

— BUILDING CODE ANALYSIS —

APPLICABILITY

This analysis reviews the existing Milton Fire Department Atherton Street Firehouse Facility in Milton, MA, with regard to the Massachusetts State Building Codes (“Code”) for new construction. The 8th Edition of the State Building Code consists, in part, of the 2009 International Building Code (IBC) and the 2009 International Existing Building Code (IEBC) with Massachusetts Amendments to these codes. Codes used in this analysis are:

- International Building Code (IBC, 2009)
- International Existing Building Code (IEBC, 2009)
- International Energy Conservation Code (IECC, 2012)
- Massachusetts State Building Code Amendments (780 CMR 8th Edition)
- Architectural Access Board Rules and Regulations (AAB, 521 CMR, 2006)
- Uniform State Plumbing Code (248 CMR)

Code compliance with regard to mechanical systems, including electrical, plumbing, fire protection systems and sitework are reviewed in separate sections of this study.

Upgrades and corrections to existing structures undergoing renovations are limited to specific items under the IEBC. During renovations, not all existing safety issues and non-compliant conditions are required to be corrected; typically only items within each renovated area are required to be corrected. However, non-compliant conditions at stairs and egress elements, fire rating separations, accessibility, and fire protection (sprinklers) are required to be corrected or provided anew as required by the IBC. Because the building was constructed almost one hundred and forty years ago, in 1901, existing conditions which may be allowed to remain under the requirements of the IEBC may also be in conflict with current life safety codes and standards. Over time, since the original construction of this building, life safety standards have been improved in reaction to tragic events. *In order to evaluate life safety conditions in accordance with the most current intent of these codes, the current IBC and Fire Safety codes and regulations are used as a basis for judging compliance.*

Correcting existing conditions to comply with current Accessibility and Fire Protection requirements is required when the value of the work exceeds the cost or scope triggers stated in the AAB and the Fire Code.

Compliance with Massachusetts General Law M.G.L. Chapter 148 Section 26G is required in all existing buildings in which renovations will exceed 7,500 square feet in area or in which major alterations’ are planned, as defined by the statute. Under these conditions, an existing building must provide a full sprinkler fire suppression system if sufficient water flow and pressure is available. A major alteration is defined as a reconfiguration of walls, doors, windows, mechanical systems, etc., which effectively makes installation of sprinkler systems easier and which affects more than 33% of the building area or more than 33% of the assessed value of the building. Buildings for which sufficient water flow and pressure does not exist are exempt, however, it is assumed that sufficient flow and pressure is available and all code discussions below are based on this building being fully sprinklered.

Also, according to this section of M.G.L., any work performed, even if under separate contracts or

building permits, within a 5 year period must be included in the aggregate construction cost to determine applicability of M.G.L. This includes site work and building renovations, whether done separately or together.

- Future Change Orders and other unanticipated costs could also trigger full compliance if the aggregate value exceeds the 33% limit.
- Cost of future building projects requested for permit within 5 years, before or after the permit date for this project, will be considered part of the project costs and may trigger compliance.

Accessibility in public buildings is regulated by 521 CMR, which is enforced by the Massachusetts Architectural Access Board (MA AAB) and the Building Inspector of the municipality. 521 CMR, as issued in 2006, is used for this review.

MA AAB 5.1 Definitions states:

“Public Buildings: A building privately or publicly financed that is open to and used by the public”,

MA AAB 11.1 Commercial Buildings states:

“The design of commercial *buildings* shall comply with 521 CMR, except as specified or modified in 521 CMR 11.00. Commercial *buildings* are *public buildings* ... as well as city and town ... *facilities*.”

The Fire Facility is considered a public and commercial building and so is required to be accessible in accordance with 521 CMR.

Currently, the AAB regulates only areas and conditions accessed by the “public”; areas occupied solely by staff are not included in the regulation. Staff areas are included in the ADA Accessibility Guidelines as part of federal law, but these are not directly enforceable as part of the Building Code. However, in an effort to unify compliance requirements with the recently adopted IBC as the State Building Code, the AAB will be revising the regulation to include staff areas as well as public areas. In anticipation of the release of the revised AAB regulations, all discussions below regarding accessibility will include compliance of staff areas.

Applicability of the AAB Regulations for renovations of existing buildings is based on the value of the renovations as a percentage of the current assessed value of the building (100% valuation). According to AAB 3.3, partial compliance is required when the value of the renovations exceeds \$100,000 and full compliance of the entire facility is required when the value of the renovations exceeds 30% of the assessed value of the building. An exception to this rule is for maintenance work on MEP systems, sprinkler systems, roofs, replacement windows, masonry repair, site utilities, landscaping, and septic system which in aggregate is less than \$500,000.

As stated in AAB 3.3 (paraphrased):

“3.3 EXISTING BUILDINGS

All additions to, reconstruction, remodeling, and alterations or repairs of existing public buildings or facilities ...shall be governed by all applicable subsections in 521 CMR.

3.3.1....,

- a. if the work costs less than \$100,000, then only the work being performed is required to comply with 521 CMR...
 - b. if the work costs \$100,000 or more, then the work being performed is required to comply with 521 CMR. In addition, an accessible public entrance and an accessible toilet room, telephone, drinking fountain (if toilets, telephones and drinking fountains are provided) shall also be provided in compliance with 521 CMR...
- 3.3.2 If the work performed, including the exempted work, amounts to 30% or more of the full and fair cash value (see 521 CMR 5.00) of the building the entire building is required to comply with 521 CMR. “

Also, according to AAB 3.5, any work performed, even if under separate contracts or building permits, within a 3 year period must be included in the aggregate construction cost. This includes sitework and building renovations, whether done separately or together.

- Future Change Orders and other unanticipated costs could also trigger full compliance if the aggregate value exceeds the 30% limit.
- Cost of future building projects requested for permit within 3 years of the permit date for this project will be considered part of the project costs and may trigger compliance.

The building and site must be reviewed together and may affect compliance in areas not anticipated to be updated to comply.

- If a building’s renovation cost exceeds 30% of the building assessed value, then the entire building and site must be made to comply;

Energy conservation, as required by the IECC for new construction, is not required for renovations to existing structures under the IEBC. However, any new elements or alterations to the exterior building envelope, such as new windows or new roofing, must comply to the greatest degree possible. As stated in the IEBC Alteration Level 3 Section 808 Energy Conservation “*Essentially, the entire building is not require to meet the energy provisions, but only improvement in the energy performance of the building is intended to be achieved by making the new elements meet the IECC...*”. Overall upgrade of the exterior envelope of this building is not required or recommended and so is not reviewed as part of this study, except for elements recommended to be replaced.



General Information

According to the Town of Milton Assessors Department, the Atherton Street Firehouse – Engine -4 is located at 815 Blue Hill Avenue; construction of the facility completed in 1901. The area of the building is listed on the Assessor’s Card as 6,768 total gross square feet (GSF).

The current assessed value of the Atherton Street Firehouse building (structure only) is \$198,000.

- The threshold value of the cost trigger for accessibility (full compliance) is 30% of this value less the cost of permitted work within the last 3 years.
- The threshold value of the cost trigger for fire protection is 33% of this value less the cost of permitted work within the last 5 years.

This cost threshold is shown below. The cause of the renovation or the source of the funding is not relevant, only the total value of cost for renovations, including demolition. Any work within these time limits which exceed these cost triggers will require that the entire structure and site be modified to be compliant. Because each threshold is based on the aggregate value of recent work (requiring a building permit) over the most recent 3 or 5 years, respectively, these threshold values are dynamic and will

change based on the aggregate value of recent projects over time. The values below are only a guide and should be recalculated when a new renovation project is considered.

COST THRESHOLDS FOR ACCESSIBILITY AND FIRE SUPPRESSION COMPLIANCE	
Assessed Value (Structure Only)	\$198,000
30% Cost Trigger for Accessibility Compliance	\$ 59,400
33% Cost Trigger for Fire Protection	\$ 65,934

AGGREGATE TOTAL VALUE OF RECENTLY COMPLETED WORK		
Date	Description	Approximate Value
8/2014	Fire alarm Upgrades	\$ 1,000
9/2015	Boiler Replacement	\$ 33,500
3 year aggregate total value for accessibility compliance		\$ 34,500
5 year aggregate total value for fire protection compliance		\$ 34,500

ACCESSIBILITY UPGRADE REQUIREMENT	
30% of Assessed Building Value	\$59,400
Less the Aggregate Cost of Projects Completed in the Past 3 Years	\$34,500
Current Value for Renovation Work to the Cost Trigger for Full Accessibility Compliance	\$24,900

235,605

Fire Protection Upgrade Requirement	
33% of Assessed Building Value	\$65,934
Less the Aggregate Cost of Projects Completed in the Past 5 Years	\$34,500
Current Value for Renovation Work to the Cost Trigger for Full Fire Protection Compliance	\$31,434

There are two building permits on file with the Inspectional Services Department dated within the last three years.

BUILDING CODE COMPLIANCE ANALYSIS (IEBC / 780 CMR - IBC)

Although the Atherton Street Firehouse would be regulated under the IEBC for the purposes of a renovation of the existing building, this analysis reviews compliance with regard to requirements of the new IBC. This is to ensure that existing conditions which do not meet the current intent for life safety, and which may be allowed to remain as part of a renovation under the IEBC, are identified for correction. In the discussion below, references to specific code sections are noted before each paragraph with parentheses.

(IEBC 101.4.2) Applicability: Under this definition, as a building that has been previously occupied prior to the issuance of the Code, this building is considered an existing building and regulated under the IEBC.

(IEBC 101.5.2) IEBC offers three methods for compliance analysis and four levels of work classification. For the purposes of this study, the *Work Area Compliance* method will be used and future renovations will be considered as an *Alteration Level 3* work classification.

(IEBC 701.3) Compliance: All new elements must comply with IBC.

**The following discussions regarding Type of Construction, Use Group Classification, and Height and Area Limitations are provided to document the existing facility classification only. These characteristics are not regulated by the IEBC and existing buildings are not required to be modified to comply as a result of renovations. Additions to an existing building, however, must conform to current limitations of allowable height and area and are regulated by the IBC. Determination of the allowable height and area of the existing structure provides guidance for the extent of any new additions that may be planned.*

(IBC Ch. 3 – Use and Occupancy)

(IBC 305.1) Primary Use Group: Group B - Business
(IBC 305.1) Mixed Use Areas: Group R-2 Residential (Bunk Area)
(IBC 305.1) Mixed Use Areas: Group S-1 Storage (Apparatus Bays)

(IBC Ch. 5 – General Building Limitations)

Height and area limitations for the existing building are presented below to show the allowable area for the uses within the building and possible expansion of the existing building. As stated above, the aggregate area of any new additions and renovations that exceed 7,500 square feet or that exceed 33% of the assessed value of the existing building will require sprinklers to be installed throughout the new and existing structure. The allowable floor area calculations below include increase permitted for fire protection sprinkler system, however the increase for existing building frontage accessible to emergency vehicles; is not. This allowable increase in area for accessible frontage may be affected by additions to the building.

According to information from the Milton Assessing Department, the current building area is listed at 6,768 gross square feet (occupied space) for all floors combined. Storage uses and Assembly uses are believed to occupy less than 10% of the gross area of the relative floor levels and so are considered to be accessory to the Business Use on each floor.

(Table 503) Based on the presumption that any renovation or new construction for this building will require the installation of a new sprinkler system, the allowable height may be increased by one story and the allowable area may be increased by 200%. Additionally, there is a provision to increase the allowable area due to the accessibility of the building perimeter. Since no plans were available to determine the length of the accessible vs. inaccessible perimeter, this increase will not be calculated.

- The allowable area increase for a sprinkler system will allow a total increase in area of 200% in addition to the limitations stated in Table 503. This total allowable area is shown in the last column of the table below
- The total area of the building cannot exceed the allowable area used for the primary Residential (“R-2”) Use Group. Other uses within the mixed use building cannot exceed an area proportional to the percentage of the area that Use Group occupies in the building. Because this ratio of allowable areas between uses may vary based of differing layouts, it is impossible to provide an allowable area for all uses in every possible combination. As such, the allowable area for Use Group B is calculated as a baseline and further calculation will be required to confirm if future renovations are within Code requirements.

(Table 503) The allowable height and area for each Use Group under Type V-B (5-B) Construction is:

USE GROUP	Total Allowable Height (+1 Story Increase for Sprinkler System)	Allowable Area per Story Plus Increase for Sprinkler System and Accessible Perimeter			
		Allowable Area (Table 503)	Sprinkler System Area Increase (+200%)	Accessible Perimeter (Not taken)	Total Allowable Area per Floor with Allowable Increases
R-2	4 Stories	7,000 sf.	+ 14,000 sf.	+ 0 sf.	21,000 sf.

(IBC 508.3 & 508.4) Buildings with multiple Use Groups are called mixed-use buildings. Buildings are further classified as a ‘separated’ mixed use or a ‘non-separated’ mixed use. If classified as a ‘separated’ mixed-use building, the different use groups within the building must be separated by fire rated construction as required in Table 508.4. If classified as a ‘non-separated’ mixed-use building, then fire rated separations are not required BUT the most restrictive use group is used to calculate the allowable height and area. This building is assumed, based on field observations, to be a non-separated mixed-use building. (IBC 508.2.4 and Table 508.4) In table 508.2.4, rooms used for storage and assembly may be considered to be accessory to the primary Use Group if the aggregate area of these rooms is less than 10%

of each floor area and smaller than the area allowed by Table 503. Spaces considered to be accessory to the primary use are not required to be separated from the primary use by fire rated partitions. This report assumes that all Storage and Assembly uses are considered to be accessory and so not separated.

IBC Ch. 6 – Types of Construction

(IBC Table 601) No information is provided by the Milton Assessing Department with regard to the type of construction of the building. As observed in the field, the building appears to be constructed of a wood frame with a stone veneer with punched windows and doors.

As the existing construction system is assumed to be wood framed with non-fire rated members, this generally conforms to the requirements for Type V-B (Roman numeral 5 - B, unprotected) construction in the current IBC. The structure does not appear to be protected with spray fireproofing or other rated construction. Interior partitions are assumed to be non-load bearing wood stud / drywall construction. The Use Group is assumed to be Residential (R-2) with accessory or mixed use areas for Business and Storage.

Type V-B Construction Type Min. Fire Resistance Rating Requirements (780 CMR Table 601)

Building Elements	Required Fire Resistance Rating (Hrs)
Structural Frame (including columns, girders, and trusses)	0
Exterior Bearing Walls	0
Interior Bearing Walls	0
Exterior Non-Bearing Walls and Partitions (See Table 602)	0
Interior Non-Bearing Walls and Partitions	0
Floor Construction (including support beams and joist)	0
Roof Construction (including support beams and joist)	0

Table 601 establishes the required minimum fire rating of construction elements and is related to the allowable height and area discussed in Table 503 below. Type V-B (5-B) construction allows the building structural members to be unprotected (not fire rated). The tradeoff for not protecting the building structure is a reduction in the allowable height and area that can be built; essentially, the greater the fire protection of building structural elements, the larger the building height and area which is allowed.

(IBC Chapter 10 - Means of Egress)

Occupancy load in the existing facility is determined by the functions in each area of the building and not the primary use group. According to the IBC Table 1004.1.1, Business functions require an occupant load calculated at 100 GSF per person, Residential sleeping areas (bunks) are calculated at 120 GSF per person, Locker rooms are calculated at 50 GSF per person, and Mechanical/Storage areas are calculated at

300 GSF per person, and Assembly spaces are calculated at 5, 7, or 15 GSF per person dependent upon whether the persons are standing, sitting, or at tables. As the functions and areas for each may change over time, areas with lesser occupancy rates may be renovated for a use with a higher occupancy rate. This summary will not break out each function separately; as a preliminary determination of occupancy, a rate of 100 GSF per person will be used as an overall general occupancy rate for this building as this will be the predominant occupancy for any renovation of the building:

- 6,768 GSF (All Floors) / 100 sf. per occupant = 68 occupants on all floors

The egress capacity (0.3"/per occupant for non-sprinklered buildings) for a minimum 44-inch wide stairway is approximately 146 occupants. The egress capacity (0.2"/per occupant for non-sprinklered buildings) for a typical single 36-inch wide egress doorway is approximately 170 occupants.

IEBC 102.2.2.1 is an amendment by the State of Massachusetts and supersedes other less restrictive paragraphs in the IEBC. This amendment requires that all existing stairs comply with current requirements of the IBC with regard to the quantity of exit ways on each floor, the width of all exit ways, fire rating, handrails, continuity, etc., to "provide safe and adequate means of egress".

- The existing egress stair in the building is not enclosed in required fire rated construction, does not have risers and treads of required dimensions, does not have railings and guards on both sides of the stair, does not have railings and guards with required height and spacing, does not have required rail extensions, and does not have fire rated doors which comply. All stair conditions must be corrected in accordance with current egress requirements as part of any renovation project.



(IEBC 703.2.1 Existing Vertical Openings)

All existing vertical openings connecting 2 or more floors must have an enclosure with a fire-resistive rating of 1 hour minimum.

- The stair connecting the basement, main and upper levels is a vertical opening. This opening is not separated from adjacent areas by fire rated construction. This stair cannot be used as an exit in its current configuration.

(IBC Table 1016.1 Exit Access Travel Distance)

- The greatest travel distance to an exit enclosure occurs on the 2nd floor and is approximately 100 feet. This is far less than the allowable travel distance of 200 feet.

(IBC 1014.3) In buildings of a Business Use with a sprinkler system, the allowable length of a common path of travel is 100 feet.

- All locations appear to be compliant.

(IBC 1018.4) In buildings of a Business Use without a sprinkler system, the allowable length of a dead end corridor is 20 feet.

- Far end of the upper level corridor appears to be non-compliant.

(IBC 1015.2) When multiple exits are required, the exits must be separated by a minimum distance equal to 1/3 of the longest diagonal distance of the floor plate.

- There is only one non-compliant Exit from the basement, main and upper floors. As a result separation distance is not applicable.

(IBC 1021.1) All stories are required to provide a minimum of 2 means of egress, except when serving a maximum of 4 dwelling units. As this building is classified as a Business B Use Group with more than 4 dwelling units on the second floor, a minimum of 2 means of egress must be provided.

ACCESSIBILITY CODE COMPLIANCE ANALYSIS (521 CMR AAB)

AAB 11 – Commercial Buildings (Municipal Facilities)

(521 CMR 11.1)

Public Areas, Toilet rooms, transaction counters and other work areas are required to be accessible.

- Accessible transaction counters at First Floor Public Lobby is not provided.
- Accessible male and female toilet rooms are not provided for public use on the First Floor.

AAB 14 – Places of Assembly

(AAB 14.2) Places of assembly are not provided in the existing building.

AAB 19 – Recreational Facilities (Fire Only)

(AAB 19.4) Locker rooms are provided for male and female Fire staff and officers. These lockers and associated toilet rooms are not required to be accessible.

AAB 20 - Accessible Routes

(AAB 20.1) Accessible routes within the building generally comply with requirements for width, passing space, protruding objects, headroom, etc.

- Access to all floors is not provided for public and administrative staff. A compliant elevator is required to provide access to all floor levels and activities.
- Many doorways reviewed do not provide required clearance for accessibility.

(AAB 20.6.1) Objects projecting from walls with their leading edges between 27 inches and 80 inches above the finished floor must not protrude more than 4 inches into walks, halls, corridors, passageways or aisle and must not have sharp edges.

- There does not appear to be any non-compliant conditions.

(AAB 20.12) Areas of rescue assistance at stairways and means of egress are not required in accordance with Exception a. Existing Buildings.

AAB 24.00 - Ramps

There are no ramps required on the exterior of the building.

Please refer to the Landscape section of this study for information regarding site accessibility.

AAB 25.00 – Entrances

(AAB 25.1) All public entrances to the building must be accessible and be on an accessible route.

- Access to the building from the exterior is non-compliant at the Ground Level public entrances.

AAB 26.00 – Doors and Doorways

(AAB 26.6 – Maneuvering Clearances)

Many doors in the building do not provide required pull and push clearances for accessible doors. In public areas or areas accessed by civilian staff, modify these doorways to provide accessible clearances.

(AAB 26.11 - Door Hardware)

Existing hardware throughout building is not compliant and replacement with lever-type hardware at all doors is recommended.

AAB 27.00 – Stairs

(AAB 27.3 – Nosings)

Stair nosings are required to be angled or radiused and not abrupt. Existing wood stair nosings at the connecting stair between the Garage Level and the First Floor have a protruding lip at each tread.

- The stair treads need to be modified to comply. Modification of the treads with tread covers is necessary to reduce the abrupt nosing.

AAB 28.00 – Elevator

(AAB 28.1) Multistory buildings are required to be served by an elevator.

- The building must be modified to provide an elevator to access all floors of the building.

AAB 30.00 – Public Toilet Rooms

The are no public toilet rooms in the building. The plumbing code requires separate toilet rooms for men and women; although unisex fixtures are allowed for compliance with AAB, this is not compliant with the plumbing code.



AAB 31.00 – Public Bathing Rooms

(AAB 31.7) A single unisex toilet/shower room is provided for able-bodied staff only and compliance is not required. However, the plumbing code requires separate toilet/shower rooms for men and women; although unisex rooms are allowed for compliance with AAB, this is not compliant with the plumbing code.



AAB 32.00 - Kitchens

(AAB 32.1) Commercial kitchens are not regulated by the AAB.

AAB 36.00 – Drinking Fountains

(AAB 36.1.1)

Drinking fountains are not provided within the building.

- Please refer to the plumbing section of this report for discussion about requirements for drinking fountains

AAB 41.00 – Signage

(AAB 41.00)

Room signage with braille must be provided at all ‘permanent rooms and spaces’ as well as code required egress signage.

- Compliant signage and Symbols of Accessibility are missing throughout the building. Where exit signs indicate an accessible route, if all routes are not accessible, these signs shall include the symbol of accessibility.