

CAMBRIDGE
DEPARTMENT
OF PUBLIC
**THE
WORKS**

City of Cambridge
Department of Public Works

Retrofitting Existing Municipal Buildings

City of Cambridge
Municipal Facilities Improvement Plan



CITY OF CAMBRIDGE

Area:
Population:
Portfolio:

6.4 square miles
118,403 Residents
71 City Owned Buildings



Building Portfolio



Building Portfolio



ALKE K. WOLF CENTER



AREA IV YOUTH CENTER



CITY HALL



CITY HALL ANNEX



COFFON BUILDING



DPW GARAGE



CENTRAL SQUARE BRANCH LIBRARY



GREEN STREET GARAGE



FIRE DEPARTMENT HEADQUARTERS



FRESH POND GOLF GARAGE



CITY HALL



FRESH POND GOLF CLUBHOUSE



HEALY PUBLIC SAFETY BUILDING



INMAN STREET FIREHOUSE



NORTH CAMBRIDGE SENIOR CENTER



PORTER SQUARE FIRE HOUSE



KENNEDY LONGFELLOW SENIOR



LOMBARDI BUILDING



MAIN LIBRARY



WEST CAMBRIDGE YOUTH CENTER



FRISOLI YOUTH CENTER



DPW ADMINISTRATION BUILDING



TAYLOR SQUARE FIRE HOUSE



BOUFFORD BRANCH LIBRARY



LANDON AVENUE FIRE HOUSE



O'CONNELL BRANCH LIBRARY



MOORE YOUTH CENTER



RIVER STREET FIREHOUSE



DOROTHY PARK COMFORT STATION



LAFAYETTE SQUARE FIREHOUSE



CENTENARY CHAPEL



CAMBRIDGE ELECTRICAL SHOP



MUNICIPAL BUILDING



PEARBODY/RING AVE UPPER SCHOOLS



SAVITS YOUTH CENTER



FIRST STREET PARKING GARAGE



EAST CAMBRIDGE FIREHOUSE



CEMETARY ADMINISTRATION



O'NEILL BRANCH LIBRARY



CEMETARY GARAGE

A photograph of a brick building with a sign that reads "MUNICIPAL GARAGE". The building has a large central entrance and several windows. A blue barrel is on the sidewalk in front of the entrance. A "ONE WAY" sign is visible on the right side of the building. A dark SUV is parked on the street to the right. The sky is blue with scattered white clouds. The text "MUNICIPAL FACILITIES IMPROVEMENT PLAN 2016" is overlaid in white on the image.

**MUNICIPAL FACILITIES
IMPROVEMENT PLAN
2016**

Assessment Framework



Energy



Building Systems



GHG Emissions



IEQ



Historic Preservation



Fire & Life Safety



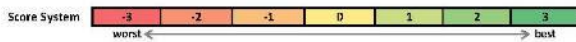
Accessibility



2016 Assessment

Building Portfolio Assessment Matrix

Building Level Tool Portfolio Level Tool	Overall Score	Assessment Categories						IEQ Subcategories					Building Systems Subcategories						Vulnerability				
		2015 EUI (kBtu/s/yr)	2015 GHG (CO2e/s/yr)	Historic Preservation	Accessibility	IEQ	Building Systems	Fire and Life Safety	Thermal Comfort	Air Quality	Lighting	Acoustic	General Satisfaction	Exterior Architecture	Interior Architecture	Structural Systems	Mechanical Systems	Electrical Systems	Plumbing Systems	Flood Risk 2030	Flood Risk 2070	Heat Risk 2030	Heat Risk 2070
East Cambridge Fire House	-1	1	0	0	3	-1	0	-1	2	1	0	-2	1	0	0	1	0	-1	0	V1	V1	V0	V1-V2
Porter Square Fire House	-1	0	0	1	3	0	0	-3	-1	-1	1	-1	-1	1	0	1	0	-1	0	V1	V1	V1-V2	V1-V2
Fire Headquarters	-1	0	0	0	2	0	0	-3	0	-1	1	-1	-1	0	0	1	-1	0	1	V2	V2	V1-V2	V3-V4
Lafayette Square Fire House	-1	0	0	1	3	-1	0	-1	-1	-2	1	-1	-2	1	0	1	-1	0	1	V1-V3	V1-V3	V1-V2	V1-V2
Lexington Avenue Fire House	-1	0	0	1	3	2	0	-3	2	2	2	2	1	0	0	1	-1	-1	-1	V1	V1	V0	V0
River Street Fire House	0	0	1	2	3	1	0	-2	1	-1	2	0	0	0	0	1	-1	0	0	V1	V1-V3	V0	V1-V2
Inman Square Fire House	0	1	2	2	3	-1	0	-2	-1	1	0	-1	-2	0	0	1	-1	-1	0	V1-V3	V1-V3	V1-V2	V1-V2
Taylor Square Fire House	0	-1	0	2	3	1	1	1	0	1	1	1	1	1	0	1	0	0	2	V1-V3	V1-V3	V0	V1-V2
Robert W. Healy Public Safety Bldg.	0	0	-1	0	1	0	1	0	-1	0	0	0	1	1	1	1	-1	1	1	V3-V5	V3-V5	V3-V4	V3-V4
Collins Branch Library	-1	0	0	2	-1	0	0	3	1	1	1	1	0	1	1	1	-1	-1	0	-	-	-	-
Cambridge Public Library	0	-1	-1	2	1	1	1	-2	1	1	1	1	2	1	1	1	2	2	2	-	-	-	-
O'Connell Branch Library	1	0	1	2	0	2	0	-3	2	2	2	2	1	1	1	1	0	0	-1	-	-	-	-
Roussau Branch Library	1	2	2	0	0	0	0	-2	0	0	0	0	0	0	0	1	0	-1	0	-	-	-	-
Central Square Branch Library	1	0	2	1	-2	0	0	-1	0	0	1	0	-2	1	0	-1	-2	1	0	-	-	-	-
O'Neill Branch Library	1	0	1	0	0	1	1	1	0	0	1	1	0	1	1	1	1	1	0	-	-	-	-
Moore Youth Center	-1	-1	-1	0	1	0	0	1	0	0	2	1	0	1	0	1	-1	-1	1	V2	V2	V3-V4	V3-V4
Innisill Youth Center	0	-1	-1	0	0	1	0	-1	-1	1	1	0	-1	0	0	1	-1	-1	1	V2	V2	V1-V2	V3-V4
Moore Youth Center	1	0	0	0	1	0	0	-1	0	0	0	0	-1	0	0	1	-1	0	0	V2	V2	V1-V2	V3-V4
Russell Youth and Community Ctr.	1	0	0	0	1	1	1	-1	-1	2	1	0	2	1	1	1	1	1	1	V2	V2	V1-V2	V3-V4
Citywide Senior Center	1	-1	-1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	V1	V1	Not Assessed	Not Assessed
Savely Youth Center	1	2	2	1	2	1	0	0	0	1	1	0	1	1	0	1	-1	-1	1	V2	V2	V3-V4	V3-V4
North Cambridge Senior Center	1	2	2	0	0	1	0	-1	1	2	2	1	1	1	-1	-1	-1	-1	0	-	-	-	-
Camery Administrative Building	-2	-2	-2	1	3	1	0	-3	2	-1	2	0	1	1	0	1	-1	-1	0	-	-	-	-
Corporal Burns Building	-2	1	0	-1	3	0	-1	-3	0	-1	1	0	-1	0	-1	-1	-2	-2	-2	-	-	-	-
DFW Frazier Administrative Bldg.	-1	-1	0	0	2	0	0	-2	-1	0	1	0	-1	1	0	1	1	-1	1	-	-	-	-
Loamsted Building	-1	-1	-1	1	0	0	0	-2	-1	0	0	0	-1	0	0	1	0	-1	1	-	-	-	-
Coffin Building	0	1	1	1	0	0	0	-3	-1	0	0	-1	0	1	1	1	-1	-2	-1	V2	V2	V1-V2	V3-V4
City Hall Annex	0	0	0	1	-1	0	1	-1	-1	0	1	0	0	0	1	2	1	1	2	V1	V1	V0	V1-V2
City Hall Building	0	0	0	3	-1	0	0	-1	-1	0	0	-1	1	1	1	1	-1	-1	0	V1	V1	V0	V1-V2
Alice K. Wolf Center	1	1	1	2	1	1	1	0	0	1	1	1	1	1	1	1	2	1	2	-	-	-	-
Camery Garage	-2	-2	-2	1	-1	0	0	-3	1	0	1	1	-1	0	1	-1	-1	0	0	-	-	-	-
DFW Garage	-1	-1	0	1	2	-1	0	0	0	-2	0	-2	-1	0	0	1	-1	-1	0	-	-	-	-
First Street Parking Garage	1	2	2	1	-1	0	0	-2	0	0	0	0	0	0	0	1	-1	0	1	V1	V1	V1	V1
Green Street Garage	1	2	2	0	1	0	0	-1	0	0	1	0	-1	0	0	1	0	-1	1	V1	V1	V1	V1
Kennedy-Loggellow School/P4US	-2	0	0	0	3	-1	0	-3	-2	2	0	-1	-2	0	-1	2	0	-1	0	V1-V3	V1-V3	V1-V2	V1-V2
Feebody School/S4US	0	0	0	0	-1	1	1	0	0	1	1	0	1	1	0	1	0	1	1	V1	V1	V1-V2	V1-V2
Camery Chapel	-2	-2	-2	1	3	0	0	-3	1	0	1	1	-2	-1	0	-2	-1	0	0	-	-	-	-
The Shop - Electrical Department	-2	2	2	-2	3	-1	-2	-3	-1	-1	0	-1	-1	0	-2	-3	-2	-2	0	-	-	-	-
DFW Simard Building	-1	-1	0	0	-3	1	0	-3	1	1	0	1	1	1	0	1	-1	-1	1	-	-	-	-
Golf Course Clubhouse	-1	-2	-1	-1	0	0	0	0	0	-2	1	-1	-1	1	0	1	-1	0	0	-	-	-	-
Darehy Park Comm'ori Station	-1	-1	2	0	2	2	1	2	2	2	2	2	2	1	0	1	1	-1	1	-	-	-	-
First Street Parking Garage Retail	0	2	2	1	-1	-1	0	-2	0	-1	0	-1	-1	1	0	1	-1	0	1	-	-	-	-
Golf Course Tip O'Neill Maint. Bldg.	1	2	2	0	1	2	0	-1	3	0	3	2	1	0	0	1	0	0	1	-	-	-	-
Total Score for City of Cambridge Portfolio	-1	0	0	1	-1	0	0	-1	0	0	1	0	0	1	0	0	-1	1	1				



Source: Kettle der adapted from ICLEI, Nov 2015



2016 Assessment

Recommendations (Sample)

City of Cambridge - Department of Public Works
Municipal Facilities Improvement Plan
Site Assessment Recommendations

Building Name	Typology	Area (SF)	Community Use?	Overall Score
East Cambridge Fire House	Public Safety	17,093	No	-1
Porter Square Fire House	Public Safety	11,213	No	-1
Fire Headquarters	Public Safety	30,389	Yes	-1
Lafayette Square Fire House	Public Safety	19,080	No	-1
Lexington Avenue Fire House	Public Safety	6,525	No	-1
River Street Fire House	Public Safety	9,643	No	0
Inman Square Fire House	Public Safety	16,728	No	0
Taylor Square Fire House	Public Safety	16,187	No	0
Robert W. Healy Public Safety Bldg.	Public Safety	162,547	Yes	0
Collins Branch Library	Library	3,300	Yes	-1
Cambridge Public Library	Library	277,185	Yes	0
O'Connell Branch Library	Library	6,427	Yes	1
Boudreau Branch Library	Library	1,955	Yes	1
Central Square Branch Library	Library	15,447	Yes	1
O'Neill Branch Library	Library	4,566	Yes	1
Moses Youth Center	Youth Center	19,405	Yes	-1
Frisoli Youth Center	Youth Center	20,059	Yes	0
Moore Youth Center	Youth Center	10,537	Yes	1
Russell Youth and Community Ctr.	Youth Center	31,586	Yes	1
Citywide Senior Center	Senior Center	27,999	Yes	1
Gateway Youth Center	Youth Center	14,837	Yes	1
North Cambridge Senior Center	Senior Center	3,623	Yes	1
Cemetery Administrative Building	Office	2,874	Yes	-2
Corporal Burns Building	Office	3,591	No	-2
DPW Frazier Administrative Bldg.	Office	12,550	Yes	-1
Lombard Building	Office	21,806	Yes	-1
Coffon Building	Office	31,240	Yes	0
City Hall Annex	Office	33,909	Yes	0
City Hall Building	Office	61,731	Yes	0
Alice K. Wolf Center	Office	58,316	Yes	1
Cemetery Garage	Garage	1,830	Yes	-2
DPW Ryan Garage	Garage	44,547	No	-1
First Street Parking Garage	Garage	378,000	Yes	1
Green Street Garage	Garage	110,884	Yes	1
Kennedy Longfellow School/PAUS	School	127,302	Yes	-2
Peabody School/RAUS	School	108,989	Yes	0
Cemetery Chapel	Other	1,923	Yes	-2
The Shop - Electrical Department	Other	8,418	No	-2
DPW Simard Building	Other	11,542	No	-1
Go! Course Clubhouse	Other	4,610	Yes	-1
Danery Park Comfort Station	Other	1,696	Yes	-1
First Street Parking Garage Retail	Other	8,909	Yes	0
Go! Course Tip O'Neil Main. Bldg.	Other	4,319	No	1

Immediate Recommendation
Additional Opportunity

ARCHITECTURE				
Window Lintels: Re-paint	Window Replacement:	Door Repairs: Re-paint	Interior Finishes:	Interior Finishes: Re-
Door Repair: One	Sealant Work: Sealants	Interior Finishes: Vinyl	Interior Finishes:	
Roof Replacement: The	Facade Masonry: Masonry	Sealants: Sealants are		
Window Repairs: Paint	Interior Finishes: Insulate	Interior Finishes: Replace	Roof: Snow Guards:	Sealants: Sealants
Window Repairs: Install	Interior Finishes: Repair	Sealants: Replace sealants	Interior Finishes:	Door Repairs: Replace
External Doors: Exterior	Interior Finishes: Replace			
Sealants: Replace sealants	Window Repairs: Install	Roof Replacement:	Door Repairs: Repair:	Interior Finishes:
Roof Repair: Water:				
Window Upgrades: We	Door Repairs: Add	Green Roof Maintain: The		
Window Replacement: The	Roof Insulation: Verify level			
Window Replacement:				
Roof PV System addition:				
Door Replacement:	Interior Repairs: Repair	Interior Finishes: Ceiling		
Window Replacement: The				
Masonry Repairs: Repair	Door Replacement:	Sealant Work: Replace		
Window Repairs: Insulated	Interior Finishes: Replace			
Door Hardware Repairs:	Window Hardware Repair:	Interior Finishes: Walls:	Roof Replacement:	Interior Finishes:
Roof Replacement: The				
Windows/Glazing: Solar				
Roof Replacement: Roof at	Sealant Work: Replace	Interior Finishes: Areas of		
Sealant Work: Sealants	Interior Finishes: The wood			
Sealant Work: Replace	Interior Finishes: Replace			
Window Repairs: Further	Sealant Work / Glazing:	Interior Finishes: Carpeted		
Entry Stair Repairs: The	Window Replacements:	Door Replacements:	Trim Replacements:	General: Al
Storefront Replacement:	Interior finishes: floors			
Roof Replacement: Rubber	Sealant Work: Sealants	Interior Finishes: Flooring:		
Roof Replacement: The	Interior Finishes: Replace	Interior Finishes: Replace		
Window Repair: Address	Masonry Repairs: Step	Roof and Wall Leakage:	Sealant Work: Some	Interior Finishes: A
Interior Insulation:	Window Replacement:	Flooring Replacement: The		
Interior Finishes: Flooring:	Interior Finishes: Walls:			
Masonry Repairs: It's	Interior Finishes: Floors and	General: MEP,		
Sealants & Control Joints:	Stair Case Inspection: Some	Door Replacement: Metal	Interior Finishes:	
Sealant Work: Sealants on	Interior finishes: All:			
Masonry Repairs &	Storefront Entrance:	Envelope & Window	Ceiling & flooring	Interior Finishes:
Interior Finishes: Wood	Sealant Work: The sealants	Roof Replacement: The		
Window Repairs:	Interior Finishes: Vinyl			
Window Replacements:	Door Replacements:	Roof Replacement: The flat	Cornice Replacement:	Interior Finishes:
Interior Finishes: Floors and				
Door Replacement: The	Roof Repair: Isolated areas	Window Repairs: Some	Window Repairs:	Sealant Work: There
Masonry Repairs: Some	Window Repairs: One			
Interior Finishes: The retail				
Envelope Thermal	Sealant Work: Sealants	Roof Repairs: The wood	Doors: The wood Trim	Doors: The wood Trim



Approach

Project Classifications:

Large Scale Renovations

Greatest Needs, addressed through major alterations.

Net Zero Emissions requirement applies

\$5 to \$50M
Project Budget

Small Scale Renovations

Improvement projects to address accessibility, fire & life safety, controls, or a combination. Target electrification & on-site renewables whenever feasible.

\$500,000 - \$5.0M
Project Budget

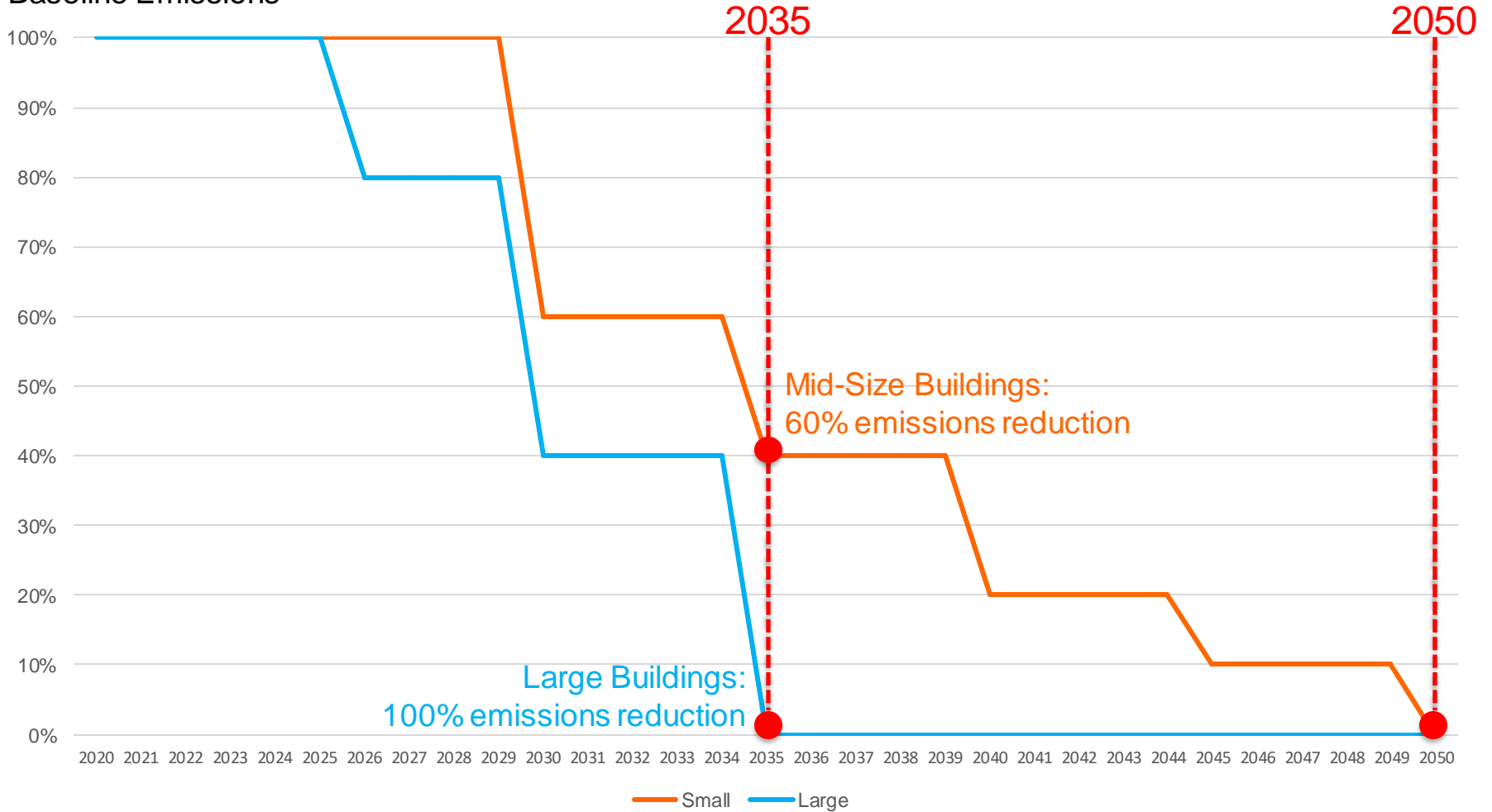
Deferred Maintenance

Projects to address envelope and equipment that are at or beyond useful life, such as roofs, sealants, equipment, or interior finishes and fixtures

\$50,000 - \$2.0M
Project Budget

Net Zero and BEUDO

Baseline Emissions



2035: ~86% overall
GHG reduction target

2050: 100%
Net Zero

Net Zero and BEUDO

Paths to Net Zero:

2035:

- ~86% GHG Emissions reduction target
- Ongoing Capital Improvement Projects to electrify Gas and Oil Systems and improve building efficiency
- Renewable Electricity Purchase: Certified investments in clean, renewable energy
- Carbon Offsets as required to meet any shortfalls to 2035 target

2050:

- 100% Net Zero Emissions
- Capital Improvements required to full portfolio of BEUDO buildings (25,000 sf and up) to electrify building systems and Eliminate gas and oil use

Funding Sources

The **City of Cambridge** self-funds much of our building improvements using **general obligations bonds** or **free cash appropriations** (for items that are supplemental to the annual budget).

However, the City does utilize additional sources of funding, including:

- DOER Green Community Grants
- Eversource Rebates for energy efficiency projects
- Revenue from DOER's Alternative Energy Credits (AECs) program



CASE STUDIES

A large, empty room with a high ceiling and a series of arched windows along the right wall. The walls are covered in peeling, patterned wallpaper. The floor is a light-colored, polished surface. Two people are standing in the center of the room, one facing the camera and one with their back to it. The room appears to be in a state of renovation or disrepair. The text "CASE STUDIES" is overlaid in large, white, sans-serif font across the center of the image.

Lexington Avenue Firehouse

167 Lexington Avenue



Current Project:	Full Renovation
Status:	COMPLETE
Project Completion Date:	2022
Construction Cost:	\$3.4 million

Current Scope of Work:

- Exterior masonry re-pointing
- Roof replacement
- Complete interior renovation, including:
 - New kitchen
 - Decontamination showers
 - Sleeping Quarters
 - Common Area
 - Gym
 - Engine Bay
- All-electric HVAC systems
- Energy-efficient LED Lighting
- Driveway repaving

Future Upgrades:

- Window replacement

Original Completion:	1893
Previous Renovations:	N/A
Historic:	-
Internal Area:	6,525 sf
Function:	Firehouse
Occupants:	Fire Department: Engine 9
Areas of Need:	Architectural Mechanical Electrical Fire & Life Safety

Moses Youth Center

243 Harvard Street



Current Project:	HVAC Upgrade & Repairs
Status:	FEASIBILITY
Project Completion Date:	2025
Est. Construction Cost:	\$5 million

Current Scope of Work:

- Full HVAC replacement (all-electric)
- Partial roof replacement
- Slate Roof repairs
- Partial Window and Door seals
- Feasibility Study for façade and interior improvements

Challenges:

- Occupied building
- HVAC beyond useful life
- Significant other needs beyond HVAC

Original Completion:	1991
Previous Renovations:	-
Historic:	No
Internal Area:	22,000 sf
Function:	Youth & Day Care Center
Occupants:	Community
Areas of Need:	HVAC Roof Facade

DPW Simard Building

147 Hampshire Street



Current Project:	Full Renovation
Status:	CONSTRUCTION
Project Completion Date:	Fall 2023
Est. Construction Cost:	\$8 million

- Current Scope of Work:
- Envelope Repair & Upgrades
 - Full interior renovation
 - All-Electric Building
 - Rooftop PV Array
 - Geothermal Wells

Original Completion:	1977
Previous Renovations:	1989, 1993, 2002, 2005
Historic:	No
Gross Internal Area:	11,542 sf
Function:	DPW
Occupants:	Offices, Workshop, Sign Shop, Storage
Areas of Need:	Space Planning, Envelope, Energy, IEQ, MEP, Accessibility

Fire Headquarters

491 Broadway



Current Project:	Full Renovation
Status:	DESIGN
Project Completion Date:	Winter 2025
Est. Construction Cost:	\$47 million

Current Scope & Targets:

- All-electric (Net-Zero emissions)
- LEED Gold renovation
- Envelope: Roof replacement, windows, masonry
- Equipment bay slab lowering
- Interior renovation, including:
 - Equipment bay
 - Sleeping Quarters
 - Common Area
 - Kitchen
 - Decontamination showers
 - Gym
- Rooftop Photovoltaic array
- Ground source heat pumps
- EV Charging stations

Original Completion:	1933
Previous Renovations:	1990, 2009, 2012
Historic:	Yes
Internal Area:	30,389 sf
Function:	Firehouse
Occupants:	Fire Department: Engine 1, Ladder 1, Rescue 1
Areas of Need:	Mechanical, Fire & Life Safety Accessibility Roof

Conclusions & Commentary

- Energy & Sustainability Goals: Easier to achieve in new construction, existing building retrofits are more difficult, more costly, and there are many competing needs and logistical challenges
- For existing buildings with significant other maintenance and repair needs, recommend **Net-Zero “over time”** approach – preferable to implement phased improvements addressing multiple building issues in one project, rather than targeting “quick-fix” systems electrification projects that are not in the long-term best interests of the building or its occupants, and don’t address other critical needs.



THANK YOU