16.0	\$29,706
	Replacement 2020 Nissan Leaf*	12	2,222	112.0	\$34,760
SCENARIO 2: REPLACE ONLY HIGHEST MILEAGE VEHICLES	Existing Sedan Fleet	5	3,831	15.6	\$31,281
	Replacement 2020 Nissan Leaf*	5	3,831	112.0	\$34,760

***VEHICLE PRICING AND MPG BASED ON JULY 2020 PRICING AVAILABLE THROUGH MASSACHUSETTS STATEWIDE CONTRACT VEH98.**

In Scenario #1, where all 12 sedans are replaced with battery electric vehicles, the simple payback is 19.2 years. In Scenario #2, we analyzed the replacement of only the five highest mileage sedans to improve the payback period, while still excluding the outlier vehicles of #157 and #426. The vehicles included for replacement are two Inspections Division, one Capital Projects and Facilities Management, and two Engineering Division sedans. In Scenario #2, the simple payback is reduced to 7.4 years, which means the vehicles will provide operational savings towards the second half of the vehicle’s lifespan. This suggests a general rule of thumb to identify a cost-effective electrification opportunity for sedan’s in the city’s fleet would be to target any sedan that drives more than 3,500 miles annually and has a calculated fuel efficiency rating at or under 16 MPG.

TABLE 2B: SEDAN ELECTRIFICATION SCENARIO SIMPLE PAYBACK ANALYSIS

	Gasoline Scenario 1	EV Scenario 1	Gasoline Scenario 2	EV Scenario 2
Acquisition Cost	\$356,472	\$417,120	\$156,405	\$173,800
Annual Operating Cost - Private Station Fueling	\$8,099	\$4,935	\$5,894	\$3,545
Incremental Acquisition Cost Compared to Gasoline LD Fleet		\$60,648		\$17,395
Annual Operating Savings Compared to Gasoline LD Fleet		\$3,165		\$2,349
Simple Payback (years)		19.2		7.4

Vehicle Electrification with Fleet Right-Sizing Scenario

Another way to improve the overall efficiency of a fleet and improve payback period of vehicle replacements is through right-sizing. This approach involves examining the daily use patterns of existing low-mileage vehicles to see if there are opportunities to consolidate use of multiple vehicles down to a single vehicle that may be shared by multiple drivers. It is important that any right-sizing be done in consultation with fleet managers and drivers to ensure it is appropriate and meets their operational needs.

In Scenario #3, we illustrate the potential impact of a right-sizing approach paired with electrification by consolidating four of the Engineering Department vehicles down to two vehicles to increase usage of each vehicle (for the calculation, we assume a new average annual mileage of 4,500). For this scenario, we also remove all of the Health Department and Fire Department sedans that have annual mileage too low to have significant cost or energy savings.

TABLE 3A: SEDAN VEHICLE ELECTRIFICATION AND RIGHT-SIZING SCENARIO INPUTS

Scenario	Make/Model	Number of Vehicles	Avg. Annual Miles Driven	MPG	Average MSRP
SCENARIO 3: RIGHT SIZED AND HIGH MILEAGE VEHICLES	Existing Sedan Fleet	8	2,920	14.9	\$31,636
	Replacement 2020 Nissan Leaf*	6	4,500	112.0	\$34,760

*VEHICLE PRICING AND MPG BASED ON JULY 2020 PRICING AVAILABLE THROUGH MASSACHUSETTS STATEWIDE CONTRACT VEH98.

In Scenario #3, the fleet is now saving on both acquisition costs and has projected operational savings of over \$2,000 annually. This illustrates how increasing utilization of fleet vehicles and strategically electrifying high usage vehicles can provide significant cost savings for the municipality.

TABLE 3B: SEDAN ELECTRIFICATION AND RIGHT-SIZING SCENARIO SIMPLE PAYBACK ANALYSIS

	Gasoline Scenario 3	Scenario 3: EV & Right-Size
<i>Acquisition Cost</i>	\$253,088	\$208,560
<i>Annual Operating Cost - Private Station Fueling</i>	\$7,361	\$4,997
<i>Incremental Acquisition Cost Compared to Gasoline LD Fleet</i>		-\$44,528
<i>Annual Operating Savings Compared to Gasoline LD Fleet</i>		\$2,364
<i>Simple Payback (years)</i>		-18.8

Recommendations

- Replace DPW Highway Vehicle #157 and Inspections Vehicles #49 and #53 with full battery electric options in the next 1-3 years. Consider replacing CPFM Vehicle #412 and DPW Engineering Vehicles #138 and #147 with full battery electric options in the next 3-6 years.
- Target fuel inefficient sedans within the fleet that drive, on average, over 3,500 miles per year for replacement with full battery electric options.
- Discuss fleet right-sizing and pool vehicle options with the DPW Engineering Division to make replacement of the vehicles with full battery electric options more financially viable.

SUVs

SUVs included in this analysis consumed 9,041 gallons of gasoline in FY19. Overall, the SUVs have higher mileage and lower MPGs than the Sedan vehicle fleet, presenting an opportunity for higher cost and energy savings. SUV age ranges from 2004 to 2017. For the purposes of comparing like to like, this analysis separates the compact SUV fleet (Ford Escapes) from the full-size SUV fleet (Ford Explorers).

Simple Payback analysis in AFLEET is based on replacement of the existing vehicles with either a 2020 Ford Hybrid Escape, a 2020 Ford Hybrid Explorer, or a 2021 Hyundai KONA Electric (SEL trim). There is not currently a Hyundai dealership on the statewide contract so the City may need to execute its own procurement for this new model of vehicle.

Compact SUV Replacement Scenarios

The seven gasoline Ford Escapes in the fleet average 3,207 miles a year with an average MPG of 16.5. This is the lower mileage, higher MPG segment of the City's SUV fleet.

TABLE 4A: COMPACT SUV EXISTING AND REPLACEMENT SCENARIO INPUTS

Scenario	Make/Model	Number Of Vehicles	Annual Miles Driven	MPG	Average MSRP
SCENARIO 1: ALL VEHICLES REPLACED WITH HYBRID	Existing Ford Escape Fleet	7	3,207	16.5	\$26,385
	Replacement 2020 Ford Escape Hybrid Fleet*	7	3,207	38	\$26,980
SCENARIO 2: ALL VEHICLES REPLACED WITH EV	Existing Ford Escape Fleet	7	3,207	16.5	\$26,385
	Replacement 2021 Hyundai KONA Electric Fleet**	7	3,207	120	\$37,190

*VEHICLE PRICING AND MPG BASED ON JULY 2020 PRICING AVAILABLE THROUGH MASSACHUSETTS STATEWIDE CONTRACT VEH98.

**VEHICLE PRICING BASED ON MSRP FROM HYUNDAI AND MPGE BASED ON FUELECONOMY.GOV. MPGE IS BASED ON THE 2020 KONA ELECTRIC AS THE 2021 MPGE IS NOT YET AVAILABLE.

When replaced with hybrid electric vehicles in Scenario #1, the simple payback is 2.1 years. In Scenario #2, we replace the Ford Escapes with Hyundai KONA Electric. This results in a simple payback of 28.7 years due to the much higher MSRP for this new battery electric SUV in comparison to the compact hybrid electric SUV.

TABLE 4B: COMPACT SUV REPLACEMENT SCENARIO SIMPLE PAYBACK ANALYSIS

	Gasoline	Scenario 1: HEV	Scenario 2: EV
Acquisition Cost	\$184,695	\$188,860	\$260,330
Annual Operating Cost - Private Station Fueling	\$6,737	\$4,739	\$4,099
Incremental Acquisition Cost Compared to Gasoline LD Fleet		\$4,165	\$75,635
Annual Operating Savings Compared to Gasoline LD Fleet		\$1,998	\$2,637
Simple Payback (years)		2.1	28.7

Full-Size SUV Replacement Scenarios

TABLE 5A: FULL-SIZE SUV EXISTING AND REPLACEMENT SCENARIO INPUTS

SCENARIO	MAKE/MODEL	NUMBER OF VEHICLES	ANNUAL MILES DRIVEN	MPG	AVERAGE MSRP
SCENARIO 1: ALL VEHICLES REPLACED WITH FULL-SIZE HYBRID	Existing Ford Explorer Fleet	18	5,309	12.3	\$34,765
	Replacement 2020 Ford Explorer Hybrid Fleet*	18	5,309	25	\$48,240
SCENARIO 2: ALL VEHICLES REPLACED WITH COMPACT HYBRID	Replacement 2020 Ford Escape Hybrid Fleet*	18	5,309	38	\$26,980
SCENARIO 3: ALL VEHICLES REPLACED WITH COMPACT EV	Replacement 2021 Hyundai KONA Electric Fleet**	18	5,309	120	\$37,190

*VEHICLE PRICING AND MPG BASED ON JULY 2020 PRICING AVAILABLE THROUGH MASSACHUSETTS STATEWIDE CONTRACT VEH98.

**VEHICLE PRICING BASED ON MSRP FROM HYUNDAI AND MPGE BASED ON FUELECONOMY.GOV. MPGE IS BASED ON THE 2020 KONA ELECTRIC AS THE 2021 MPGE IS NOT YET AVAILABLE.

The current hybrid replacement option for the Ford Explorer has a high cost difference from the base gasoline model. Even though it provides a substantial improvement in fuel economy for these higher mileage SUVs, the simple payback is 24 years as is shown in Scenario #1.

In Scenario #2, we explore the cost and energy savings impact of reducing the vehicle size from full-size SUV Explorers to compact SUV Escapes. This results in significant energy savings and immediate cost savings for the City. In Scenario #3, we explore the potential of replacing the Ford Explorers with Hyundai KONA Electric subcompact SUVs, which will have greater environmental and operational savings impact than the hybrid electric option. In this scenario with the all-electric SUVs, the fleet will see the highest operating savings in comparison to the existing gasoline SUV fleet and a simple payback of 2.7 years.

TABLE 5B: FULL-SIZE SUV REPLACEMENT SCENARIO SIMPLE PAYBACK ANALYSIS

	Gasoline	Full-Size HEV Scenario 1	Compact HEV Scenario 2	EV Scenario 3
Acquisition Cost	\$625,770	\$868,320	\$485,640	\$669,420
Annual Operating Cost - Private Station Fueling	\$33,489	\$23,394	\$20,177	\$17,096
Incremental Acquisition Cost Compared to Gasoline LD Fleet		\$242,550	-\$140,130	\$43,650
Annual Operating Savings Compared to Gasoline LD Fleet		\$10,095	\$13,312	\$16,393
Simple Payback (years)		24.0	-10.5	2.7

Recommendations

- Replace the seven Ford Escapes with hybrid electric models. Starting with Engineering Division vehicles #145 and #146 (oldest).

- Discuss with Engineering Division, Fire Department, and Inspections Department whether the technical specs of Hyundai KONA Electric, or comparable all-electric SUV, will meet drivers needs as replacements for the Ford Explorer SUVs.
- Target replacement of the full-size SUVs that have an annual mileage over 5,000 miles with an all-electric SUV option, such as the Hyundai KONA or other models as they become available.

Light Duty Pick-Ups Analysis and Recommendations

Light duty pick-ups consumed 23,756 gallons of gasoline and 335 gallons of diesel in FY19. Vehicle ages range from 2006 to 2019. Battery electric options to replace light duty pick-ups, such as F-150s, are imminently emerging onto the market. In the interim, one option to explore is the XLP Plug-in Hybrid Electric Drive up-fit system. When considering vehicles for up-fit, the City should target the oldest vehicles that are nearing the end of their operations.

TABLE 6: LIGHT DUTY PICK-UPS EXISTING AND REPLACEMENT SCENARIO INPUTS

Make/Model	Number Of Vehicles	Avg. Annual Miles Driven	MPG	Average MSRP
EXISTING F150 FLEET	9	7,223	12.5	\$33,390
REPLACEMENT F150 WITH XLP UP-FIT*	9	7,223	18.9	\$62,490
EXISTING F250 FLEET - GASOLINE	17	7,383	7.4	\$40,135
REPLACEMENT F250 XLP UP-FIT*	17	7,383	11.1	\$67,435

*UP-FIT AND VEHICLE PRICING AND MPG IS BASED ON PRICING FROM STATEWIDE CONTRACTS VEH102 AND VEH98, AS WELL AS PRODUCT CUT SHEETS FROM XL.

AFLEET Payback Analysis is based on replacement with 2020 F-150 and F250 that have been up-fit with the XLP system. XL reports a fuel economy improvement of up to 50% for its XLP system. The analysis applies this improvement in fuel economy to the existing fleet's MPG. We are assuming a base price of \$35,730 for the F-150 and \$40,135. XLP system cost estimate is \$26,760 for an F-150 and \$27,300 for an F-250.

For both the F150 and F250, the simple payback period is lengthy and well beyond the anticipated lifespan of the vehicles. However, the payback period for the F250 up-fit (18.1 years) is less than half the payback period for the F150 up-fit (46.2 years). This suggests that this technology may be a more impactful solution for the F250s, particularly if grant funding is leveraged to subsidize the additional cost of the up-fit.

TABLE 7: PICK UP REPLACEMENT SCENARIO SIMPLE PAYBACK ANALYSIS

	Gasoline F150	PHEV Up-fit F150	Gasoline F250	PHEV Up-fit F250
Acquisition Cost	\$300,510	\$562,410	\$682,295	\$1,146,395
Annual Operating Cost - Private Station Fueling	\$23,390	\$17,722	\$62,182	\$36,571
Incremental Acquisition Cost Compared to Gasoline LD Fleet		\$261,900		\$464,100
Annual Operating Savings Compared to Gasoline LD Fleet		\$5,668		\$25,611
Simple Payback (years)		46.2		18.1

Recommendations

- Conduct additional analysis using the AFLEET Tool when pricing and fuel economy information is released by Ford regarding the electric F150 to identify if more cost-effective than the XLP up-fit option tested in this memo.
- Consider applying for Green Communities grant funding in 2021 to pilot the XLP up-fit on 1 to 2 F250 pickups within the City’s fleet that are due for replacement. Move forward with installation of charging infrastructure if needed at the vehicle’s primary parking site.

Police Cruiser Idling Analysis and Recommendations

The Police Department fleet is relatively young in comparison to other City Departments – a majority of the vehicles were purchased in the last five model years (2016 to 2020). Other vehicle ages range from 2006 to 2015. The most common make and model in the fleet is the Ford Police Interceptor Explorer – this analysis examines options for improving the fuel economy of the 45 existing Ford Police Interceptor Explorers. The average lifetime of a police cruiser in the City’s fleet is 6 years (about 3 years of front-line service and 3 years in a secondary role).

Actual mileage for each police cruiser was not available at the time of this analysis, so several assumptions and estimates needed to be made:

- Existing fleet was assumed to have an annual driven mileage of 12,500 miles with 600 hours of idling annually.
- MPG ratings for police cruisers are unavailable on FuelEconomy.gov so data available from fuelly.com was used as a proxy for MPG. Existing fleet was assumed to have an average MPG of 14.6.
- Exact pricing for the 2021 Ford Police Interceptor Hybrid with all necessary up-fits required by the Police Department was not available. However, the base MSRP of the hybrid model is comparable to the gasoline model, so a slightly higher purchase price was assumed based on the purchase prices listed in the City’s inventory (\$52,000).
- For the idle reduction calculations, the default assumptions provided in AFLEET were used for the breakdown of services required, fuel consumption rates, electrical power demand, and idle reduction equipment price.

Hybrid Electric Cruiser Replacement Scenario

The first option examined for the police cruisers was replacement with the 2021 Ford Police Interceptor Hybrid.

TABLE 8: POLICE CRUISER EXISTING AND REPLACEMENT SCENARIO INPUTS

Make/Model	Number Of Vehicles	Annual Miles Driven	MPG	Average Cost
EXISTING POLICE INTERCEPTOR FLEET	45	12,500	14.6	\$50,856
REPLACEMENT 2021 POLICE INTERCEPTOR HYBRID FLEET*	45	12,500	24	\$52,000

*MPG IS BASED ON DATA AVAILABLE FROM THE MANUFACTURER ON THE EPA RATING.

Based on the assumptions listed above, the simple payback analysis in AFLEET shows a pay back of just over a year (1.3). This output is heavily reliant on the cost estimates used and the MPG of the existing fleet. Further investigation of the actual MPG of the cruisers will better determine whether this is a cost-effective option. If the price of the hybrid option with all up-fits is within a reasonable range of its gasoline

counterpart, a schedule of replacing these vehicles as they come of age is a sensible approach given the cost savings potential and emissions benefits.

TABLE 9: POLICE CRUISER REPLACEMENT SCENARIO SIMPLE PAYBACK ANALYSIS

	Gasoline	HEV Scenario
<i>Acquisition Cost</i>	\$2,288,520	\$2,340,000
<i>Annual Operating Cost - Private Station Fueling</i>	\$224,715	\$184,991
<i>Incremental Acquisition Cost Compared to Gasoline LD Fleet</i>		\$51,480
<i>Annual Operating Savings Compared to Gasoline LD Fleet</i>		\$39,724
<i>Simple Payback (years)</i>		1.3

Idle Reduction Technology Scenario

The second option examined for the police cruisers was the installation of idle reduction technology during the up-fit process when new acquisitions are made to replace the existing fleet vehicles. For the AFLEET idling analysis we tested out the potential savings from installing a battery auxiliary power unit paired with a fuel operated air heater. The Idle Reduction calculator produced a simple payback of 13.9 years. This may be a viable alternative depending on the final economics of the hybrid vehicles in the first scenario.

TABLE 10: POLICE CRUISER IDLE REDUCTION SIMPLE PAYBACK ANALYSIS

	Gasoline	Idle Reduction Scenario
<i>Acquisition Cost</i>		\$234,000
<i>Annual Operating Cost - Private Station Fueling</i>	\$28,653	\$11,759
<i>Annual Operating Savings Compared to Gasoline LD Fleet</i>		\$16,894
<i>Simple Payback (years)</i>		13.9

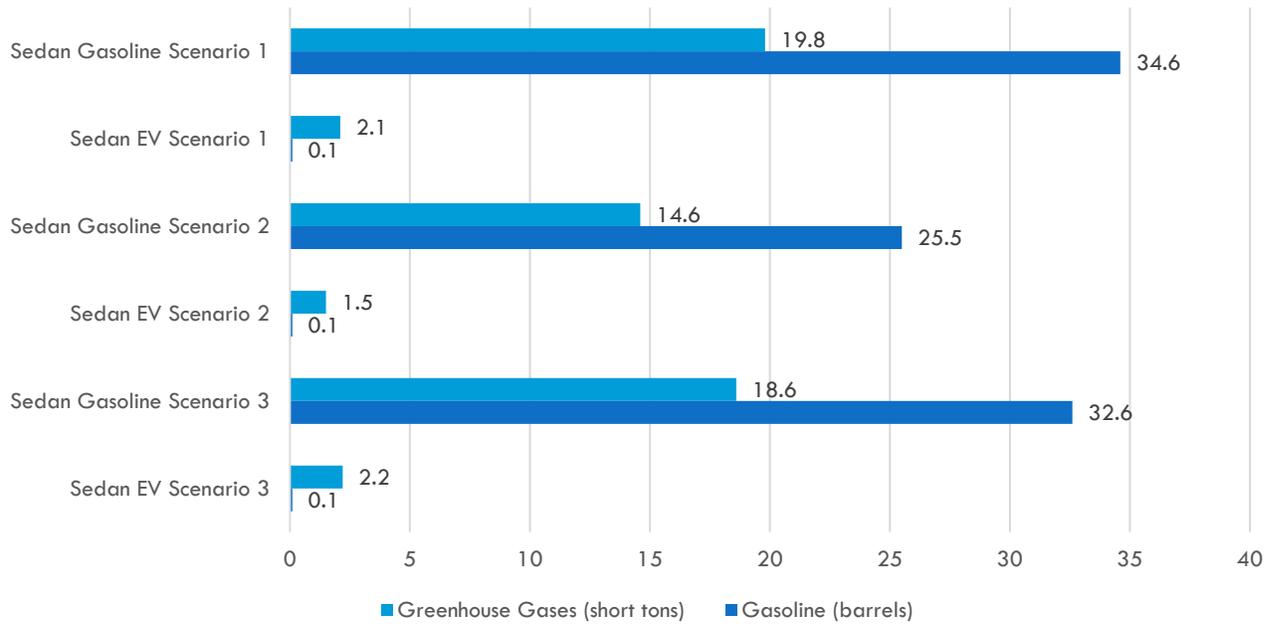
Recommendations

- Work with the Police Department to spec out the up-fit pricing for a standard gasoline and a hybrid 2021 Ford Police Interceptor to verify the savings potential identified above.
- Commit to purchasing the hybrid option moving forward to phase-in more fuel-efficient vehicles into the Police Department Fleet.

Energy and Emissions Impact Potential

While cost savings and simple payback calculations can inform the decision whether or not a particular vehicle is a prime candidate for replacement with a more fuel-efficient option, the potential to reduce energy consumption and greenhouse gas emissions should be another driving factor in the purchasing process. The following series of charts are based on the calculations performed by the AFLEET tool for each scenario to produce an estimated annual gasoline consumption (barrels) and greenhouse gas emissions (short tons). For each chart, the baseline “Gasoline” scenario is provided and can be compared to the fuel-efficient scenarios presented for each segment of the City’s fleet.

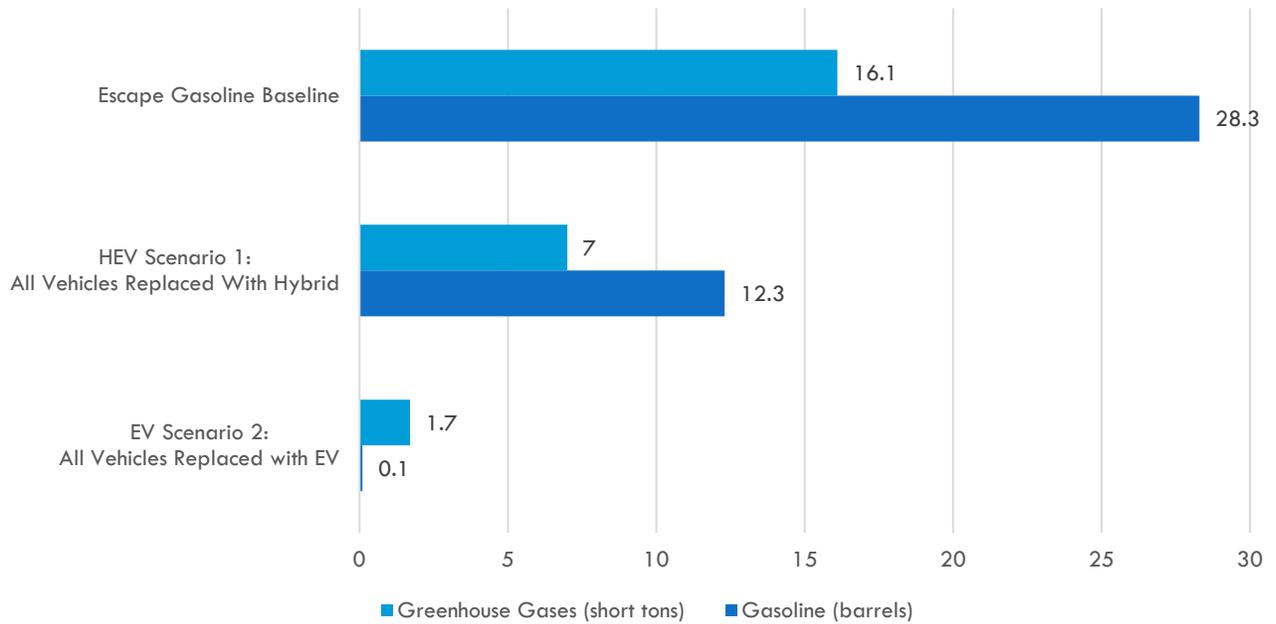
FIGURE 3: SEDAN SCENARIO ANNUAL WELLS-TO-WHEELS AFLEET CALCULATIONS



*SEE PAGE 4 FOR DETAILS ON SCENARIOS 1 AND 2.

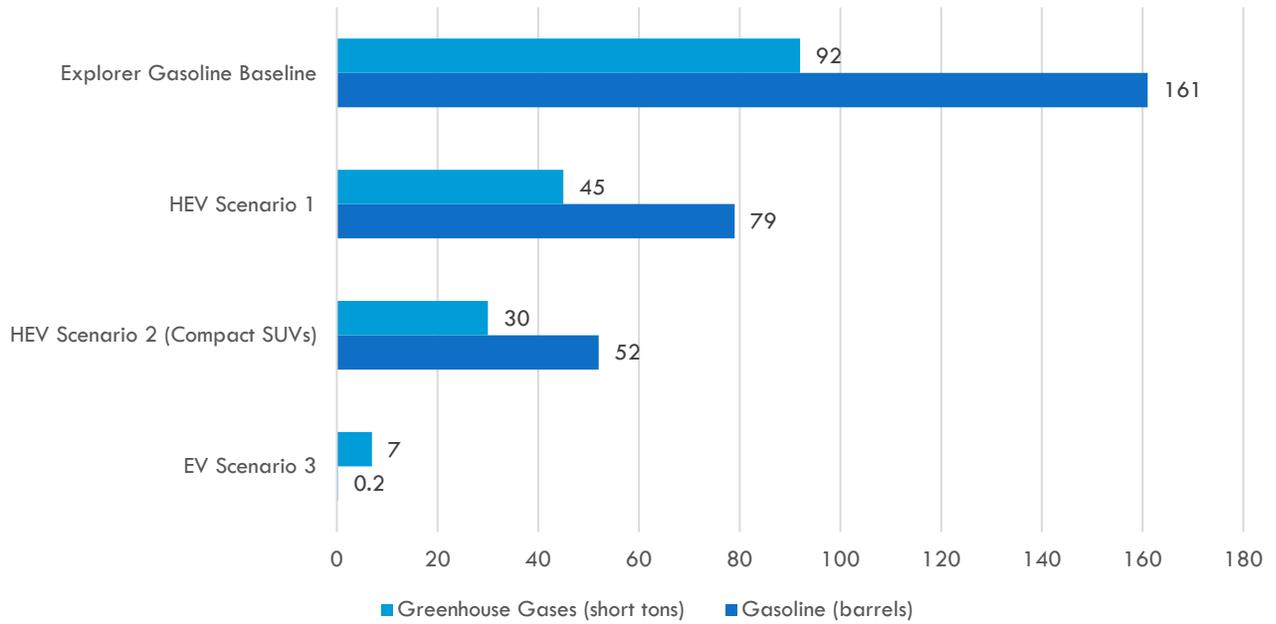
**SEE PAGE 5 FOR DETAILS ON SCENARIO 3.

FIGURE 4: COMPACT SUV SCENARIO ANNUAL WELLS-TO-WHEELS AFLEET CALCULATIONS



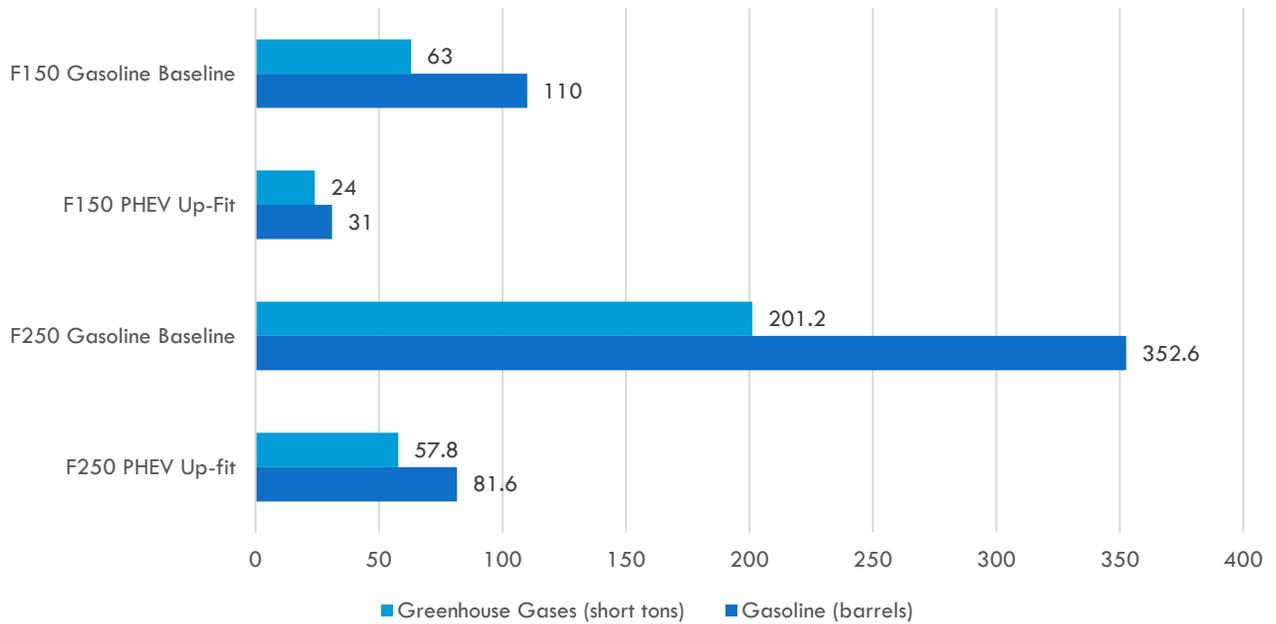
*SEE PAGE 6 FOR DETAILS ON SCENARIOS 1 AND 2.

FIGURE 5: FULL SIZE SUV SCENARIO ANNUAL WELLS-TO-WHEELS AFLEET CALCULATIONS



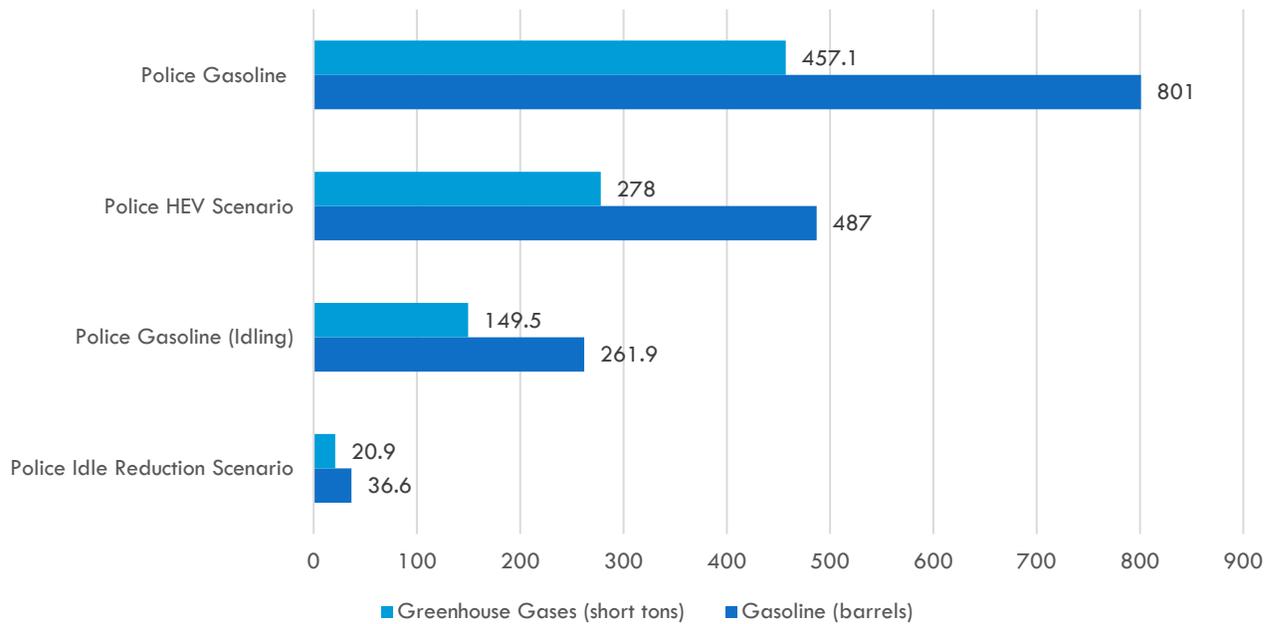
*SEE PAGE 7 FOR DETAILS ON SCENARIOS 1, 2, AND 3.

FIGURE 6: LIGHT DUTY PICK-UP SCENARIO ANNUAL WELLS-TO-WHEELS AFLEET CALCULATIONS*



*SEE PAGE 8 FOR DETAILS ON THE F150 AND F250 UP-FIT SCENARIOS.

FIGURE 7: POLICE CRUISER SCENARIO ANNUAL WELLS-TO-WHEELS AFLEET CALCULATIONS



*SEE PAGES 9-10 FOR DETAILS ON THE HEV REPLACEMENT AND IDLE REDUCTION SCENARIOS.

Fleet Efficiency Action Plan

Recommendation Summary

Based on the analysis completed for priority fleet segments, MAPC recommends the City consider taking the following next steps to and incorporating the strategies identified into its vehicle purchasing plans for the upcoming years. This summary incorporates additional recommendations regarding procurement, financing, and areas for further analysis.

Sedans and SUVs

- Replace DPW Highway Vehicle #157 and Inspections Vehicles #49 and #53 with full battery electric options in the next 1-3 years. Consider replacing CPM Vehicle #412 and DPW Engineering Vehicles #138 and #147 with full battery electric options in the next 3-6 years.
- Target fuel inefficient sedans within the fleet that drive, on average, over 3,500 miles per year for replacement with full battery electric options.
- Discuss fleet right sizing and pool vehicle options with the DPW Engineering Division to make replacement of the vehicles with full battery electric options more financially viable.
- Replace the seven Ford Escapes with hybrid electric models, starting with Engineering Division vehicles #145 and #146 (oldest).
- Discuss with Engineering Division, Fire Department, and Inspections Department whether the technical specs of Hyundai KONA Electric, or comparable all-electric SUV, will meet drivers needs as replacements for the Ford Explorer SUVs.
- Target replacement of the full-size SUVs that have an annual mileage over 5,000 miles with an all-electric SUV option, such as the Hyundai KONA or other models as they become available.

- For both Sedans and SUVs, discuss with Departments appropriate site for combined public and fleet charging infrastructure. Consider using resources available through the Eversource Make-Ready program to fund the installation costs.

Light Duty Pick Ups

- Conduct additional analysis using the AFLEET Tool when pricing and fuel economy is released by Ford regarding the electric F150 to identify if more cost-effective than the XLP up-fit option tested in this memo.
- Consider applying for Green Communities grant funding in 2021 to pilot the XLP up-fit on 1 to 2 F250 pickups within the City's fleet that are due for replacement. Move forward with installation of charging infrastructure if needed at the vehicle's primary parking site.

Police Cruisers

- Work with the Police Department to spec out the up-fit pricing for a standard gasoline and a hybrid 2021 Ford Police Interceptor to verify the savings potential identified above.
- Commit to purchasing the hybrid option moving forward to phase-in more fuel-efficient vehicles into the Police Department Fleet.

Fleet-wide

- Consider using statewide contract VEH98 to purchase electric and hybrid options and statewide contract VEH102 for hybrid up-fit, idle reduction, and charging station equipment and services.
- Leverage Green Communities and Mass EVIP (Electric Vehicle Incentive Program) funds for targeted replacement of sedans and SUVs with electric and hybrid options.
- Monitor available funding from the Massachusetts Department of Environmental Protection (MassDEP) through the Volkswagen Settlement Environmental Mitigation Trust. Future "Open Solicitations" may provide opportunities to pilot higher cost electric models for medium- and heavy-duty trucks within the City's fleet.
- Consider procurement and installation of vehicle telematics across the fleet to inform future analysis of vehicle efficiency and opportunities for cost savings.

Vehicle Electrification Initiative



Utilizing the 2021 MAPC Fleet Analysis, the City is seeking to prioritize the replacement of its oldest, highest mileage, and least efficient fleet vehicles with battery electric and plug-in hybrid electric vehicles. Existing vehicles identified through the study that present the greatest opportunity for replacement include the following. Vehicles outlined with a red-dotted line are high priority vehicles for replacement with PHEVs and EVs and have been proposed for replacement as part of this capital project.

Department	Division	Year	Make & Model	Class	Average MPG (FY 2019)
CPFM		2014	Ford Taurus	Sedan	15.7
DPW	Water	2013	Ford Explorer	SUV	10.2
DPW	Engineering	2010	Ford Explorer Utility	SUV	9.0
DPW	Engineering	2008	Ford Escape	SUV	12.7
DPW	Wastewater	2013	Ford Explorer	SUV	8.3
DPW	Engineering	2009	Ford Taurus	Sedan	13.7
DPW	Engineering	2009	Ford Taurus	Sedan	13.3
DPW	Engineering	2013	Ford Explorer	SUV	11.4
DPW	Streetlighting	2013	Ford Explorer	SUV	15.4
DPW	Engineering	2008	Ford Escape	SUV	16.4
DPW	Engineering	2011	Ford Taurus	Sedan	16.4
DPW	Administration	2013	Ford Taurus	Sedan	14.0
DPW	Wastewater	2015	Ford Explorer	SUV	7.8
DPW	Sanitation	2014	Ford Explorer	SUV	15.1
DPW	Engineering	2014	Ford Taurus	Sedan	14.0
DPW	Highway	2014	Ford Taurus	Sedan	19.8
Fire		2004	Ford Explorer	SUV	9.2
Fire		2005	Ford Explorer	SUV	10.7
Fire		2008	Crown Victoria	Sedan	6.2
Fire		2017	Ford Explorer	SUV	13.3
Fire		2017	Ford Explorer	SUV	14.8
Fire		2017	Ford Explorer	SUV	16.0
Fire		2016	Ford Explorer	SUV	16.5
Health		2013	Ford Fusion	Sedan	11.9
Health		2012	Ford Focus	Sedan	19.3
Health		2012	Ford Fusion	Sedan	25.3
Inspections		2008	Ford Explorer	SUV	10.9
Inspections		2005	Ford Explorer	SUV	10.8
Inspections		2013	Ford Explorer	SUV	14.5
Inspections		2013	Ford Taurus	Sedan	15.3
Inspections		2015	Ford Explorer	SUV	13.6
Inspections		2014	Ford Escape	SUV	16.8
Inspections		2014	Ford Fusion	Sedan	16.8
Inspections		2017	Ford Escape	SUV	18.8
Inspections		2017	Ford Escape	SUV	16.8
Parks		2016	Ford Escape	SUV	19.3
PCD		2012	Ford Escape	SUV	14.8
Schools		2013	Ford Explorer	SUV	14.6



For Reference Purposes - Previous Capital Budget Votes for FY21 Expedited Capital and FY22 Capital

Order 2021-035
dated
04/09/2021

Department	Title	Division Priority	Funding Source	Project Status	Fiscal Year	Budget Request	District	City Council Vote
Engineering	MS4 Permit Compliance Year 3 (Expedited Request)		General	Recommended	2021	\$150,000	Citywide	\$ 150,000
Engineering	Drainage System & Stormwater Quality Project (Expedited Request)		General	Recommended	2021	\$270,000	Citywide	\$ 270,000
Highway	Roadway Improvements (Expedited Request)		General	Recommended	2021	\$1,500,000	Citywide	\$ 1,500,000
Sanitation	Packer (Expedited Request)		General	Recommended	2021	\$385,000	Citywide	\$ 385,000
Sanitation	Dudley Road Landfill Closure (Expedited Request)		General	Recommended	2021	\$35,000	D6	\$ 35,000
Sewer	Various Sewer System Improvements (Expedited Request)		Sewer Enterprise	Recommended	2021	\$190,000	Citywide	
Sewer	Wastewater Pump Station Equipment Replacement (Expedited Request)		Sewer Enterprise	Recommended	2021	\$250,000	Citywide	
Sewer	SSES High Priority Defect Repairs Phase 3 (Expedited Request)		Sewer Enterprise	Recommended	2021	\$460,000	Citywide	
Water	Backhoe (Expedited Request)		Enterprise Water	Recommended	2021	\$165,000	Citywide	\$ 165,000
Water	Various Water System Improvements (Expedited Request)		Enterprise Water	Recommended	2021	\$300,000	Citywide	
School B&G	New Fuller Middle School Synthetic Turf Field		General	Recommended	2022	\$3,212,670	D7	\$ 3,212,670

Voted by Finance Subcommittee and City Council

\$6,917,670

\$ 5,717,670

Order 2021-063-002
dated
06/29/2021

Department	Title	Division Priority	Funding Source	Project Status	Fiscal Year	Budget Request	District	City Council Vote
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For Reference Purposes - Previous Capital Budget Votes for FY21 Expedited Capital and FY22 Capital

Cemeteries	2021 Kubota Mini Excavator	1	General	Recommended	2022	\$73,629	D3	\$	73,629
CPFM	Memorial Exterior Envelope repairs for Masonry	2	General	Recommended	2022	\$2,094,680	D5	\$	2,094,680
CPFM	Pearl Street Garage stairwell repairs and masonry patching	3	General	Recommended	2022	\$757,574	D5	\$	235,000 partial
CPFM	HVAC Improvements at Municipal Facilities	1	General	Recommended	2022	\$310,000	Citywide		
CPFM	Fleet Electrification Initiative	1	General	Recommended	2022	\$70,000	Citywide		
CPFM	Energy Resiliency Enhancements	1	General	Recommended	2022	\$200,000	Citywide		
CPFM	Green Communities Mechanical upgrades		General	Recommended	2022	\$200,000	Citywide		
Engineering	Edgell Rd/Central St Intersection - Final Design	4	General	Recommended	2022	\$340,000	D3, D4	\$	340,000
Engineering	Union Ave Right of Way, Nonparticipating & Construction Services	7	General	Recommended	2022	\$1,340,000	D5, D7	\$	1,340,000
Engineering	Arlington St Area Drains & Roads (Phase 1) – Design	8	General	Recommended	2022	\$415,000	D8, D9	\$	415,000
Fire	Safety/Training Officer Response Vehicle - Fire Apparatus Asset Replacement		General	Recommended	2022	\$65,000	Citywide	\$	65,000
Fleet	Consolidated Vehicle/Equipment	1	General	Recommended	2022	\$816,000	Citywide	\$	816,000
Highway	Carlson Road Roadway	15	General	Recommended	2022	\$150,000	D9	\$	150,000
Highway	Various Road Improvements - FY22	3	General	Recommended	2022	\$1,000,000	Citywide	\$	1,000,000
Highway	Various Traffic Calming - FY22	16	General	Recommended	2022	\$150,000	Citywide	\$	150,000
Library	New Teen Area Main Library		General	Recommended	2022	\$150,000	Citywide	\$	150,000
Parks & Recreation	F250 4x4 Extra Cab Pickup 10,400 GVW	1	General	Recommended	2022	\$42,206	Citywide	\$	42,206
Parks & Recreation	F350 4x4 Extended Cab Pickup	2	General	Recommended	2022	\$57,635	Citywide	\$	57,635
Sanitation	Dudley Road Landfill Closure - Corrective Action Design	2	General	Recommended	2022	\$460,000	D6	\$	460,000
School B&G	Exterior Envelope	2	General	Recommended	2022	\$1,100,000	D2	\$	1,100,000
School B&G	MSBA Feasibility Study - Future Elementary School	1	General	Recommended	2022	\$600,000	D8	\$	600,000

For Reference Purposes - Previous Capital Budget Votes for FY21 Expedited Capital and FY22 Capital

Sewer	Consolidated Vehicle/Equipment	1	Sewer Enterprise	Recommended	2022	\$250,000	Citywide	\$	250,000
Sewer	Carlson Rd Sewer - Design & Construct	11	Sewer Enterprise	Recommended	2022	\$115,000	D9	\$	115,000
Water	Consolidated Vehicle/Equipment	1	Water Enterprise	Recommended	2022	\$265,000	Citywide	\$	265,000
Water	Carlson Road Water - Design & Construction	6	Water Enterprise	Recommended	2022	\$1,200,000	D9	\$	120,000

Projects Recommended to be Deferred: For Reference

Department	Title	Division Priority	Funding Source	Project Status	Fiscal Year	Budget Request	District	City Council Vote
CPFM	Climate Action Planning	1	General	Deferred	2022	\$150,000	Citywide	
Engineering	Fountain St/Dudley Rd Intersection - Construction	9	General	Deferred	2022	\$2,760,000	D6	
Engineering	Central St Road and Drains - Design	10	General	Deferred	2022	\$650,000	D2, D4, D5	
Engineering	100 & 110 Western Ave - Roof Replacement	11	General	Deferred	2022	\$100,000	D9	
Engineering	Herbert Street Culvert Replacement	12	General	Deferred	2022	\$285,000	D9	
Engineering	Unaccepted Street Improvements - harmony, Bonvini, Sax	13	General	Deferred	2022	\$450,000	D3, D8	
Engineering	Garvey Rd & Leo Chasse Way Rehab & Improve – Design & Construction	14	General	Deferred	2022	\$3,165,000	D1	
Engineering	Rt 126/135 & Railroads Intersection Improvements – Preliminary Design	17	General	Deferred	2022	\$2,175,000	D7, D8, D9	
Fire	Fire Chief SUV (Car 1) - Fire Apparatus Asset Replacement		General	Deferred	2022	\$70,000	Citywide	
Fleet	Consolidated Vehicle/Equipment	1	General	Deferred	2022	\$1,110,000	Citywide	
Highway	Various Road Improvements - FY22	3	General	Deferred	2022	\$7,500,000	Citywide	
Highway	Various Drainage System & Storm Water Quality Projects - FY22	5	General	Deferred	2022	\$500,000	Citywide	
Highway	MS4 Permit Compliance Yr 4 - FY22	6	General	Deferred	2022	\$195,000	Citywide	

For Reference Purposes - Previous Capital Budget Votes for FY21 Expedited Capital and FY22 Capital

Library	Systemwide Technology Upgrade Plan		General	Deferred	2022	\$277,000	Citywide
Parks & Recreation	Toro Groundmaster 580-D 4x4	3	General	Deferred	2022	\$127,009	Citywide
Parks & Recreation	F450 Crew Cab Dump Truck	4	General	Deferred	2022	\$66,154	Citywide
Parks & Recreation	Repaving Winch Tennis and Basketball Courts	5	General	Deferred	2022	\$560,732	
Parks & Recreation	Fence and Backstop Replacement Phase I	6	General	Deferred	2022	\$289,176	Citywide
Sanitation	Recycling Drop-Off Center (RDC) Replacement – Demo Exist, and Design & Construction	18	General	Deferred	2022	\$5,562,000	D5
School B&G	Roof Replacement - Farley Heating Ventilation Air Conditioning (HVAC) - Replace Rooftop Air Handling Units (AHU's) and Ventilation	4	General	Deferred	2022	\$1,826,975	D7
School B&G		8	General	Deferred	2022	\$1,500,000	Citywide
School B&G	Exterior Envelope Security Enhancement Throughout the District	2	General	Deferred	2022	\$1,056,095	D2
School B&G		7	General	Deferred	2022	\$250,000	Citywide
School B&G	ADA Upgrades for Compliance	5	General	Deferred	2022	\$300,000	D7
School B&G	Asbestos Abatement - Floor Tile, Ceiling Tile, Pipe Insulation - Brophy Paving Replacement/Storm Water - Walsh Middle School & McCarthy Elementary School	6	General	Deferred	2022	\$600,000	D3
School B&G		3	General	Deferred	2022	\$1,095,000	D4, D7
Sewer	Consolidated Vehicle/Equipment Various Sewer Pump Stations Eqpt	1	Enterprise Sewer	Deferred	2022	\$356,000	Citywide
Sewer	Replacements - FY22	2	Enterprise Sewer	Deferred	2022	\$550,000	Citywide
Sewer	Various Sewer Improvements - FY22	3	Enterprise Sewer	Deferred	2022	\$400,000	Citywide
Sewer	Gates Street PS Rehabilitation - Design & Construction	4	Enterprise Sewer	Deferred	2022	\$2,095,000	D6
Sewer	Worcester Rd Sewer Phase II - Construction	5	Enterprise Sewer	Deferred	2022	\$4,180,000	D4

For Reference Purposes - Previous Capital Budget Votes for FY21 Expedited Capital and FY22 Capital

Sewer	Flanagan SPS Replacement - Construction	6	Sewer Enterprise	Deferred	2022	\$2,135,000	D3
Sewer	Sewer Defects Repairs Ph 4 – Design & Construction	7	Sewer Enterprise	Deferred	2022	\$800,000	Citywide
Sewer	Lomas Dr. SPS Replacement- Design	8	Sewer Enterprise	Deferred	2022	\$290,000	D2
Sewer	Central St CIPP Lining - Phase 1	9	Sewer Enterprise	Deferred	2022	\$1,350,000	D2, D4, D5
Sewer	Lowther Rd SPS Replacement - Design	10	Sewer Enterprise	Deferred	2022	\$290,000	D2
Sewer	SSES Report, Ph #7	12	Sewer Enterprise	Deferred	2022	\$500,000	D3, D4, D5, D6
Water	Consolidated Vehicle/Equipment	1	Water Enterprise	Deferred	2022	\$374,000	Citywide
Water	Various Water Improvements - FY22	2	Water Enterprise	Deferred	2022	\$1,000,000	Citywide
Water	Merriam Hill Water Tank Rehabilitation	3	Water Enterprise	Deferred	2022	\$2,400,000	D6
Water	Worcester Rd Phase II - Construction	4	Water Enterprise	Deferred	2022	\$4,630,000	D4
Water	Worcester Road 9/90 Water Main - Construction	5	Water Enterprise	Deferred	2022	\$1,675,000	D6



ORDER NO. 2021-035
REQUEST OF THE MAYOR

UPON THE REQUEST OF THE MAYOR, THE CITY OF FRAMINGHAM, THROUGH THE FRAMINGHAM CITY COUNCIL, IT IS SO ORDERED:

That \$5,552,670 is appropriated to pay costs of the following General Fund capital projects:

Capital Project Name	Amount
Expedited Roadway Improvements	\$1,500,000
Dudley Road Landfill Closure	\$35,000
Sanitation Packer Replacement	\$385,000
Drainage system and Stormwater Quality Projects	\$270,000
MS4 Permit Compliance Year 3	\$150,000
Synthetic Turf Field at New Fuller Middle School	\$3,212,670

and for the payment of costs incidental and related thereto, to be spent under the direction of the Mayor or her designee, with the exception of the Synthetic Turf Field at New fuller Middle School project, which will be spent under the direction of the Fuller School Building Committee or its designee; that the Mayor is authorized to acquire by gift, purchase or eminent domain, permanent easements and temporary construction easements or other interests in land for said projects; that the Mayor is authorized to take all actions necessary or convenient to carry out the purposes of this order; and, further, to meet this appropriation, the Treasurer is authorized, with the approval of the Mayor, to issue from time to time bonds or notes in such amount pursuant to the provisions of M.G.L. Chapter 44, or any other enabling authority. Any premium received by the City upon the sale of any bonds or notes approved by this vote, less any such premium applied to the payment of the costs of issuance of such bonds or notes, may be applied to the payment of costs approved by this vote in accordance with Chapter 44,

City of Framingham

The City Council of Framingham



Section 20 of the General Laws, thereby reducing the amount authorized to be borrowed to pay such costs by a like amount.

FURTHER ORDERED: that \$165,000 is appropriated to pay costs of the following Utility Enterprise Fund capital projects:

Capital Project Name	Amount
Backhoe/Loader Replacement	\$165,000

and for the payment of costs incidental and related thereto, to be spent under the direction of the Mayor or her designee; that the Mayor is authorized to acquire by gift, purchase or eminent domain, permanent easements and temporary construction easements or other interests in land for said projects; that the Mayor is authorized to take all actions necessary or convenient to carry out the purposes of this order; and, further, to meet this appropriation, the Treasurer is authorized, with the approval of the Mayor, to issue from time to time bonds or notes in such amount pursuant to the provisions of M.G.L. Chapter 44, or any other enabling authority. Any premium received by the City upon the sale of any bonds or notes approved by this vote, less any such premium applied to the payment of the costs of issuance of such bonds or notes, may be applied to the payment of costs approved by this vote in accordance with Chapter 44, Section 20 of the General Laws, thereby reducing the amount authorized to be borrowed to pay such costs by a like amount.

First Reading

YEAS: Bryant, Cannon, Case, King, Leombruno, Long, Ottaviani, Shepard, Stefanini, Steiner, Stewart-Morales

NAYS: None

ABSTAIN: None

ABSENT: All members were present in person or via teleconferencing

PASSED IN COUNCIL: March 16, 2021

City of Framingham



The City Council of Framingham



Second Reading

YEAS: Bryant, Cannon, Case, King, Leombruno, Long, Ottaviani, Shepard, Stefanini, Steiner, Stewart-Morales

NAYS: None

ABSTAIN: None

ABSENT: All members were present in person or via teleconferencing

PASSED IN COUNCIL: March 30, 2021

A True Record, Attest:

3/31/2021

Date Approved

4/8/2021

Date Approved

Lisa A. Ferguson
Lisa A. Ferguson, City Clerk

Yvonne M. Spicer
Yvonne M. Spicer, Mayor



ORDER NO. 2021-063-002
REQUEST OF THE FINANCE SUBCOMMITTEE

CITY OF FRAMINGHAM
IN COUNCIL

ORDERED: that \$9,089,150 is appropriated to pay costs of the following General Fund capital projects, provided that the Administration explore issuing mini municipal bonds to allow participation by small local investors:

Department	Capital Project Name	Amount
Cemeteries	2021 Kubota Mini Excavator	\$73,629
Facilities Management	Memorial Building Exterior Envelope Repairs for Masonry	\$2,094,680
Facilities Management	Pearl Street Garage stairwell repairs and masonry patching	\$235,000
Engineering	Edgell Rd/Central St Intersection - Final Design	\$340,000
Engineering	Union Ave Right of Way, Nonparticipating & Construction Services	\$1,340,000
Engineering	Arlington St Area Drains & Roads (Phase 1) – Design	\$415,000
Fire	Safety/Training Officer Response Vehicle – Fire Apparatus Asset Replacement	\$65,000
Fleet	Consolidated Vehicle/Equipment	\$816,000
Highway	Carlson Road Roadway	\$150,000
Highway	Various Road Improvements - FY22	\$1,000,000
Highway	Various Traffic Calming - FY22	\$150,000
Library	New Teen Area Main Library	\$150,000

City of Framingham



The City Council of Framingham



Parks & Recreation	F250 4x4 Extra Cab Pickup 10,400 GVW	\$42,206
Parks & Recreation	F350 4x4 Extended Cab Pickup	\$57,635
Sanitation	Dudley Road Landfill Closure -Corrective Action Design	\$460,000
School B&G	Exterior Envelope	\$1,100,000
School B&G	MSBA Feasibility Study - Future Elementary School	\$600,000

and for the payment of costs incidental and related thereto, to be spent under the direction of the Mayor or her designee, with the exception of the School Department projects, which will be spent under the direction of the School Superintendent or his designee; that the Mayor is authorized to acquire by gift, purchase or eminent domain, permanent easements and temporary construction easements or other interests in land for said projects; that the Mayor is authorized to take all actions necessary or convenient to carry out the purposes of this order; and, further, to meet this appropriation, the Treasurer is authorized, with the approval of the Mayor, to issue from time to time bonds or notes in such amount pursuant to the provisions of M.G.L. Chapter 44, or any other enabling authority. Any premium received by the City upon the sale of any bonds or notes approved by this vote, less any such premium applied to the payment of the costs of issuance of such bonds or notes, may be applied to the payment of costs approved by this vote in accordance with Chapter 44, Section 20 of the General Laws, thereby reducing the amount authorized to be borrowed to pay such costs by a like amount.

FURTHER ORDERED: that \$1,830,000 is appropriated to pay costs of the following Utility Enterprise Fund capital projects:

Department	Capital Project Name	Amount
Sewer	Consolidated Vehicle/Equipment	\$250,000
Sewer	Carlson Rd Sewer - Design & Construct	\$115,000
Water	Consolidated Vehicle/Equipment	\$265,000
Water	Carlson Road Water - Design & Construction	\$1,200,000



and for the payment of costs incidental and related thereto, to be spent under the direction of the Mayor or her designee; that the Mayor is authorized to acquire by gift, purchase or eminent domain, permanent easements and temporary construction easements or other interests in land for said projects; that the Mayor is authorized to take all actions necessary or convenient to carry out the purposes of this order; and, further, to meet this appropriation, the Treasurer is authorized, with the approval of the Mayor, to issue from time to time bonds or notes in such amount pursuant to the provisions of M.G.L. Chapter 44, or any other enabling authority. Any premium received by the City upon the sale of any bonds or notes approved by this vote, less any such premium applied to the payment of the costs of issuance of such bonds or notes, may be applied to the payment of costs approved by this vote in accordance with Chapter 44, Section 20 of the General Laws, thereby reducing the amount authorized to be borrowed to pay such costs by a like amount.

Motion to approve the FY-22 Capital Budget, not including items held for discussion.

YEAS: Bryant, Cannon, Case, King, Leombruno, Long, Ottaviani, Shepard, Stefanini,
Steiner, Stewart-Morales
NAYS: None
ABSTAIN: None
ABSENT: All members were present in person or via teleconferencing
PASSED IN COUNCIL: June 15, 2021

A True Record, Attest:

6/25/21

Date Approved

Lisa A. Ferguson, City Clerk
Emily Butler, Assistant City Clerk

6/29/21

Date Approved

Yvonne M. Spicer, Mayor