

APPENDIX C:
CONDITIONS ASSESSMENT

Certified Building Study 12 Brainard Street Hyde Park, Boston, MA

DCR Project No. P22-3471-S3A

Prepared For:

**The Commonwealth of Massachusetts
Department of Conservation and Recreation**

December 27, 2022

HKT Architects Inc.

24 Roland Street, Charlestown, MA



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Section 1

Preface

HKT Architects has been tasked to evaluate 12 Brainard Street, a Dutch Colonial style house which is located on the edge of the Stonybrook Reservation in Hyde Park. The structure was built in 1898 as living quarters for the Park Superintendent, but over the years the house has accommodated a number of other uses. Most recently it has been used as office space.

The purpose of this study is to evaluate the existing condition of 12 Brainard Street and to make recommendations for its rehabilitation for residential or Commercial use such as private business offices under the DCR Historic Curatorship Program.

This study was prepared by HKT Architects and the following consultants on the Design Team:

HVAC and Fire Protection
Structural Engineering
Landscape Architects
Code Consultant
Cost Consultants

GGD Engineering Consultants
Lim Consultants
CBA Landscape Architects
AKF Group
Miyakoda Consulting



Section 2 Acknowledgements

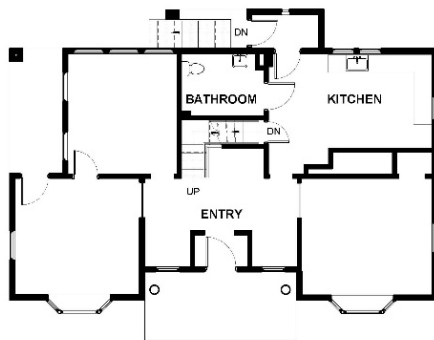
Our thanks and appreciation for the help we have received from the following DCR staff members:

Peter Seweryn
Kevin Allen
Grace McCabe

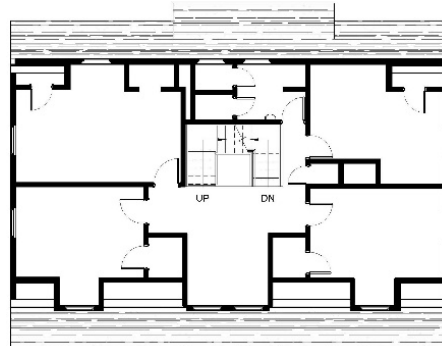
Section 3 Executive Summary

The approach to this report consisted of an initial **Existing Conditions Analysis** of the building and the site in its current condition. The following areas were documented by the Design Team:

- Structural Integrity
- Exterior Building Elements
- Site and Landscape
- Interior Building and Systems

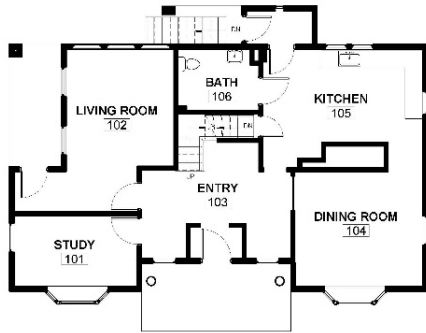


Existing First Floor Plan

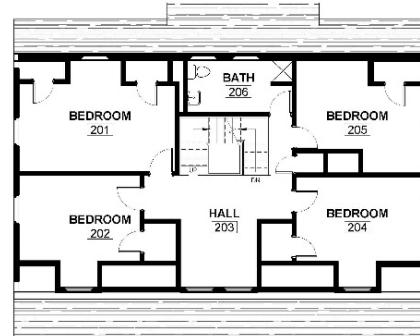


Existing Second Floor Plan

Upon completion of the Existing Conditions analysis, the Design Team focused on the **Recommended Improvements** to make the building conform to current building code requirements for both residential and commercial uses. It was decided at the outset to plan for the two potential uses with minimal changes to the existing building configuration. The code differences between the two uses are summarized under Section 6 of this narrative with a detailed code analyses in Appendices E and F. In order to make use of the existing building layout, it was assumed that the commercial use would include offices on the ground and upper floors by keeping the kitchen and toilet rooms in the same location as the residential use. The office plan could accommodate a single office tenant or multiple small businesses with shared common support spaces.



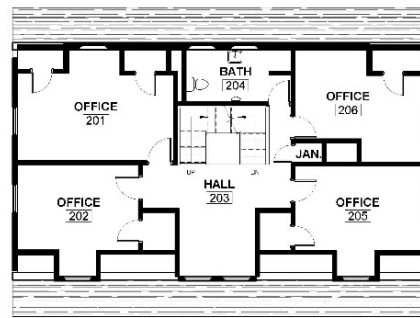
Proposed Residential First Floor



Proposed Residential Second Floor



Proposed Commercial First Floor



Proposed Commercial Second Floor

To summarize, the building condition is generally good with several exceptions:

- The bathrooms and the kitchen are unusable in their current state. They need to be gutted and rebuilt with new finishes and fixtures.
- The main stairs in the center of the building need repairs and refinishing.
- The rear stairs from the kitchen are in need of repair with added guards and handrails to meet code.
- The entire electrical system is outdated and not code compliant. It must be replaced. New efficient lighting fixtures are strongly recommended.
- The existing mechanical system is relatively new and can serve the building adequately for the near future. There is no central air conditioning.
- The oil fired furnace can be used, but it should eventually be replaced with a non-fossil fuel system.

The site is located on the edge of the Stony Brook Reservation facing a residential neighborhood. There is no accessible path to the house from the parking area or from the street. This can be solved by regrading the parking area and the path to the front door to serve as the accessible access route.

The **Recommended Improvements** section addresses most of these issues, but different needs and individual tastes may look at other ways to bring the building and the site into conformance with prevailing building codes.

Section 4

Existing Condition Analysis

EXISTING CONDITIONS INVESTIGATION AND ANALYSIS

The following is a summary of the existing conditions prepared by HKT and their structural, MEP/FP and landscape consultants. The relevant photographs are integrated into the descriptions below. The existing floor plans for 12 Brainard Street are in Appendix A.

1. Structural Systems

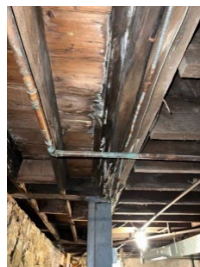
- A. Existing Structural System: The substructure of the existing addition consists of a stone foundation wall at the perimeter, a concrete slab on grade in the basement, and a line of interior steel pipe columns in the basement for the intermediate support of first-floor framing. We assume the steel lally columns were installed at a later time to replace the original wood columns.

The superstructure is wood framing consisting of the first floor, second floor, unfinished attic, and roof. The floor framings are 2x10 joists bearing on the interior and the exterior 2x4 stud walls. The exterior walls are bearing on exterior foundation walls. The interior walls are bearing on a wood beam at the first floor supported by pipe columns in the basement. The roof framing consists of 2x6 rafters tied together with 2x8 attic joists and bears on exterior bearing wall at each end of the roof. The gambrel roof has shed roof extensions on each side at second floor level. We believe the lateral loads are likely carried by the wood shear walls on the exterior.

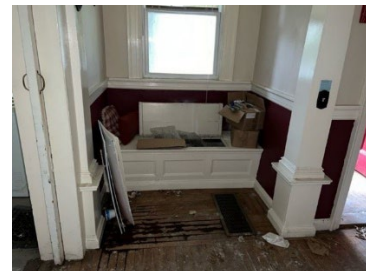
- B. Observed Conditions and Repairs Needed: Observations were made from accessible locations where the structure was exposed to view. Overall, the structure appeared to be in acceptable condition. The following are the noted deficiencies in the structure:
- 1) At the time of the site visit, the first-floor framing at the front entrance was damp. The dampness appears to be due to infiltrating water due to the inward slope of the porch deck. We recommend resolving the drainage issue of the front deck and replace any damaged wood members.



Missing Stone at Foundation Wall



Water Penetration



Source of Water from 1st Floor

- 2) The north (back side) foundation wall of the building has damage to the interior face at the location where a beam bears on the wall. The beam is temporarily supported by adjustable steel pipe columns. We recommend removing a section of a wall and replacing it with new concrete blocks.

- 3) On the attic floor, the framing was damp at a few locations. The dampness appears to be due to water penetration from the roof during the rainfall. We recommend fixing the waterproofing issue on the roof.

2. Exterior Building Elements

- A. Roofing: Asphalt Shingles, were installed approximately 10 years ago. The roof looks good and the gutters and downspouts are in good condition. It looks as though it has some useful life left but might need some repairs.



Asphalt Shingle Roof



Wood Shingle Siding



Paint at Soffit

- B. Exterior Walls: The exterior of the building is finished with stained wood shingles that are in very good condition and was part of the exterior renovation 10 years ago. Generally, the wood trim is in good shape with some minor peeling. The soffit above the front entrance, however, is peeling and should be repaired. There may be moisture above the soffit that is causing the paint to deteriorate. It should be looked at more closely, otherwise the exterior paint is in very good condition.
- C. Windows: Vinyl double-hung with storm windows. The sash and wood trim is in good shape with minor peeling. The window replacement was also part of the previous renovation. A few of the screens are torn and damaged and the one of the storm windows in the kitchen is cracked.



Double-hung windows w/storms



Damaged Screen & Damaged Glass

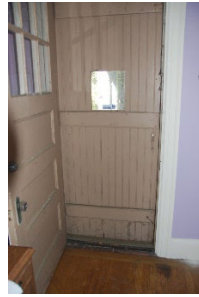


Screen at Front Door

- D. Doors: Wood panel with screen door at the front is in good condition but needs repainting. The screen door should be replaced. In addition, there is a flush storm wood door between the current living room and the rear porch. This door can be repaired and repainted, but it doesn't offer much in terms of heat loss. The rear door from the kitchen needs work and repainting.



Storm Door to Deck



Storm Door Interior



Front Entry Door



Rear Stairs at Kitchen

- E. Rear Stairs: These stairs are falling apart and are extremely dangerous. The tread and Risers are unequal and coming loose. No handrail.



Rear Stairs



Missing Tread

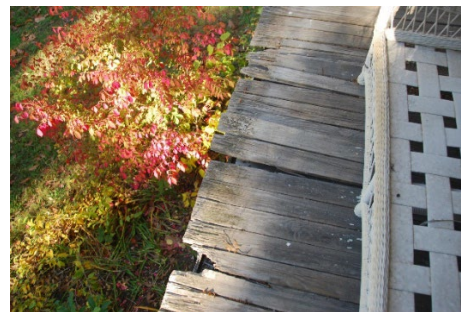


Broken Decking

- F. Exterior Trim: Generally the exterior is in good condition with minor peeling. The trim can be repaired by spot priming and paint touch-up as needed.
- G. Wood decks: The wood deck off of the living room is very bad condition and needs to be replaced. The joints below the deck were not exposed, but there is a good possibility of deterioration from sitting water. The wood deck at the entry is not original. An early drawing (see the cover of this report) shows curved steps leading up to the front entry door. They were eventually removed and the current wood deck was installed we assume to provide accessibility. The entry deck is plywood over wood joists. The joists appear to be rotting and the plywood was completely inappropriate as a material in this location. It is recommended that the wood be replaced with a concrete pad that can drain surface water away from the entry.



Plywood deck at Entry



Deteriorated Decking at Rear Porch

H. Accessibility: See the code summary in Section 6 and the AKF code reports in appendices C and D and III Site and Landscape description below.

3. Site And Landscape

Existing Conditions: The front (main) entrance to the building currently has a wooden stoop which provides a no-threshold access at the front door. The stoop is in need of repair; our understanding is that HKT is recommending the replacement of the wooden structure with a more durable material, which CBA would support. Based on historical photographs, it appears that there had initially been a step up to the stoop which has been eliminated.



From the stoop, a brick walkway (overgrown) runs directly out to the asphalt sidewalk; a short distance out from the building (approximately 5 feet), a secondary brick walkway runs parallel to the front elevation to the driveway, where there is a single step down to the asphalt driveway. Both of these walkways vary slightly in pitch, but on-site measurements with a smart level taken at several points varied between 8.35% and 5.75%, on the main walk, and between 3.55% and 7.50% on the walk to the driveway. The average pitch in each case was clearly above the 5% maximum slope acceptable without a handrail.



The driveway itself includes numerous areas where the pitch exceeds 5%, including measurements up to 6.55%, as well as areas with very minimal cross-pitch (0.25% at one spot). Provided the budget allows, the driveway and parking area may need to be regraded for ADA compliance.



From the rear of the parking area, a curving sloped brick walkway leads down to a single door (shorter than typical) on the rear of the structure that appears to enter into the lower level. While the grade of the walkway was not directly measured by CBA, a visual analysis indicated that it is likely over 5% in places. Based on apparent ceiling height, CBA also anticipates that that door may not be accessible from the interior of the building (there may be stairs), which would preclude its use as an accessible route unless the door threshold is lowered down to the floor level. There is no access (at grade or via stairs) to a porch located on the southwest corner of the building.



Existing plant material in the vicinity of the house consists of low foundation plantings (some intentional and some which appear to be overgrown self-seeded shrubs, perennials, and small trees) which are rather weedy in appearance. Of particular note, a few climbing vines (at the front left/southeast corner and on the rear of the house) have climbed the downspouts and are affecting the roof gutters; these should be addressed. In addition, the weed trees near the front right/northeast corner should be removed as they are too close to the structure. Out in the front lawn to the north and east of the two brick walkways, a single weeping cherry is the only tree of note in the front other than the large existing street trees located at the back of the sidewalk.

4. Interior Building Elements

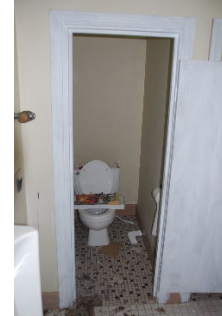
- A. Flooring: There are several rooms that will need new floor, specifically the kitchen, both bathrooms, the corridor on both floors and the former dining room that has a plywood subfloor at the present time. The other rooms with hardwood flooring needs moderate repairs and refinishing.



First Floor Hardwood Flooring

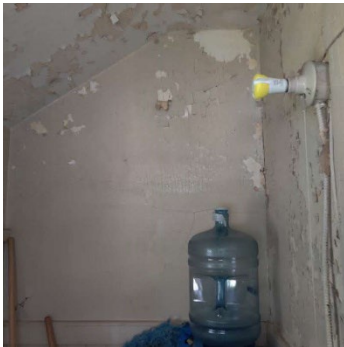


First Floor Dining Room: Plywood Subfloor

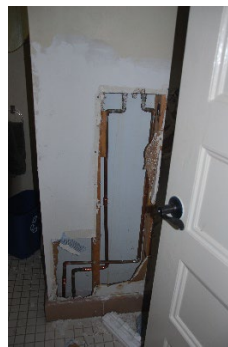


Second Floor Bath

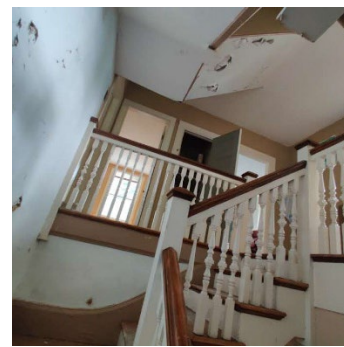
- B. Walls: The interior finished walls are plaster with some gypsum drywall. The condition of the walls are good requiring minor to major repairs including patching and repainting. There are areas that have peeling paint, especially around the stair and the rear vestibule entry off of the kitchen. There is a good deal of deteriorating paint and plaster patch at the main stair, possibly caused by water penetration and/or lack of heat during the past several winter months.



Rear Entry Vestibule

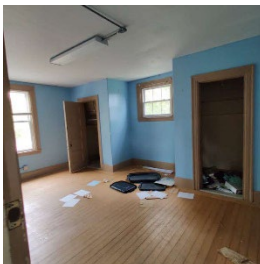


Open Wall 2nd Floor



Peeling Paint at Main Stair

- C. Ceilings: Most of the ceilings on the second floor are in good condition. The kitchen needs significant repair and the ceiling in the front entry hall needs patching and repainting.



Typical Ceiling 2nd Floor



Ceiling at Front Hall



Kitchen Ceiling

- D. Interior Trim: The interior trim around door and window openings, and baseboards is in good condition primarily needing only repainting. The actual detailing particularly around the fireplace on the first floor is part of the historic nature of the building and it has been well preserved.



Typical Window



Fireplace Trim



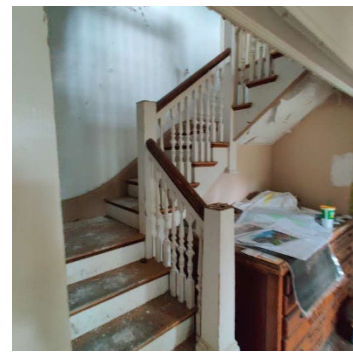
Window Seat at First Floor Entry Hall



Typical Door Trim



Bay Window



Stair: Missing Newel Post Caps

- E. Stairs: The main stair is in moderately good shape. The treads, risers are showing wear and the guard rails are too low as per code and newel post caps are missing, however that are stored on site and can be reinstalled. The stair to the basement also does not meet code.



General Condition of Stair



General view of the kitchen

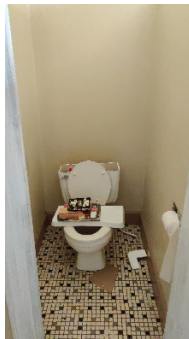
F. Kitchen: The existing kitchen is in severe shape, although some of the cabinetry might be salvageable. The floor finishes must be replaced and parts of the gypsum ceiling has collapsed. The stove was disconnected, and therefore it was not checked to see if it could be reused and/or refurbished. There is no refrigerator.

G. Bathrooms:

The bathrooms on both floors are in very poor condition. The second floor toilet room has been arranged as a men's room with toilet compartment (one toilet is missing) and two urinals (one is missing) and one shower stall. This toilet room is not very well laid out and the finishes are beyond repair. The first floor toilet room is off of the kitchen and it is also beyond repair. See the plumbing report in paragraph 5 below.



Ceiling at 1st floor lavatory



2nd Floor toilet stall



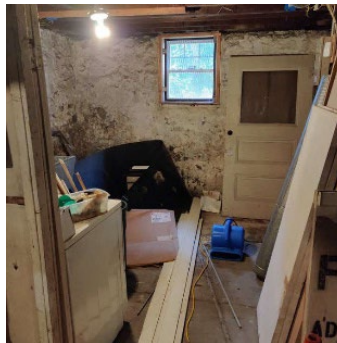
2nd Floor urinals

H. Basement and Attic:

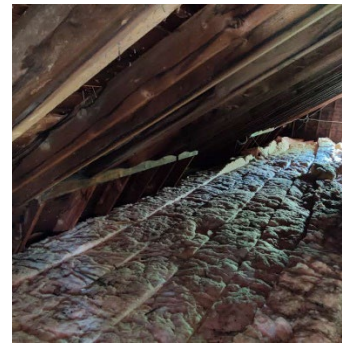
Both the basement and the attic are unfinished and used for miscellaneous storage. There is no insulation in the basement and the stair from the first floor includes winder treads that may need to be modified if any alteration occurs. The insulation in the attic is believed to be 6" (possibly 8") batts without any foil backing. See the two code reports in the appendices of this report and the brief summary in Section 6.



General view of basement



Rear access from backyard



Attic with exiting insulation

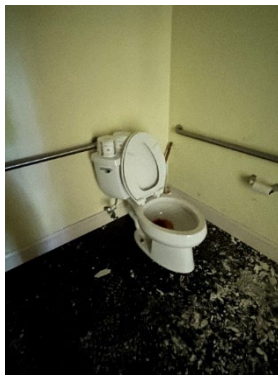
5. Plumbing

- A. Executive Summary: Presently, the Plumbing Systems serving the building are cold water, hot water, and sanitary, waste and vent system. Municipal sewer and municipal water service the building. The building is currently not occupied.

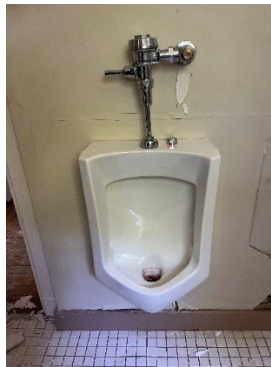
The plumbing systems are antiquated and near the end of their useful life. The plumbing fixtures are in poor condition.

B. Fixtures:

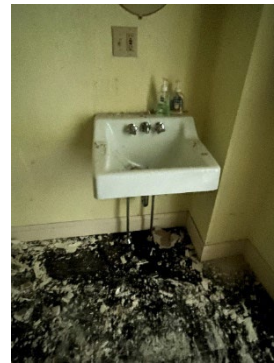
- The water closets are floor mounted vitreous china with flush tanks.
- Urinal is wall hung vitreous china with manually operated flush valve.
- Lavatories are wall hung vitreous china with manual faucets.
- Kitchen sink is two-bowl counter mounted fixture with gooseneck faucet and vegetable spray.
- Shower has concealed valve hot and cold water valve.
- There is a two-bowl laundry sink in the Basement with manual hose bibbs.



First Floor bathroom



Urinal at second floor bath



Second floor sink



Basement Laundry Tub



Kitchen Sink

- H. Water Systems: The domestic water service is in the Basement. The service appears to be 1-inch in size and includes a 5/8-inch water meter. The main domestic cold-water distribution is 3/4-inch in size. Piping is copper with sweat joints. Valves are antiquated. The piping is not insulated.



Main Water Service



Water Meter and PRV

Domestic hot water is generated by a tank type electric water heater. Water heater is single phase, 240 volt, with 4.5 kw upper and lower heating elements. The water heater was manufactured in January 2007. There is no mixing valve to prevent scalding and no recirculation pump.

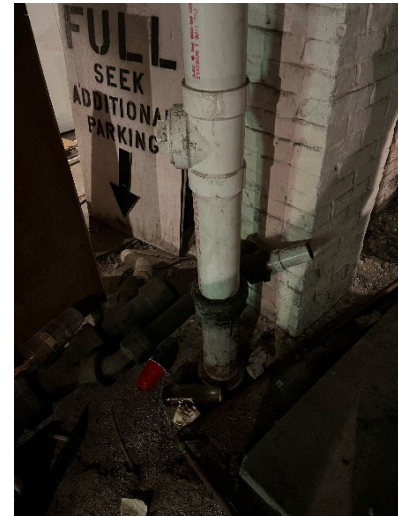
- D. Drainage Systems: PVC is used for sanitary, waste, and vent system. Where visible, the PVC pipe appears to be in good condition. PVC transitions to cast iron at the Basement floor slab.

In general, the cast iron drainage piping can be reused even in a major renovation where adequately sized for the intended new use.

There appears to be signs of groundwater infiltration through the existing foundation walls. There is no sump pump in the basement.



PVC Waste Piping



Transition from PVC to Cast Iron

6. Heating, Ventilation And Air Conditioning (HVAC)

- A. Executive Summary: The residential type building is currently unoccupied. The heating system was replaced and upgraded in 2016, it uses #2 home heating oil as the primary source of heat. While the primary heating equipment appears in good condition, there may be contributing factors to consider as to for a supplemental heating system or additional equipment maybe required to adequately serve the building's needs.
- B. Heating: The building is heated from an oil fired furnace located in the basement. The furnace is an Airco Olsen model BCL14552, that provides 141 MBH of heating utilizing #2 home heating oil stored in a 275 gallon oil tank manufactured by Granby also located in the basement. The furnace has a Beckett oil burner. The oil furnace and burner were installed in 2016. The oil tank, supply and return lines were installed in 2010, at the same time a complete tune-up was performed on the air furnace. At optimal performance, the energy rating tag on the furnace rates the appliance at 84% efficient. While this is good for oil fired appliances, many other types of heating systems can reach higher efficiencies and be more environmentally friendly. This is a heating only system with no means of providing air conditioning.



Oil Fired Furnace



Oil Tank

The hot air furnace is ducted throughout the basement. The ductwork provides warm air throughout the building primarily by floor grilles. All of the ductwork is uninsulated in the basement with the exception of a few branches from the main. The uninsulated ductwork loses heat through the duct wall into the basement space, which loses efficiency of heating the occupied spaces above.

While the major components of the heating system were upgraded, the thermostat controlling the system is an antiquated mercury dial type, nonprogrammable thermostat. This thermostat should be removed and disposed of in a legal and safe manner and replaced with a programmable thermostat that better serves the building and occupants.



Uninsulated Ductwork



Mercury Thermostat

- C. Ventilation: Ventilation throughout the building is lacking. Outside air for the building would be provided through operable windows. Mechanical ventilation is not present in the building, there is no kitchen exhaust hood and bathroom exhaust is deficient and lacking.

7. Electrical

- A. Executive Summary: In general, the existing electrical infrastructure is in poor condition. Most of the electrical systems are in poor condition due to environmental conditions and no maintenance. Life safety systems such as fire alarm, emergency lighting, and exit signs are either non-existent or not code compliant.
- B. Electrical Distribution System: The building is serviced with a 200 Ampere main breaker, 120/240V, 1Ø, 3W, panelboard with 40 poles. The Load Center is located in the Basement. The utility meter is located outside. The service is coming in overhead from utility pole 1441/1. Distribution equipment is in poor condition.



Main Panel



Meter



Utility Pole

- C. Emergency Power System: The site does not have a generator. The building does not have emergency battery units or exit signs.
- D. Fire Alarm System: The building does not have a fire alarm system.

- E. Exterior Lighting System: Exterior lighting consists of building mounted LED floods controlled with motion sensors.



Building Mounted Lighting

- F. Interior Lighting Systems: Lighting consists of surface wraparound fixtures with T8 fluorescent lamps controlled with local switches, and residential sconces and ceiling lights with incandescent sources. There are no occupancy sensors. Lighting is in poor condition and inadequate.



Wraparound Light



Residential Style Lighting



- G. Branch Circuitry: Branch circuits consists of Romex wiring and knob and tube. All knob and tube should be replaced. Branch circuitry is in poor condition. GFCI protection and arc fault protection is inadequate



Branch Circuits Romex



Knob and Tube



Receptacle (Typical)

H. Miscellaneous:

- Basement and other slab area receptacles do not have GFI protection.
- The building does not have an intrusion system.

8. Fire Protection

A. Executive Summary: The building does not have an automatic sprinkler system.

In general, the Massachusetts Existing Building Code, requires buildings with occupancies in Group B or R-2 work areas that have shared exit or shared corridors, but more than one tenant, or that have existing corridors serving an occupant load greater than 30 shall be provided with automatic sprinkler protection. The work area is required to be provided with automatic sprinkler protection in accordance with the 9th edition of the building code and where the work area exceeds 50 percent of the floor area.

Based on the aggregate floor area of the building, the proposed business (B) use group would not require the installation of an automatic sprinkler system. Further review of the proposed residential (R-2) use is required to determine if an automatic sprinkler system will be required.

Section 5

Recommended Improvements

The following recommendations are listed below. This study has focused on two potential occupancies: residential and commercial. There are more stringent code requirements for commercial use than for residential occupancy. Inasmuch as the original building was built as a single family home, the code restrictions have a lesser impact on maintaining the original use versus a commercial use. In general, most of the building is in good shape, particularly the exterior envelope. The windows were replaced prior to 2006 and subsequent upgrades, including interior upgrades were done approximately between 2010 to 2012.

1. Structural Systems

The building structure is in good condition with only minor repairs noted in the structural report, which is located in Section 4, item 1B. There is nothing that is immediate other than eliminating the water infiltration into the basement at the front entry porch.

The recommendation is to remove the wood deck at the front entry porch and provide a concrete slab that pitches away from the entry door. Furthermore, the slab should be level with the first floor entry in order to be compliant with the accessibility code.

2. Exterior Elements

- A. Roof: No immediate need for improvements have been observed. See comment regarding potential ice dam problem below.
- B. Exterior Walls: The exterior soffit at the entry is peeling and showing what appears to be water staining. The water staining could be due to ice dams at the gutter. This should be investigated. Otherwise minor spot-priming and touch up paint on the exterior trim and sills might be considered, but it is not a priority at this time.



Peeling Paint ant entry soffit



Gutter above entry soffit could be causing water damage at soffit

- C. Windows and Doors: The windows are in good shape. There are a few missing or damaged screens and one or two locations where the glass has been damaged and these need to be replaced or repaired. In the future, when the windows need to be replaced, they should be done so with exterior applied muntins that are more historically appropriate.

The exterior entry door and the rear door off of the kitchen should be patched and repainted where necessary. They will need new locksets. In addition, they should be weatherstripped and they may require new aluminum thresholds with a sweep at the bottom of the door to reduce air infiltration. The new threshold at the front entry must comply with accessibility requirements. The basement door in the rear of the building would require a similar upgrade as well. The screen door at the front needs to be replaced or repaired. If it is to be replaced it should be a wood screen door to meet the historic character of the house.

- D. Rear Stairs and Wood Decks: The rear stairs that exit from the kitchen do not meet code and they are in such disrepair that they cannot be considered safe. They should be rebuilt with new stringers that are pressure treated and new risers and treads. The risers and treads should be fabricated out of PVC or composite decking material to reduce maintenance and wear and tear.



PVC Decking



Composite Decking

The side porch off of the living room needs to have the deck completely replaced. The deck itself pitches to the side yard and it appears that the decking is located above the subfloor of the first floor framing. It is assumed that the subfloor has either building paper or a peel and stick rubber membrane as no water penetration was observed in the basement below. Before replacing the new PVC or Composite decking, the weather membrane should be evaluated to see if it requires repair or replacement.

The side porch must have code compliant guard rails that are 42" in height and the rear stairs must have code compliant handrail and a guard at the top landing.

3. Site and Landscape Improvements

Our landscape architect has recommended re-grading the parking area to provide a more consistent and accessible pitch from the curbcut back (shown with the red broken line), which would have the potential benefit of eliminating the single step at the end of the walkway and allowing a re-graded walkway under a 5% slope from the driveway to the door. This will provide an ADA compliant connection from the parking lot (and, by extension, from the public sidewalk) to the front door of the building.



Conceptual regrading Plan



Below: Path from parking; Above: Path from Sidewalk

The main walkway out from the front door to the sidewalk could then be re-graded to provide a gentler slope with a visible 2 riser step, that would clearly differentiate it from the accessible route through the parking lot. For both walks, pavement materials could include cast concrete sidewalk, brick or precast pavers (as are currently in use) or asphalt.

If a direct accessible connection to the public sidewalk is desired, it appears that the most feasible way of doing so would be to run the walk at a diagonal from where the paths currently join out to the corner of driveway and sidewalk, as this would be the highest point along the sidewalk. It appears (based on measuring the slope of the lawn) that such a walkway would be under a 5% pitch, but this layout will require removal of the weeping cherry tree from the front lawn. CBA does not recommend this approach as it would create an awkward connection from sidewalk to front entry, remove a healthy tree, and is unnecessary given that the parking area will likely need to be re-graded for ADA compliance anyway, making it a more feasible accessible route.

Access to the rear door of the property, if required, would be challenging to provide, especially if the driveway / parking area is re-graded as recommended. The path would need to extend further into the rear yard rather than hugging the building as it does now,

or potentially could be located to the southern side of the building rather than from the driveway at the northwest corner. Since this is not the primary route to enter the building, and because the door leads to the basement, it would not be required to be ADA-accessible.

In summary, CBA would recommend that the driveway and parking be regraded for ADA compliance, which should permit an ADA-compliant walkway from the driveway to the front threshold along the eastern (front) façade of the building. If desired, an ADA walkway could also be created to provide access to the rear door. A non-ADA-compliant front walk leading out directly to the sidewalk should be included as well, for consistency with the house's historic appearance and means of approach. The plant beds at the foundation should be thoroughly cleaned out and replanted with appropriate low-maintenance plantings (a mix of shrubs and perennials); at a minimum, the weed trees and climbing vines need to be addressed.

4. Interior Improvements

A. Plumbing Upgrades: The following recommendations address the plumbing:

- 1) Replace all plumbing fixtures with new high-efficiency toilet fixtures.
- 2) Provide accessible plumbing fixtures where required.
- 3) Replace all domestic water piping. Insulate all domestic water piping per energy codes.
- 4) Provide new high-efficiency domestic hot water heaters including thermostatic mixing valves to prevent scalding.
- 5) Provide accessible drinking fountain if use is changed to Business.
- 6) Replace all PVC drainage piping if use is changed to Business.
- 7) Provide provisions to mitigate groundwater infiltration in Basement.

B. HVAC Recommendations

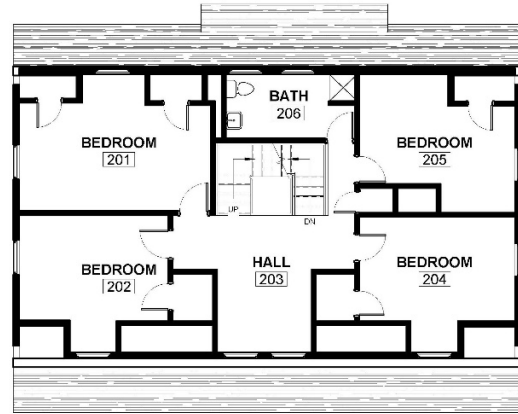
- 1) Despite the heating oil fired system being in good condition and having years more of its serviceable life expectancy, energy efficiency could be improved in many ways throughout the building.
- 2) The existing mercury thermostat should be replaced with a 7-day programmable thermostat with remote monitoring.
- 3) Air conditioning would be recommended and depending on the building usage may be required. Since the existing heating system is only relies on fossil fuel, a heat pump system would be recommended. This would not require any additional equipment to a new air conditioning system and would reduce the oil dependency of the heating system.
- 4) Mechanical ventilation in the form of exhaust in bathrooms and kitchens would be recommended. Depending on the building usage, outside air or an energy recovery unit may be recommended for spaces of high occupancy or where mechanical ventilation would better serve the building occupants.

C. Electrical Recommendations: Electrical systems in this building are in poor condition and should be replaced. Depending on the use group and whether the Building Use Group is B use or an R use, the electrical systems will be new and will comply with the requirements of the Building Use Group.

- D. **Residential Finishes:** The general plans for the residential use are shown below. The assessment of finish improvements follows. In some cases, there are more than one finish that is suggested, depending on the user. Some decisions will also be driven by the user's preference and budget.



First Floor Residential Occupancy



Second Floor Residential Occupancy

Residential Occupancy:

Room	Floors	Walls	Ceiling	Notes
101 Office	1,2	1	1	This room is in good condition
102 Office	1,2	1	1	This room is in good condition
103 Entry	1,2	4	2	Needs hardwood floor repairs/refinishing
104 Conference Room	2,4	1	1	No Finish Floor-add hardwood or carpet
105 Kitchen	4	1	1 & 2	Major ceiling repairs & wall patch needed
106 Bath	3 or 4	1	1&2	Needs floor repairs & major ceiling repairs
201 Office	1	1	1	Room in good condition; missing closet door
202 Office	1	1	1	Damage around light fixture in ceiling
203 Hall	2	1,2	1	Walls and ceiling over stairs needs work
204 Bath	1	1	1	This room is in good condition
205 Office	1	1	1	This room is in good condition
206 Office	3 or 4	1,2	1,2	This room needs to be gutted & rebuilt
Stairs	1,2	Replace newel post caps, Install carpet runner		
Rear Stair Vestibule	4	All of the walls and ceiling needs to be scraped and painted		

KEY:

Floors:

- 1 Refinish, Repair Existing Hardwood
- 2 Carpet
- 3 Ceramic Tile
- 4 Linoleum, Rubber or vinyl tile
- 5 Paint
- New Hardwood

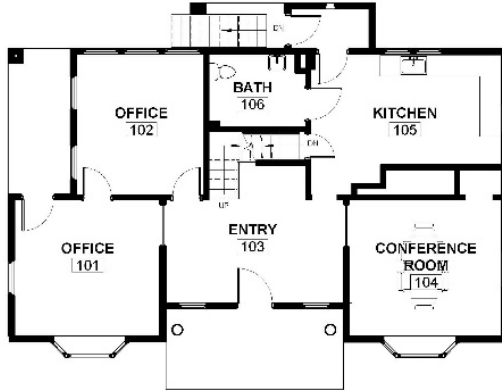
Walls:

- 1 Patch and Paint
- 2 New GWB, Painted
- 3 Ceramic Tile

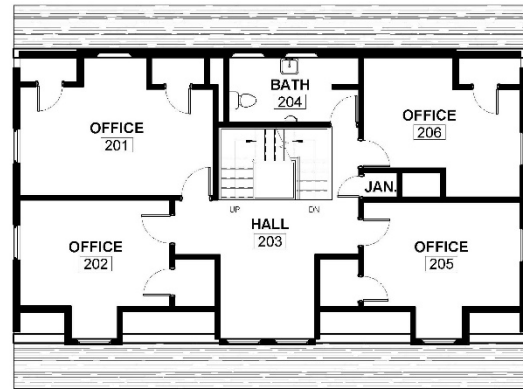
Ceiling:

- 1 Patch and Paint
- 2 New GWB, Painted
- 3 Acoustic Tile

- E. **Commercial Finishes:** Many of the finishes for the commercial uses will be similar to the residential finishes and again it would have to fit the needs and the budget of the user. The layout that is presented in this report is generic considering that it assumes most of the rooms would be converted into office use. Some tenants might prefer a separate copy room, a smaller kitchen, etc. If the tenant is a single business or if offices are rented separately and share common spaces, there will be different spatial needs. A janitor's closet has been added to the commercial program on the 2nd floor.



First Floor Commercial Occupancy



Second Floor Commercial Occupancy

Commercial Occupancy:

Room	Floors	Walls	Ceiling	Notes
101 Office	1,2	1	1	This room is in good condition
102 Office	1,2	1	1	This room is in good condition
103 Entry	1,2	4	2	Needs hardwood floor repairs/refinishing
104 Conference Room	2,4	1	1	No Finish Floor-add hardwood or carpet
105 Kitchen	4	1	1 & 2	Major ceiling repairs & wall patch needed
106 Bath	3 or 4	1	?	Needs new floor and major ceiling repairs
201 Office	1	1	1	Room in good condition; missing closet door
202 Office	1	1	1	Damage around light fixture in ceiling
203 Hall	2	1,2	1	Walls and ceiling over stairs needs work
204 Bathroom	1	1	1	This room is in good condition
205 Office	1	1	1	This room is in good condition
206 Office	3 or 4	1,2	1,2	This room needs to be gutted & rebuilt
Stairs	1,4	Replace newel post caps, install vinyl or rubber treads		
Rear Stair Vestibule	4	All of the walls and ceiling needs to be scraped and painted		

KEY:

Floors:

- 1 Refinish, Repair Existing Hardwood
- 2 Carpet
- 3 Ceramic Tile
- 4 Linoleum, Rubber or vinyl tile
- 5 Paint
- New Hardwood

Walls:

- 1 Patch and Paint
- 2 New GWB, Painted
- 3 Ceramic Tile

Ceiling:

- 1 Patch and Paint
- 2 New GWB, Painted
- 3 Acoustic Tile

Section 6

Building Code Summary

Many of the interior improvements required for this property will be similar for both commercial and residential use. However, as noted earlier in this report, there are specific differences between the two that are driven by current building code regulations. These are summarized below for both uses and a detailed code analysis for each is located in Appendices C and D. The commercial use is generic to illustrate how the building could be divided with minimal spatial changes.

Before the scope of work is finalized, the building should be reviewed with a contractor who can review the existing conditions, open up walls and ceilings to avoid latent conditions during construction.

The following summary is a brief overview of the requirements for the two occupancies that have been the basis of this study.

1. **Residential Use:** The residential use code analysis was based on use of the building as a detached, single-family residence. The code analysis was based on the current 9th edition of the MA State Building Code (780 CMR 51.00), which adopts and amends the 2015 International Residential Code (IRC). MA adopts and amends Appendix J of the IRC, which provides requirements for alterations to existing single-family residences. In general, Appendix J does not require the upgrading or replacement of any existing nonconforming feature, provided such feature is in serviceable condition. However, elements that are considered to be dangerous, unsafe, damaged, or significantly deteriorated by the building official must be remediated.

Based on AKF's review of the building, existing conditions that require repair, maintenance, or that present an unsafe condition include: lack of existing guards, missing treads on stairs, non-level walking surfaces, and existing floor/ceiling assemblies in disrepair. Other existing elements must be made to comply with 780 CMR 51.00 where there are specifically altered, or where the condition is considered unsafe by the building official. Such elements include: lack of stair handrails, low guards, noncompliant door/stair widths, missing landings, non-level walking surfaces, and low headroom. Single-family residences are not required to comply with the accessibility requirements of 521 CMR or the federal ADA Standards. See AKF's code report for a detailed code analysis of the building.

2. **Commercial Use:** The commercial use code analysis was based on use of the building as a primarily Group B (business) occupancy. The analysis also considered Group S-1 and S-2 storage classifications due to the presence of moderate-hazard and low-hazard storage, respectively. The code analysis was based on the current 9th edition of the MA State Building Code (780 CMR), which adopts and amends the 2015 International Building Code (IBC) and 2015 International Existing Building Code (IEBC). Based on the proposed work area, the project is considered a Level 2 Alteration since the work area is

less than 50% of the aggregate building area. Level 2 Alterations must comply with IEBC Chapter 8, as well as IEBC Chapter 7 for Level 1 Alterations.

The majority of the requirements applicable to Level 2 Alterations are based on the specific work area (i.e., area of reconfigured space). In addition, any newly installed elements, fixtures, or equipment must comply with the applicable new construction requirements (e.g., interior finishes). Features requiring repair, general maintenance, and that constitute life safety hazards must also be remediated. Based on AKF's review of the building, such elements include adding guards where no guards exist, replacing missing treads on stairs, providing level walking surfaces, providing exit signs/egress lighting, and replacing floor/ceiling assemblies in disrepair. In addition, existing non-conforming elements that are specifically altered or that are deemed unsafe by the building official (e.g., winder treads, low guards, stair dimensions, missing landings, low headroom, etc.) must be brought into compliance. Where these elements are not specifically altered, they can remain existing non-conforming conditions as long as they are not deemed unsafe by the building official. The existing stairs must comply with the enclosure requirements of the IEBC where they are within the work area. Accessibility implications depend on whether the building is open to the public. However, even if the building is not open to the public, the federal ADA Standards require employee bathrooms and kitchens to be accessible. The federal ADA Standards require alterations to comply with the applicable requirements to the maximum extent feasible. See AKF's code report for a detailed code analysis of the building.

Section 7

Cost Estimate Summary

The detail cost estimate for this project is located in Appendix D. There are several qualifiers to the total cost of \$803,816:

1. The total cost estimate is based on prevailing wages and the requirements of the Massachusetts public bid statute, Chapter 149. However, the tenant does not have to publicly bid the renovations under Chapter 149 and may negotiate directly with a contractor inasmuch as the cost of the renovations is financed privately without the use of any public funds. It is reasonable therefore that negotiating directly with, or bidding with a group of contractors could reduce the total cost by 25% to 30%. The Commonwealth uses the cost of improvements under Chapter 149 only to determine value the improved property.
2. The estimate is based on the assumption that work will start in the fall of 2023. It includes a 10% contingency and an inflation factor of 7.33%. Since the start of this past year, inflation has risen dramatically due to the Covid pandemic, supply-chain issues and world events, all of which have disrupted the availability of both materials and labor.
3. This estimate is based on the improvements that are recommended in this report. The final renovation will likely vary from the scope outlined herein. The improvements must adhere to current building codes and local ordinances, but the design can differ significantly depending on the tenant's needs. The basis of design for both uses in this study includes organizing the space program for each use into to the existing plan configuration with a minimum of changes. This does not preclude the tenant from making other changes and thereby increasing the scope and the possibly, the cost.
4. As stated above, the scope of work outlined in this report has been the basis of this estimate and would cover the different improvements required by code for both commercial and residential uses. Each use has its own needs. For example, the residential occupancy would require a more robust kitchen that could serve a family as opposed to a smaller kitchen with less appliances to accommodate office personnel. The residential use would likely require a washer and dryer and the commercial office would require exit signage and other specific life safety elements that are not required for a single occupancy residence. Accordingly, the Design Team feels that the totals in the estimate would cover the different code requirements for both uses.



Appendix A: Existing Floor Plans

Existing Basement Plan
Existing First and Second Floor Plans



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Project
12 BRAINARD STREET
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MASSACHUSETTS DCR

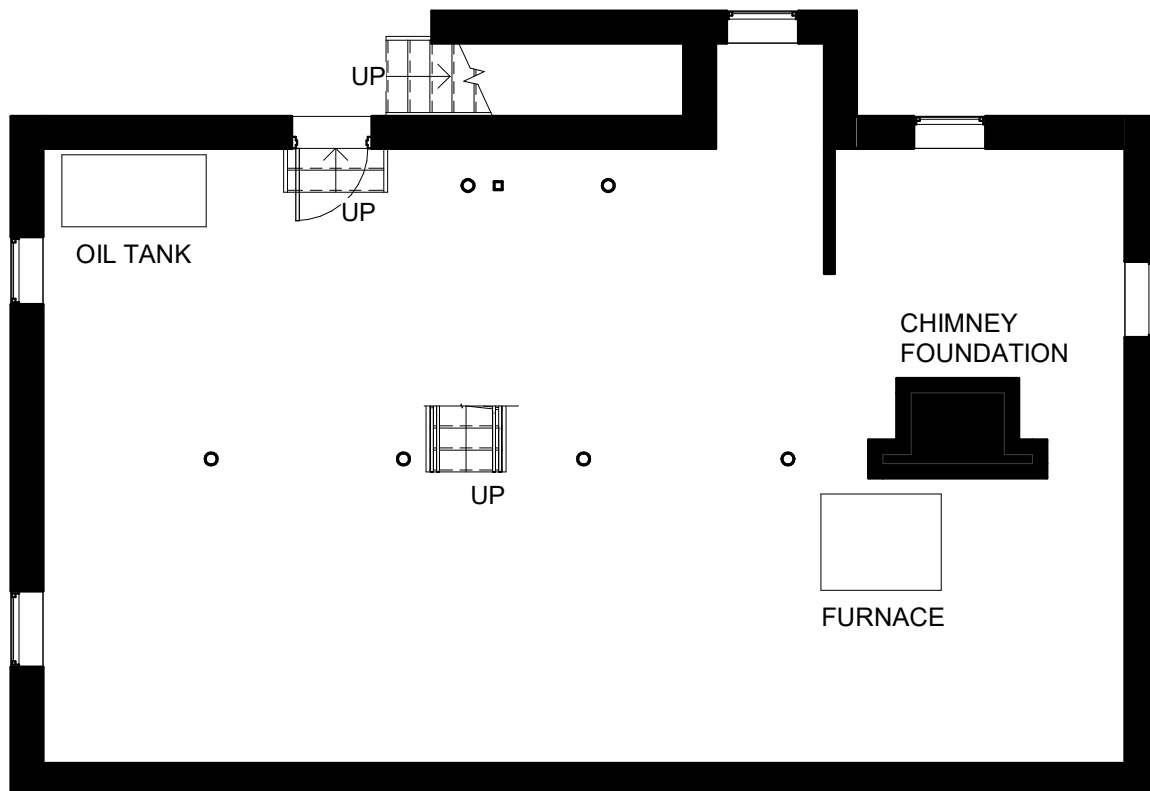
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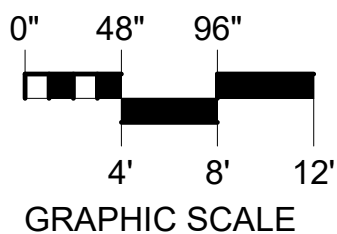
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PLAN EXISTING BASEMENT PLAN

1





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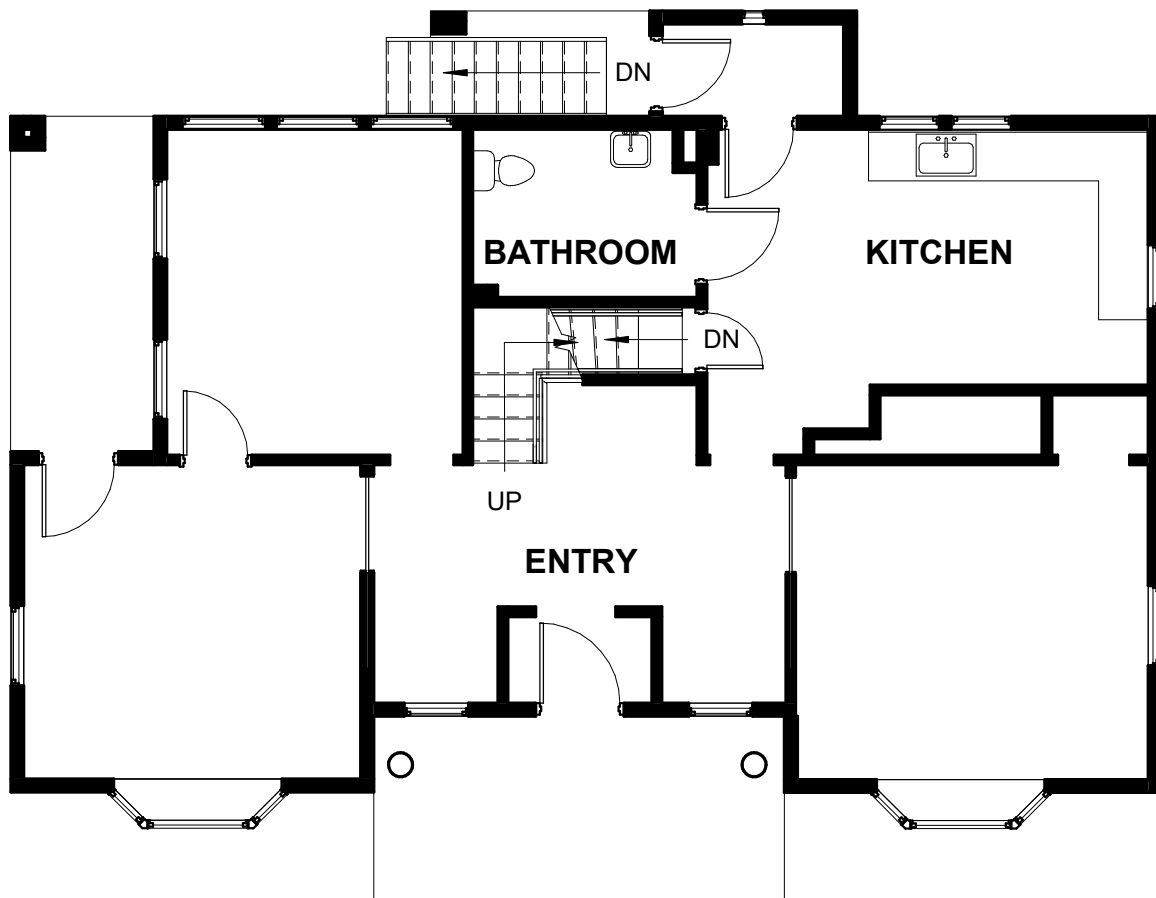
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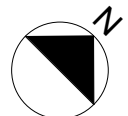
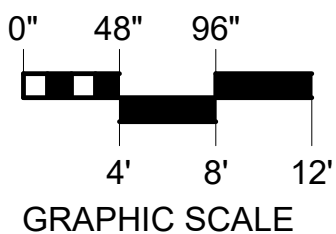
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PLAN EXISTING FIRST FLOOR

1





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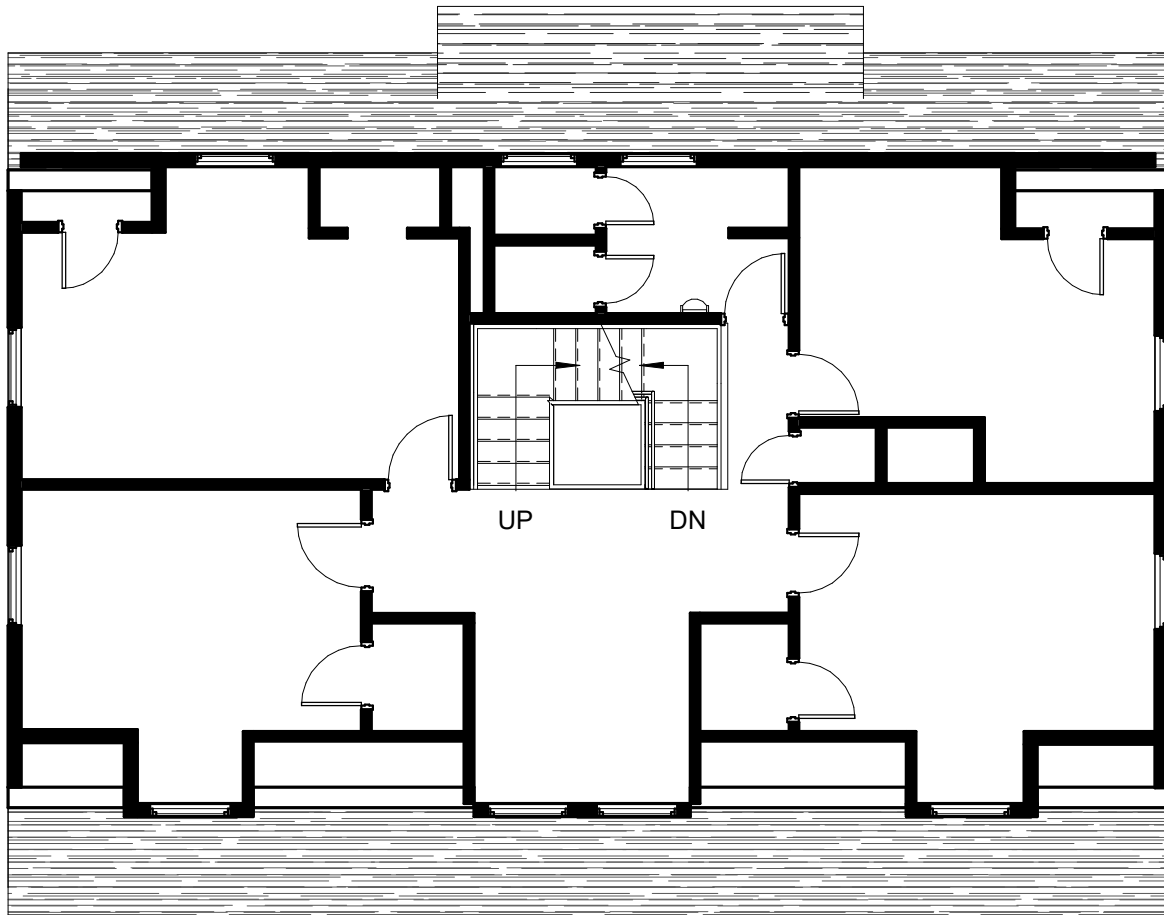
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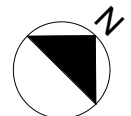
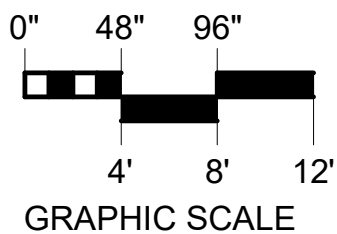
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PLAN EXISTING SECOND FLOOR

1





Appendix B: Schematic Plans

Residential Use



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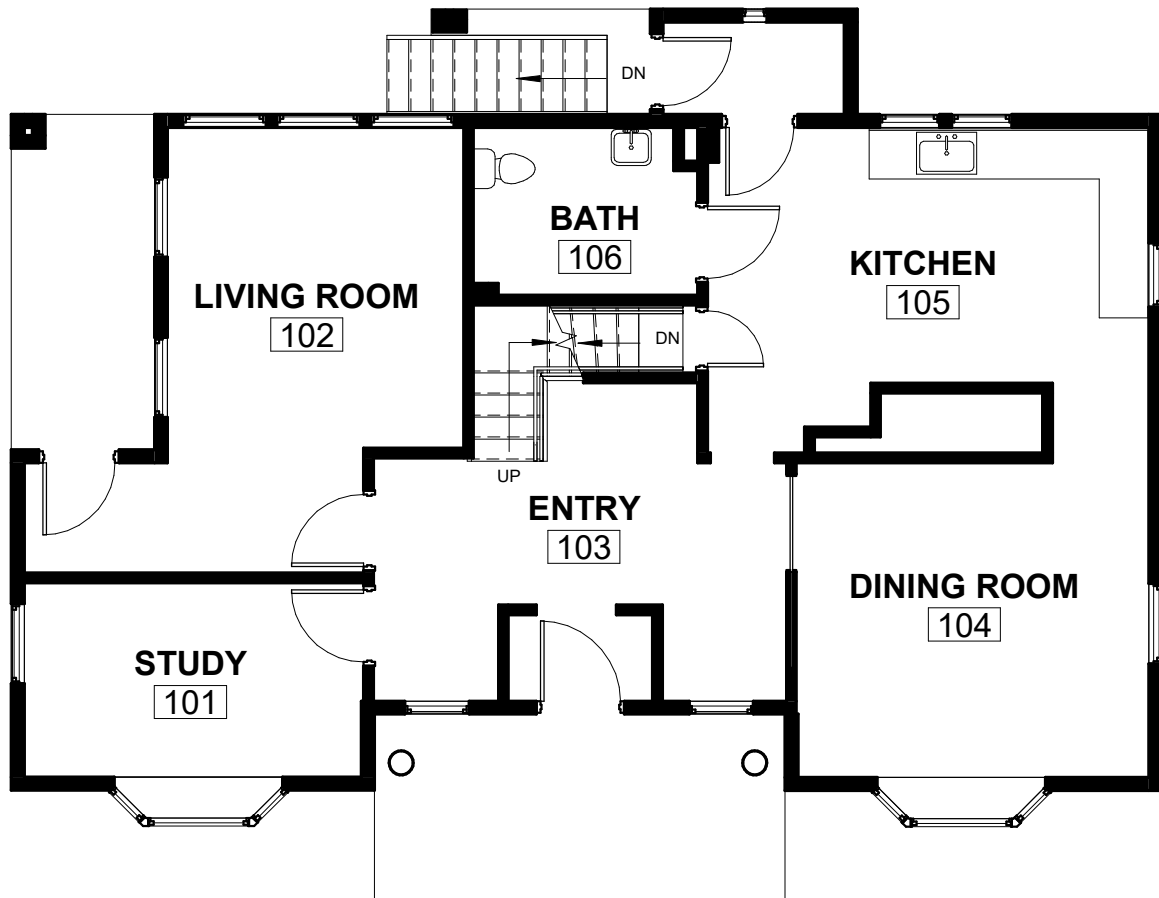
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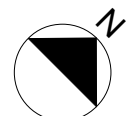
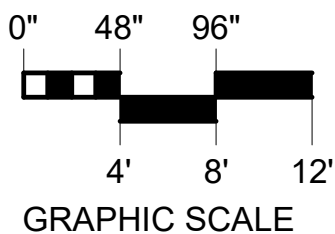
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PLAN RESIDENTIAL 1ST FLOOR

1





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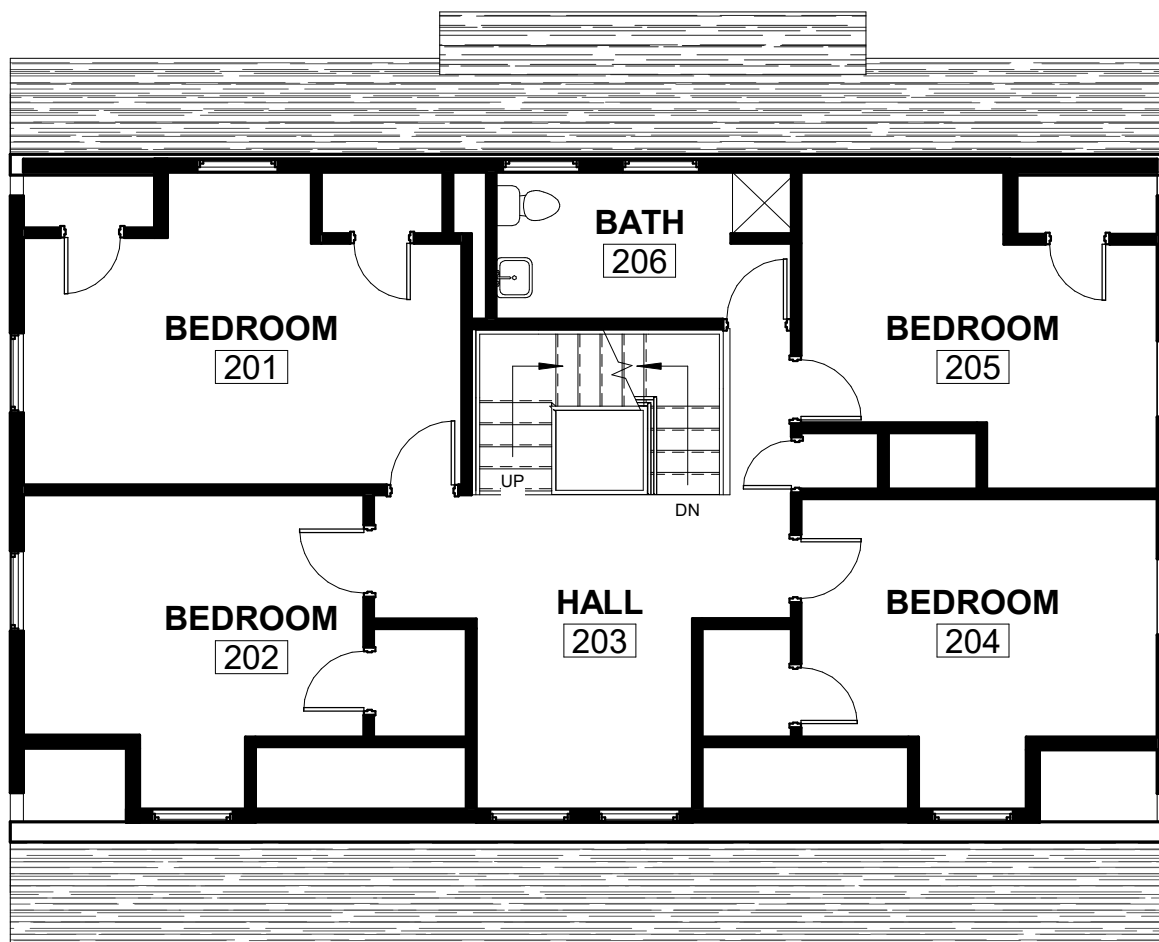
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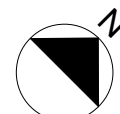
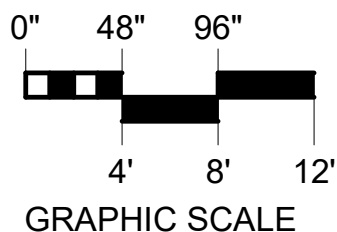
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PLAN RESIDENTIAL 2ND FLOOR

1





Appendix C: Schematic Plans

Commercial Use



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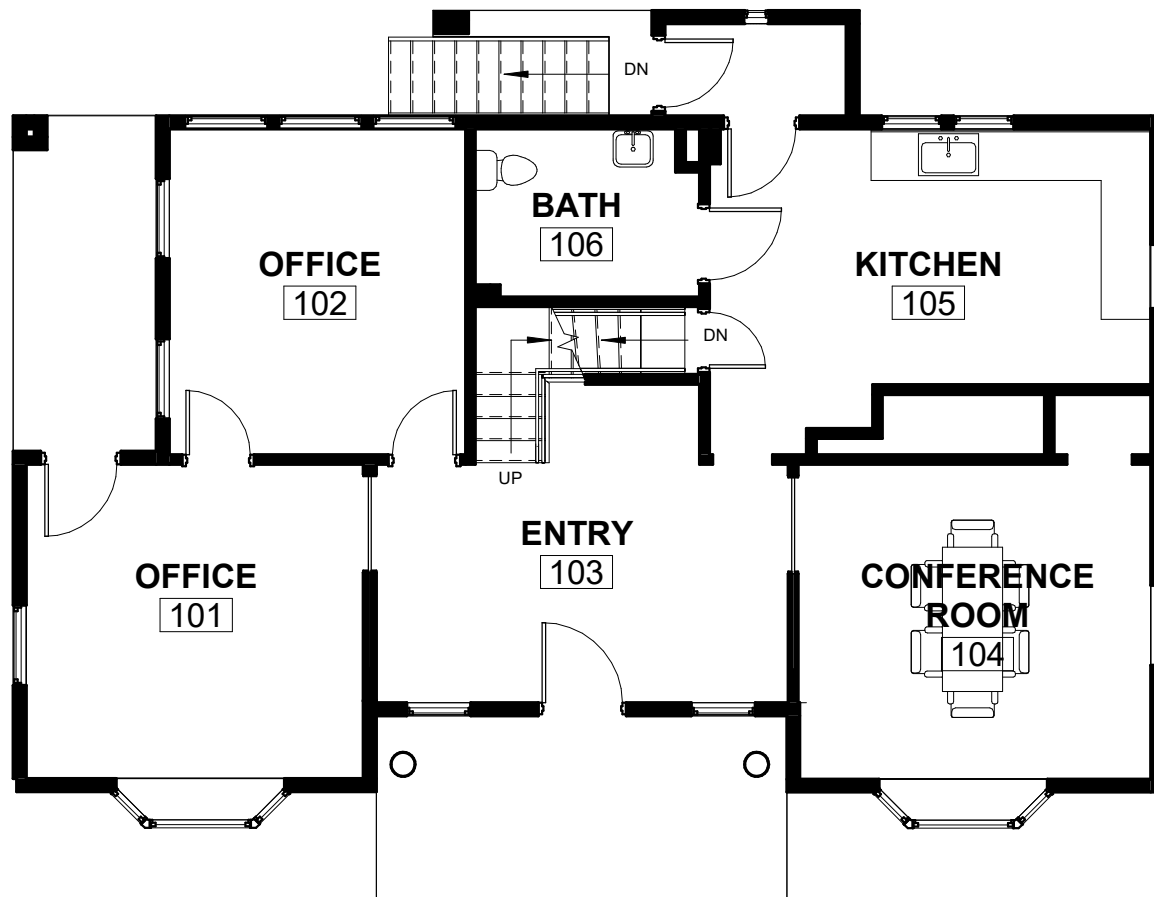
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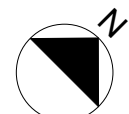
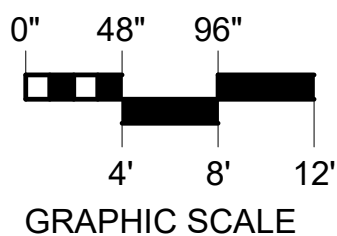
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PLAN COMMERCIAL 1ST FLOOR

1





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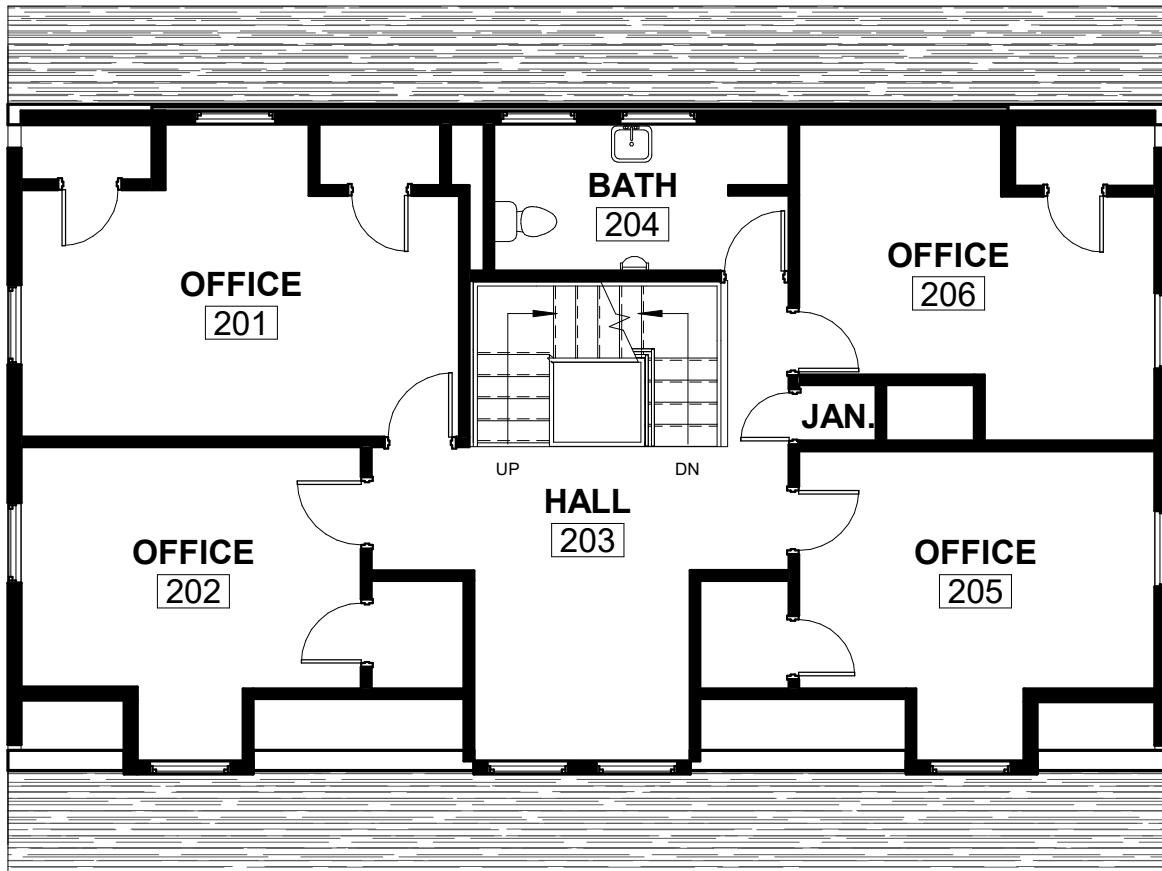
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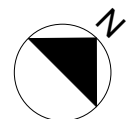
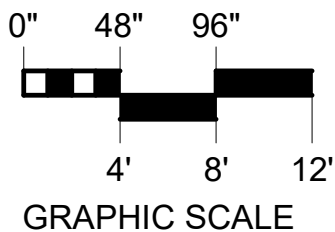
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PLAN COMMERCIAL 2ND FLOOR

1





Appendix D: Cost Estimate

***Department of Conservation and Recreation
12 Brainard Street***

Hyde Park, Boston, MA

Mass. State Project No. P22-3471-S3A

December 13, 2022

Certified Building Study Estimate

Architect:

HKT Architects Inc.

24 Roland Street, Suite 301

Charlestown, MA 02129

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Cost Estimator:

Miyakoda Consulting Inc.

PO Box 120731

Raynham, MA

(617) 799-5832

www.miyakoda.com

12 Brainard Street

Hyde Park, Boston, MA

Introduction

Basis For The Estimate:

- 1 The project is a public building for DCR. It is renovation of an existing building in Hyde Park, MA
- 2 Sitework has been included.

Project Particulars:

- 1 Estimate is based on Certified Building Study from HKT dated 11/21/2022

Assumptions:

- 1 The project will be constructed by a General Contractor. There will be no less than four GC's will bid this project
- 2 Our costs assume that there will be competitive bidding in all trades i.e. at least three bids per trade or sub-trade
- 3 Unit rates are based on current dollars
- 4 Design Contingency is an allowance for unforeseen design issues, design detail development and specification clarifications
- 5 General Conditions and Requirements value covers Construction Manager's site office overhead and on-site supervision
- 6 Fee markup is calculated on a percentage of direct construction costs.
- 7 Escalation has been included
- 8 Assume Construction To Begin Fall 2023

Exclusions within the Estimate:

- 1 Elevator
- 2 Design fees and other soft costs
- 3 Interest expense
- 4 Owner's project administration
- 5 Construction of temporary facilities
- 6 Printing and advertising
- 7 Specialties, loose furnishings, fixtures and equipment beyond what is noted
- 8 Site or existing condition surveys and investigations
- 9 Hazardous materials survey, report and abatement

12 Brainard Street

Hyde Park, Boston, MA

Main Summary

4,013 GSF

<u>DESCRIPTION</u>	<u>NSF</u>	<u>GSF</u>	<u>TOTAL</u>	<u>COST/SF</u>
Lower Building		4,013 GSF	\$519,558	\$129.47
Sitework			\$82,821	
Trade Cost Subtotal			\$602,379	\$150.11
Design Contingency	10.00%	\$602,379	\$60,238	\$15.01
Trade Cost Total			\$662,617	\$165.12
Mark-ups (on Direct Trade Costs Subtotal)				
General Conditions and General Requirements	15.00%	\$662,617	\$99,393	\$24.77
Insurance/Subcontractor Insurance	1.40%	\$762,009	\$10,668	\$2.66
Bonds	1.00%	\$772,678	\$7,727	\$1.93
Permit		\$780,404	Waived	
Fee	3.00%	\$780,404	\$23,412	\$5.83
Estimate Construction Cost Subtotal			\$803,816	\$200.30
Escalation Allowance	7.33%	\$803,816	\$58,920	\$14.68
Assume Construction To Begin Fall 2023				
ECC Total, including Escalation			\$862,736	\$214.99

Work prepared by non Chapter 149 could be reduced by 25% to 30%

12 Brainard Street

Hyde Park, Boston, MA

Detailed Summary

4,013 GSF

<u>ELEMENT</u>	<u>TOTAL</u>	<u>Total/GSF</u>
02 05 00 Selective Demolition	\$11,766	\$2.93
02-EXISTING CONDITIONS TOTAL	\$11,766	\$2.93
03 00 00 Cast-In-Place Concrete	\$3,349	\$0.83
03-CONCRETE TOTAL	\$3,349	\$0.83
04 00 00 Masonry	\$1,200	\$0.30
04-MASONRY TOTAL	\$1,200	\$0.30
05 50 00 Metal Fabrications	\$7,678	\$1.91
05-METALS TOTAL	\$7,678	\$1.91
06 10 00 Rough Carpentry	\$22,338	\$5.57
06 20 00 Finish Carpentry	\$79,117	\$19.72
06-WOOD AND PLASTICS TOTAL	\$101,455	\$25.28
07 10 00 Dampproofing and Waterproofing	\$650	\$0.16
07 20 00 Insulation	\$500	\$0.12
07 40 00 Roofing and Siding Panels	\$3,500	\$0.87
07 80 00 Firestopping & Fireproofing	\$937	\$0.23
07 92 00 Joint Sealants	\$4,013	\$1.00
07-THERMAL AND MOISTURE TOTAL	\$9,600	\$2.39
08 3 1 00 Access Doors & Panels	\$500	\$0.12
08 51 00 Windows	\$3,250	\$0.81
08-DOORS AND WINDOWS TOTAL	\$3,750	\$0.93
09 21 00 Plaster and Gypsum Board Assemblies	\$15,751	\$3.92
09 30 00 Tile	\$4,859	\$1.21
09 64 00 Wood Flooring	\$44,920	\$11.19
09 65 00 Resilient Flooring	\$3,430	\$0.85
09 90 00 Painting	\$34,051	\$8.49
09-FINISHES TOTAL	\$103,011	\$25.67
10 14 00 Signage	NIC	
10 28 00 Toilet and Bath Accessories	\$1,500	\$0.37
10 44 00 Fire Protection Specialties	\$900	\$0.22
10-SPECIALTIES TOTAL	\$2,400	\$0.60

12 Brainard Street

Hyde Park, Boston, MA

Detailed Summary

4,013 GSF

<u>ELEMENT</u>	<u>TOTAL</u>	<u>Total/GSF</u>
11 31 00 Residential Appliances	\$8,800	\$2.19
11-EQUIPMENT TOTAL	\$8,800	\$2.19
12 24 13 Roller Window Shades	NIC	
12 30 00 Casework	\$11,000	\$2.74
12-FURNISHINGS TOTAL	\$11,000	\$2.74
21 00 00 Fire Protection	NIC	
22 00 00 Plumbing	\$113,219	\$28.21
23 00 00 HVAC	\$54,905	\$13.68
21, 22, 23 - MECHANICAL TOTAL	\$168,124	\$41.89
26 00 00 Electrical	\$75,790	\$18.89
26-ELECTRICAL TOTAL	\$75,790	\$18.89
31 00 00 Earthwork	\$11,635	\$2.90
31-EARTHWORK TOTAL	\$11,635	\$2.90
BUILDING DIRECT COST TOTAL	\$519,558	\$129.47

12 Brainard Street

Hyde Park, Boston, MA

Detailed Estimate

4,013 GSF

<u>Element/Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Total</u>
10 <u>02-EXISTING CONDITIONS</u>				
11				
12 02 05 00 Selective Demolition				
13 Remove exterior rear stairs	1	FLT	\$1,500.00	\$1,500
14 Remove interior basement stairs	1	FLT	\$1,800.00	\$1,800
15 Remove torn window screens	2	EA	\$300.00	\$600
16 Remove a portion of the roof for repairs	100	SF	\$6.50	\$650
17 Remove side deck	87	SF	\$16.00	\$1,392
18 Remove rear deck	19	SF	\$16.00	\$304
19 Remove stoop	1	EA	\$500.00	\$500
20 Remove flush storm door	1	EA	\$150.00	\$150
21 Remove toilet accessories	2	RMS	\$300.00	\$600
22 Remove all interiors in kitchen	277	SF	\$10.00	\$2,770
23 Protect existing	1	AL	\$1,500.00	\$1,500
24 02 05 00 Selective Demolition Total				\$11,766
25				
26				
27 <u>03-CONCRETE</u>				
28				
29 03 00 00 Cast-In-Place Concrete				
30 <u>Slab on Grade for Front Deck</u>	142	sf		
31 Concrete; material	4	CY	\$200.00	\$800
32 Concrete; place & finish	142	SF	\$3.50	\$497
33 WWF	156	SF	\$2.00	\$312
34				
35 <u>Miscellaneous</u>				
36 Sawcut existing foundation	20	LF	\$15.00	\$300
37 Remove material	1	LS	\$1,000.00	\$1,000
38 Concrete accessories	1	LS	\$440.00	\$440
39 03 00 00 Cast-In-Place Concrete Total				\$3,349
40				
41				
42 <u>04-MASONRY</u>				
43				
44 04 00 00 Masonry				
45 CMU infill at damaged foundation walls	6	SF	\$200.00	\$1,200
46 04 00 00 Masonry Total				\$1,200
47				
48				
49 <u>05-METALS</u>				
50				
51 05 50 00 Metal Fabrications				



12 Brainard Street

Hyde Park, Boston, MA

Detailed Estimate

4,013 GSF

<u>Element/Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Total</u>
52 Back stairs handrails	20	LF	\$250.00	\$5,000
53 Miscellaneous metals	2,678	GSF	\$1.00	\$2,678
54 05 50 00 Metal Fabrications Total				\$7,678
55				
56				
57 <u>06-WOOD AND PLASTICS</u>				
58				
59 06 10 00 Rough Carpentry				
60 Rehang flush storm door	1	EA	\$200.00	\$200
61 Rehang screen door	1	EA	\$200.00	\$200
62 Repair flush storm door	1	EA	\$200.00	\$200
63 Replace members at front entrance due to drainage issues	1	AL	\$5,000.00	\$5,000
64 Plywood at repaired roof	100	SF	\$6.50	\$650
65 Repair exterior soffit	142	SF	\$15.00	\$2,130
66 Remove storm window due to it being cracked (Kitchen)	1	EA	\$250.00	\$250
67 New side deck	87	SF	\$65.00	\$5,655
68 New rear deck	19	SF	\$65.00	\$1,235
69 Repair flush storm door	1	EA	\$250.00	\$250
70 Rough carpentry / blocking	2,627	SF	\$2.50	\$6,568
71 06 10 00 Rough Carpentry Total				\$22,338
72				
73 06 20 00 Finish Carpentry				
74 Exterior stairs in back	1	FLT	\$15,000.00	\$15,000
75 New tread and riser (exterior)	4	LFR	\$95.00	\$380
76 New basement stairs	1	FLT	\$15,000.00	\$15,000
77 Counters	22	LF	\$385.00	\$8,470
78 Handrails to interior stairs	25	LF	\$350.00	\$8,750
79 Wall mounted handrails	25	LF	\$200.00	\$5,000
80 New newel posts	4	EA	\$1,000.00	\$4,000
81 Allow for wood base	1	LS	\$5,000.00	\$5,000
82 Guardrail at side porch	20	LF	\$300.00	\$6,000
83 Miscellaneous repair trim where necessary	1	LS	\$7,500.00	\$7,500
84 Miscellaneous standing and running trim	2,678	SF	\$1.50	\$4,017
85 06 20 00 Finish Carpentry Total				\$79,117
86				
87				
88 <u>07-THERMAL AND MOISTURE</u>				
89				
90 07 10 00 Dampproofing and Waterproofing				
91 Dampproof foundation/basement walls				

NIC



12 Brainard Street

Hyde Park, Boston, MA

Detailed Estimate

4,013 GSF

<u>Element/Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Total</u>
92 Ice and water shield	100	SF	\$6.50	\$650
93 07 10 00 Dampproofing and Waterproofing Total				\$650
94				
95 07 20 00 Insulation				
96 Batt insulation at attic (due to damage from rain)	1,292	SF	\$1.50 NIC	
97 Insulation to kitchen vestibule	1	LS	\$500.00	\$500
98 07 20 00 Insulation Total				\$500
99				
100 07 40 00 Roofing and Siding Panels				
101 Repair asphalt shingles were there has been some leakage	100	SF	\$35.00	\$3,500
102 07 40 00 Roofing and Siding Panels Total				\$3,500
103				
104 07 80 00 Firestopping & Fireproofing				
105 Fireproof				NIC
106 Through floor penetration firestopping	2,678	SF	\$0.35	\$937
107 07 80 00 Firestopping & Fireproofing Total				\$937
108				
109 07 92 00 Joint Sealants				
110 Caulking and sealants	4,013	SF	\$1.00	\$4,013
111 07 92 00 Joint Sealants Total				\$4,013
112				
113				
114 <u>08-DOORS AND WINDOWS</u>				
115				
116 08 3 1 00 Access Doors & Panels				
117 Access doors	1	LS	\$500.00	\$500
118 08 3 1 00 Access Doors & Panels Total				\$500
119				
120 08 51 00 Windows				
121 Install new storm window (kitchen)	1	EA	\$850.00	\$850
122 Repair glazing at broken windows	1	LS	\$1,000.00	\$1,000
123 Replace torn screens	2	EA	\$700.00	\$1,400
124 08 51 00 Windows Total				\$3,250
125				
126				
127 <u>09-FINISHES</u>				
128				
129 09 21 00 Plaster and Gypsum Board Assemblies				
130 Repair/replace ceiling in kitchen	227	SF	\$18.00	\$4,086
131 Patch ceiling at entry	183	SF	\$13.50	\$2,471



12 Brainard Street

Hyde Park, Boston, MA

Detailed Estimate

4,013 GSF

<u>Element/Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Total</u>
132 Allow for repairs to walls; patch plaster	2,627	SF	\$3.50	\$9,195
133 09 21 00 Plaster and Gypsum Board Assemblies Total				\$15,751
134				
135 09 30 00 Tile				
136 Ceramic tile floors	136	SF	\$24.00	\$3,264
137 Tile base	73	LF	\$15.00	\$1,095
138 Threshold	2	EA	\$250.00	\$500
139 09 30 00 Tile Total				\$4,859
140				
141 09 64 00 Wood Flooring				
142 Refinish dining room floors	216	SF	\$18.00	\$3,888
143 Refinish corridor floors	385	SF	\$18.00	\$6,930
144 Wood flooring to dining room	223	SF	\$28.00	\$6,244
145 Refinish all other room floors	1,466	SF	\$13.00	\$19,058
146 Refinish interior stair treads	88	LFR	\$100.00	\$8,800
147 09 64 00 Wood Flooring Total				\$44,920
148				
149 09 65 00 Resilient Flooring				
150 Kitchen flooring	227	SF	\$8.50	\$1,930
151 Base	1	LS	\$1,500.00	\$1,500
152 09 65 00 Resilient Flooring Total				\$3,430
153				
154 09 90 00 Painting				
155 Painting walls	5,418	SF	\$1.50	\$8,127
156 Paint the ceilings on the 1st floor	1,335	SF	\$2.00	\$2,670
157 Paint exterior soffit	142	SF	\$3.00	\$426
158 Paint wood panel door	1	EA	\$350.00	\$350
159 Paint screen door	1	EA	\$300.00	\$300
160 Paint flush storm door	1	EA	\$200.00	\$200
161 Spot prime and paint existing exterior trim	1	AL	\$7,500.00	\$7,500
162 Prepare and paint interior trim	1	AL	\$8,000.00	\$8,000
163 Prepare, prime and paint doors and frames	19	EA	\$200.00	\$3,800
164 Miscellaneous painting	2,678	SF	\$1.00	\$2,678
165 09 90 00 Painting Total				\$34,051
166				
167				
168 <u>10-SPECIALTIES</u>				
169				
170 10 14 00 Signage				
171 Signage				

NIC



12 Brainard Street

Hyde Park, Boston, MA

Detailed Estimate

4,013 GSF

<u>Element/Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Total</u>
172 10 14 00 Signage Total				NIC
173				
174 10 28 00 Toilet and Bath Accessories				
175 Singler Toilet room accessories	2	RMS	\$750.00	\$1,500
176 10 28 00 Toilet and Bath Accessories Total				\$1,500
177				
178 10 44 00 Fire Protection Specialties				
179 Fire extinguisher cabinets	2	EA	\$450.00	\$900
180 10 44 00 Fire Protection Specialties Total				\$900
181				
182				
183 <u>11-EQUIPMENT</u>				
184				
185 11 31 00 Residential Appliances				
186 Refrigerator	1	EA	\$2,500.00	\$2,500
187 Dishwasher at Break room	1	EA	\$850.00	\$850
188 Oven/cooktop	1	EA	\$3,800.00	\$3,800
189 Microwave	1	EA	\$650.00	\$650
190 Washer/Dryer				NIC
191 Install	4	EA	\$250.00	\$1,000
192 11 31 00 Residential Appliances Total				\$8,800
193				
194				
195 <u>12-FURNISHINGS</u>				
196				
197 12 24 13 Roller Window Shades				
198 Roller shades				NIC
199 Window Treatment				NIC
200 12 24 13 Roller Window ShadesTotal				NIC
201				
202 12 30 00 Casework				
203 Upper cabinets	22	LF	\$250.00	\$5,500
204 Base cabinets	22	LF	\$250.00	\$5,500
205 12 30 00 Casework Total				\$11,000
206				
207				
208 <u>21, 22, 23 - MECHANICAL</u>				
209				
210 21 00 00 Fire Protection				
211 No work in this section				NIC



12 Brainard Street

Hyde Park, Boston, MA

Detailed Estimate

4,013 GSF

<u>Element/Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Total</u>
212 21 00 00 Fire ProtectionTotal				NIC
213				
214 22 00 00 Plumbing				
215 Waste and Vent				
216 Waste and Vent Piping w/ Ftgs, Hgrs	6	FIX	\$2,545.00	\$15,270
217 Floor Drains w/ Piping	2	EA	\$1,145.00	\$2,290
218				
219 Domestic Water Piping				
220 Domestic Water Piping	6	FIX	\$2,975.00	\$17,850
221 Nonfreeze Wall Hydrants	1	ALLOW	\$1,500.00	\$1,500
222				
223 Natural Gas Piping				
224 Natural Gas Piping to Water Heaters	1	ALLOW	\$26,125.00	\$26,125
225				
226 Plumbing Fixtures and Equipment				
227 Hot Water Expansion Tank	1	EA	\$1,125.00	\$1,125
228 House Antiscald Valve	1	EA	\$8,400.00	\$8,400
229 Kitchen Sinks	1	EA	\$884.70	\$885
230 Wall Hung Water Closet w/ Carrier	2	EA	\$1,473.26	\$2,947
231 Countertop Lavatories	2	EA	\$622.08	\$1,244
232 Drinking Fountain w/ Bottle Filler	1	EA	\$2,975.00	\$2,975
233 Shower	1	EA	\$2,923.00	\$2,923
234 Water Heater	1	EA	\$18,000.00	\$18,000
235 Hot Water Recirculation Pump	1	EA	\$685.00	\$685
236				
237 Miscellaneous				
238 Coordination Drawings, As Builts, Submittals, O&M's	1	LS	\$5,000.00	\$5,000
239 Rigging, Hoisting, and Scaffolding	1	LS	\$1,500.00	\$1,500
240 Valve Tags, Pipe Identification	1	LS	\$2,000.00	\$2,000
241 Flushing, Sanitization	1	LS	\$2,500.00	\$2,500
242 22 00 00 Plumbing Total				\$113,219
243				
244 23 00 00 HVAC				
245 Replace thermostats	1	LS	\$1,500.00	\$1,500
246				
247 Miscellaneous repairs to heat	2,627	SF	\$15.00	\$39,405
248				
249 AC				NIC
250				
251 Miscellaneous				



12 Brainard Street

Hyde Park, Boston, MA

Detailed Estimate

4,013 GSF

<u>Element/Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Total</u>
252 Testing, Adjusting and Balancing	1	LS	\$5,000.00	\$5,000
253 Rigging, Hoisting, and Scaffolding	1	LS	\$3,500.00	\$3,500
254 Valve Tags, Pipe Identification	1	LS	\$2,500.00	\$2,500
255 Coordination Drawings, As Builts, Submittals, As Builts	1	LS	\$3,000.00	\$3,000
256 23 00 00 HVAC Total				\$54,905
257				
258				
259 <u>26-ELECTRICAL</u>				
260				
261 26 00 00 Electrical				
262				
263 1. Lighting Fixtures				
264 Light Fixtures	2,627	SF	\$6.00	\$15,762
265				
266 2. Branch Circuitry				
267 Branch Circuitry	2,627	SF	\$3.50	\$9,195
268 Lighting Control Devices	2,627	SF	\$1.25	\$3,284
269 Power Wiring Devices	2,627	SF	\$1.50	\$3,941
270				
271 3. Power Circuitry				
272 Circuitry	2,627	SF	\$3.00	\$7,881
273				
274 Motor Feeders	2,627	SF	\$4.00	\$10,508
275				
276 4. Power Equipment				
277 Power equipment	2,627	SF	\$3.00	\$7,881
278				
279 Motor Disconnects	2,627	SF	\$2.25	\$5,911
280				
281 5. Special Systems				
282 Fire Alarm System				NIC
283 Telecommunications System, wiring				NIC
284 Security Access Control System				NIC
285 CCTV Security System				NIC
286				
287 Temp Power and Lighting	2,627	SF	\$1.00	\$2,627
288				
289 Temp Power	1	LS	\$3,800.00	\$3,800
290 Misc Site Demo	1	LS	\$5,000.00	\$5,000
291 26 00 00 Electrical Total				\$75,790



12 Brainard Street

Hyde Park, Boston, MA

Detailed Estimate

4,013 GSF

<u>Element/Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Total</u>
292				
293				
294 <u>31-EARTHWORK</u>				
295				
296 31 00 00 Earthwork				
297 Rock removal, using back hoe jack hammer				NIC
298 Rough and fine grade for new slab	142	SF	\$1.75	\$249
299 Bulk excavation and stockpile	74	CY	\$18.00	\$1,332
300 Excavation support	360	SF	\$25.00	\$9,000
301 Backfill with existing soil	70	CY	\$15.00	\$1,055
302 31 00 00 Earthwork Total				\$11,635
303				
304				



12 Brainard Street

Hyde Park, Boston, MA

Sitework Summary

<u>ELEMENT</u>	<u>TOTAL</u>
Sitework	\$82,821
Sitework Direct Sub-Total	\$82,821

12 Brainard Street

Hyde Park, Boston, MA

Sitework Detail

<u>Description/Element</u>	<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Total</u>
9 SITEWORK				
10				
11 Site clearing				NIC
12 Site demolition and relocations	1	AL	\$1,500.00	\$1,500
13 Remove brick paths	475	SF	\$3.00	\$1,425
14 Remove parking area	2,665	SF	\$3.00	\$7,995
15 Site protection	1	AL	\$3,000.00	\$3,000
16 Rough grading	770	SY	\$1.50	\$1,155
17 Site cut and fill	513	CY	\$12.00	\$6,156
18 Strip and stockpile topsoil	128	CY	\$9.50	\$1,216
19 Wash down area	1,500	SF	\$3.00	\$4,500
20 Construction fence	444	LF	\$16.00	\$7,104
21 Construction gates	1	PR	\$3,000.00	\$3,000
22 Temp signs	1	LS	\$1,000.00	\$1,000
23 Allow for erosion control	444	LF	\$9.50	\$4,218
24 Fine grading	3,140	SF	\$1.50	\$4,710
25 Paving	2,665	SF	\$3.30	\$8,795
26 Parking spaces	2	EA	\$35.00	\$70
27 HC parking spaces	2	EA	\$250.00	\$500
28 Miscellaneous marking	1	LS	\$500.00	\$500
29 Curbing				NIC
30 Standard concrete; allow	475	SF	\$10.00	\$4,750
31 Gravel base	134	CY	\$35.00	\$4,690
32 Curb cuts	2	EA	\$450.00	\$900
33 Site and street furnishes	1	LS	\$5,000.00	\$5,000
34 Lawns	3,791	SF	\$0.33	\$1,251
35 Spread stockpiled topsoil	128	CY	\$12.00	\$1,536
36 Planting	1	LS	\$5,000.00	\$5,000
37				
38 33 10 00 Water Distribution				
39 No work in this section				
40				
41 33 30 00 Sanitary Sewerage				
42 No work in this section				
43				
44 33 40 00 Storm Drainage				
45 No work in this section				
46				
47 33 50 00 Gas Service				
48 No work in this section				
49				
50 33 70 00 Electrical Utilities				
51 1. Site Lighting				



12 Brainard Street

Hyde Park, Boston, MA

Sitework Detail

<u>Description/Element</u>	<u>Quantity</u>	<u>Unit</u>	<u>Rate</u>	<u>Total</u>
9 SITEWORK				
52 Wall mounted lighting	1	ALLOW	\$2,000.00	\$2,000
53				
54 Telecommunications:				
55 Telecomm Utility Riser				NIC
56				
57 Misc Site Demo	1	LS	\$500.00	\$500
58 Misc Eqpt Rentals	1	LS	\$350.00	\$350
59 SITEWORK TOTAL				<u>\$82,821</u>
60				
61				
62				
63				
64				
65				
66				
67				
68				
69				
70				
71				





Appendix E: Code Analysis

Residential Use

AKF



DCR Stonybrook – Single Family Residential

Code Summary Report

12 Brainard Street

Boston, MA 02136

AKF Project No.: 220624

September 23, 2022

Prepared By: Mariah Seaboldt, PE

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1. Introduction

HKT Architects has retained AKF Group LLC to prepare this existing building narrative code report for the proposed renovations of the building located at 12 Brainard Street in Boston, MA. The existing building is located on the Department of Conservation and Recreation's (DCR) Stonybrook Reservation. The building is two stories above grade with a partially below-grade basement and unfinished attic.

It is our understanding that the building was originally constructed as a single-family residence, but has most recently been used as office space. The existing building has been vacant for some time and is in general disrepair. DCR intends to renovate the building for use as either a single-family residence or offices. This report provides an overview of the applicable code requirements for the architectural and fire/life safety features applicable to a single-family residence use.

2. Quick Facts

Work Area:	130 SF
Building Footprint:	1,300 SF
Building Area:	2,500 SF above grade, 1,100 SF below grade
Number of Stories:	2 stories above grade, 1 partially below-grade basement, 1 unfinished attic
Sprinkler Status:	Not sprinklered
Occupancy Classification:	Single-Family Dwelling

3. Applicable Codes & Standards

- Massachusetts State Residential Code (780 CMR 51.00), Ninth Edition, Residential Volume (2015 International Residential Code with amendments)
- Massachusetts State Sanitary Code (105 CMR 410.00)
- MA Stretch Energy Code (International Energy Conservation Code, 2018 edition with amendments) ¹
- Massachusetts Board of State Examiners of Plumbers and Gas Fitters Regulations (248 CMR)
- Massachusetts Comprehensive Fire Safety Code (527 CMR 1.00 – 2015 NFPA 1: Fire Code with amendments)
- Massachusetts Electrical Code (527 CMR 12.00 – 2020 NFPA 70: National Electrical Code with amendments)

Although the 9th edition of 780 CMR is currently applicable, the Board of Building Regulations and Standards (BBRS) is currently reviewing the 10th edition of 780 CMR. The 10th edition will adopt the 2021 International Residential Code (IRC). A specific adoption date is not yet known; however we understand that the 10th edition is expected to become effective in early 2023 with a six-month concurrency period.

4. Project Scope & Use

The project involves renovations and limited reconfiguration of the existing building located at 12 Brainard Street in Boston, MA. The building was originally constructed as a single-family residence, but has also been used as office space. This report is based on the use of the building as a single-family residence.

5. Existing Building Requirements

Massachusetts adopts and amends Appendix J of the IRC, which provides requirements for existing single-family residences undergoing repairs, renovations, alterations, and reconstructions. Existing elements that do not comply with 780 CMR 51.00 are presumed to have met the regulations in effect at the time of construction and are considered existing nonconforming. Unless stated otherwise, 780 CMR 51.00 Appendix J does not require the upgrading or replacement of any existing nonconforming feature, provided such feature is in serviceable condition. Elements which are considered by the building official to be dangerous, unsafe, damaged, or significantly deteriorated must be remediated in accordance with 780 CMR 51.00 (780 CMR 51.00 AJ101.1).

¹ Although the City of Boston adopts the Stretch Energy Code, existing residential buildings are exempt from the provisions. Alterations must comply with the 780 CMR 51.00.

New systems or portions thereof must comply with 780 CMR 51.00 for new construction to the fullest extent possible. However, individual components of an existing system may be repaired or replaced without requiring full compliance with 780 CMR 51.00, unless specifically required by Appendix J (780 CMR 51.00 AJ101.1).

The various classifications of work for existing single-family residences are defined as follows (780 CMR 51.00 AJ201.1):

1. **Repairs** include the patching, restoration, or minor replacement of materials, elements, components, equipment, or fixtures for the purposes of maintaining those materials, elements, components, equipment, or fixtures in good or sound condition.
2. **Renovations** include the change, strengthening, or addition of load-bearing elements; or the refinishing, replacement, bracing strengthening, upgrading, or extensive repair of existing materials, elements, components, equipment, or fixtures. Renovations do not include reconfiguration of space. Interior or exterior painting are not considered renovations.
3. **Alterations** include the reconfiguration of any space; the addition or elimination of any door or window; the reconfiguration or extension of any system; or the installation of any additional equipment.
4. **Reconstructions** include the reconfiguration of space that affects an exit, a renovation or alteration where the work area is not permitted to be occupied because existing means of egress and fire protection systems are not in place or continuously maintained; or the work area exceeds 50% of the area of the dwelling unit (IRC AJ501.3).

Based on the proposed drawings provided to AKF there is limited reconfiguration of space on the first floor of the building. Since the area of reconfigured space is less than 50% of the dwelling unit, the proposed work qualifies as an alteration. In addition, it is AKF's understanding that the work will include refinishing and replacement of existing fixtures and therefore will also qualify as a renovation. AKF assumes the existing means of egress will be maintained such that the work does not qualify as a reconstruction.

6. Building Elements & Materials

In general, newly constructed elements, components, and systems must comply with the requirements applicable to new construction (780 CMR 51.00 AJ501.1). In addition, the proposed work cannot create or extend an existing nonconforming condition (780 CMR 51.00 AJ501.2).

6.1 Existing Construction Type

The existing building is primarily wood construction consisting of wood structural elements, wood doors, wood stairs, and wood accents and trim. Repairs are permitted using like materials or materials permitted by the code for new construction, except that hazardous materials such as asbestos and lead-based paint are not permitted (780 CMR 51.00 AJ301.1).

6.2 Exterior Walls

The proposed project maintains the location of the existing exterior walls. Where existing exterior walls are altered, the required fire-resistance rating must comply with 780 CMR 51.00 R302.1. The exterior wall requirements applicable to non-sprinklered buildings are summarized below for reference.

780 CMR 51.00 Table R302.1(1) – Non-sprinklered Sprinklered Buildings

Exterior Wall Element		Minimum Fire-Resistance Rating	Minimum Fire Separation Distance
Walls	Fire-resistance rated	1 hour-tested in accordance with ASTM E 119 or UL 263 with exposure from both side	< 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Projections	Not allowed	N/A	< 2 feet
	Fire-resistance rated	1 hour on the underside	≥ 2 feet to 5 feet
	Not fire-resistance rated	0 hours	≥ 5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section R302.4	< 3 feet
		None required	3 feet

6.3 Floor Assemblies

Where altered, floor assemblies must be provided with one of the following on the underside of the floor fanning member (780 CMR 51.00 R302.13).

1. ½-inch gypsum wall-board membrane;
2. 5/8-inch wood structural panel membrane; OR
3. Equivalent protection to the above.

6.4 Stair Protection

Where the alterations affect enclosed accessible spaces under stairs, such spaces must have walls, under-stair surfaces, and soffits protected on the enclosed side with minimum ½-inch gypsum board (780 CMR 51.00 R302.7).

6.5 Interior Finishes

Wood paneling and textile wall covers used as interior finishes must comply with the flame spread requirements applicable to new construction, as follows (780 CMR 51.00 AJ401.3).

New interior wall and ceiling finishes must comply with the requirements for Class C materials, as follows (780 CMR 51.00 R302.9):

1. Maximum flame spread index (FSI): 200
2. Maximum smoke development index (SDI): 450

The FSI and SDI must be determined in accordance with ASTM E84 or UL 723. However, FSI requirements for finishes do not apply to:

1. Trim defined as picture molds, chair rails, baseboards and handrails;
2. Doors and windows or their frames; OR
3. Materials that are less than 1/28-inch in thickness cemented to the surface of walls and ceilings if such materials exhibit an FSI not greater than that of paper of such thickness cemented to a noncombustible backing.

As an alternative to the above requirements, finishes may be tested in accordance with NFPA 286 and meet the criteria specified in 780 CMR 51.00 R302.9.1.

6.6 Insulation Protection

New insulation materials, including facings such as vapor retarders and vapor-permeable membranes installed within floor-ceiling assemblies, roof-ceiling assemblies, wall assemblies, crawl spaces, and attics must meet the requirements for Class A materials when tested in accordance with ASTM E84 or UL 723. Class A materials must meet the following indices (780 CMR 51.00 R302.10.1):

1. Maximum FSI: 25
2. Maximum SDI: 450

However, where insulation is installed in concealed spaces, the FSI and SDI above don't apply to facings where the facing is installed in substantial contact with the unexposed surface of the ceiling, floor, or wall finish.

Where loose-fill insulation cannot be mounted for testing per ASTM E84 or UL 723, it must comply with the above indices when tested per CAN/ULCS 102.2 (780 CMR 51.00 R302.10.2). However, the FSI requirements above don't apply to cellulose fiber loose-fill insulation that is not spray-applied and that complies with CPSC 16 CFR, Parts 1209 and 1404. The SDI of such insulation must still be a maximum of 450 when tested in accordance with CAN/ULCS 102.2 (780 CMR 51.00 R302.10.1(2) and R302.10.3). Foam plastic insulation must comply with the requirements of 780 CMR 51.00 R316.

Where exposed insulation materials are installed on attic floors, the materials must have a critical radiant flux of at least 0.12 W/cm² when tested in accordance with ASTM E970 (780 CMR 51.00 R302.10.5).

Combustible insulation must be separated from recessed luminaries, fan motors, knob and tube wiring, and other heat-producing devices by at least 3 inches (780 CMR 51.00 R302.14).

6.7 Fireblocking & Draftstopping

Where concealed spaces are exposed as part of the alterations, fireblocking must be provided in accordance with the following (780 CMR 51.00 R302.11). Fireblocking materials must comply with 780 CMR 51.00 R302.11.1.

1. In concealed spaces of stud walls and partitions, including furred spaces and parallel rows of studs or staggered studs, as follows:

- a. Vertically at the ceiling and floor levels.
 - b. Horizontally at intervals not exceeding 10 feet.
2. At the interconnection between concealed vertical and horizontal spaces such as those occurring at soffits, drop ceilings, and cove ceilings.
3. In concealed spaces between stair stringers at the top and bottom of the run.
4. At openings around vents, pipes, ducts, cables, and wires at ceiling and floor level, with an approved material to resist the free passage of flame and products of combustion.
5. At chimneys and fireplaces as required by 780 CMR 51.00 R1003.19.

In addition, draftstopping must be provided in accordance with 780 CMR 51.00 R302.12 where the alterations affect existing concealed spaces.

7. Fire Protection

7.1 Sprinklers

Since the building is less than 14,400 SF, an automatic sprinkler system is not required. However, if a system is installed, it must be designed in accordance NFPA 13D (780 CMR 51.00 R313.2). If a sprinkler system is not installed in the building, the building must comply with the requirements applicable to a non-sprinklered building.

7.2 Smoke Detection

Massachusetts General Law (MGL) c. 148 s. 26E requires all single-family dwellings to be provided with approved smoke detectors. Smoke detectors must be installed on each level of habitation and on the basement level. Detectors must be either approved battery powered smoke detectors or approved primary power smoke detectors. Detectors must be installed in the following locations:

1. On the ceiling of each stairway leading to the floor above;
2. Near the base of, but not within each stairway; AND
3. Outside each separate sleeping area.

Smoke detectors must be installed in accordance with 527 CMR 1.00 Section 13.7. Smoke detectors must be the photoelectric type listed in accordance with UL 217 and UL 2034 (780 CMR 51.00 R314.1.1). Combination smoke/carbon monoxide detectors must be listed in accordance with UL 268 and UL 2075 (780 CMR 51.00 R314.7.4).

7.3 Carbon Monoxide Detection

Carbon monoxide detection is required in accordance with MGL c. 148 s. 26F $\frac{1}{2}$. Carbon monoxide detectors must be installed in accordance with 527 CMR 1.00 Section 13.7.6. Carbon monoxide detectors must be installed in the following locations:

1. On every habitable level of a dwelling unit with or without a sleeping area;

2. In habitable portions of basements, cellars, and attics; AND
3. Within the immediate vicinity of a sleeping area, but within 10 feet measured in any direction from the door to the sleeping area (bedroom).

As an alternative to the locations above, carbon monoxide detection may be installed in accordance with one of the alternative technical options identified in 527 CMR 1.00 Section 13.7.7. Carbon monoxide detectors must be listed in accordance with UL 2034 and 2075. Combination carbon monoxide/smoke detectors must be listed in accordance with UL 2034 and UL 217 (780 CMR 51.00 R315.1.1). Where combination carbon monoxide/smoke detectors are used, the smoke alarm must take precedence (780 CMR 51.00 R315.4).

8. Means of Egress

Per 780 CMR 51.00 R102.6.4, the building official has the authority to cite the following conditions as a violation and order abatement within a time frame deemed necessary by the building official.

- a. Inadequate number of means of egress
- b. Egress components with insufficient width or so arranged to be inadequate, including signage and lighting
- c. Inadequate lighting and ventilation

Note that where full compliance is not practical, the building official may accept compliance alternatives, engineering, or other evaluations that adequately address the deficiency.

8.1 Emergency Escape and Rescue Openings

In existing single-family dwellings, emergency escape and rescue openings must have a minimum net clear opening area of 3.3 SF. The net clear opening must be 20 inches by 24 inches in either direction. However, where windows in sleeping rooms do not meet these requirements, such windows may be replaced provided that the replacement windows do not significantly reduce the existing opening size (780 CMR 51.00 AJ401.2.1).

Newly created emergency escape and rescue openings must have a net clear opening of at least 5.7 SF, except grade and below grade floors are permitted to have a net clear opening of 5 SF (780 CMR 51.00 R310.2.1).

Replacement windows are exempt from the dimensional requirements above, where the replacement window meets the following requirements (780 CMR 51.00 R310.2.5):

1. The replacement window is the manufacturer's largest standard size window that will fit in the existing frame or rough opening.
2. The replacement window is of the same operating style as the existing window or a style that provides for equal or greater window opening area than the existing window.
3. The replacement window is not part of a change of occupancy.

8.2 Number of Exits and Continuity

Dwelling units must be provided with a primary and secondary means of egress complying with 780 CMR 51.00 R311.1. The required egress doors must open directly into a public way or to a yard or court that opens to a public way (780 CMR 51.00 R311.1). The primary and secondary egress doors must be remote as possible from each other (780 CMR 51.00 R311.2). Egress from habitable levels not provided with an egress door must be via a stairway or ramp in accordance with 780 CMR 51.00 R311.7 or R311.8, respectively (780 CMR 51.00 R311.4).

8.3 Doors

Minor reductions in the clear opening dimensions of replacement doors and windows that result from the use of different materials are permitted (780 CMR 51.00 AJ401.2). Otherwise new or altered doors must comply with the following requirements (780 CMR R311.2).

Primary Egress Door

1. Door type: Side-hinged
2. Minimum clear width: 32 inches
3. Minimum clear height: 78 inches

Secondary Egress Door

1. Door type: Side-hinged or sliding
2. Minimum clear width: 28 inches
3. Minimum clear height: 78 inches (side-hinged)

Interior Doors

1. Door type: No specific type required
2. Minimum clear width:
 - a. Bathroom doors (new): 28 inches
 - b. Bathroom doors (existing): 24 inches
 - c. Other doors: 30 inches
3. Minimum clear height: 80 inches

8.4 Hallways

New or altered hallways must have a minimum width of 3 feet (780 CMR 51.00 R311.6).

8.5 Stairs

Where existing basement stairs are altered or modified, the existing headroom and landing depth cannot be reduced. Basement stairs that are not otherwise being altered are permitted to maintain their existing headroom height, landing dimensions, and stair width (780 CMR 51.00 AJ501.8).

New or altered stairs must comply with 780 CMR 51.00 R311.7, the requirements of which are summarized below.

Element		Required Dimension
Minimum Clear Width	Above handrail, below headroom	36 inches
	At or below handrail – handrail on one side	31 ½ inches
	At or below handrail – handrail on both sides	27 inches
Maximum Handrail Projection	On either side of stairway	4 ½ inches
Minimum Headroom		6 feet 8 inches
Maximum Vertical Rise	Between floor levels or landings	147 inches
Maximum Riser Height		8 ¼ inches
Minimum Tread Depth		9 inches
Nosing Projection	Solid risers	¾-inch minimum to 1 ¼ inch maximum ^A
Stair Landings ^B	Width (perpendicular to travel)	At least as wide as the stair
	Depth (direction of travel)	36 inches

^A Nosing projections aren't required on treads with a depth of at least 11 inches.

^B Stair landings are not required at the top of interior stairs where the door does not swing over the stairs.

Open risers on stairs are permitted as long as openings located more than 30 inches vertically above the floor or grade below do not permit passage of a 4-inch-diameter sphere (780 CMR 51.00 R311.7.5.1).

Winder Treads

The stairs to the existing basement include winder treads. Where these stairs are altered, they must comply with the following requirements.

Winder treads must have a minimum depth equal to the tread depth of the straight run portion of the stairs, measured at a point 12 inches from the side where the treads are narrower. Winder treads must have a minimum depth of 3 inches at any point within the clear width of the stair (780 CMR 51.00 R311.7.5.2.1). Winder treads within the same flight of stairs must have uniform tread depths in accordance with 780 CMR R311.7.5.2.1.

The walkline on winder treads must be concentric to the curved direction of travel and located 12 inches from the side where the winders are narrower. The 12-inch dimension must be measured from the widest point of the clear stair width at the walking surface. If winders are adjacent within the flight, the widest

clear stair width of the adjacent winder must be used for the measurement of this 12-inch dimension (780 CMR 51.00 R311.7.4).

8.6 Stair Lighting

Interior stairways must be provided with an artificial light source that illuminates the landings and treads to at least 1 foot-candle, measured at the center of treads and landings. A switch must be provided at each floor level to control the light source where the stairway has six or more risers (780 CMR 51.00 R303.7).

Exterior stairs must be provided with an artificial light source located at the top landing of the stairway. Exterior stairs providing access to a basement from the outdoor grade level must be provided with an artificial light source at the bottom landing (780 CMR 51.00 R303.8).

8.7 Handrails

Handrails must be provided on at least one side of each continuous run of treads or flight with four or more risers (780 CMR 51.00 R311.7.8). Handrails must comply with the following.

Height

Handrails must be 34 inches minimum and 48 inches maximum above tread nosings or finished surface of ramp slopes (780 CMR 51.00 R311.7.8.1).

Continuity

Handrails must be continuous for the full length of the flight, from a point directly above the top riser to a point directly above the lowest riser. However, handrails are permitted to be interrupted by a newel post at the turn. Handrail ends must return or terminate in newel posts or safety terminals. A clearance of 1 ½ inches must be provided between the handrail and adjacent walls (780 CMR 51.00 R311.7.8.2).

Grip

Handrails must be Type I or Type II in accordance with 780 CMR 51.00 R311.7.8.3, or provide equivalent graspability.

8.8 Guards

Guards must be provided along open-sided walking surfaces, including stairs, ramps, and landings that are more than 30 inches vertically above the floor or grade below. This requirement applies to any point located within 36 inches horizontally of the open side (780 CMR 51.00 R312.1.1).

Guards must be at least 36 inches high. However, guards on the open sides of stairs are permitted to be a minimum of 34 inches high. Where the stair handrails serve as the required guard, they must comply with the height requirements for handrails (780 CMR 51.00 R312.1.2). Openings in guards must not allow passage of a 4-inch-diameter sphere, except for the following (780 CMR 51.00 R312.1.3):

1. The triangular open side of a stair, formed by the riser, tread, and bottom rail of a guard must not allow passage of a 6-inch diameter sphere.

2. Openings in guards on the open sides of stairs must not allow passage of a 4 3/8-inch diameter sphere.

Window Fall Protection

Where the top of a sill of an operable window is less than 24 inches above the finished floor and more than 72 inches above the finished grade below, one of the following fall protection methods must be provided (780 CMR 51.00 R312.2):

1. Window openings that won't allow passage of a 4-inch-diameter sphere when the window is in the largest opened position.
2. Fall prevention devices complying with ASTM F2090.
3. Window opening control devices complying with 780 CMR 51.00 R312.2.2.

9. Interior Environment

9.1 Lighting, Ventilation, & Heating

Reconfigured spaces intended for occupancy and spaces converted to habitable or occupiable space must be provided with ventilation in accordance with 780 CMR 51.00 R303 (780 CMR 51.00 AJ501.6). However, operable windows may be added without requiring compliance with the light and ventilation requirements of 780 CMR 51.00 R303 (780 CMR 51.00 AJ501.1 Exception 1).

Habitable rooms must have an aggregate glazed area of not less than 8% of the floor area of the room (780 CMR 51.00 R303.1). Mechanical ventilation is required where the infiltration rate of a dwelling unit is 5 air changes per hour or less where tested with a blower door at a pressure of 0.2 inches w.c. (780 CMR 51.00 R303.4). Where natural ventilation is permitted, the openable area to the outdoors in habitable rooms must be at least 4% of the floor area being ventilated (780 CMR 51.00 R303.1).

Bathrooms must be provided with mechanical ventilation per 780 CMR 51.00 M1507 (780 CMR 51.00 R303.3).

9.2 Room Size

Where the alterations affect the dimensions of habitable rooms, such spaces must comply the following requirements (780 CMR 51.00 R304):

1. Minimum room area: 70 SF
2. Minimum horizontal dimension: 7 feet

Portions of a room with a sloping ceiling measuring less than 5 feet, or a furred ceiling measuring less than 7 feet, cannot contribute to the minimum required habitable area of the room (780 CMR 51.00 R304.3).

9.3 Ceiling Height

Habitable spaces created in existing basements must have minimum ceiling heights of 6 feet 8 inches. However, obstructions are permitted to reduce the ceiling height to 6 feet 4 inches minimum. Existing finished ceiling heights in non-habitable spaces in basements must not be reduced (780 CMR 51.00 AJ501.7).

Habitable spaces, hallways, and portions of basements containing such spaces must have a minimum ceiling height of 7 feet. Bathrooms, toilet rooms, and laundry rooms, must have a minimum ceiling height of 6 feet 8 inches (780 CMR 51.00 R305.1).

Portions of basements that do not contain habitable space must have a minimum ceiling height of 6 feet 8 inches. However, beams, girders, ducts, or other obstructions may project within 6 feet 4 inches of the finished floor (780 CMR 51.00 R305.1.1).

9.4 Attic Access

Where access to the attic is altered or reconfigured, such access must comply with 780 CMR 51.00 R807.1. In addition, where the attic is used to house mechanical equipment, access to such equipment must be provided in accordance with 780 CMR 51.00 M1305.1.3.

10. Accessibility

Since the building is a detached single-family dwelling, it is exempt from accessibility requirements (780 CMR 51.00 R320.1).

11. Plumbing Fixtures

Alterations to the plumbing system must comply with the requirements of 248 CMR 10.00. Single-family dwellings must be provided with one bathroom group (toilet, bath or shower, and lavatory) and one kitchen sink (248 CMR 10.10 Table 1).

12. Structural

The minimum design loads for the structure are the loads applicable at the time the building was constructed, provided that a dangerous condition is not created. Structural elements that are uncovered during the course of the alteration and that are found to be unsound or dangerous must comply with the requirements applicable to new construction. Alterations that may decrease the structural performance of an existing building must be evaluated by a structural engineer (780 CMR 51.00 AJ501.4).

13. Energy Conservation

Alterations to existing buildings must comply with 780 CMR 51.00 N1107 and N1109, which generally requires alterations to comply with the code for new construction. However, unaltered portions of the existing building or building supply system are not required to comply with new construction requirements (780 CMR 51.00 N1107.1.1 and N1109.1). Alterations must not cause an existing building to be less conforming to the applicable energy conservation requirements (780 CMR 51.00 N1109.1).

14. Findings and Required Upgrades

The following section summarizes AKF's findings and required upgrades based on AKF's site visit on August 31, 2022 and the proposed scope of work.

1. Stair Handrails

- a. **Code Sections:** 780 CMR 51.00 R311.7.8
- a. **Threshold for Compliance:** Required where altered or deemed unsafe

Handrails must be provided on at least one side of each stair. The rear stair, the stairs at the exterior basement door, and the top of the basement stair are not provided with handrails on either side (Figure 1). The lack of a handrails can be considered unsafe by the building official. Therefore, a handrail should be provided for these stairs as part of the proposed renovations.

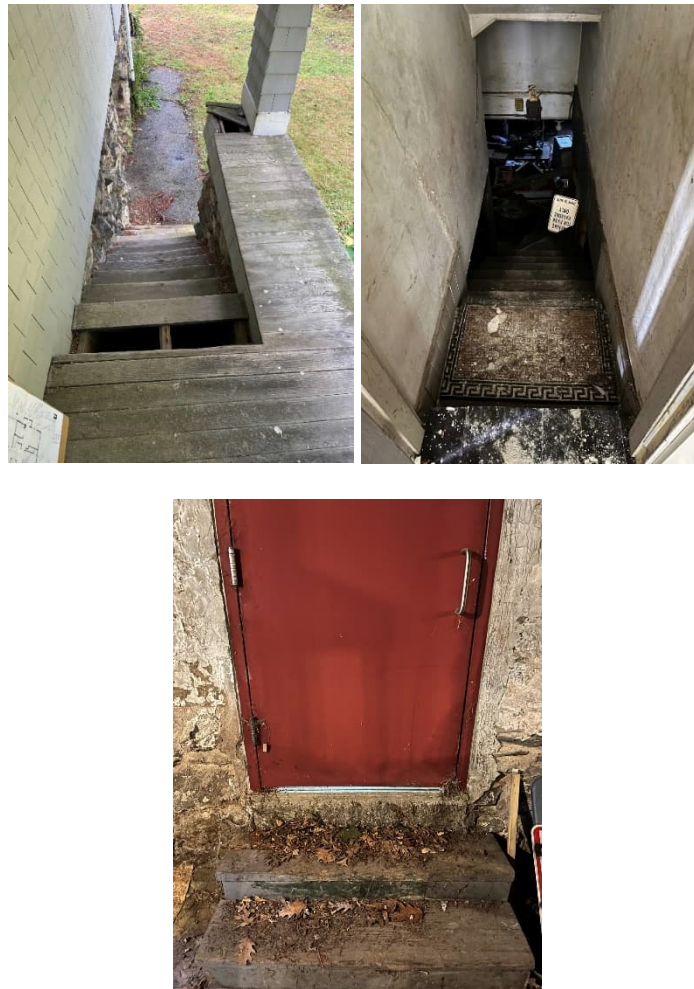


Figure 1: Lack of handrails at rear and basement stairs

2. Guards and Guard Height

a. **Code Sections:** 780 CMR 51.00 R312.1

b. **Threshold for Compliance:** Required where altered or deemed unsafe

Guards are required along open-sided walking surfaces, including stairs and balconies, where the walking surface is located more than 30 inches above the floor or grade below. As shown in Figure 2, guards are not provided at the basement stair, the rear stair, nor the rear porch. The lack of guards can be considered an unsafe condition. Therefore, guards should be provided in these locations as part of the proposed alterations.

In addition, the guard on the second floor is only 33¾" inches high and the guard in the attic is only 34" high (Figure 3). The openings in the attic guard are also greater than 4" (approximately 14½"). New guards must be at least 36" above the floor and must not allow passage of a 4" sphere. The guards on the second floor and attic must be raised, and the openings in the attic guard must be reduced if they're altered or if the existing guards are deemed unsafe by the building official.



Figure 2: Lack of guards at basement, rear stair, and exterior porch



Figure 3: Low guard on Level 2 and in the Attic

3. Stair Construction

- a. **Code Sections:** 780 CMR R102.6.4 & R102.8
- b. **Threshold for Compliance:** Required, maintenance and life safety issue

The rear stair is in disrepair due to missing treads and decking. Existing buildings, including means of egress must be maintained in safe, working condition. As is, the existing stairs are not safe for use. The missing treads and decking must be replaced.



Figure 4: Missing treads and decking at rear stair

4. Floor Assemblies

- a. **Code Sections:** 780 CMR 51.00 R102.8 & R302.13
- b. **Threshold for Compliance:** Required, maintenance and life safety issue

There are various floor/ceiling assemblies that are in disrepair (Figure 5). Floor assemblies must be provided with a membrane consisting of ½-inch gypsum wallboard, 5/8-inch wood structural panel, or equivalent membrane. The existing construction must be maintained in safe, working condition. The existing floor/ceiling membranes must be repaired and protected in accordance with these requirements.



Figure 5: Floor/ceiling assemblies in disrepair

5. Door Width

- a. **Code Sections:** 780 CMR 51.00 R311.2
- b. **Threshold for Compliance:** Required where altered or deemed unsafe

The existing door at the top of the basement stair has a clear width of 23¼". New interior doors require a minimum clear width of 28". The basement door must comply where the doorway is specifically altered, or where the reduced door width is deemed unsafe by the building official.

6. Stair Width Requirements

- a. **Code Sections:** 780 CMR 51.00 R311.7.1
- b. **Threshold for Compliance:** Required where altered or deemed unsafe

New stairs must have a minimum width of 31½" at or below the handrail, and 36" above the handrail. Various portions of the existing stairs do not meet these requirements, including the following:

- Top portion of basement stair: 28" wide
- Bottom of Level 1 stair at newel post: 30 ¾" wide
- Top of Level 1 stair at Level 2 landing: 30" wide
- Stair to attic: 29" wide

The stairs must comply with the requirements applicable to new construction where they are specifically altered or where the reduced widths are considered unsafe by the building official.

7. Basement Door Landing

- a. **Code Sections:** 780 CMR 51.00 R311.3
- b. **Threshold for Compliance:** Required where altered or deemed unsafe

For new construction, landings are required on each side of exterior doors, except that a step of up to 7¾" is permitted on the exterior side of the door. The existing exterior door in the basement level has steps leading up to the door and there is no landing provided at the interior side of the door (Figure 6). A landing must be provided where the stairs are specifically altered, or where the condition is considered unsafe by the building official.



Figure 6: Steps at basement exterior door

8. Non-level Walking Surfaces

- a. **Code Sections:** 780 CMR 51.00 102.6.4
- b. **Threshold for Compliance:** Required where altered or deemed unsafe

The basement level includes various elevation changes that range from 1½" to 8½" (Figure 7). The level changes present a tripping hazard and therefore can be considered an unsafe condition. As part of the alterations, a level walking surface should be provided.



Figure 7: Non-level walking surface in basement

9. Basement Headroom

- a. **Code Sections:** 780 CMR 51.00 AJ501.7 & R305.1.1
- b. **Threshold for Compliance:** Required where altered or deemed unsafe

The existing headroom in non-habitable basements must not be reduced as part of the alterations. For new or altered areas, non-habitable basements must have a minimum ceiling height of 6'-8", with ducts permitted to project within 6'-4". There is an existing duct that reduces the available headroom to 63" (Figure 8). Where the duct is altered, the available headroom must comply with the requirements applicable to new construction to the greatest extent possible.



Figure 8: Large duct that reduces basement headroom



Appendix E: Code Analysis

Commercial Use

AKF



DCR Stonybrook – Office Use

Code Summary Report

12 Brainard Street

Boston, MA, 02136

AKF Project No.: 220624

September 23, 2022

Prepared By: Kyle Wood & Mariah Seaboldt, PE

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1. Introduction

HKT Architects has retained AKF Group LLC to prepare this existing building narrative code report for the proposed renovations of the building located at 12 Brainard Street in Boston, MA. The existing building is located on the Department of Conservation and Recreation's (DCR) Stonybrook Reservation. The building is two stories above grade with a partially below-grade basement and unfinished attic.

It is our understanding that the building was originally constructed as a single-family residence, but has most recently been used as office space. The existing building has been vacant for some time and is in general disrepair. DCR intends to renovate the building for use as either a single-family residence or offices. This report provides an overview of the applicable code requirements for the architectural and fire/life safety features applicable to an office use.

2. Quick Facts

Work Area:	150 SF
Building Footprint:	1,300 SF
Aggregate Area:	2,500 SF above grade, 1,100 SF below grade
Number of Stories:	2 stories above grade, 1 partially below-grade basement, 1 unfinished attic
Sprinkler Status:	Not Sprinklered
Construction Type:	Type VA
Occupancy Classification:	Group B, Group S-2, Group S-1

3. Applicable Codes & Standards

- Massachusetts State Building Code (780 CMR), Ninth Edition, Base Volume (2015 International Building Code with amendments)
- MA Stretch Energy Code (International Energy Conservation Code, 2018 edition with amendments) ¹
- Massachusetts Board of State Examiners of Plumbers and Gas Fitters Regulations (248 CMR)
- Massachusetts Comprehensive Fire Safety Code (527 CMR 1.00 – 2015 NFPA 1: Fire Code with amendments)
- Massachusetts Electrical Code (527 CMR 12.00 – 2020 NFPA 70: National Electrical Code with amendments)
- Massachusetts Architectural Access Board Regulations (521 CMR) ²
- Massachusetts Board of Elevator Regulations (524 CMR)
- Americans with Disabilities Act (ADA)
- M.G.L. Ch. 148 §26G

Although the 9th edition of 780 CMR is currently applicable, the Board of Building Regulations and Standards (BBRS) is currently reviewing the 10th edition of 780 CMR. The 10th edition will adopt the 2021 International Residential Code (IRC). A specific adoption date is not yet known; however we understand that the 10th edition is expected to become effective in early 2023 with a six-month concurrency period.

4. Project Scope & Use Groups

The project involves renovations and limited reconfiguration of the existing building located at 12 Brainard Street in Boston, MA. The building was originally constructed as a single-family residence, but has also been used as office space. This report is based on the use of the building as office space.

The proposed project includes the following uses and occupancies:

Group B:	Office areas and conference/assembly spaces less than 750 sf or with less than 50 people
Group S-1:	Moderate-hazard storage
Group S-2:	Low-hazard storage and utility space

¹ Although the City of Boston adopts the Stretch Energy Code, existing commercial buildings are exempt from the provisions. Alterations must comply with the 780 CMR Chapter 13.

² Changes to 521 CMR are currently being reviewed by the Building Code Coordinating Council (BCCC). The effective date of these changes is unknown

5. Work Area Method

Since the work includes the reconfiguration of space, and the work area is less than 50% of the aggregate building area, the project is classified as a Level 2 Alteration. The Level 2 Alteration must comply with the requirements of IEBC Chapter 8, as well as the requirements of IEBC Chapter 7 for Level 1 Alterations.

Similar to repair work, the existing level of safety and protection throughout the building regarding fire protection and means of egress must be maintained for Level 1 Alterations. The following sections summarize the requirements applicable to building elements and materials for the proposed alterations.

6. Building Elements & Materials

6.1 Existing Shafts and Vertical Openings

In general, existing vertical openings in Level 2 work areas must be enclosed with 1-hr rated construction (IEBC 803.2.1). However, in Group B occupancies vertical openings that connect three or fewer floors may be enclosed with ½-hr rated construction (IEBC 803.2.1 Exception 5). In Group S occupancies, vertical openings connecting a maximum of two floors are permitted to be unenclosed (IEBC 803.2.1 Exception 13).

In addition to the above, existing vertical openings are permitted to be unenclosed were permitted by the requirements applicable to new construction (IEBC 803.2.1 Exception 1). As such, exit access stairs connecting a maximum of two stories are permitted to be unenclosed (780 CMR 1019.3(1)).

Based on the above, if the existing stairs are within the work area, a minimum 1-hr separation must be provided between the basement stair and the stair serving Level 1 and 2 such that no more than two stories are connected.

6.2 Interior Finishes

Interior finish of walls and ceilings in exits or corridors within the work area must comply with the code for new construction (IEBC 803.4). See below for interior finish requirements.

All newly installed interior trim materials, and interior wall, ceiling, and floor finish (including new carpeting) must comply with the code for new construction based on Use Group and whether or not the building is sprinkled (IEBC 702).

Finish Characteristics

Element	Test Method	Criteria
Wall & Ceiling Finishes	ASTM E84 or UL 723	Class A = FSI 0-25; SDI 0-450
		Class B = FSI 26-75; SDI 0-450
		Class C = FSI 76-200; SDI 0-450
Floor Finish	NFPA 253	Class I = 0.45 W/cm ² or greater
		Class II = 0.22 W/cm ² up to 0.45 W/cm ²
	DOC FF-1	Pass

Notes:

FSI = flame spread index

SDI = smoke-developed index

Table 803.11 Interior Wall and Ceiling Finish Requirements by Occupancy

Use Group	Walls & Ceilings			Floors	
	Exit enclosures and exit passageways	Corridors	Rooms and enclosed spaces	Exits and corridors	Other spaces
B	A	B	C	Class II	DOC FF-1
S	B	B	C	Class II	DOC FF-1

Note that where the work area includes corridors and exit enclosures shared by more than one occupancy, the most restrictive finish must be used. Alternatively, finish materials tested in accordance with NFPA 286 and meeting acceptance criteria of IBC section 803.1.2.1 are considered Class A materials.

6.3 Guards

In all work areas, every portion of a floor, including balconies, docks, terraces, or porches that measures more than 30 inches above the floor or grade below must be provided with guards where guards are not already provided or where existing guards are in danger of collapse (IEBC 803.5.1). Guards required by IEBC must be designed in compliance with 780 CMR 1015.2.

7. Fire Protection

The following requirements apply to the required fire protection systems within the building based on the requirements for Level 2 Alterations.

7.1 Sprinklers

Automatic sprinkler systems are required in Group B and S work areas where exits or corridors are shared by more than one tenant or serve an occupant load exceeding 30 people, provided: (1) the work area exceeds 50% of the floor area and (2) sprinkler protection is required by 780 CMR for new

construction (IEBC 804.2.2). As the exits do not serve more than one tenant and the work area does not exceed 50% of the floor area, the requirements of IEBC 804.2.2 do not apply.

MA General Law (MGL) Chapter 148 Section 26G does not apply to buildings or additions in which the gross aggregate floor area of the building or structure does not exceed 7,500 SF. Since the total aggregate floor area does not exceed 7,500 SF, sprinklers are not required per MGL 148 Section 26G.

7.2 Standpipe System

Since there is no work area located more than 50 feet above or below the lowest level of fire department access, a standpipe system is not required (IEBC 804.3).

7.3 Fire Alarm and Detection

The IEBC does not require the installation of a fire alarm/detection system in Group B or S occupancies (IEBC 804.4.1). Carbon monoxide detection is not required in Group B or S occupancies (780 CMR 915.1.1).

8. Means of Egress

Per the MA amendments to 780 CMR 102.6.4, the building official has the authority to cite the following conditions as a violation and order abatement within a time frame deemed necessary by the building official.

- a. Inadequate number of means of egress
- b. Egress components with insufficient width or so arranged to be inadequate, including signage and lighting
- c. Inadequate lighting and ventilation

Note that where full compliance is not practical, the building official may accept compliance alternatives, engineering, or other evaluations that adequately address the deficiency.

The following table summarizes the approximate calculated occupant load, number of exits, and exit capacity for each floor. Note that proper exit signage and emergency lighting must be provided throughout the building.

Floor	Occupant Load	Minimum Exits Required	Exits Provided	Exit Capacity
B	4	1	2	258
1	21	1	2	294
2	13	1	1	100

The work area does not include exits or corridors shared by more than one tenant and therefore the requirements of IEBC 805 do not apply. However, proper exit signage and emergency lighting must be provided throughout the building. Means of egress lighting and exit signs must be connected to an emergency power supply with a supply duration of at least 90 minutes (IEBC 903.3 & 905.2, 780 CMR

1008.3.4 & 1013.6.3). The emergency power supply must consist of storage batteries, unit equipment, or an on-site generator.

9. Accessibility

The following accessibility requirements apply to the Level 2 work area.

9.1 MA Architectural Access Board Regulations: 521 CMR

All spaces open to the general public (i.e. students, visitors) are subject to the provisions the Massachusetts Architectural Access Board (MAAB) Regulations (521 CMR), however employee-only spaces are not regulated by MAAB. For existing buildings undergoing alterations applicable requirements are based on the scope of work being completed, as follows:

521 CMR 3.3.1 requires that all new work must comply. Additionally, when the cost of work exceeds \$100,000, the building must be provided with an accessible entrance and accessible toilet room, drinking fountain, and public telephone (where provided within the building).

521 CMR 3.3.2 requires that where the cost of work equals 30% or more of the assessed building value, the entire building must comply in full with 521 CMR.

Based on the City of Boston's Assessors Database, the assessed building value is \$2,195,200.00. However, the assessed building value provided by the City of Boston's Assessors Database includes multiple buildings on DCR's property. We recommend that DCR review with the assessor's office to determine a specific assessed value for the building at 12 Brainard Street.

9.2 American's with Disabilities Act (ADA)

The 2010 ADA Standards require that altered portions of an existing building must be readily accessible to and usable by individuals with disabilities to the maximum extent feasible (§36.402(a)). Further, where alterations affect an area of primary function (i.e. an area serving a major activity of the building), an accessible path of travel must be provided to the altered area. Note that the accessible path includes an accessible entrance (including exterior approach), toilet rooms, and drinking fountains serving the altered area (§36.403(a)). However, the alterations made to provide an accessible path of travel are only required up to 20% of the cost of the alteration to the primary function area.

The ADA further defines a list of priorities for accessible upgrades in the event of disproportionality (i.e. costs exceeding 20% of the alteration costs). The following elements must be provided up to 20% of the project costs in the following order:

1. An accessible entrance
2. An accessible route to the altered area
3. At least one accessible restroom for each sex
4. Accessible telephones
5. Accessible drinking fountains
6. Additional accessible elements such as parking, storage, and alarms

The 2010 ADA Standards do not require employee work areas to be fully accessible. However, common-use circulation paths within employee work areas must be accessible. In addition, employee work areas must be designed such that individuals with disabilities can approach, enter, and exit the work space (ADA 203.9). Employee bathrooms and breakrooms are not considered employee work areas and therefore must be fully accessible.

10. Plumbing Fixtures

The Massachusetts State Plumbing Code (248 CMR) requires a minimum number of plumbing fixtures based on the use of the building. The requirement for a minimum number of fixtures is applicable to projects involving the installation, alteration, or extension of the plumbing system. Where the occupant load of a story is increased by more than 20%, the minimum number of required plumbing fixtures must be provided for that story (IEBC 810.1).

Since the proposed project includes alterations to the existing plumbing system the requirements for 248 CMR apply. The table below identifies the applicable factors for the proposed alterations.

Use	Toilets		Urinals	Lavatories	Drinking Fountain	Bath / Shower	Other Fixtures
	Female	Male					
Offices	1 per 20	1 per 25	33%	1 per 50	1 per floor	N/A	1 Service Sink per floor

The table below identifies the required plumbing fixtures based on the above factors and the calculated occupant load.

Space	Floor Occupant Load	Required Fixtures			
		Toilets		Lavatories	
		Female	Male	Female	Male
Basement	4	0.10	0.08	0.04	0.04
Level 1	21	0.55	0.44	0.22	0.22
Level 2	13	0.35	0.28	0.14	0.14
Total	30	1	1	1	1

Based on the calculated occupant load, the two single-user toilet facilities provide sufficient capacity for the building. Single-user gender neutral bathrooms that comply with 248 CMR 10.10(18)(m) and (r) are permitted under 248 CMR 10.10(18)(i)(3).

11. Mechanical

All reconfigured and converted spaces intended for occupancy in any work area must be provided with natural or mechanical ventilation in accordance with the International Mechanical Code (IMC) (IEBC 809.1). In existing mechanically ventilated spaces, existing mechanical ventilation systems that are altered, reconfigured, or extended must provide not less than 5 cfm per person of outdoor air and not less than 15 cfm of ventilation air per person or not less than the amount of required ventilation air determined by the Indoor Air Quality Procedure of ASHRAE (IEBC 809.2).

12. Energy Conservation

Alterations are permitted without requiring the entire building to comply with the requirements for new construction (IEBC 811.1). Only those systems or portions of the building that are altered are required to comply with the energy conservation requirements for new construction. The building is considered a commercial building for the purposes of energy code compliance.

Note that the IECC requires all newly installed mechanical systems and lighting controls to be commissioned in accordance with Section C408. There is an exception to the commissioning requirements for mechanical systems and service water heater systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h cooling capacity and 600,000 Btu/h combined service water-heating and space-heating capacity.

13. Findings and Required Upgrades

The following section summarizes AKF's findings and required upgrades based on AKF's site visit on August 31, 2022 and the proposed scope of work.

1. Handrail Locations, Height, Continuity, and Extensions

- a. **Code Sections:** 780 CMR 1014.2, 1014.4, & 1014.6, 521 CMR 27.4.1, 27.4.2 & 27.4.3
- a. **Threshold for Compliance:** Required where altered, deemed unsafe, or if 30% accessibility threshold is reached and the area is open to the public

Handrails must be located minimum 34" and maximum 38" above stair nosings and be provided on both sides of the stairwell. Only one handrail is provided for the lower portion of the basement stair at a height of 28.5". Similarly, only one handrail is provided on the stair between Level 1 and Level 2 at a height of 32". Handrails are not provided in the following locations (Figure 1):

- Top portion of the basement stair
- Steps leading to the basement exterior door
- Rear exterior stair

In addition, handrail gripping surfaces must be continuous without interruptions, such as by the newel posts seen in Figure 2. The handrail on all levels for the main interior stair and basement stair are interrupted by newel posts.

Further, handrails require extensions where they terminate at the top or bottom of a run of stairs. This extension must extend at least 12" horizontally at the top of a run, and 12" plus the width of one tread at the bottom of a run. All handrails for the interior stair and basement stair terminate in newel posts such that extensions are not provided.

The handrails must comply with the requirements applicable to new construction, including number of handrails, height, continuity, and extensions where they are specifically altered, where an existing condition is deemed unsafe by the building official, or in areas open to the public, where the cost of work triggers the 30% threshold for full compliance with 521 CMR.

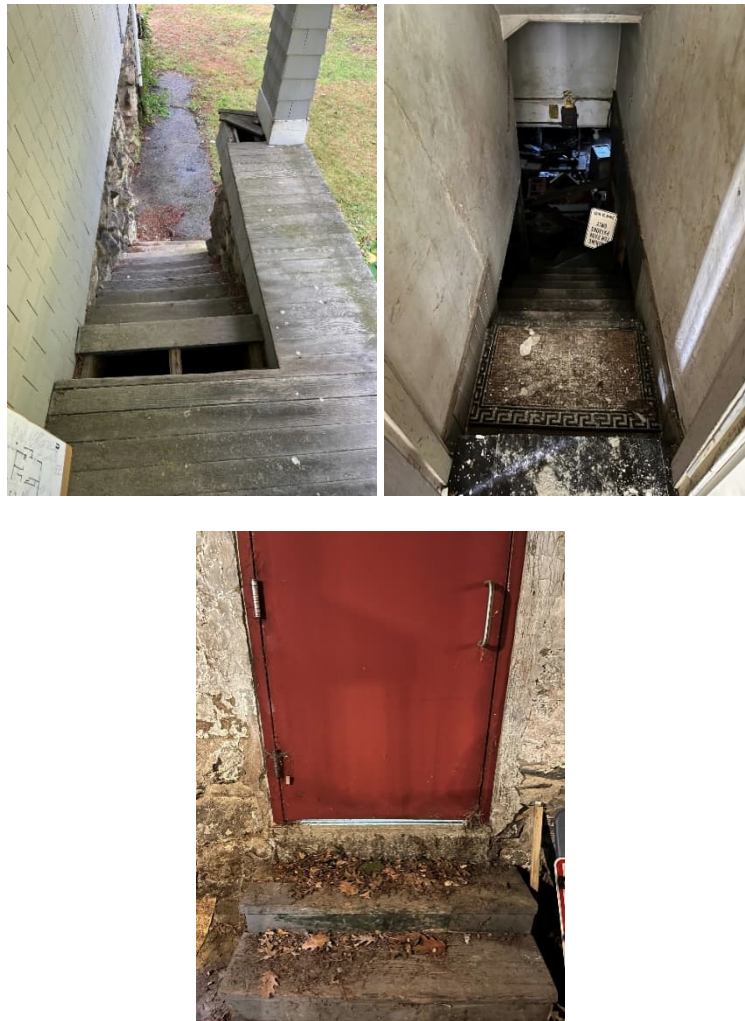


Figure 1: Lack of handrails at rear and basement stairs



Figure 2: Handrails interrupted by newel posts

2. Guards and Guard Height

- a. **Code Sections:** 780 CMR 1015.2, IEBC 803.5.2
- b. **Threshold for Compliance:** Required where altered or deemed unsafe

Guards are required along open-sided walking surfaces, including stairs and balconies, where the walking surface is located more than 30 inches above the floor or grade below. Guards must be provided in work areas where not already provided, or where existing guards are in danger of collapse. Figure 3 below shows the rear exterior porch, rear stair, and the interior basement stairs, all of which are not protected by guards but have a height above the floor below of at least 30 inches. The lack of guards can be considered an unsafe condition. Therefore, guards should be provided where in these locations as part of the proposed alterations.

In addition, guards shall be 42" minimum in height, measured from the adjacent walking surface. The guards provided on Level 2 (measuring 33" in height) and at the attic (measuring 34" in height) are less than 42" high (Figure 4). The guard on the attic stair also has openings that exceed the 4" maximum (14½"). The guards on the second floor and attic must be raised, and the openings in the attic guard must be reduced if they're altered or if the existing guards are deemed unsafe by the building official.



Figure 3: Lack of guards at basement, rear stair, and exterior porch



Figure 4: Low guard on Level 2 and in the Attic

3. Winder Treads

- a. **Code Sections:** 780 CMR 1011.5.3
- b. **Threshold for Compliance:** Required where altered or deemed unsafe

Winder treads are not permitted for use in stairs that serve as a means of egress, except within a dwelling unit. The basement stair currently includes winder treads (seen in Figure 5). The winder treads must be replaced with compliant treads if the basement stairs are altered or if the condition is considered unsafe by the building official.



Figure 5: Winder treads in basement

4. Stair Construction

- a. **Code Sections:** 780 CMR 102.6.4, 102.8, & 1011.5
- b. **Threshold for Compliance:** Required, maintenance and life safety issue

The rear stair is in disrepair due to missing treads and decking. Existing buildings, including means of egress must be maintained in safe, working condition. As is, the existing stairs are not safe for use. The missing treads and decking must be replaced.



Figure 6: Missing treads and decking at rear stair

5. Floor Assemblies

- a. **Code Sections:** 780 CMR 102.8
- b. **Threshold for Compliance:** Required, maintenance and life safety issue

There are various floor/ceiling assemblies that are in disrepair (Figure 7). The existing construction must be maintained in safe, working condition. The existing floor/ceiling membranes must be repaired in accordance with these requirements.



Figure 7: Floor/ceiling assemblies in disrepair

6. Riser Dimensions

- a. **Code Sections:** 780 CMR 1011.5.2 and 1011.5.4
- b. **Threshold for Compliance:** Required where altered or deemed unsafe

Stair riser heights shall be a minimum of 4" and a maximum of 7". Risers on the basement stair as well as the stair leading to the basement exterior door have risers greater than the 7" maximum (ranging 7¼" to 8"). Further, risers are required to have uniform height, varying at most by 3/8". The basement stair contains treads that vary in height by differences of up to ½" (between 7¼" and 7¾"). Risers must be modified to comply where they are altered or the existing condition is deemed unsafe.

7. Basement Door Landing

- a. **Code Sections:** 780 CMR 1010.1.6
- b. **Threshold for Compliance:** Required where altered or deemed unsafe

Landings at doors shall have a minimum length of 44 inches measured in the direction of travel and a width equal to the door or stair it serves, whichever is greater. The small stair leading to the door in the basement does not provide a landing with adequate length (as seen in Figure 8). The landing around the door must be made compliant with new construction if the door or landing is altered or deemed unsafe.



Figure 8: Non-compliant landing on inside of door

8. Vertical Openings

- a. **Code Sections:** IEBC 803.2.1, 780 CMR 1019.3(1)
- b. **Threshold for Compliance:** Required where the stair is within the Level 2 work area

As they currently exist, the existing unprotected interior stairs connect three stories. If the existing stairs are within the work area, a minimum 1-hour fire-resistance rated separation must be

provided between the basement stair and the stair serving Level 1 and 2 such that no more than two stories are connected.

9. Inaccessible Bathrooms

- a. **Code Sections:** 521 CMR 30, 2010 ADA Standards Chapter 6
- b. **Threshold for Compliance:** Required where altered or if 30% accessibility threshold is reached and the area is open to the public

Accessible features must be provided where the bathrooms are altered, or where the 30% threshold for full compliance with 521 CMR is reached and the bathrooms are open to the public. Note that even if the bathrooms are not open to the public, bathrooms for employee-use must comply with the requirements of ADA Standards. Existing inaccessible bathroom fixtures include:

- Sink depth exceeding 6.5" maximum (measured at 11") (521 CMR only)
- Knee clearance less than minimum 27" (measured at 25.5")
- Rear grab bar in Level 1 restroom is more than 6" from the side wall (measured at 27")
- Paper towel dispenser exceeds 40" height maximum (measured at 43" from finished floor) (521 CMR only)
- Second floor bathroom not provided with any accessible features

10. Kitchen Accessibility

- a. **Code Sections:** 521 CMR 32, 2010 ADA Standards Section 804
- b. **Threshold for Compliance:** Required where altered or if 30% accessibility threshold is reached and the area is open to the public

Accessible features must be provided to altered elements of the kitchen, or throughout the kitchen if the space is open to the public and the 30% threshold for accessibility is reached. Accessible kitchen features include knee/toe space at appliances and amenities, countertop space and clearance, accessible hardware for cabinets, and accessible design features for sinks. Existing inaccessible kitchen elements include:

- Kitchen sink depth exceeding 8" maximum (measured to be 9") (521 CMR only)
- Countertop height exceeding 34" maximum (measured to be 36.5")

11. Elevator Access

- a. **Code Sections:** 521 CMR 28.1
- b. **Threshold for Compliance:** Required where the 30% accessibility threshold is reached and the building is open to the public

The building is not currently provided with an elevator. Elevators are required in new multistory buildings per 521 CMR 28.1. If the building is open to the public, an elevator must be provided where the 30% threshold for full compliance with 521 CMR is reached.

12. Accessible Entrance

- a. **Code Sections:** 521 CMR 25.1
- b. **Threshold for Compliance:** Required where the building is open to the public and the cost of work exceeds \$100,000

The existing path to the front door is uneven, overgrown, and in disrepair. If the building is open to the public, an accessible entrance must be provided where the cost of work exceeds \$100,000. Note that if the building is not open to the public, or the cost of work does not exceed \$100,000, the path to the front entrance must still be repaired in accordance with the maintenance provisions of 780 CMR 102.8.



Figure 9: Existing front entrance

13. Doorknobs

- a. **Code Sections:** 521 CMR 26.11.1, 2010 ADA Standards Section 309.4
- b. **Threshold for Compliance:** Required where altered or if 30% accessibility threshold is reached and the area is open to the public

Various doors throughout the building include doorknobs (examples seen in Figure 10). Doorknobs are not accessible since they require tight grasping, pinching, or twisting of the wrist. Compliance can be achieved by replacing existing doorknobs with a lever-operated mechanism, push-type mechanism, or U-shaped mechanism doorknob. Doorknobs must be replaced with accessible hardware where they are specifically altered, or in areas open to the public where the 30% threshold for full compliance with 521 CMR is reached.



Figure 10: Non-compliant doorknobs

14. Storm Door in Series

- a. **Code Sections:** 780 CMR 1010.1.8, 2010 ADA Standards Section 404.2.6, 521 CMR 26.7
- b. **Threshold for Compliance:** Required where altered, deemed unsafe, or if 30% accessibility threshold is reached and the area is open to the public

The required clear width between doors in series is 48 inches minimum plus the width of the door swinging into the space. Storm and screen doors are not permitted in Group B or S occupancies. The existing screen door at the front entrance must be removed if the door is specifically altered, if the condition is deemed unsafe, or if the 30% threshold for full compliance with 521 CMR is reached and the building is open to the public. However, even if the door is not altered as part of the proposed renovations, we recommend removing the door as it represents a barrier to accessibility that can be easily eliminated.

15. Door Width Requirements

- a. **Code Sections:** 780 CMR 1010.1.1, 521 CMR 26.5, 2010 ADA Standards 404.2.3
- b. **Threshold for Compliance:** Required where altered, deemed unsafe, or if 30% accessibility threshold is reached and the area is open to the public

The minimum clear width for doors serving as part of a means of egress is 32". The door at the top of the basement stair is 23 ¼" clear. The door must comply with the requirements applicable to new construction where it is specifically altered or if the reduced width is deemed unsafe by the building official. Note that as shown in Section 8 of this report, the existing exits provide sufficient capacity for the calculated occupant load.

16. Door Locking

- a. **Code Sections:** 780 CMR 1010.1.9.3(2)
- b. **Threshold for Compliance:** Required, life safety issue

Locks are provided on the exterior doors on Level 1 and in the basement. Key-operated locks are permitted on the main doors in Group B and S occupancies where the locking device is

readily distinguishable as a lock and signage is provided on the egress side of the door. The sign must read: THIS DOOR TO REMAIN UNLOCKED WHEN THIS SPACE IS OCCUPIED. The sign must have letters 1" high on a contrasting background. The use of key-operated locks is revocable by the building official. If the main doors of the building are to be locked, compliant signage must be provided.

17. Stair Width Requirements

- a. **Code Sections:** 780 CMR 1011.2 Exception 1
- b. **Threshold for Compliance:** Required where altered or deemed unsafe

The minimum clear width for stairs serving as part of a means of egress and serving and occupant load of less than 50 people is 36". The interior stair serving Level 2 of the building has an inconsistent width, but all measurements taken were less than 36" in width. Where the stairs are altered, a minimum clear width of 36" must be provided.

18. Non-level Walking Surfaces

- a. **Code Sections:** 780 CMR 102.6.4 and 1003.5
- b. **Threshold for Compliance:** Required where altered or deemed unsafe

Where elevation changes of less than 12 inches exist in the means of egress, sloped surfaces shall be used. The basement includes various elevation changes less than 12" building (Figure 11) . The level changes present a tripping hazard and therefore can be considered an unsafe condition. As part of the alterations, a level walking surface should be provided.



Figure 11: Non-level walking surface in basement

19. Basement Headroom

- a. **Code Sections:** 780 CMR 1208.2
- b. **Threshold for Compliance:** Required where altered or deemed unsafe

The required headroom clearance for storage rooms is 7' minimum. A large duct is located in the basement that reduces the headroom clearance to 63" (Figure 12). The headroom must comply with the requirements applicable to new construction where the ductwork is specifically altered or where the condition is deemed unsafe by the building official.



Figure 12: Large duct that reduces basement headroom

20. Exit Signs & Emergency Lighting

- a. **Code Sections:** 780 CMR 102.6.4
- b. **Threshold for Compliance:** Required, life safety issue

The building is not currently provided with exit signage or emergency lighting. Existing buildings must be provided with adequate means of egress, including signage and lighting. Exit signs and emergency lighting should be provided as part of the proposed alterations.