

Conditions Assessment Furnace Brook Parkway Substation

**1198 Furnace Brook Parkway
Quincy, MA**

DCR Project No. P25-3595-S2A

**Prepared for:
The Commonwealth of Massachusetts
Department of Conservation and Recreation**

March 24, 2025

**Johnson Roberts Associates
24 Dane Street, Somerville MA**



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Section 1

Introduction

Johnson Roberts Associates, Inc has been requested to prepare a conditions assessment and cost estimate for the former MDC Police Substation located at 1198 Furnace Brook Parkway in Quincy, Massachusetts. The Substation is a single-story English Revival-style cottage approximately 420 square feet plus a basement. The building is currently unoccupied.

The purpose of this study is to evaluate the existing condition of 1198 Furnace Brook Parkway, and to identify and describe recommended improvements to make the building suitable for occupancy either as a business-use small office or a single household residence. The study also establishes cost estimates for the repair and re-use of the building.

This study is prepared by Johnson Roberts Associates and the following consultants on the Design Team:

Structural Engineering	Engineers Design Group
HVAC and Plumbing	C.A. Crowley Engineering, Inc.
Electrical	ART Engineering Corp.
Code Consultant	Hastings Consulting, Inc.
Cost Estimator	PM&C

Section 2

Executive Summary

The report begins with an Existing Conditions Analysis based on the design team's site visit on December 18, 2024 to observe the building and site in its current condition. The following areas are documented by the design team:

- Structural systems
- Plumbing system
- HVAC system
- Electrical system
- Site and exterior elements
- Interior elements

The Recommendation section describes the improvements needed to bring the property up to code and into working condition. The report considers two types of occupancy for the renovation: (1) commercial small office and (2) single-family residential. The recommendations included in this report assume that the current floor plan layout will remain largely intact with some new door openings in existing walls. Should the layout be altered more extensively, additional measures may be needed to meet code.

Structurally the building is largely intact. All of the structural components that are visible appear to be in sound condition except for the stair to the basement and some columns which will need to be replaced.

It is also recommended that the roof and attic members be positively connected with light gage metal connectors to the exterior wood walls.

The commercial use will require accessibility criteria to be met. The extents of the accessibility requirements will depend upon what type of commercial enterprise is housed in the building and the cost of the work. At minimum, in all commercial use cases, an exterior accessible access path and building entrance and an accessible restroom will need to be provided. The residential occupancy does not need to comply with accessibility requirements.

The residential occupancy is a change of occupancy and will increase the energy demand for the building. It must therefore be upgraded to be fully compliant with the Massachusetts Stretch Energy Code, including that the building envelope is fully compliant. Although the continued commercial occupancy would only be required to make code compliant those portions of the building being altered, the new energy efficient HVAC system relies on the building envelope being insulated to function properly. Hence it is recommended that the commercial occupancy make similar exterior envelope improvements as the residential occupancy. These include insulating the exterior walls, attic floor, and basement ceiling in addition to replacing or improving the windows and doors.

The commercial occupancy, given its small size, is permitted to have a single means of egress from the building. The residential occupancy requires that the building have two means of egress. Additionally, the bedroom that is assumed to be housed in the secondary room, will need an emergency escape opening. The double hung window, given its aspect ratio, does not provide a large enough opening to be a compliant emergency escape. It is therefore recommended that a new exterior door out to an exterior landing and stairs down to be grade be added in the secondary room to provide both a second means of egress for the building and an emergency escape opening for the bedroom.

The bathroom is no longer functional and will need to be fully renovated in both occupancy cases. In the commercial use case, an accessible bathroom will need to be provided with toilet, sink, grab bars, and proper clearances. In the residential use case, the bathroom will need to add a shower in addition to toilet and sink/vanity. Mechanical ventilation will need to be added in both use cases.

For the residential use, a kitchen will need to be added. It is also suggested that washer/dryer hookups be provided.

The existing HVAC system is dismantled and not serviceable. The HVAC system needs to be replaced and an electrical air source heat pump system providing both heating and cooling is recommended. The plumbing system is nearing its end of life. It is recommended that, given the extent of the renovations required, that the plumbing system be fully replaced. An exploratory investigation is needed to confirm if the sanitary and storm drains are combined; if they are, the systems will need to be separated, and new connections established at the street. The electrical system is in poor condition and will need to be fully replaced along with increasing the size of service in support of VRF heating / cooling and capacity for a vehicle charging station.

No hazardous materials testing was performed as part of this assessment. Given the age of the property, it should be assumed that asbestos containing materials and other hazardous materials may be present.

Section 3

Existing Conditions Analysis

The following is a summary of the existing conditions observed by Johnson Roberts Associates and their structural, MEP/FP, and code consultants. These observations are based on the site visit to 1198 Furnace Brook Parkway that occurred on December 18, 2024. The site visit involved visual inspections of observable conditions, and no finishes were removed or disassembled to reveal hidden conditions.

3.1 Structural System, Existing Conditions

The full structural report, including existing conditions analysis and recommended improvements, can be found in Appendix C.

A. Existing Structural System

The existing structure is a single-story wood framed structure with a basement under the entire footprint of the building. The first floor is framed with wood joists spanning between exterior stone foundation walls and interior wood beams and wood columns and sheathed with wood planks. The hipped roof is framed conventionally with wood rafters spanning between exterior wood stud walls. The attic floor is also framed conventionally with wood joists and is partially covered with plywood for access to the roof drains and vent lines located in the attic space. The basement floor is concrete slab on grade.

B. Observed Conditions Assessment, Structural

The existing structure is in good condition. The engineer did not observe any distress in any of the members. The engineer did not observe any signs of foundation settlement or undue vibrations due to footfall on the supported first floor. The engineer did not observe any signs of water infiltration through the roof or the exterior walls. The stair from the first floor to the basement is in state of disrepair and is structurally unsafe. The engineer observed some deterioration at the base of a wood column in the basement. The column may have to be replaced with a new wood column supported on a new thickened slab locally. The engineer observed some rusting at the base of the steel columns supporting the Entrance Canopy. Based on the observations, the majority of the structure is in fair condition and there are no major structural concerns at this time other than the basement column and the stair structure from the first floor to the basement.



Existing First Floor Framing and Stone Foundation Walls



Existing Stair Framing



Existing Roof Framing



Attic and Roof Framing



Base of Canopy Column

3.2 Plumbing System, Existing Conditions

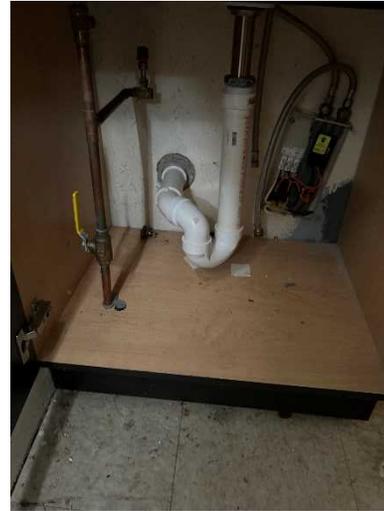
The full plumbing and HVAC report, including existing conditions analysis and recommended improvements, can be found in Appendix D.

The building's domestic water is supplied underground through a ¾-inch (¾") pipe which enters the basement through the slab. The domestic water supply was equipped with a meter which has been removed and sits on the floor next to the water service. The water service piping appears to be of unknown metal.

The domestic water heater is an electric point-of-use heater located within the restroom vanity.



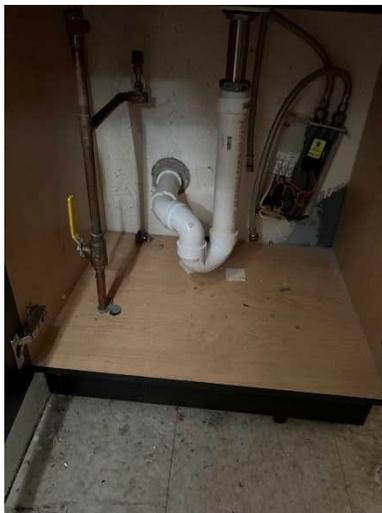
Water Service



Water Heater

Only the exposed water piping scattered throughout the building could be observed and evaluated. The domestic water piping is hard drawn copper pipe. Piping appears to be in fair condition.

What could be seen of the existing sanitary drain, waste and vent system appears to be a combination of PVC and hub and spigot cast iron with leaded and caulked joints. PVC is limited to the lavatory drain. Visible piping appeared to be in fair condition, with little evidence of active leaks.



PVC Piping



Cast Iron Piping

Storm water had been served by gutters, downspouts, downspout boots and exterior cast iron storm drain piping. The gutters and downspouts no longer exist. Some cast iron piping inside the building is suspected to be storm drain piping.



Cast Iron Storm Piping



Downspout Boot

There are various structures located in the basement slab which appear to have served the sanitary and/or storm drainage system. We suspect they may have been abandoned in place. More investigation of these structures should be conducted, and the system evaluated for being a combined sanitary and storm piping system, which is no longer allowed by current codes, and continued use.

Plumbing fixtures include only a floor mounted elongated rim tank type toilet and vanity countertop lavatory with two-handle faucet.



Toilet



Lavatory

It appears that the plumbing system had been dismantled for winterization. It is unclear if the existing equipment and systems could be made operational, or if there is any damage to the systems due to freezing or corrosion.

As this is an existing structure, there were no obvious deficiencies noted. While many of the fixtures, equipment, and systems are intact and may have been allowed by the codes in force at the time of construction, they do not meet the latest edition of the codes and should be addressed during any major renovation.

Deficiencies of the plumbing system include:

- Plumbing fixtures may not meet current codes for flow rates.
- Sanitary and storm drains may be combined.

However, a major renovation or change in use could create additional deficiencies such as:

- Shower, kitchen and laundry connections would be required for residential use.
- Additional designated male/female and/or accessible fixtures would be required for business use.
- Mop sink and drinking fountain would be required for business use.
- Hot water is needed at fixtures. (except toilet and drinking fountain).

3.3 HVAC System, Existing Conditions

The full plumbing and HVAC report, including existing conditions analysis and recommended improvements, can be found in Appendix D.

Heat for the building is provided by a Hydrotherm gas-fired, atmospheric boiler located in the basement. The boiler produces hot water which is distributed to cast iron radiators located on the first floor through steel piping with threaded fittings. The hot water is circulated by a single inline pump mounted near the boiler.

There are no zone control valves and one wall mounted mechanical thermostat located in the main room near the basement stairs.

The heating system has been dismantled and is not operational. The gas service and gas piping are intact, but the gas meter has been removed. The boiler had been vented into a masonry chimney.



Boiler and Circulator



Radiator

There is no mechanical ventilation or exhaust systems. Bathroom exhaust is via a double-hung window. There is no air conditioning.

It appears that the heating systems had been dismantled for winterization. It is unclear if the existing equipment and systems could be made operational, or if there is any damage to the systems due to freezing or corrosion.

As this is an existing structure, there were no obvious deficiencies noted. While many of the fixtures, equipment, and systems are intact and may have been allowed by the codes in force at the time of construction, they do not meet the latest edition of the codes and should be addressed during any major renovation.

Deficiencies in the HVAC system include:

- The exact age of the existing boiler couldn't be determined but it appears to be beyond its normal life expectancy and mostly would not be practical to be re-used.
- The existing controls do not meet current standards.
- The existing heating supply and return piping is not insulated.
- There is no mechanical exhaust for the toilet room as required by code.
- The openable portions of the existing windows may not meet the minimum requirement for natural ventilation and mechanical ventilation may be required.

A major renovation or change in use could create additional deficiencies.

3.4 Electrical System, Existing Conditions

The full electrical report, including existing conditions analysis and recommended improvements, can be found in Appendix E. Most aspects of the electrical system are deemed to either be Failed or Poor, as defined:

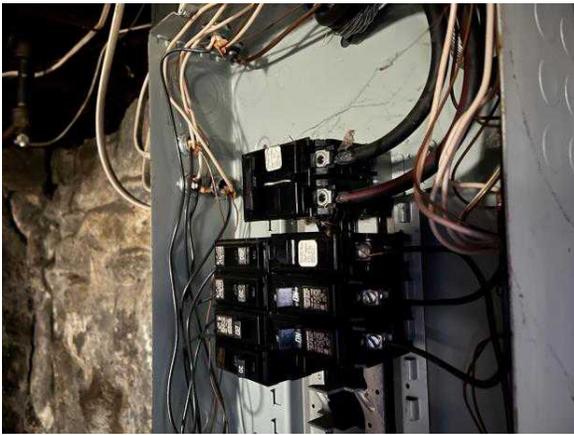
- Failed – The equipment, component or system is no longer in proper operating condition.
- Poor – The equipment, component or system is still in operation, but failure is imminent. Significant signs of deterioration are present and/or components may be missing from equipment. Significant repair work may be required.

A. Main Electrical Service and Distribution Equipment

The main electrical service is a 100A, 120/240V, 1-phase, 4-wire panel, located in the basement. The panel is fed by pole mount Utility-Co. transformer distributing power to the single panel located in the basement. The Main Panel is by Westinghouse and appeared to be installed in the 1990's. The corrosive nature of the unconditioned space has weathered the panel, and the panel face has been removed, creating a safety hazard. The load center covers the power needs to this single-story structure with attic space for gas-fired steam boiler, point of use domestic hot water system, plug loads, and lighting.

While the Electrical System is in service, a rating of poor/failed is assigned due to the risk associated with corrosion and age and the absence of a protective panel cover. Support of the 35-yr old load

center is due for immediate replacement. Today's code requires AFCI and GFCI breakers as well as surge protection for the main service panel.



Westinghouse Load Center



Westinghouse Panel

B. Egress and Exit Lighting

No EXIT signs were observed at the egress door. A rating of failed is assigned for commercial use.

C. General Purpose Power

The general-purpose receptacles are located throughout the building. The location and the quantity of the receptacles may not be adequate for new program space. Receptacle outlets should be replaced with tamper resistant units. Any plans for a kitchen/kitchenette equipment to include GFCI breakers around wet areas. A rating of poor is assigned.

D. Emergency Power

There is no generator.

E. Lighting and Controls

The lighting in the building is of fluorescent and LED replacement bulbs. There are LED replacement lamps within surface-mount 1x4 fixtures configured for T-8 lamps.

Lighting control is by wall mounted snap switches. The building's perimeter and porch lighting were missing. In general, the interior/exterior lighting system is barely functioning.

A rating of failed is assigned.



Primary Room Lighting



Secondary Room Lighting



No Entryway Light



No Walkway Lighting

F. Fire Alarm System

There was no observed fire alarm system.

G. Telecommunications Cabling Infrastructure

The telecommunications system comprises mostly of Category 3 analog phone line. The telecommunications distribution is nonexistent for commercial or residential use. A rating of poor is assigned.

H. Security

There is no security system.

3.5 Exterior Elements, Existing Conditions

A. Site / Landscape

The lot is a small corner lot at the corner of Furnace Brook Parkway and Cross Street. There are sidewalks at both streets. A narrow, approximately 3'-0" wide, asphalt path leads from the Furnace

Brook Parkway sidewalk to the front entry. A small narrow driveway is located along the north lot line and is overgrown with grasses and shrubs.

The lot is largely covered by grass. A large street tree sits at the front of the house alongside Furnace Brook Parkway. Two trees are at the west side of the house directly adjacent to the narrow driveway. On the east side and a portion of the rear, there are overgrown deciduous shrubs directly adjacent to the building.



Front of Building



Google Streetview with Street Tree at Furnace Brook



Google Streetview of Driveway and Utility Pole (potential easement) in northeast corner of lot



Rear of building; Infilled exterior stairwell and shrubs to be removed / cutback

It appears there may be a utility easement at the rear of the lot. There is a utility pole in the northeast corner of the lot, with wires coming from the street pole located on Cross Street. The building electrical service appears to be coming from the street pole to the west side of the building. There are additional wires coming from the lines at the rear of the yard to the north side of the building and wires from the pole in the northeast corner of the lot continue and serve neighboring properties.

At the rear of the building, the exterior stair well down to the basement doors is filled with debris, soil, and leaves. The condition was covered so the condition of the existing stair well could not be assessed. It needs to be cleared out, and it is assumed that the landing and steps will need to be rebuilt to step down to the basement level.

B. Parking and accessibility

On site parking is limited to a single car in the narrow driveway at the north portion of the lot. The driveway is non-conforming in that it is extremely narrow and directly adjacent to the presumed lot line. The surface of the driveway is overgrown and the roots of the two trees directly adjacent to the driveway are affecting the driveway surface. The driveway is in an unusable condition.

The entry to the building is currently not accessible from either the driveway or the street sidewalk. The grade of the walkway visually appears to be steeper than the maximum 5% permitted without a ramp. At the entry to the building, there are two steps plus a raised threshold that do not permit accessible access.



Driveway on west side of building with trees adjacent



Side view of front of building where grade slopes up from sidewalk to front door



Front and Driveway side of Building



Front Entry

C. Roofing

The existing roof is a tall hip roof with an integral small hip roof over the front entry landing. Both are clad in asphalt shingles. Exposed painted wood rafter tails occur at all the roof soffits and appear to have formerly held the roof gutters. There are no gutters currently.

At the main roof, there is a brick chimney and a cast iron vent on the rear portion of the roof. As observed from the ground, the flashing around the vent appears to be improperly installed. On the northwest side there is a roof pipe penetration for the electrical connection.

The front entry canopy roof has a wood soffit with some wood trim. There appears to be an electrical connection for a light fixture, but there is no light fixture currently. It is supported on two painted lally columns and is above a small wood landing that is two steps, approximately 10 inches, above grade.

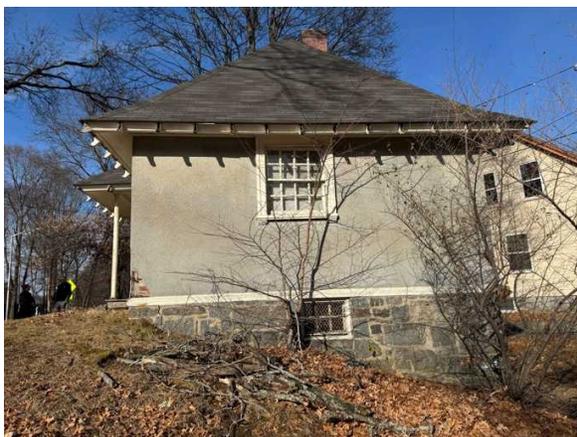
As observed from the ground, the asphalt shingle roofing appears to be fair condition, although there is some vegetative growth on the front portion of the roof. The exposed painted wood rafter tails are completely deteriorated and unusable. The soffit of the front entry canopy appears in fair condition. The steel columns supporting the porch roof are deteriorating and in poor condition as noted in the structural portion of the report. The front landing and stair are in fair condition, but do not meet code requirements for some of the proposed building uses.

D. Exterior walls

The exterior walls appear to be uninsulated and composed of 2x4 wood stud construction. Selective demo at the wall would need to be made to confirm this condition and depth. The exterior is clad in stucco with wood trim at the soffit, transition to the stone foundation, and door and window openings.

Overall, the stucco is in fair condition and in need of cleaning. In the south corner of the project at the foundation wall, the stucco has been damaged and come off, leaving the wood sheathing exposed. This corner needs to be repaired. There is also a crack in the stone foundation wall at this corner that should be evaluated and repaired.

The wood trim, except for the exposed rafter tails, appears to be in fair condition but the paint is peeling and in unusable condition. The wood trim needs to be stripped and repainted.



East Side of Building where Stucco Needs to be Repaired and Shrubs Removed



West Side of Building including Deteriorated Rafter Tails to be Replaced

E. Windows

At the ground floor of the building, the existing windows are wood windows, single pane, double hung, with divided lites. Due to the aspect ratio of the window, none of these windows provide a large enough clear opening to be code compliant emergency escape openings.

At the basement, the windows are wood windows, single pane, with divided lites. The rear window is double hung with many broken panes and is boarded over from the exterior. The side windows are fixed. The exterior of all of the basement windows are covered with a painted metal mesh security screen to prevent entry.

The windows were not accessible from the interior due to being covered over and therefore were not opened. The caulking at the divided lites is cracking. The paint is peeling and cracking. The windows are in poor condition, and they will either need to be replaced or restored and storms added. The approach needs to evaluate the historic significance of the property along with the energy code requirements for the for the building envelope as described in the Recommendations Section.



Partial view of Front of Building, Including Window, Column, and Rafter Tails to be Replaced

F. Doors

The threshold of the front door is a couple of inches above the exterior wood entry landing. The front door is a half-glazed painted wood door with two panels in the lower portion. The glazing is single pane with divided lites. There are no weatherstripping or sweeps on the door. The threshold is a flat wood threshold that is flush with the interior floor. Given the poor condition of the threshold and interior floor, it is difficult to determine if there has been any water intrusion. The door has two deadbolts (high and low) and a keyed doorknob. The paint is peeling and in unusable condition.

The door is in poor condition, although still serviceable currently by virtue of being intact, lockable, and fully openable. The door will either need to be replaced or restored. The approach needs to evaluate the historic significance of the property along with the energy code requirements for the for the building envelope as described in the Recommendations Section.

The basement has an irregularly sized door half-glazed painted wood door (approximately 6'-2" tall by 3'-9"). The glazing is single pane with divided lites and two panels in the lower portion. The door is secured shut with a wood brace and was not opened, so it couldn't be evaluated for its serviceability. No weatherstripping or sweeps are observed. On the exterior, the bottom portion of the door is covered with debris and an exterior landing and steps would need to be reestablished. Should the door be deemed serviceable, it could be stripped and restored, but it will not meet the code requirements for the building envelope as described in the Recommendations Section.



Existing Front Door



Existing Basement Door

3.6 Interior elements, Existing Conditions

A. Floor plan layout

The ground floor exists of three rooms, the larger primary room into which one enters, a smaller secondary room, and a bathroom off the secondary room. As described in the Plumbing Section, the bathroom only has a toilet and vanity. There is no kitchen or laundry. There is abandoned furniture remaining in the building.

At the rear of the primary room is a narrow non-code compliant stair down to the basement. The basement is unfinished. The electrical panel, water, and remaining HVAC equipment are in the basement. There are some abandoned ducts and a table remaining.



First Floor, Main Room looking to Rear
(door leads to stair down to Basement)



First Floor, Main Room looking to Front



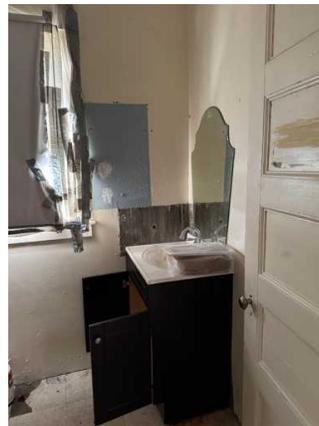
First Floor, Main Room looking West



First Floor, Secondary Room looking to Rear



First Floor, Bathroom



First Floor, Bathroom



Basement looking to Rear



Basement looking East

B. Flooring

The first floor is resilient flooring over a wood plank subfloor. In the primary room, there is a painted wood wall base. In the secondary room and bathroom, there is no wall base. The flooring is in unusable condition.

The basement is unfinished. The flooring is an unsealed concrete slab on grade that has several trench cuts and openings cut into it. The flooring, if the trench cuts are filled and the slab cleaned, is in fair condition for an unfinished space.



First Floor Resilient Floor without Wall Base and Surface Mounted Electrical Conduit and Receptacle



Basement Slab Floor with a Trench Cut that Needs to be Infilled

C. Walls and ceilings

The first-floor walls and ceilings appear to be painted gypsum board and may also include plaster in some locations. There are several locations where the finish layer is peeling from the board and/or scaling, like what might be expected if there are moisture or condensation issues. This may be occurring because the building is no longer conditioned.

There is wood trim around the windows and door openings. The windows are covered on the interior and the windows and much of the surrounding trim is not visible. In the primary room, there is wood base board, a minimal wood crown molding, and in some locations a wood chair rail. In locations where there is no base board, the bottom of the wall finish shows additional deterioration.

The surface condition of the walls is poor and of the trim is fair. Refurbishment and repainting of these conditions could make them usable again, but as described in the Recommendations Section, the exterior walls will need to be insulated. This will require removing the interior finishes and trim from the walls in order to install the insulation. It should also be noted that all the electrical wiring, outlets, switches, and fixtures are currently surface mounted. The removal of interior finishes will require these electrical items to be removed and reestablished.



Wall and Ceiling Damage, Secondary Room



Example of Types of Trim, Primary Room



Wall Damage, Primary Room

In the unfinished basement, the walls are stone foundation. They appear to be in fully functional condition. At the rear basement door is a stud wall into which the door is installed. This will need to be modified for the new door and to be compliant with the code required thermal envelope.

D. Stairs

There is a wood stair down to the basement. It is narrower and steeper than code compliant, is lacking a handrail, and is in unusable/poor condition. One can currently walk down it, but it is an unsafe condition and will need to be fully replaced.



Stair looking down to
Basement



Stair looking up to First Floor



Stair in Basement (looking West)

Section 4

Recommendations

4.1 Summary

The study has focused on two potential occupancies: commercial small office and single-family residential. The recommendations included in this report assume that the current floor plan layout will remain largely intact with some new door openings in existing walls. Should the layout be altered more extensively, additional measures may be needed to meet code. A full code report can be found in Appendix B.

Many of the recommended improvements to meet code or bring the building to working condition are the same for both occupancy types, but the code requirements and scope of alterations for the two occupancies do differ in several ways.

The commercial use will require accessibility criteria to be met. The extents of the accessibility requirements will depend upon what type of commercial enterprise is housed in the building and the cost of the work. These are more fully described in the Code Report in Appendix B. If the commercial use invites the public into the building for goods or services, these portions of the building will need to be accessible in keeping with Massachusetts 521 CMR. Even if the commercial use is not open to the public, the building is still subject to ADA compliance for employee-only spaces. In all commercial use cases, an exterior accessible access path and building entrance and an accessible restroom need to be provided. The residential occupancy does not need to comply with accessibility requirements.

The residential occupancy is a change of occupancy. Per the Massachusetts Stretch Code, spaces that undergo a change in occupancy that results in an increase in demand for either fossil fuel or electrical energy must be upgraded to be fully compliant with the Stretch Energy Code, including that the building envelope is fully compliant. The residential use will increase the energy demand for the building. Although the continued commercial occupancy would only be required to make code compliant those portions of the building being altered, the new energy efficient HVAC system relies on the building envelope being insulated to function properly. Hence it is recommended that the commercial occupancy make similar exterior envelope improvements as the residential occupancy.

A compliant thermal envelope will require insulating the exterior walls, attic floor, and basement ceiling in addition to improving or replacing the windows and doors. In order to insulate the exterior walls of the first floor, all of the interior finishes will need to be removed to open up the stud walls. Combined with the other required upgrades, the interior of the first floor will be a full gut renovation.

The commercial occupancy, given its small size, is permitted to have a single means of egress from the building. The residential occupancy requires that the building have two means of egress. Egressing through the basement, with its non-code compliant stair and exterior door, does not qualify as a second means of egress. A new exterior door out to an exterior landing and stairs down to grade will need to be added to the rear of the building. Additionally, the bedroom that is assumed to be housed in the secondary room, will need an emergency escape opening. The double hung window, given its aspect

ratio, does not provide a large enough opening to be a compliant emergency escape. It is therefore recommended that the new exterior door be added in secondary room to provide both a second means of egress for the building and an emergency escape opening for the bedroom.

The bathroom is no longer functional and will need to be fully renovated in both occupancy cases. In the commercial use case, an accessible bathroom will need to be provided with toilet, sink, grab bars, and proper clearances. In the residential use case, the bathroom will need to add a shower in addition to toilet and sink/vanity. Mechanical ventilation will need to be added in both use cases.

For the residential use, a kitchen will need to be added. It is also suggested that washer/dryer hookups be provided.

The existing HVAC system is dismantled and not serviceable. The HVAC system needs to be replaced and an electrical air source heat pump system providing both heating and cooling is recommended. The plumbing system is nearing its end of life. It is recommended that, given the extent of the renovations required, that the plumbing system be fully replaced. An exploratory investigation is needed to confirm if the sanitary and storm drains are combined; if they are, the systems will need to be separated, and new connections established at the street. The electrical system is in poor condition and will need to be fully replaced along with increasing the size of service in support of VRF heating / cooling and capacity for a vehicle charging station.

4.2 Structural recommendations

The existing structure appears to be in fair condition. All of the structural components that are visible appear to be in sound condition except the items noted Existing Conditions Analysis section which include the Wood Column on the Basement and the Stair Structure from the First Floor to the Basement and the base of the Entrance Canopy columns. These should be repaired / replaced as noted.

Based on the proposed scope of renovations, upgrades to the existing structure are not anticipated. See the full structural report in Appendix C for further detail on the structural evaluation and compliance requirements. It is recommended to use the Work Area Compliance Method for the project. In addition to the repairs noted in the Existing Conditions Analysis section, it is recommended that the roof and attic members be positively connected with light gage metal connectors to the exterior wood walls.

4.3 Plumbing recommendations

A full plumbing report can be found in Appendix D. Although the sanitary drainage system piping appears to be in fair condition, given the age of the building, extensive investigation should be conducted prior to reuse or modifications if the existing cast iron drainage piping system needs to last for an extended period of time, as should be expected with a major renovation.

Although it appears to be in fair condition, we do not believe that the existing domestic water piping system in the building would last for an extended period of time, as should be expected with a major renovation, and would be prone to failure. Due to its' unknown condition and age, any major

renovation should consider the replacement of the domestic water piping system in the building.

The condition of the existing water heater is unknown and should be replaced. If additional fixtures are to be added, consideration should be given to installation of a tank type gas or electric water heater and hot water piping to serve the fixtures. The stored water temperature should be increased to reduce the possibility of Legionella growth, and a master mixing valve should be installed to temper the water before distribution.

For any major renovation, an analysis of the current fixture count and plumbing code requirements should be conducted, and the correct type and quantity of plumbing fixtures, including separate restroom facilities for male and female employees, should be provided. For a commercial occupancy of this size (less than 20 occupants and less than 2,000 square feet), one unisex accessible restroom can be provided. A commercial occupancy requires that a mop sink and a drinking water station be provided, and these will need to be added.

For a change in use from business to residential, a shower, kitchen, and laundry will be needed.

Piping should be investigated for being a combined system. Should it be a combined system, to separate them, they would have to be inspected and located, and the basement slab cut in order to separate the two and provide a second building drain. It may also require demolition of piping above the basement slab. There are at least 3 unidentified pipes which do not appear to serve any sanitary fixtures.

It is not recommended that the existing boots and piping that formerly collected water from the roof gutters and downspouts be reused. It will need to be assessed if the storm water from the roof can be managed onsite or if new piping to the storm drain needs to be installed.

4.4 HVAC Recommendations

A full HVAC report can be found in Appendix D. Due to the age and condition of the existing boiler, we recommend that the heating system be replaced with a new efficient and sustainable system. The existing gas-fired boiler and heating system could be replaced with a new ducted air source heat pump (ASHP) system that would provide both heating and cooling. The new ASHP will consist of an indoor air handling unit(s) which would include a fan, filter and refrigerant coil that would be connected to an exterior heat pump via a new refrigerant piping loop. The heat pump would be able to provide both heating and cooling. During the cooling period the heat pump operates as a typical air conditioning system and during the heating period, the system runs in "reverse" to extract heat for the ambient outdoor air and transfers it to the indoor air handling unit. These systems are becoming very common and as a result, the initial costs and maintenance costs are in line with typical gas-fired systems of similar size. Depending on the final use of the building, multiple systems maybe required in order to meet the HVAC zoning requirements. The new HVAC system should also include an energy recovery ventilator (ERV) to provide proper ventilation to the building. The ERV would exhaust air from the bathroom (and kitchen if applicable) and provide ventilation air to the spaces.

The new heat pump system would be an all-electric, sustainable system and allow for the onsite fossil fuels to be eliminated. The new system may qualify for rebates from the local utility company.

Due to the age and condition of the existing building, it is recommended that windows and doors be replaced, and insulation installed for code compliance and proper operation of the HVAC system(s).

4.5 Electrical recommendations

A. Main Electrical Service and Distribution Equipment

The existing electrical service should be replaced with a new 150A, 120/240V panel with AFCI/GFCI breakers and surge protection. Additionally, it is recommended to locate the electric panel on the main floor space, removing it from exposure to the corrosive unconditioned space of the basement. The consideration for a larger main electric service is in support VRF heating/cooling and to provide the code required capacity for a vehicle charging station.

B. Egress and Exit Lighting

Should the occupancy of the building be commercial, EXIT signs over doors and egress lighting via battery backup are to be provided. No egress and exit lighting need to be provided for residential use.

C. General Purpose Power

In both occupancy types, all the receptacles and wiring are to be replaced. Receptacles should be replaced with tamper resistant units. Depending upon the occupancy, the receptacle counts and locations should be adjusted to match the planned occupancy. For the residential occupancy, additional outlets will need to be provided for kitchen (and with types specific to the appliances) and washer/dryer connections. GFCI breakers should be used around wet areas in kitchen and bathroom. On the exterior, receptacles should be in weatherproof boxes.

D. Emergency Power

Neither occupancy type requires emergency power. For commercial occupancy, it is recommended to utilize LED light fixtures with integral emergency battery to provide egress lighting.

E. Lighting and Controls

For both occupancies, all the light fixtures and controls need to be replaced. It is recommended to include dimming and utilize Vacancy Sensors. Exterior lighting to be added.

F. Fire Alarm System

For commercial occupancy, it is recommended to add a fire alarm system which includes ADA compliant signaling devices and CO detection. For residential occupancy, smoke and CO detectors should be added.

G. Telecommunications Cabling Infrastructure

The system should be expanded to provide internet service / Wi-Fi. Depending on the specifics of the commercial occupancy, further Office Technology requirements may be needed.

H. Security

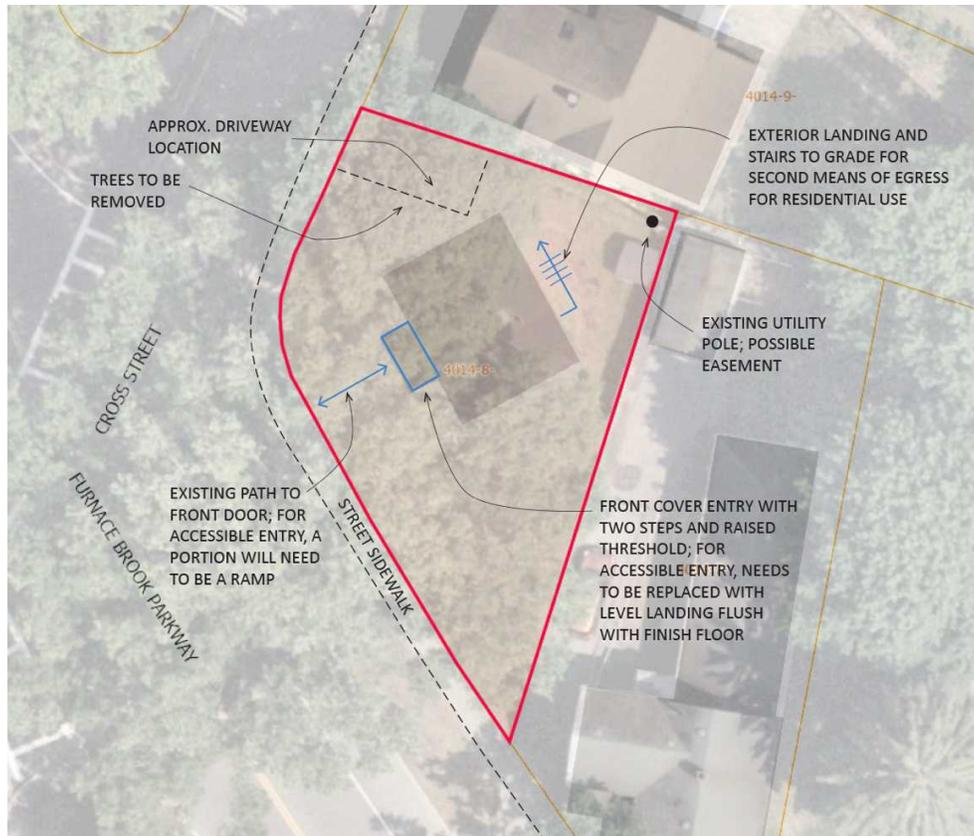
DCR is to work with the leasee to determine the scope of the security system requirements.

4.6 Exterior elements recommendations

A. Site / landscape / site accessibility / parking

The existing asphalt one-car driveway needs to be removed, and a new asphalt driveway put in approximately the same location. The two trees directly adjacent to the existing driveway need to be removed and some regrading may be needed to provide sufficient width for the one car driveway. Additional zoning code provisions, including driveway setbacks from lot lines and number of parking spaces required, will need to be evaluated depending upon the proposed use of the building. The property appears to be within the Residential B zone but is not zoned as Residential. From visual observation of the property's corner location and spatial constraints, it will be challenging to provide more than one parking space. A survey with grades would be needed to evaluate how additional parking can be accommodated if desired or needed. For the commercial use, the parking space does not need to be accessible as Massachusetts 521 CMR first requires accessible parking space(s) if 15 or more spaces are provided.

For residential use, the existing pathway from the Furnace Brook Parkway sidewalk and two stair wood entry porch are in serviceable condition and can remain. For the commercial use, an accessible path must be provided to the front door. From visual inspection, the existing sloped grade in combination with the need to eliminate the two steps leading up to the entry porch and the raised threshold at the front door, a ramp will be needed to provide an accessible path and entry into the front door. A survey with grades is required to determine how long a ramp would be needed and the possibility of navigating some of the required grade changes with a sloped path. For costing purposes, the ramp should be assumed to be concrete with metal handrails, and a concrete flush landing that accommodates the porch roof provided at the existing front door. Any of the remaining existing path is to be replaced with a concrete path of at least 3'-0" width and a slope of less than 5%.



Site Diagram Noting Some of the Improvements Needed

The bushes and shrubbery alongside the east and north portions of the building should be removed or cut back. At the rear of the building, the door well into the basement needs to be cleaned out. A new concrete door landing at the basement and steps up to grade needs to be provided. For the residential use, an exterior door needs to be provided from the first floor secondary room (bedroom) to provide a second means of egress from the building and an emergency escape from the bedroom. At the exterior, this door will need to be provided with a wood landing and set of stairs down to grade with a concrete landing. This will be supported on wood posts and concrete footings. Its configuration will need to be coordinated with access to the basement door below and compatibility with lot line setbacks and zoning.

Other landscaping improvements may be desired. DCR is to work with the leasee to determine the scope of those landscape improvements.

B. Roofing

Given that the painted wood rafter tails need to be replaced, work will need to occur at the roof and it should be planned that the asphalt shingle roofing is replaced. The painted wood rafter tails along the roof soffit are in disrepair and not useable. They need to be replaced, and gutters and downspouts added to the perimeter of the main and porch roof. If the existing boots and drainage lines are desired to be reused, they would need to be inspected and be shown to be in satisfactory condition. Otherwise

the roof runoff water either needs to be piped to a new storm drain connection or managed on site away from the building to avoid water entering the basement.

The two steel columns at the porch need to be replaced. Exploratory demolition will be needed to confirm that the columns are on proper footings. If inadequate footings are present, they will need to be removed and new concrete footings put in place. This may necessitate work at the entry porch deck as well. The new round columns should be wood or fiberglass in keeping in the style with the time period of the building and painted. For the commercial use with an accessible entry, the landing at the door will need to be raised and the column height adjusted accordingly when the columns are replaced.

C. Exterior walls

The existing stucco finish of the exterior walls should be cleaned. In the southeast corner, the stucco needs to be repaired. All the wood trim needs to be cleaned and repainted.

It is surmised that the existing exterior walls are composed of wood 2x4 framing and not insulated. Exploratory demolition is needed to confirm these assumptions. The proposed residential use is a change of occupancy that also increases the energy use of the building. For such a change of occupancy, the Massachusetts Stretch Code requires that the building envelope be code compliant. Making the building envelope code compliant will include insulating the exterior walls, insulating or replacing the windows and doors, and insulating the attic floor and basement ceiling. Although the continued commercial occupancy would only be required to make code compliant those portions of the building being altered, the recommended new energy efficient HVAC system relies on the building envelope being insulated to function properly. Hence it is recommended that the commercial occupancy make similar exterior envelope improvements as the residential occupancy.

As described in the Code Report in Appendix B, the thermal performance of the building envelope is governed by the International Energy Conservation Code as amended by the Massachusetts Stretch Code. The specific requirements for the two proposed uses differ somewhat, with the residential use falling under the Residential Stretch Code (225 CMR Chapter 22) and the commercial use under the Commercial Stretch Code (225 CMR Chapter 23). Additionally, there are multiple ways that a building can comply with the Stretch Code. For the residential, the building can either comply with the prescriptive requirements of the envelope or by meeting the required HERS rating that also considers energy use of the building. For the commercial use, different prescriptive requirements need to be met, and the building envelope needs to be derated. Alternatively, compliance can be demonstrated with an energy model for either occupancy. This report suggests the general measures that need to be taken, but as the specific renovation and occupancy are determined, a closer examination of how the envelope is made code compliant will need to be made.

To insulate the first-floor exterior walls, at minimum the interior finishes, trim, and wall mounted equipment will need to be removed to fully expose the wall studs to the interior of the building. Depending upon the specifics of the renovation, filling the stud cavity with closed cell spray insulation could be sufficient for the required thermal performance. If a different type of insulation such as mineral

wool is desired, or a higher insulation value is needed, the stud cavity would need to be furred out for greater depth and then filled with insulation.

D. Windows

As part of improving the building thermal envelope to meet the Stretch Code, the single pane windows will need to be addressed. Due to the historic significance of the building, it is preferred that the existing windows be refurbished, and interior storm windows be installed to improve the windows' thermal performance. As part of the overall design of the renovation, an energy code compliance method will need to be selected, and the window configuration will need to be selected and designed for conformance with the energy code. Given the historic nature of the property, discussions with the authority having jurisdiction may be needed. Minimizing air leakage is an important aspect of meeting thermal performance requirements and the refurbishment and storm window design should address this. All windows should be reinstalled with proper flashing and sealing.

E. Doors

As part of improving the building thermal envelope to meet the Stretch Code, the front door will need to be replaced. The basement door will need to be replaced due to its state of repair. For the residential option, a second exterior door will need to be added in the secondary room.

Ideally the doors should replicate the styling, glazing, and panelizing of the existing doors to stay in keeping with the historic significance of the building while being insulated and thermal performing. This may require a balancing of needs and working with DCR and the Authority Having Jurisdiction to find a solution that works for both the historic and the thermal criteria. Air leakage is a concern, and all doors should have weatherstripping and sweeps in addition to required threshold flashing.

4.7 Interior elements recommendations

This report assumes that the plan layout of the first floor remains largely intact in for both commercial use and residential use. The front door opens into the main room, and there is a cased opening to a secondary room with a restroom off that room. The first floor will be conditioned and occupiable, and the basement remains an unoccupiable, unconditioned storage / mechanical use. For the residential use, it is assumed that that secondary room will serve as the bedroom. To gain more square footage for the first floor, the stair down to the basement and the chimney could be removed, but this report does not address these changes.

For both occupancy cases, the building will need to be emptied of the abandoned furniture, equipment, and radiators. The first flooring will need to be removed to the subfloor and replaced with a resilient flooring. For the residential use, a painted wood floor base is recommended. For the commercial use, a 4" resilient base is recommended. In the basement, the slab will need to be repaired, trenched openings filled in, and the slab cleaned.

For both occupancy cases, the interior wall finishes, wood trim, and surface mounted electrical conduit, switches, outlets and fixtures need to be removed to insulate the exterior walls. As described in the Exterior Walls section of these recommendations, the approach to insulating the exterior walls will depend upon compliance path used to comply with the Stretch Energy Code and design approach of the renovation. For costing purposes, assume at minimum the stud wall cavity is filled with closed spray cell insulation, new gypsum board and wood trim at the windows, doors, and floor base are installed. A new exterior door is added to the secondary room in the residential occupancy. Wood trim profiles should match the existing trim in place currently. The trim should be replaced throughout. The existing wall finish at the interior walls and at the ceiling can either be repaired or replaced. Given the amount of work that will need to occur, it is recommended to replace these finishes. New paint to be provided throughout.

The floor of the attic and ceiling of the basement is to be insulated to meet the Stretch Code. Both of these spaces are unfinished, and the rafter bays are accessible. The specifics of how much insulation is required will depend upon which occupancy type and which compliance path is selected.

The restroom is fully gutted for both occupancy types. In the commercial use case, an accessible bathroom will need to be provided with toilet, sink, grab bars, mirror, accessories, and proper clearances. The existing door into the restroom is too narrow. A three-foot-wide door will need to be provided in the center of the wall (to provide wheelchair turn around space and clearances at the door within the restroom) and the former door opening filled in. In the residential use case, the bathroom will need to add a shower in addition to toilet, sink/vanity, mirror, and accessories. The door location may need to be adjusted depending upon the bathroom layout. Mechanical ventilation will need to be added in both use cases.

For the residential use, a kitchen will need to be added in the main room. This should include a sink, induction range with oven, and refrigerator. For pricing, include 6 linear feet of base and upper cabinets, but the design of the renovation will need to determine the layout and amount of cabinetry that can be accommodated. For residential use, a washer and dryer hookup should be added. For residential use, it may be elected to add a closet to the secondary room, but this is based on preference and not required by code.

The wood stair to the basement needs to be replaced. Given the existing configuration, it will not be code-compliant and replaced in kind per the exception under IEBC 503.1. A guardrail and a handrail need to be provided on one side. The project can also consider removing the interior stair to the basement and only having basement access from the exterior. Should that be the case, the interior walls surround the stair and the stair can be removed, and the floor framing filled in, to add square footage to the main room.

Section 5

Cost Estimate Summary

A detailed cost estimate for this project can be found in Appendix F*. The project was estimated for two renovation scenarios: (1) commercial small office and (2) single-family residential. As described in this report, the scope of the renovations and hence the cost of the project, varies depending on the final use of the building.

The cost for the commercial renovation is estimated to be \$947,738. The cost for the single-family residential renovation is estimated to be \$916,849.

This estimate assumes a start date of April 2026, carries a design and pricing contingency of 12%, assumes a 6 month construction duration, and assumes that the building will be unoccupied during construction. Escalation is carried at 3%. It assumes the project to be a publicly bid project. Hazardous material abatement costs are not included. See the detailed cost estimate for a full listing of assumptions and exclusions.

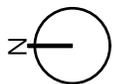
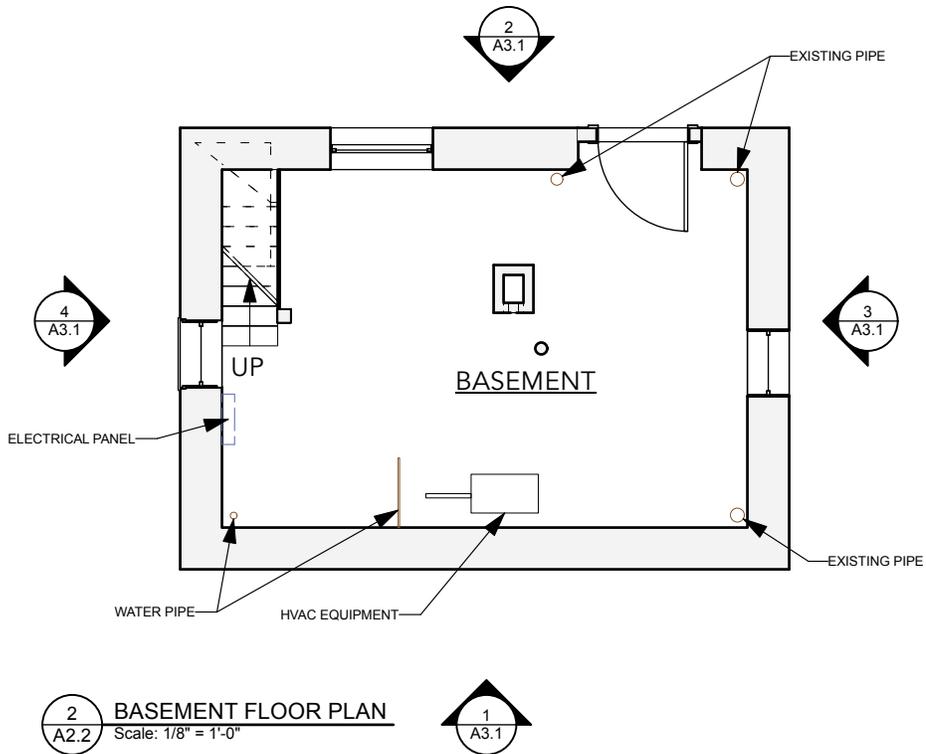
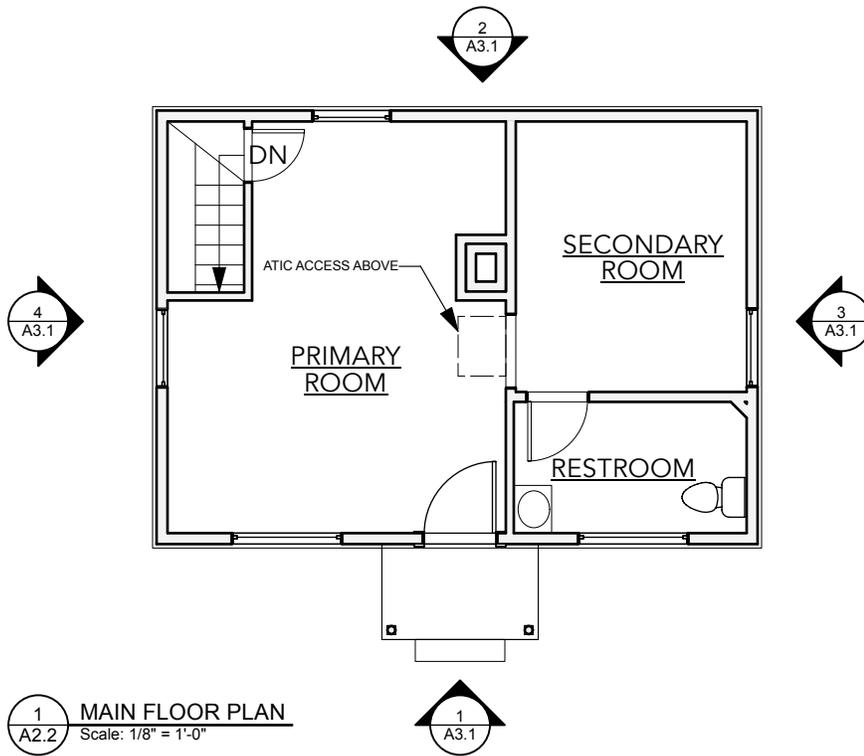
The estimate is based on the improvements and work recommended in this report. The final renovation will likely vary from the scope outlined herein. The final improvements will need to adhere to current building codes and local ordinances, but the final design can differ from the report's recommendations depending on the tenant's needs. This will impact the cost. If it is selected to phase the work, this will also affect the final cost of the project.

See the full cost estimate in Appendix F for a detailed breakout of the estimated costs.

**Please refer to Appendix B in the Request for Proposals for the Cost Estimate.*

Appendices

Appendix A: Existing Floor Plans and Exterior Elevations



DRAWING
NORTH

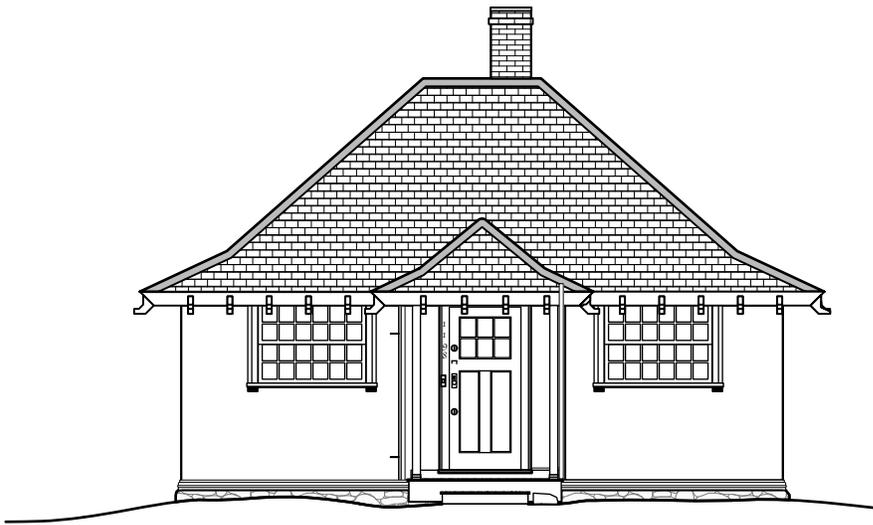


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SOMERVILLE, MA
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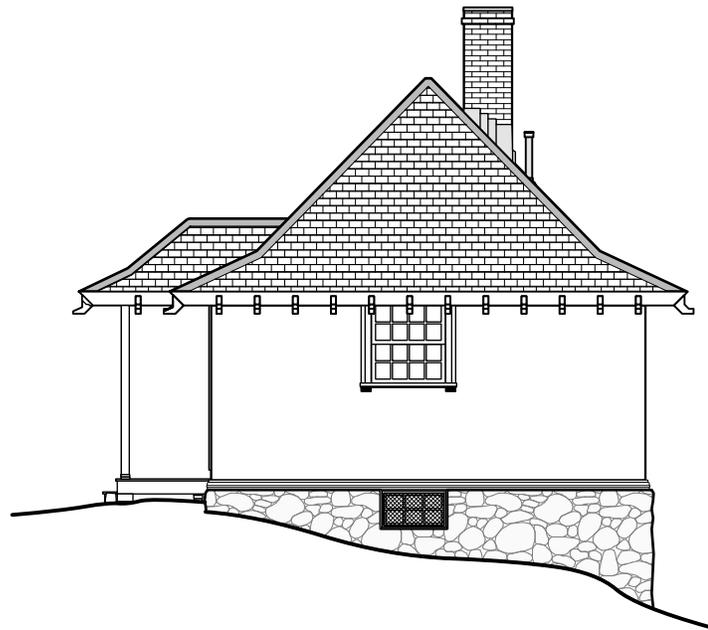
Furnace Brook
Parkway
Substation
Quincy, MA

Title: EXISTING FLOOR PLANS

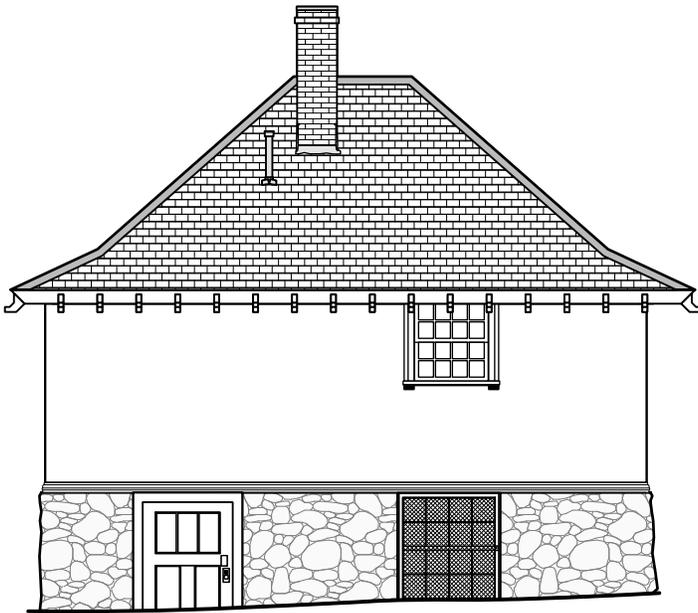
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A2.2



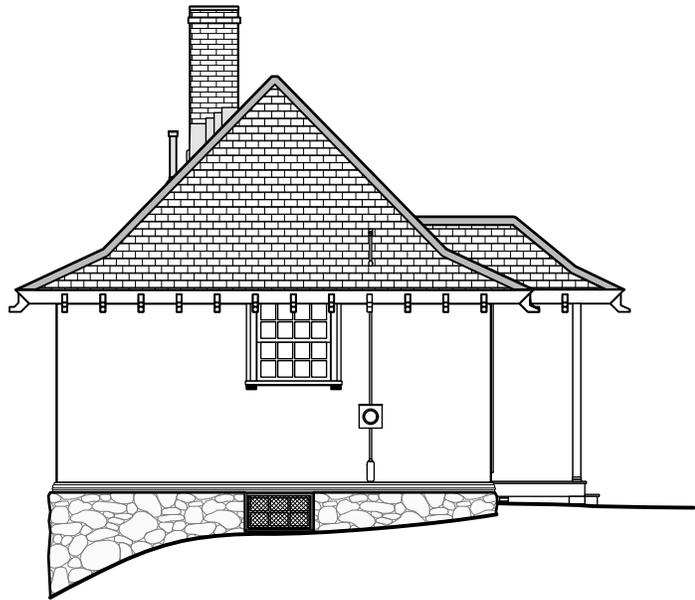
1 FRONT ELEVATION - WEST
A3.1 Scale: 1/8" = 1'-0"



3 SIDE ELEVATION - SOUTH
A3.1 Scale: 1/8" = 1'-0"



2 BACK ELEVATION - EAST
A3.1 Scale: 1/8" = 1'-0"



4 BACK ELEVATION - NORTH
A3.1 Scale: 1/8" = 1'-0"

**JOHNSON
ROBERTS
ASSOCIATES INC.**
ARCHITECTS

24 DANE STREET
SOMERVILLE, MA
0 2 1 4 3 - 3 2 2 8

Furnace Brook
Parkway
Substation
Quincy, MA

Title: EXISTING EXTERIOR
ELEVATIONS

Date: 01/22/25
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Appendix B: Code Report

PRELIMINARY CODE SUMMARY

Furnace Brook Parkway Substation 1198 Furnace Brook Parkway Quincy, Massachusetts

January 9, 2025

Prepared By: Kevin S. Hastings, P.E.

Introduction

The Furnace Brook Parkway Substation is currently unoccupied but was last occupied as an MDC Police substation. The proposed scope of work is to renovate the building for future commercial use or as a single-family residence. This code summary is based on a site visit conducted on December 18, 2024 to review the existing conditions.

Following is a list of applicable codes:

Code Type	Applicable Code (Model Code Basis)
Building	780 CMR: Massachusetts State Building Code, 10 th Edition <ul style="list-style-type: none">• Amended 2021 International Building Code (IBC)• Amended 2021 International Existing Building Code (IEBC)• Amended 2021 International Residential Code
Fire Prevention	527 CMR: Massachusetts Fire Prevention Regulations
Accessibility	521 CMR: Massachusetts Architectural Access Board Regulations 2010 ADA Standards
Electrical	527 CMR 12.00: Massachusetts Electrical Code <ul style="list-style-type: none">• Amended 2023 National Electrical Code (NFPA 70)
Mechanical	2021 International Mechanical Code (IMC)
Plumbing	248 CMR: Massachusetts Plumbing Code
Energy Conservation	2021 International Energy Conservation Code (IECC) & Stretch Energy Code (225 CMR) Massachusetts Executive Order 594

1. Occupancy Classification:

Existing Classification

- Use Group B (Office Space)
- Use Group S-1 (Storage)

Proposed Classification

- Use Group B (Office/Commercial)
- Use Group S-1 (Storage)

OR

- Use Group R-3 (Single-Family Dwelling)

Future renovations for the proposed continued Use Group B occupancy would be regulated by the Massachusetts Commercial Code which adopts the 2021 International Existing Building Code (IEBC) with amendments.

If the occupancy is changed to a Single-Family Dwelling the Massachusetts Residential Code, adopting the 2021 International Residential Code (IRC) with amendments, would apply. Appendix J of the Residential Code contains specific requirements for existing building renovations.

2. Classification of Work:

Commercial Use

The requirements in the IEBC area based on the classification of the work as Alteration Level 1, 2 or 3. This is based on the extent of the project “work area”, which is defined as the area within which architectural reconfiguration will occur (IEBC Chapter 2). Areas where the only work will be new finishes, furnishings, or installation of new building systems are not classified as part of the work area. The levels of work area defined as follows:

Level 1 Alteration	No architectural reconfiguration, no work area.
Level 2 Alteration	Aggregate size of work areas (architectural reconfigured area) does not exceed 50% of the gross building area.
Level 3 Alteration	Aggregate size of all work areas (architectural reconfigured area) exceeds 50% of the gross building area.

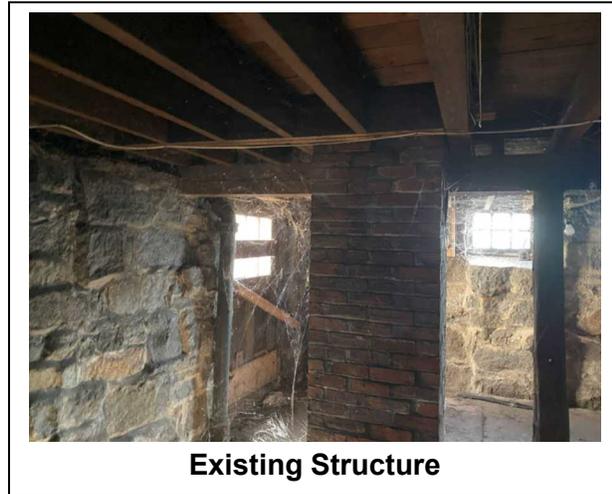
Residential Use

In general Appendix J of the Residential Code allows renovations to existing buildings without requiring full compliance for all building elements (Section AJ101.1). There are various specific requirements depending on the Classification of work as a repair, alteration,

and/or addition (Section AJ 101.2). Projects may include multiple categories or work, in which case all of the applicable code provisions apply.

3. Construction Type

The building is an unprotected wood-framed structure, classified as Type VB construction. For either proposed future occupancy this existing construction type is allowed due to the small size of the building.



4. Fire Resistance Ratings:

The following fire resistance ratings are required in accordance with IBC Table 601 for Type VB construction.

Building Element	Fire Resistance Rating (Hrs)
Primary Structural Frame	0
Exterior Bearing Walls	0
Interior Bearing Walls	0
Exterior Non-Bearing Walls	Based on Fire Separation Distance 0 For 10 Feet or More
Interior Non-Bearing Walls	0
Floor Construction	0
Roof Construction	0

5. Means of Egress:

The building has a single means of egress (the front door) from the first floor. There is also an exterior access door from the Lower Level but it has limited headroom and is in disrepair.

For a future commercial use the building only requires a single means of egress since the occupant load will be less than 50 and the exit access travel distance is less than 75 feet. Depending on the future use of the Lower Level the building official is likely to require

improvements to the stair and/or a new means of egress from the Lower Level (i.e. if the level is used for anything other than unoccupied space).

For new construction the Residential Code requires two means of egress from dwelling units. It is likely the building official would require a second means of egress from the dwelling unit (i.e. a new back deck and stair to grade). Appendix J also requires emergency escape and rescue openings from sleeping rooms with a net clear opening of 3.3 ft². The minimum net clear opening must be 20 inches by 24 inches in either direction (Section AJ102.4.3).

		
<p>Entrance</p>	<p>Lower Level Exterior Access</p>	<p>Lower Level Stair</p>

6. Fire Protection Systems:

Commercial Use

Based on the small building size, the only required fire protection equipment for a commercial use are portable fire extinguishers (527 CMR 1 Section 13.6, IBC 906.1). Fire extinguishers must be located so that all areas are within 75 feet of the nearest extinguisher.

Residential Use

Based on the scope of work that will likely be necessary to convert the building for use as a single-family home, it is anticipated that smoke detection and carbon monoxide detection as required for new construction will be required (Section AJ 102.3.2).

7. Energy Code Provisions for Existing Buildings:

The Massachusetts Stretch Code adopts the 2021 International Energy Conservation Code (IECC) with Massachusetts Amendments (225 CMR 22 & 23). This code includes a commercial section and residential section, both of which contain similar thresholds for existing building compliance. Alterations to an existing building, building system or portion thereof must conform to the provisions of the IECC as those provisions relate to new construction without requiring the unaltered portions of the existing building or building system to comply (IECC C503.1). Although this code does not have a full-compliance threshold, any new equipment must also comply with the Stretch Code amendments to the 2021 IECC. Spaces undergoing a change in occupancy that would result in an increase in

demand for either fossil fuel or electrical energy are also required to comply (i.e. compliant building envelope).

The project is also subject to Massachusetts Executive Order 594 which requires projects to include decarbonization of fuels used to heat and cool state facilities.

8. Accessibility for Persons with Disabilities

Massachusetts Architectural Access Board Regulations

Massachusetts has a unique state-written code that applies to all public buildings in the state, referred to as 521 CMR. All areas open to the public are subject to the requirements of 521 CMR. Employee-only spaces such as the kitchen and brewery area are not currently regulated by 521 CMR, but are subject to ADA compliance.

Residential Use

521 CMR does not apply to single-family dwellings.

Commercial Use

Buildings or parts of buildings where a service or product is offered to the public and into which a member of the public may enter including but not limited to: doctors', dentists', and counseling offices, chiropractors', psychologists' and psychiatrists' offices, lawyers', and accountants' offices, insurance companies, veterinarians, realtors, travel agents, as well as city and town halls and facilities (521 CMR 11.1).

If the building will be open to the public, the level of compliance with 521 CMR is based on the cost of the proposed work:

- A. If the cost of the proposed work is **less than \$100,000**, only the new work must comply.
- B. If the cost of the proposed work is **greater than \$100,000** then all new work must comply and the existing building must include an accessible public entrance, toilet room, telephone and drinking fountain (if public phones and drinking fountains are provided) (521 CMR Section 3.3.1(b)). Exempt work when calculating the cost of work includes roof repair or replacement, window repair or replacement, and repointing and masonry repair work unless the exempt work exceeds \$500,000.
- C. If the cost of the proposed work is **greater than 30% of the full and fair cash value** of the existing building, the entire building is required to comply with 521 CMR (521 CMR Section 3.3.2). There is no exempt work, i.e. the entire project costs apply to determining the 30% criteria.

The cost of all work performed on a building in any 36-month period must be added together in determining the applicability of 521 CMR (521 CMR Section 3.5). The full and fair cash value of the building is defined as the DCAMM CAMIS value.

The cost of the proposed scope of work is expected to exceed the 30% full compliance threshold, therefore all areas open to the public must comply with 521 CMR. Currently none

of the building is accessible. At a minimum a new accessible entrance would be required. Other improvements may also be required if other elements are subject to public use (i.e. an accessible public toilet room).

Americans With Disabilities Act Guidelines

Even if the commercial use is not open to the public, it is still subject to ADA compliance for employee-only spaces. Compliance with the ADA Guidelines is triggered by renovations to the existing building. All renovations to the building must be made to ensure that, to the maximum extent feasible, the altered portions of the facility are readily accessible to and usable by individuals with disabilities.

Conditions Assessment: Furnace Brook Parkway Substation
1198 Furnace Brook Parkway, Quincy, MA
DCR Project No. P25-3595-S2A

Appendix C: Structural Report

Furnace Brook Parkway Substation
Quincy, Massachusetts
Structural Assessment
January 27, 2025

PURPOSE

The purpose of this report is to describe, in broad terms, the structure of the existing buildings; to comment on the condition of the existing buildings; and on the feasibility of renovation of the buildings.

SCOPE

1. Description of existing structures
2. Comments on the existing condition
3. Comments on the feasibility of renovation and expansion

BASIS OF THE REPORT

This report is based on our visual observations during our site visit on December 18, 2024. Drawings of the original construction were not available for our review at the time of writing this report.

During our site visit, we did not remove any finishes or take measurements, so our understanding of the structure is limited to the observations of the exposed structure and the exterior facade.

BUILDING DESCRIPTION

The building is located on Furnace Brook Parkway in Quincy, Massachusetts. The structure is single story, 420 sq. ft. English Revival style cottage with a basement under the entire footprint of the first floor. The building was constructed in 1940 was in use by the Police Department as a substation for the department.

EXISTING BUILDING

The existing structure is a single story wood framed structure with a basement under the entire footprint of the building. The first floor is framed with wood joists spanning between exterior stone foundation walls and interior wood beams and wood columns and sheathed with wood planks. The hipped roof is framed conventionally with wood rafters spanning between exterior wood stud walls. The attic floor is also framed conventionally with wood joists and is partially covered with plywood for access to the roof drains and vent lines located in the attic space. The basement floor is concrete slab on grade.

EXISTING CONDITIONS

The existing structure is in good condition. We did not observe any distress in any of the members. We did not observe any signs of foundation settlement or undue vibrations due to footfall on the supported first floor. We did not observe any signs of water infiltrations through the roof or the

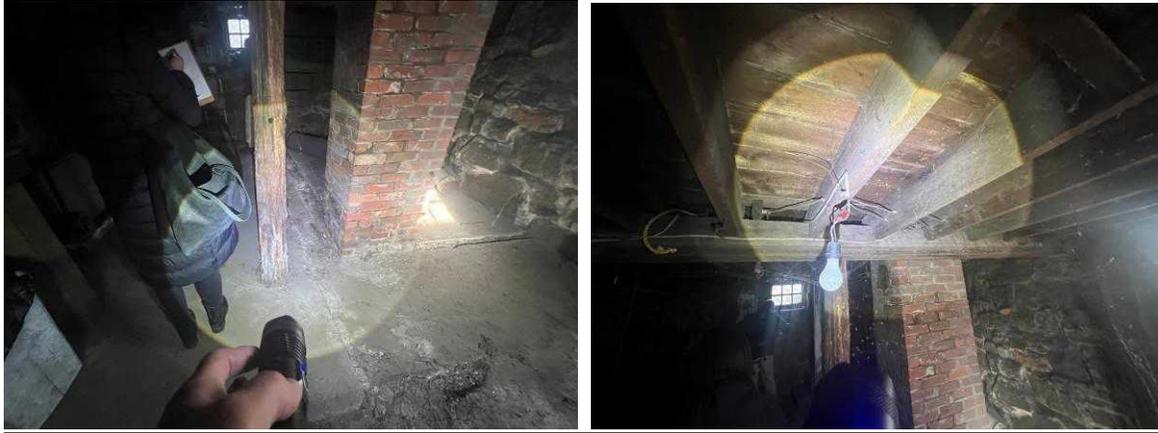
exterior walls. The stair from the first floor to the basement is in state of disrepair and is structurally unsafe. We observed some deterioration at the base of a wood column in the basement. The column may have to be replaced with a new wood column supported on a new thickened slab locally. We observed some rusting at the base of the steel columns supporting the Entrance Canopy. Based on our observations, majority of the structure is in fair condition and there are no major structural concerns at this time other than the basement column and the stair structure from the first floor to the basement.



Existing First Floor Framing and Stone Foundation Walls



Existing Stair Framing



Existing Basement Column



Existing Roof Framing



Attic and Roof Framing



Base of Canopy Column

FEASIBILITY OF RENOVATION AND EXPANSION OF THE STRUCTURE

Depending on the scope of the renovations to the structure, it may be feasible to make modifications to the existing structure without requiring full compliance with the code requirements for new construction. The proposed scheme requires a change of use from a Police Substation to either office use or residential use and non-structural renovations to change the use to Residential or an Office use. There are no plans to alter the existing structures.

GENERAL CODE CONSIDERATIONS

If any repairs, renovations, additions or change of occupancy or use are made to the existing structure, an evaluation of the structure is required to demonstrate compliance with 780 CMR, Chapter 34 “Existing Building Code” (Massachusetts Amendments to The International Existing Building Code 2021). The intent of the IEBC and the related Massachusetts Amendments to IEBC is to provide alternative approaches to alterations, repairs, additions and/or a change of occupancy or use without requiring full compliance with the code requirements for new construction.

The IEBC provides three compliance methods for the repair, alteration, change of use, or additions to an existing structure. The three compliance methods are as follows:

1. Prescription Compliance Method.
2. Work Area Compliance Method.
3. Performance Compliance Method.

A summary of the structural implications of the various compliance methods follows.

Prescriptive Compliance Method

In this method, compliance with Chapter 5 of the IEBC is required. As part of the scope of this report, the extent of the compliance requirements identified are limited to the structural requirements of this chapter.

Alterations

- If the proposed alterations of the structures increase the demand-capacity ratio of any lateral load resisting element by more than 10 percent, the structure of the altered building or structure shall meet the requirements for the code for new construction.
- Where alterations increase the design gravity loads by more than 5 percent on any structural members, those members would have to be strengthened, supplemented, or replaced.

Additions

Additions can be designed to be structurally separate or structurally connected to the existing building. Based on the project scope, the following structural issues must be addressed: The requirements applicable to the existing structure for connected additions are similar to those for altered structures.

- All construction of all addition areas must comply with the code requirements for new construction in the IBC.
- For additions that are not structurally independent of an existing structure, the following rules apply to the existing building:
 - The existing structure and its addition - acting as a single structure - must meet the requirements of the code for new construction for resisting lateral loads. Exceptions allow that structural elements that only resist lateral forces whose demand-capacity ratio is not increased by more than 10 percent may remain unaltered.
 - Any load-bearing structural element for which the addition or its related alterations causes an increase in the design gravity load of more than 5 percent shall be strengthened, supplemented or replaced. This may invoke or cause additional renovation work to access the structure.

In order to avoid invoking required structural modifications to the existing building, any planned additions should be designed as structurally separate buildings.

Change of Occupancy

The Change of use reduces the Risk Category of the building from Risk Category III to Risk Category II, thus no upgrades would be triggered from this Change of Use.

Work Area Compliance Method

In this method, compliance with Chapter 6 through 12 of the IEBC is required. The extent of alterations has to be classified into LEVELS OF WORK based on the scope and extent of the alterations to the existing building.

This report addresses the scenario that planned renovation schemes would affect more than 50 percent of the floor area and invoke Level 3 Alteration requirements, and the following analysis is based on that assumption. In addition, there are requirements that have to be satisfied for additions to the existing structure.

Level 3 Alterations

- Any existing load-bearing structural element for which an alteration causes an increase in the design gravity load of more than 5 percent shall be strengthened, supplemented or replaced.
- If the proposed structural alterations of an existing structure exceed 30 percent of the total floor and roof areas of an existing structure, we have to demonstrate that the altered structure complies with the IBC for wind loading and with reduced IBC level seismic forces.
- Existing anchorage of all unreinforced masonry walls to the structure have to be evaluated. If the existing anchorage of the walls to the structure is deficient, the tops of the masonry walls will require new connections to the structure.
- If the proposed structural alterations of an existing structure are less than 30 percent of the total floor and roof areas of the existing structure, the project must demonstrate that the altered structure complies with the loads applicable at the time of the original construction (or the most recent major renovation) and that the seismic demand-capacity ratio is not increased by more than 10 percent on any existing structural element. Those structural elements whose seismic demand-capacity ratio is increased by more than 10 percent must be strengthened, supplemented, or replaced in order to comply with reduced IBC level seismic forces.

Additions

- All additions shall comply with the requirements for the code for new construction in the IBC.
- Any existing gravity, load-carrying structural element for which an addition or its related alterations cause an increase in design gravity load of more than 5 percent shall be strengthened, supplemented or replaced.
- For additions that are not structurally independent of any existing structures, the existing structure and its additions, acting as a single structure, shall meet the requirements of the code for new construction in the IBC for resisting wind loads and IBC Level Seismic Forces (may be lower than loads from the Code for New Construction in the IBC), except for small additions that would not increase the lateral force story shear in any story by more than 10 percent cumulative. In this case, the existing lateral load resisting system can remain unaltered.

Change of Occupancy

The Change of use reduces the Risk Category of the building from Risk Category III to Risk Category II, thus no upgrades would be triggered from this Change of Use.

Performance Compliance Method

Following the requirements of this method for the alterations and additions may be onerous on the project because this method requires that the altered existing structure and the additions meet the requirements for the code for new construction in the IBC.

Summary

The existing structure appears to be in fair condition. All of the structural components that are visible appear to be in sound condition except the items noted above which include the Wood Column on the Basement and the Stair Structure from the First Floor to the Basement and the base of the Entrance Canopy columns.

We would recommend the Work Area Compliance Method for the project. Based on the proposed scope of renovations we do not anticipate any upgrades to the existing structure but we would recommend that all the roof and attic members be positively connected with light gage metal connectors to the exterior wood walls.

Conditions Assessment: Furnace Brook Parkway Substation
1198 Furnace Brook Parkway, Quincy, MA
DCR Project No. P25-3595-S2A

Appendix D: HVAC + Plumbing + FP Report

Evaluation of Existing Conditions

Executive Summary

C.A. Crowley Engineering visited the site on Wednesday, December 18, 2024 to observe and record the following existing conditions of the plumbing and HVAC systems.

The existing building is equipped with several plumbing systems including domestic hot and cold water; sanitary drain, waste, and vent, natural gas, and storm drainage. Building heating is provided by a gas-fired hot water boiler with forced hot water and cast iron radiators.

The building appears to be served by municipal water and sewer system. The sanitary and storm drains may be combined within the building.

The building is not sprinklered, and is well below the square footage required for a sprinkler system to be installed, whether the building remains business use group or changes residential occupancy.

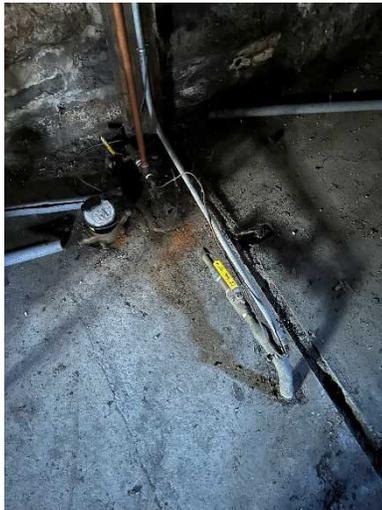
Plumbing

EXISTING CONDITIONS

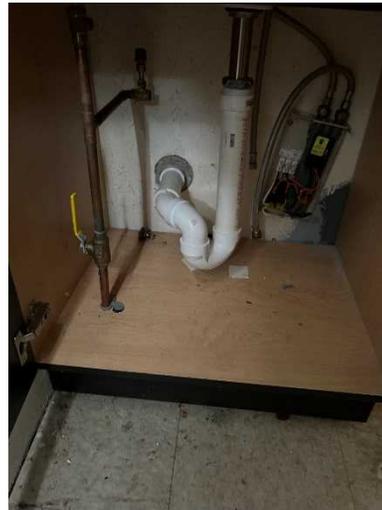
Plumbing Systems

The building's domestic water is supplied underground through a ¾-inch (¾") pipe which enters the basement through the slab. The domestic water supply was equipped with a meter which has been removed and sits on the floor next to the water service. The water service piping appears to be of unknown metal.

The domestic water heater is an electric point-of-use heater located within the restroom vanity.



Water Service

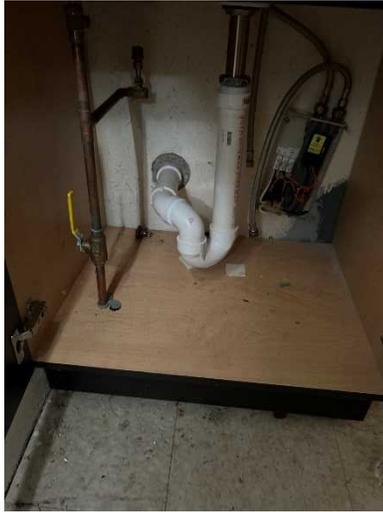


Water Heater

Only the exposed water piping scattered throughout the building could be observed and evaluated. The domestic water piping is hard drawn copper pipe. Piping appears to be in fair condition.

What could be seen of the existing sanitary drain, waste and vent system appears to be a combination of PVC and hub and spigot cast iron with leaded and caulked joints. PVC is limited to the lavatory drain. Visible piping appeared

to be in fair condition, with little evidence of active leaks.



PVC Piping



Cast Iron Piping

Storm water is served by gutters, downspouts, downspout boots and exterior cast iron storm drain piping. Some cast iron piping inside the building is suspected to be storm drain piping.



Cast Iron Storm Piping



Downspout Boot

There are various structures located in the basement slab which appear to have served the sanitary and/or storm drainage system. We suspect they may have been abandoned in place. More investigation of these structures should be conducted, and the system evaluated for being a combined sanitary and storm piping system, which is no longer allowed by current codes, and continued use.

Plumbing Fixtures

Plumbing fixtures include only a floor mounted elongated rim tank type toilet and vanity countertop lavatory with two-handle faucet.



Toilet



Lavatory

HVAC System

Heat for the building is provided by a Hydrotherm gas-fired, atmospheric boiler located in the basement. The boiler produces hot water which distributed to cast iron radiators located on the first floor through steel piping with threaded fittings. The hot water is circulated by a single inline pump mounted near the boiler.

There are no zone control valves and one wall mounted mechanical thermostat located in the main room near the basement stairs.

The heating system has been dismantled and is not operational. The gas service and gas piping are intact but the gas meter has been removed. The boiler had been vented into a masonry chimney.



Boiler and Circulator



Radiator

There is no mechanical ventilation or exhaust systems. Bathroom exhaust is via a double-hung window.

There is no air conditioning.

DEFICIENCIES

It appears that the plumbing and heating systems had been dismantled for winterization. It is unclear if the existing equipment and systems could be made operational, or if there is any damage to the systems due to freezing or corrosion.

As this is an existing structure, there were no obvious deficiencies noted. While many of the fixtures, equipment, and systems are intact and may have been allowed by the codes in force at the time of construction, they do not meet the latest edition of the codes and should be addressed during any major renovation.

Plumbing Systems

- Plumbing fixtures may not meet current codes for flow rates.
- Sanitary and storm drains may be combined.

However, a major renovation or change in use could create additional deficiencies such as:

- Shower, kitchen and laundry connections would be required for residential use.
- Additional designated male/female and/or accessible fixtures would be required for business use.
- Mop sink and drinking fountain would be required for business use.
- Hot water is needed at fixtures. (except toilet and drinking fountain).

HVAC Systems

- The exact age of the existing boiler couldn't be determined but it appears to be beyond its normal life expectancy and mostly would not be practical to be re-used.
- The existing controls do not meet current standards.
- The existing heating supply and return piping is not insulated.
- There is no mechanical exhaust for the toilet room as required by code.
- The openable portions of the existing windows may not meet the minimum requirement for natural ventilation and mechanical ventilation maybe required.

However, a major renovation or change in use could create additional deficiencies such as:

- A change to residential use would require insulation, windows, and doors to be upgraded.

RECOMMENDATIONS

Deficiencies noted above should be addressed in accordance with the final scope of work.

Plumbing Systems

Although the sanitary drainage system piping appears to be in fair condition, given the age of the building, extensive investigation should be conducted prior to reuse or modifications if the existing cast iron drainage piping system needs to last for an extended period of time, as should be expected with a major renovation.

Although it appears to be in fair condition, we do not believe that the existing domestic water piping system in the building would last for an extended period of time, as should be expected with a major renovation, and would be

prone to failure. Due to its' unknown condition and age, any major renovation should consider the replacement of the domestic water piping system in the building.

The condition of the existing water heater is unknown and should be replaced. If additional fixtures are to be added, consideration should be given to installation of a tank type gas or electric water heater and hot water piping to serve the fixtures. The stored water temperature should be increased to reduce the possibility of Legionella growth, and a master mixing valve should be installed to temper the water before distribution.

For any major renovation, an analysis of the current fixture count and plumbing code requirements should be conducted, and the correct type and quantity of plumbing fixtures, including separate restroom facilities for male and female employees, should be provided.

For a change in use from business to residential, a shower, kitchen, and laundry will be needed.

HVAC Systems

Due to the age and condition of the existing boiler, we recommend that the heating system be replaced with a new efficient and sustainable system. The existing gas-fired boiler and heating system could be replaced with a new ducted air source heat pump (ASHP) system that would provide both heating and cooling. The new ASHP will consist of an indoor air handling unit(s) which would include a fan, filter and refrigerant coil that would be connected to an exterior heat pump via a new refrigerant piping loop. The heat pump would be able to provide both heating and cooling. During the cooling period the heat pump operates as a typical air conditioning system and during the heating period, the system runs in "reverse" to extract heat for the ambient outdoor air and transfers it to the indoor air handling unit. These systems are becoming very common and as a result, the initial costs and maintenance costs are in line with typical gas-fired systems of similar size. Depending on the final use of the building, multiple systems maybe required in order to meet the HVAC zoning requirements. The new HVAC system should also include an energy recovery ventilator (ERV) to provide proper ventilation to the building. The ERV would exhaust air from the kitchen and bathrooms and provide ventilation air to the spaces.

The new heat pump system would be an all-electric, sustainable system and allow for the onsite fossil fuels to be eliminated. The new system may qualify for rebates from the local utility company.

Due to the age and condition of the existing building, we recommend that windows and doors be replaced, and insulation installed for code compliance and proper operation of the HVAC system(s).

Appendix E: Electrical Report and Example Outline Specification

Note: The intent of the outline specification is to provide descriptions of the types and requirements for the specific equipment noted in the Recommended Improvements (Section 4.5). The outline specification is more extensive than the Recommended Improvements; only the equipment and systems specifically cited in the Recommended Improvements (Section 4.5) should be included in the cost estimate.

DCR POLICE SUBSTATION

1198 Furnace Brook Pkwy, Quincy

Existing Conditions

INTRODUCTION

ART Engineering (ART) has completed a site survey for the existing structure, and we have developed a Failed/Poor/Fair/Good/Excellent/Indeterminate rating system for the various electrical systems for the former POLICE SUBSTATION.

Failed – The equipment, component or system is no longer in proper operating condition.

Poor – The equipment, component or system is still in operation, but failure is imminent. Significant signs of deterioration are present and/or components may be missing from equipment. Significant repair work may be required.

Fair – The equipment, component, or system is still in operation and still has some operational life left. Minor signs of deterioration may be present. Equipment has all its required components still working correctly. Minor repair work may be required.

Good - The equipment, component, or system is still in operation and still has significant operational life left. No signs of deterioration are present, and all components are in proper working order. Some clearing may be required, but no repair work should be necessary.

Excellent - The equipment, component or system is in like-new condition. No signs of deterioration are present, and all components are in present and in proper working order. No repair work is required, and very minor cleaning is necessary.

Indeterminate – The equipment, component of system could not be accessed to determine its condition.

Most of the systems included in this study were found to have failing ratings. There are many reasons for this, including the age and systems that do not meet current code requirements. The rating system considers the condition of the electrical systems as well as the types of systems, sizing, and applicability for their respective spaces.

The Massachusetts State Building Code 780 CMR requires all buildings and structures and all parts thereof, both existing and new, and all systems and equipment therein which are regulated by the State Building Code to be maintained in a safe, operable, and sanitary condition. All service equipment means of egress, devices and safeguards which are required by the State Building Code in a building or structure, or which were required by a previous statute in a building or structure, when erected, altered, or repaired, shall be maintained in good working order.

DCR POLICE SUBSTATION

1198 Furnace Brook Pkwy, Quincy

Existing Conditions

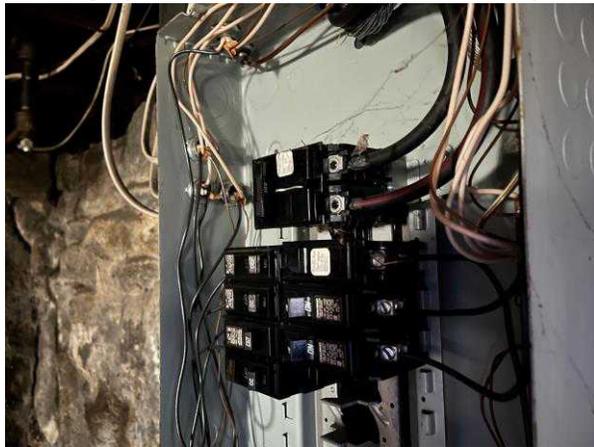
BUILDINGASSESSMENT

The former DCR Police Substation is an existing +/-930 SF single-story wood-framed and stucco building with full basement. The existing building was constructed in 1940. The building currently consists of a single room and a single toilet restroom. As part of an energy retrofit for this DCR property, the plan is to replace the existing mechanical, plumbing, and electrical systems to enhance the efficiency and operation of the building. With restoration of the envelope the building can be then returned to the community for use as a meeting house or perhaps an apartment.

MAIN ELECTRICAL SERVICE & DISTRIBUTION EQUIPMENT:

The main electrical service is a 100A, 120/240V, 1-phase, 4-wire panel, located in the basement. The panel is fed by pole mount Utility-Co. transformer distributing power to the single panel located in the basement. The Main Panel is by Westinghouse and appeared to be installed in the 1990's. The corrosive nature of the unconditioned space has weathered the panel. And the panel face has been removed, creating a safety hazard. The load center covers power needs to this single-story structure w/attic space for gas-fired steam boiler, point of use domestic hot water system, plug loads, and lighting.

While the Electrical System is in service, a rating of poor is assigned due to the risk associated with corrosion and age and the absence of a protective panel cover. Support of the 35-yr old load center is due for immediate replacement. Today's code requires AFCI and GFCI breakers as well as surge protection for the main service panel.



Westinghouse Load Center



Westinghouse Panel

Rating: Failed

Recommendation – Replace the existing electrical service with a new 150A, 120/240V panel with AFCI/GFCI breakers and surge protection. Additional recommendation is to locate the electric panel to the main floor space, removing it from exposure to the corrosive unconditioned space of the basement. The consideration for a larger main electric service is in support VRF heating/cooling and capacity for a vehicle charging station.

DCR POLICE SUBSTATION

1198 Furnace Brook Pkwy, Quincy

Existing Conditions

EGRESS & EXIT LIGHTING:

No EXIT signs were observed at the egress door.

Rating: Failed – Recommend adding EXIT and egress lighting via battery backup of future public space use.

GENERAL PURPOSE POWER:

The general-purpose receptacles are located throughout the building. The location and the quantity of the receptacles may not be adequate for new program space. Receptacle outlets should be replaced with tamper resistant units. Any plans for a kitchen/kitchenette equipment to include GFCI breakers around wet areas.

Rating: Poor – Recommend replacing all receptacles and wiring and add receptacle counts to cover assembly use, kitchenette and toilet room use and, on the exterior, in weatherproof boxes.

EMERGENCY POWER:

No Generator

Rating: N/A – Recommendation is to utilize LED light fixtures with integral emergence battery for egress lighting for an assembly space.

LIGHTING AND CONTROLS:

The lighting in the building is of fluorescent and LED replacement bulbs. LED replacement lamps within surface-mount 1x4 fixtures configured for T-8 lamps.

Lighting control is by wall mounted snap switches. The building's perimeter and porch lighting were missing. In general, the interior/exterior lighting system is barely functioning.



DCR POLICE SUBSTATION

1198 Furnace Brook Pkwy, Quincy

Existing Conditions

Main Office Lighting



No Entryway Light

Common Area Lighting



No Walkway Lighting

Rating: Failed – Recommend replacing all lighting to include dimming and use of Vacancy Sensors.

FIRE ALARM SYSTEM:

The was no observed fire alarm system.

Rating: N/A – Recommend adding a fire alarm system to include ADA compliant signaling devices, and CO detection for a public meeting house or residence usage.

TELECOMMUNICATIONS CABLING INFRASTRUCTURE:

The telecommunications system comprises mostly of Category 3 analog phone line. The telecommunications distribution is nonexistent for meeting house or residential use.

Rating: Poor The system should be expanded to address Wi-Fi and Office Technology requirements.

SECURITY:

No security system.

Rating: N/A - Recommend adding an exterior camera at the main entry and perimeter of the building. The video system would integrate with the access control and intrusion detection system. The security system will be developed during the Schematic Design Phase with Owner input.

END OF NARRATIVE

SCHEMATIC DESIGN

D50 ELECTRICAL

D5010 ELECTRICAL SERVICE AND DISTRIBUTION

- A. The electrical system shall be designed per NFPA 70, the Massachusetts Electrical Code (MEC), Federal, State, local and all other applicable codes.
- B. The Electrical Design will meet or exceed LEED Silver standards for energy efficiency.
- C. Main Switchboard:
 - 1. Service entrance equipment shall comply with NEMA PB 2, NFPA 70 and UL 891.
 - 2. Nominal System Voltage: 120/240V.
 - 3. Main-Bus: 150A.
 - 4. Main Breaker: 150A, 65KAIC with Ground Fault Protection.
 - 5. Phase and Neutral Buses and Connections: Three phase, four wire unless otherwise indicated. Tin-plated, high-strength, electrical-grade aluminum alloy with tin-plated aluminum circuit-breaker line connections.
 - 6. Ground Bus: 1/4-by-2-inch- (6-by-50-mm-) minimum size, hard-drawn copper of 98 percent conductivity, equipped with pressure connectors for feeder and branch-circuit ground conductors.
 - 7. Surge Protection Device Description: IEEE C62.41-compliant, integrally mounted, solid-state, parallel-connected, with sine-wave tracking suppression and filtering modules, UL 1449, second edition, short-circuit current rating matching or exceeding the switchboard short-circuit rating.
 - 8. All circuit breakers in the main switchboard shall be Standard Micrologic (LSI) with solid-state trip unit and flux transfer shunt trip. Breakers shall have trip rating plugs with ratings as indicated on the drawings. Rating plugs shall be interlocked so they are NOT interchangeable between frames and interlocked such that a breaker cannot be latched with the rating plug removed.

D5030 PANELBOARDS

- A. Panelboards shall comply with UL 67, UL 50 and NEMA PB 1.
- B. Panelboards for non-linear loads shall be UL listed, including heat rise tested, in accordance with UL 67, except with the neutral meeting installed and carrying 200 percent of the phase bus current during testing. Provide molded case circuit breakers in accordance with UL 489.
- C. Surge Protection Device for non-linear panelboards: IEEE C62.41.1 – 2002, IEEE C62.41.2 – 2002, UL 1449 Third Edition, or most recent edition & NEC Article 285 -compliant and test devices according to IEEE C62.45 - 2002, integrally mounted, bolt-on, solid-state, parallel-connected, modular (with field-replaceable modules) type, with sine-wave tracking

suppression and filtering modules, UL labeled with 200 kA short-circuit current rating (SCCR), and matching or exceeding the panelboard short-circuit rating, redundant suppression circuits, with thermally protected metal-oxide visitors.

D5040 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

- A. Circuit Breakers: Provide molded case circuit breakers in accordance with UL 489. Provide with solid neutral when grounded conductor is present.
- B. Fusible Switch, 1200A and Smaller: NEMA KS 1, Type HD, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.
- C. Non-fusible Switch 1200 A and Smaller: NEMA KS 1, Type HD, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

D5050 GENERAL PURPOSE ELECTRICAL POWER

- A. A minimum of three general purpose duplex receptacles and one computer double duplex receptacle shall be provided in offices.
- B. A minimum of two double duplex receptacles shall be provided in meeting rooms for speaker stations. A double duplex receptacle shall be provided for the projector, access point and media distribution; and a minimum of eight general purpose receptacles shall be provided for general use in the meeting rooms.
- C. A minimum of one general purpose duplex receptacle shall be provided in utility and storage rooms.
- D. Multiple service floor outlets or fire rated poke-thru devices shall be provided for equipment and appliances when the equipment is to be placed on worktables, counters, systems furniture, or cabinets that are not against fixed walls.
- E. All new feeders shall be installed in PVC conduits when installed underground or under slab; or in EMT when installed concealed or exposed inside the building. All new branch circuit wiring shall be Type MC cable. All telecommunications and low voltage wiring shall be installed in conduit stubs to accessible ceilings, ladder tray, wire basket and supported by j-hooks.

D5060 LIGHTING

- A. Interior Lighting System
 - 1. A high efficiency lighting system shall be provided in all interior spaces as well as on the exterior of the building. The design aim is to deliver a lighting system with a light power density not exceeding 0.5W/sq. ft. Linear direct/indirect fixtures shall be LED; recessed fixtures shall be LED; exterior light fixtures shall be LED.

2. Interior lighting shall be controlled with an automatic control device to shut off building lighting in all spaces. This automatic control device shall function on either on a scheduled basis using a time of day operated control device that turns lighting off at specific programmed times; or an occupant sensor that shall turn lighting off within 30 minutes of an occupant leaving a space; or an unscheduled basis by occupant intervention.
3. Each space enclosed by ceiling-height partitions shall have at least one control device to independently control the general lighting within the space. Each control device shall be activated either manually by an occupant or automatically by sensing an occupant.
4. Each perimeter office space enclosed by ceiling-height partitions shall have a manual control to allow the occupant to uniformly reduce the connected lighting load by at least 50% or shall be provided with automatic daylighting controls.
5. Each perimeter meeting room space shall have a manual control to allow the occupant to uniformly reduce the connected lighting load by at least 50% and shall be provided with automatic daylighting controls. The meeting rooms shall have the ability to dim or switch off lights at the presentation front wall. The lighting controls shall be integrated with the HVAC controls.
6. Egress lighting shall be provided in egress pathways, meeting rooms, bathrooms, meeting areas and outside each egress door.

B. Light Fixtures

1. All light fixtures shall be LED type.
2. LED modules shall include the following features unless otherwise indicated:
3. Comply with IES LM-79 and LM-80 requirements.
4. Minimum CRI 85 and color temperature 3000° K unless otherwise specified in LIGHTING FIXTURE SCHEDULE.
5. Minimum Rated Life: 50,000 hours per IES L70.
6. Light output lumens as indicated in the LIGHTING FIXTURE SCHEDULE.
7. LED drivers shall include the following features unless otherwise indicated:
8. Minimum efficiency: 85% at full load.
9. Minimum Operating Ambient Temperature: -20° C. (-4° F.)
10. Input Voltage: 120 - 277V (±10%) at 60 Hz.
11. Integral short circuit, open circuit, and overload protection.
12. Power Factor: ≥ 0.95.
13. Total Harmonic Distortion: ≤ 20%.
14. Comply with FCC 47 CFR Part 15.
15. Installation shall meet requirements of manufacturer's recommendations and the additional requirements for "Severe Seismic Disturbance" contained in ASTM E 580. Fixture support wires shall conform to ASTM A 641/A 641M, galvanized regular coating, soft temper.

D5070 LIGHTING CONTROLS

- A. The lighting control system shall utilize the Digital Addressable Lighting Interface (DALI) protocol to transmit data to and from Input Devices and End Devices.
- B. Input Devices: occupancy sensors, daylight sensors, multi sensors (combined daylight, occupancy, and temperature), wall mount switches and dimmers.
- C. End Devices: DALI LED drivers, DALI field addressable relays, DALI relay panels, DALI dimming modules.
- D. Control Equipment: lighting control panels, touch screens, server with database and end-user application(s).
- E. All building light fixtures shall be controlled by the lighting control system.
- F. Basis of Design shall be LUTRON® Quantum® system.

D5080 WIRING

- A. Provide wiring and connections for special outlets where required. All homerun circuits must contain no more than 3 phase conductors.
 - 1. Conductors: Copper. Comply with NEMA WC 70.
 - 2. Conductor Insulation: 90 degree rated; Comply with NEMA WC 70 for THHN, THWN-2 and XHHW-2.
 - 3. Multi-conductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC with ground wire.
 - 4. Emergency System Feeders: Emergency System Feeders: Mineral-insulated, metal-sheathed cable, Type MI.
 - 5. Conductor insulation and multi-conductor cable applications and wiring methods
 - 6. Service Entrance: Type XHHW-2, single conductors in raceway.
 - 7. Exposed Feeders: Type THHN-THWN-2, single conductors in raceway.
 - 8. Emergency System Feeders: Mineral-insulated, metal-sheathed cable, Type MI.
 - 9. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN-2, single conductors in raceway; Metal-clad cable, Type MC.
 - 10. Feeders Concealed in Concrete, below Slabs-on-Grade, and underground: Type THHN-THWN-2, single conductors in raceway.
 - 11. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN-2, single conductors in raceway; Metal-clad cable, Type MC.
 - 12. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN-2, single conductors in raceway; Metal-clad cable, Type MC.
 - 13. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN-2, single conductors in raceway.
 - 14. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, and strain relief device at terminations to suit application.

15. Class 1 Control Circuits: Type THHN-THWN-2, in raceway.
16. Class 2 Control Circuits: Type THHN-THWN-2, in raceway; Metal-clad cable, Type MC.

D5090 EMERGENCY/STANDBY POWER SYSTEM

- A. Provide integral battery emergency egress and exit lighting.

D5100 SITE ELECTRICAL GENERATION

- A. No Photovoltaic (PV) System or infrastructure for future Photovoltaic (PV) System.
- B. Alternative 1: Provide conduit infrastructure (only) from the Mechanical Room to a future Roof-Mounted 2 kW Photovoltaic (PV) system with additional capped conduit sweep for a future exterior emergency disconnect.
- C. Alternative 2: Provide a complete 2 kW Roof-Mounted Photovoltaic (PV) System with conduit infrastructure to the Mechanical Room and an exterior emergency disconnect.

D5110 GROUNDING SYSTEM

- A. Comply with UL 467.
- B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- C. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.
- D. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
- E. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- F. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
- G. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
- H. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
- I. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

J. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Sprinkler Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main sprinkler service entrances to building. Connect grounding conductors to sprinkler service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
3. Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
4. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

K. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

L. Grounding for Lightning Protection System: Install 3/0 AWG copper grounding conductor, in conduit, to the building's main service equipment.

D60 COMMUNICATIONS

D6010 DATA COMMUNICATIONS

A. The telecommunications cabling infrastructure shall follow the latest TIA standards. The utility company services shall be terminated in a telecommunications entrance facility (EF). Fire rated plywood backboards, grounding, equipment racks, 110-type punch down blocks, patch panels, conduit sleeves, and corridor cable tray system shall be provided in the EF, the telecommunications room (TR). The pathway system, racks and equipment shall be sized for complete utilization of the service entrance cables and all voice and data outlets plus room for future growth. Voice and data outlets shall be provided in all office areas and in the meeting room. Voice and data horizontal cabling shall be Category 6A, non-plenum, unshielded, twisted pair, 8 conductor copper cable from each jack to the nearest telecommunications closet. Each end of each cable shall be labeled, the cables shall be terminated in accordance with TIA-568-B configuration and tested in accordance with TIA standards.

- B. A minimum of one voice/data outlet shall be provided in each office. One wall phone outlet and a minimum of seven (4) data outlets shall be provided in each meeting room. Two (2) data outlets shall be provided in the ceiling for wireless access points.
- C. Voice/data outlets shall be provided in multiple service floor outlets or fire rated poke-thru devices for equipment and appliances when the equipment is to be placed on worktables, counters, systems furniture, or cabinets that are not against fixed walls.
- D. The data communication equipment shall comprise of 10/100/1000 core and edge switches based on Extreme Networks series chassis or equal. The switches shall be equipped with PoE and non-PoE 1-Gigabit copper Ethernet ports and 10-Gigabit fiber optic ports for connection between core and edge switches. The switches shall provide connection of several devices together (PCs, servers, printers, etc.) over a wired data system and control access to various parts of the network. The servers and storage farm shall be provided under the FF&E budget.
- E. The Wi-Fi data communications equipment shall comprise of a controller and a/b/g/n access points based on Extreme Networks or equal. The access points shall provide wireless connection of several devices together (PCs, servers, printers, etc.) over a Wi-Fi network and control access to various parts of the network including 1.2 points per meeting room and exterior locations for parent/student access.

D6020 VOICE COMMUNICATIONS

- A. The voice communications equipment shall comprise of a voice-over-IP (VoIP) telephone switching system, voicemail, distribution infrastructure, and telephone handsets. Telephone handsets shall be provided in the meeting room and kitchenette.

D6030 AUDIO-VIDEO COMMUNICATIONS

- A. A/V presentation tools in meeting rooms shall consist of a display monitor integrated with the sound system. The display monitor shall incorporate DVD player, computers, incoming TV signals from a local presentation station or networked data drop.

D6060 IN-CEILING PRESENTATION AUDIO SYSTEM

- A. A speech reinforcement system shall comprise of a wall-mount speaker, pendant style speaker microphone, remote microphone, and media connector. The system shall be installed in all meeting rooms.
- B. The speech reinforcement system shall be integrated with the meeting room projector to amplify sound.
- C. The speech reinforcement system shall be integrated with the public address system and the fire alarm system to mute in the event of a page or alarm.

D70 ELECTRONIC SAFETY AND SECURITY

D7020 FIRE ALARM SYSTEM

- A. The design of the fire alarm system shall be based on engineering criteria as defined by NFPA 72 and The Massachusetts State Building Code 780 CMR. The system shall be supported by standby batteries. The batteries shall support 24-hours of full supervisory operation followed by 15 minutes of alarm.
- B. A combination audible-visual signaling appliances as required per NFPA 72 shall be provided. The audible-visual notification devices shall be located in all egress pathways, meeting rooms, public and common areas. Visual notification devices shall be provided in all offices. The devices shall be in compliance with the Americans with Disabilities Act (ADA).
- C. Manual pull stations shall be located within 5 ft. of each means of egress and mounted at 44 in. above the floor to the activating lever of the box. The pull stations shall mechanically latch upon operation and remain so until manually reset by a key common to all system locks.
- D. Photoelectric smoke detectors shall be located in egress pathways. Smoke detectors shall also be located at the top, bottom of each stairway; mechanical equipment; electrical; transformer; telephone equipment; elevator machine; or similar room. Sprinkler tamper and flow devices shall be wired for trouble and alarm indication respectively into the fire alarm control panel.

D7070 ELECTRONIC MONITORING AND CONTROL

- A. The electrical power monitoring meter shall calculate the electrical usage of electrical loads with the use of remote current transformers. The meter shall be microprocessor-based. The meter shall be capable of sampling each power waveform calculating power factor and harmonic content to achieve 0.5% accurate readings. The meter shall save the Kilowatt hour and Max demand readings, indefinitely, in non-volatile RAM during power outages, without the use of batteries until, at such time, the meter is re-energized.
- B. The meter shall contain Modbus RS485 RTU communications as a standard feature. The meters' communication wires to be Daisy Chain, Parallel, and Star wired together then connected to a RS485 / RS232 converter, which then connects to the PC. Up to 255 meters shall be connected, on a two-wire buss, to be read by software in the PC. The software package shall allow the end-user to read the meters manually or automatically.
- C. The software shall display power consumption data for each panel being monitored, total lighting load, computer power load, general purpose power load, elevator, HVAC load and total building load.

G40 ELECTRICAL SITE IMPROVEMENTS

G4010 SITE ELECTRIC DISTRIBUTION SYSTEMS

- A. The building will be pole fed from the Utility Co. to an exterior wall mount meter and accessible, lockable service disconnect.

G4050 SITE LIGHTING

- A. Pedestrian walkways shall be designed for an average maintained illuminance value (Eavg) of 0.6 foot-candle horizontal, and 1.1 foot-candle vertical, as measured 6'- 0" above ground, and shall maintain an avg/min illuminance uniformity ratio not to exceed 4:1. (This means that if the average illuminance at the ground plane is 0.6 foot-candles, the minimum illuminance shall not be lower than 0.15 foot-candles).
- B. Building security lighting shall be designed for an average illuminance value (Eavg) of 0.5-foot candle horizontal.
- C. Building security lighting shall be LED wall packs.

Appendix F: Cost Estimate*

**Redacted here, please refer to Appendix B in the Request for Proposals for the Cost Estimate*