

# — **Harold R. Cutler, P.E.**

Fire Safety, Building and Access Code Consultant

165 Landham Road  
Sudbury, MA 01776 -3156

Voice & fax 978-443-7088  
Email [hcutlercfpe@verizon.net](mailto:hcutlercfpe@verizon.net)

## **Summary of Building Code Requirements Existing Building Code of Massachusetts Eighth Edition**

### **Renovations, Alterations and Expansion Wildstar Farm Equestrian Facility Sherborn, MA**

This Code Summary is based upon the Eighth Edition of the Existing Building Code of Massachusetts (EBCM). The EBCM consists of the 2009 Edition of the International Building Code and the MA amendments to that code documented in Chapter 34 of the Eighth Edition of the Massachusetts State Building Code (MSBC8). The MSBC8 shall be the basis for construction of new features and characteristics constructed in the building.

The proposed project will be an expansion of an existing barn to include new stables, a riding arena and a barn manager's apartment. Basic data concerning the existing building and the proposed addition to that building are provided below.

#### **Existing Physical and Occupancy Characteristics**

The primary characteristics of the existing barn for purposes of this report may be summarized as follows:

- The construction type is Type VB (unprotected, wood-framed).
- The building has two stories including the First Floor stables and the Second Floor hay loft.
- The building is approximately 14'-7" high above average grade measured to the mid-point of the mid-point of the existing barn roof.
- The building area is approximately 900 sf measured inside the exterior walls.
- The single occupancy classification is Use Group U (utility).
- Automatic sprinkler protection is not provided in the building.
- Fire standpipes are not provided in the building.

- A heat detection system is provided in the building that is connected to a central station and sounds an alarm in the main house. It does not sound alarms within the barn.
- Means of egress is based on exit access aisles leading exit doors to the exterior on the First Floor and one unenclosed interior stair from the Second Floor.

## **Proposed Work**

Conceptually, the proposed project will expand the existing 900 sf barn by the addition of a 4,000 sf stable area and a 15,000 sf riding arena. Within the new portion of the stable, there will be a barn manager's apartment. The upper level of the stable will be considered a mezzanine of the riding arena, allowing the building as a whole to be considered a single story with mezzanine building.

The stable portion of the addition will be of wood framed construction. The riding arena will be a membrane structure with a steel frame and fabric roof.

The characteristics of the expanded building may be summarized as follows:

- The construction type will remain Type VB (unprotected, wood-framed).
- The building will have one story plus a mezzanine.
- The building will be approximately 26' – 0" high above average grade measured to the mid-point of the new barn hip roof.
- The building area will be approximately 19,900 sf measured inside the exterior walls.
- The occupancy classification will be Use Group U (utility) with an accessory Use Group R-3 apartment.
- Automatic sprinkler protection will not be provided in the building.
- Fire standpipes will not be provided in the building.
- The heat detection system will be expanded to include the new stable building but not the arena. The system will continue to be connected to a central station and sound an alarm in the main house. It will not sound alarms within the arena.
- Means of egress will be based on exit access aisles leading exit doors to the exterior on the First Floor and one unenclosed interior exit access stair and one interior exit stair from the mezzanine.

## **Code Rationale**

The general characteristics of the basic physical and occupancy characteristics of the expanded building may be summarized as follows:

1. The base building is of Use Group U in accordance with the definition of that occupancy in MSBC8 Section 312.

2. The base building is exempted from sprinkler requirements by the lack of a listing of Use Group U in MSBC8 Table 903.2 (MA Amendments) and the fact that the building area limitation can be met using open perimeter increase without the sprinkler increase (See height and area limitations Table 120 of Appendix C and Section 506.2)
3. The apartment is allowed to be an accessory use of the Use Group U stable because it is subsidiary to the stable occupancy and is a mezzanine that is less than 10% of the area of the main floor (a mezzanine is not considered a story of the building but rather a portion of the floor below the mezzanine).
4. MSBC8 508.2.2 concerning accessory occupancies states that "the requirements of this code shall apply to each portion of the building based on the occupancy classification of that space".
5. The apartment must be considered to be of Use Group R-3 because it does have a dedicated stair that discharges to the exterior without requiring occupants to travel through the First Floor. The dedicated stair will be an enclosed stair with respect to the remainder of the building.
6. The threshold for requirements for sprinklers in Use Group R is 0 sf in accordance with the body of MSBC8 Table 903.2. Therefore, sprinkler protection will be required in the accessory apartment.
7. Note a of MSBC8 Table 903.2 allows use of an NFPA 13D sprinkler system in single dwelling units.

## **Building Code Requirements for Existing Buildings**

In accordance with MSBC8 Section 3401.1, the alteration, repair, addition, and change of occupancy of existing buildings shall be controlled by the provisions of the *International Existing Building Code 2009* (IEBC 2009) and its appendices as modified by Massachusetts Amendments. Those documents, taken together, are identified as the Existing Building Code of Massachusetts (EBCM). The requirements of the EBCM specifically applicable to proposed renovation and alteration project except those related to the structural and electrical systems are summarized below.

### **Basic EBCM Requirements**

The EBCM offers three alternatives for regulation of work in existing buildings: (1) the “Prescriptive Compliance Method”, (2) “Work Area Compliance Method” and (3) the “Performance Compliance Method”. These three approaches are considered mutually exclusive: that is, a project must be based on one of those methods and complete the requirements applicable to that method. With respect to the EBCM, it is appropriate that the project be regulated by the Prescriptive Compliance Method in accordance with EBCM Chapter 3 as discussed below.

Given that the proposed work includes expansion of the original 900 sf barn to a 19,900 sf barn and riding arena, the project will be dominated by the new construction requirements of the Eighth Edition of the Massachusetts State Building Code (MSBC8) including the requirements of Appendix C concerning agricultural buildings. The basic requirements of the MSBC8 including Appendix C applicable to the project are summarized in Table No. 1.

### **Prescriptive Compliance Method Requirements**

The following numbered paragraphs summarize the applicable requirements of EBCM Chapter 3 to the project.

#### **Building Materials**

(1) Continue use of existing materials in conformance with requirements or approvals in effect at the time of their erection or installation unless determined by the *code official* to be *dangerous* to life, health or safety. (301.2.1)

(2) Mitigate or make safe conditions related to existing building materials that are determined to be *dangerous* to life, health or safety. (301.2.1)

(3) Utilize new and replacement materials as permitted by the applicable code for new construction. (301.2.2)

(4) Utilize like materials for repairs and alterations, provided no hazard to life, health or property is created. (301.2.2)

(5) Do not use hazardous materials where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location. (301.2.2)

Item 1 through 5 will be satisfied by continued classification of the building as Type VB construction and expansion of the building in accordance with the MSBC8 provisions for new construction.

#### Additions

(6) Construct additions to the building in compliance with the requirements of the Massachusetts State Building Code for new construction. (302.1)

(7) Alter the existing building or structure so as to ensure that the existing building together with the addition are no less conforming with the provisions of this code than the existing building was prior to the addition. (302.1)

(8) Utilize a construction type that results in compliance of the existing building and the addition with the height and area limitations of Chapter 5 of the MSBC8. (302.1)

The building will be expanded as a result of the proposed project. Therefore, Items 6, 7 and 8 are applicable to the current project. The new construction will comply with the MSBC8 provisions for new construction that are summarized in Table No. 1. As demonstrated in the discussion of Item 1 in Table No. 1, the unsprinklered building will comply with the height and area restrictions of the MSBC8.

#### Alterations

(9) Design and construct alterations in compliance with the requirements of the *Massachusetts State Building Code* for new construction and also such that the existing building or structure is no less conforming to the provisions of this code than the existing building or structure was prior to the alteration. (303.1)

The alterations within the existing building will be in accordance with the MSBC8 provisions for new construction. The basic requirements of the MSBC8 for a building of Use Group U are summarized in Table No. 1.

#### Means of Egress Capacity Factors

(10) Utilize means of egress capacity factors in accordance with Section 102.2.2.1 (303.6)

EBCM Section 102.2.2.1 identifies means of egress problems such as an insufficient number of means of egress or insufficient egress capacity that, if present in an existing building, must be corrected. Separately, MSBC8 Section 1005.1, Exceptions 2 and 3 permit use of egress capacity factors of 0.2 inches per person and 0.30 inches per person for doors and stairs respectively in a unsprinklered building.

#### Glass Replacement

(11) Install or replace of glass as required for new installations. (306.1)

New installations of glass will comply with MSBC8 requirements for new construction.

#### Change of Occupancy

(12) Make no change in the use or occupancy of any building that would place the building in a different division of the same group of occupancy or in a different group of occupancies, unless such building is made to comply with the requirements of this code for such division or group of occupancy except that, subject to the approval of the building official, the use or occupancy of existing buildings shall be permitted to be changed and the building is allowed to be occupied for purposes in other groups without conforming to all the requirements of this code for those groups, provided the new or proposed use is less hazardous, based on life and fire risk, than the existing use. (307.1)

The proposed project will not result in a change of occupancy of the existing building.

(13) Obtain a certificate of occupancy once it has been determined that the requirements for the new occupancy classification have been met. (307.2)

There will be no change of occupancy as a result of the proposed project. Compliance with the Prescriptive Compliance Method of the EBCM will insure the project qualifies for a certificate of occupancy upon completion of the proposed work.

#### Energy Conservation

(14) Buildings undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with the *International Energy Conservation Code*. (307.5)

In accordance with the IECC, altered building systems or portions thereof shall conform to the provisions of the IECC as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with the IECC.

In this particular project, there are building features that will be regulated by the IECC because they are being altered or being constructed new. With respect to the insulation of the building, the IECC will require existing spaces that are converted from unconditioned to conditioned and new conditioned spaces shall be insulated in accordance with the IECC provisions for new construction. That requirement will be applicable to the toilet, viewing room, owner's tack room and apartment.

### Mechanical Systems

(15) Make no change in the occupancy of a structure that will subject the structure to the special provisions of the *International Mechanical Code* applicable to the new occupancy without approval. The code official shall certify that the structure meets the intent of the provisions of law governing building construction for the proposed new occupancy and that such *change of occupancy* does not result in any hazard to the public health, safety or welfare. (307.8)

There are no mechanical systems in the expanded building except an exhaust ventilation fan in the single toilet room and the hearing system of the apartment. Those features will be required to comply with the mechanical and energy conservation codes.

### Other Prescriptive Compliance Method Requirements

The "Prescriptive Compliance Method" requirements include multiple additional requirements that are not applicable to this building because the conditions those requirements address are not present in the building. Those non-applicable sections are:

- Section 305.0 - Fire Escapes
- Section 308 – Historic Buildings
- Section 309 – Moved Structures

### **Accessibility**

Because the cost of the proposed project will exceed \$100,000 and also exceed 30% of the assessed value of the existing building, all existing and new building features and characteristics regulated by the Access Regulations will be required to comply with the Regulations of the MA Architectural Access Board (521 CMR). Those requirements are not included in this Code Summary.

**Table No. 1**  
**Summary of New Construction Requirements**  
**Eighth Edition of the Massachusetts State Building Code**

**Construction Type**

(1) Maintain MSBC8 Type VB construction. (T-503)

The expanded building is required to satisfy the height and area limitations of the MSBC8 for new construction. For purposes of calculation of those limitations, the building will have the following characteristics:

- Construction Type: VB
- Occupancy Classification: U
- Sprinkler Protection: No
- Perimeter Access: 100%

As an agricultural building, the height and area of the barn and arena building are regulated by Table C102.1 of MSBC8 Appendix C. The provisions of Table C102.1 limit buildings with the above characteristics to one story in height and 12,000 sf plus the allowable area increase permitted for open perimeter in MSBC8 Section 506.2. For 100% perimeter access, Section 506.2 allows a 75% increase in the Table C102.1 allowable area. The allowable area is, therefore, 1.75 times the tabular allowance of 12,000 sf or 21,000 sf. The 19,000 sf building will therefore, satisfy the height and area limits for a building with the above listed characteristics.

(2) Utilize combustible materials of construction without restriction except materials regulated as interior finish and except the fabric covering of the arena membrane building.

The use of combustible materials in a building of Type VB construction is not restricted except materials used as interior finish and materials used as the arena exterior membrane and interior liner. The flammability characteristics of membrane and liner are restricted by MSBC8 Section 3102.3.1.

**Building Separation**

(3) None required or provided.

**Occupancy Separations**

(4) Provide a one-hour fire rating for walls and floor assembly including supporting construction between the apartment dwelling unit and the



remainder of the building. (420)

### **Primary Structural Elements**

- (5) Provide an unrated structural frame except as required for support of the wall and floor assemblies separating the residential apartment from the remainder of the building. (T-601)

### **Roof Assembly**

- (6) Provide an unrated roof assembly. (T-601)

### **Floor Systems**

- (7) Provide unrated floor assemblies except as required by Item 4. (T-601, 420)

### **Interior Walls and Partitions**

- (8) Provide rated partitions for enclosure of the apartment in accordance with Section 420. (420)
- (9) Provide partitions designed to resist the passage of smoke constructed of combustible materials which extend from the floor below to the underside of the floor or roof above around the spaces identified as requiring smoke resistant enclosures in Table No. 1 concerning incidental use areas. (508.2.5.2, T-508.2.5)
- (10) Provide unrated doors to the areas identified in Item 9 that are self-closing or arranged for automatic closing upon detection of smoke. (302.1.1.1)

### **Exterior Walls**

- (11) Maintain existing bearing and non-bearing exterior walls and perimeter columns and beams of unrated, non-combustible construction. (T-601, T-602)
- (12) Utilize, as desired, unlimited, unprotected exterior wall openings for all exterior walls. (705.8.1, T-705.8)

The fire separation distances for all exterior walls of the buildings measured to the centerlines of the adjacent public streets, to adjacent interior lot lines and to imaginary lot lines between other buildings of the complex will all exceed 30 feet. For that fire

separation distance, the exterior walls at all locations permitted to be unrated and with unlimited openings.

### **Fire Alarm System**

- (13) Provide a non-required manual fire protective signaling system having the basic features required by MSBC8 Section 907.0 in the stable but not the arena.  
(Not required)
- (14) Provide interconnected multiple station smoke alarms within the apartment. (907.2.9, 907.2.11.2)
- (15) Arrange the fire protective signaling system for activation by any required smoke detectors and optional manual fire alarm boxes. (907.5)

At the least, interconnected, multiple station, photoelectric type smoke alarms will be provided within the apartment and interior egress path to and through the First Floor.

The existing fire detection and alarm system of the barn monitoring existing and new heat detectors in the stable and, optionally, the smoke alarms or smoke detectors in the apartment will be provided for a higher level of protection of the building. That system will be connected to transmit alarms to a central station and sound an alarm in the main house on the property.

### **Means of Egress**

- (16) Provide 2 doors to the corridor system from all rooms or spaces with occupant loads of more than 50 persons or in which the common path of travel distance exceeds 75 ft. (1015.1, T-1015.1, 1014.3)
- (17) Where two exit or exit access doors are required from a room or other space, separate the doors by a distance equal to or greater than one third of the longest diagonal of the area served.  
(1015.2.1, Exception 2)
- (18) Provide sufficient egress capacities for the calculated occupant loads of the separate buildings. (1005.1)

Based on the low populations of the two levels of the building and the egress capacity of any single means of egress door or stair, there will be sufficient egress capacity for the

calculated occupant loads of the individual rooms, the individual levels and the building as a whole.

- (19) Locate exits as required to limit exit access travel distances to less than 250 ft. (1016.1, T-1016.1)
- (20) Provide exit signs complying with Section 1011 in all rooms that require two or more exits or exit access paths (See Item 22) and in the common exit access paths of the building. (1011.1)
- (21) Provide means of egress lighting in all portions of means of egress in accordance with Section 1006. (1006)

### **Sprinkler Systems**

- (22) Provide automatic sprinkler protection in accordance with NFPA 13D in the apartment of the building. (506.3, 903.2.1, 903.2.3)

Automatic sprinkler protection is not required by MSBC8 Table 903.2 in buildings of Use Group U. Sprinkler protection is also not required to satisfy the height and area limitations of Chapter 5 and Appendix C.

Independently of the MSBC8, Massachusetts General Laws, Chapter 148, Section 26G, requires sprinklers in most buildings having an aggregate area on all levels of more than 7,500 sf. However, the law is explicitly not applicable to agricultural building or residential buildings. Therefore, Section 26G does not apply to the current project.

### **Fire Extinguishers**

- (23) Do not provide fire extinguishers for general protection of the building. (906.1)

The basic requirement of Section 906.1 is that portable fire extinguishers shall be provided for general protection most buildings but not for buildings of Use Group U.

### **Standpipe**

- (24) Do not provide a fire standpipe system in the building. (905.3.1, 905.3.9)

Fire standpipes are required in buildings with floor assemblies more than 30 feet above the lowest level of fire department vehicle access. The Wildstar Farm facility does not have a floor that high above the level of fire department vehicle access.

## **Emergency Power**

- (25) Provide emergency power for the fire alarm system, exit signs and emergency lights except do not provide emergency power for means of egress illumination in rooms and spaces that do not require two or more means of egress (see Item 17). (907.6.2, NFPA 72, 1011.5.3, 1006.3)

## **Interior Finish**

- (26) Utilize interior finish for walls and ceilings without restriction except utilize Class C or better interior finish within the apartment. (803.9, T-803.9)
- (27) Utilize floor coverings without restriction except utilize traditional floor coverings such as wood, vinyl, linoleum, terrazzo or other resilient floor finish materials or carpeting that complies with the DOC FF-1 "pill test" (CPSC 16 CFR, Part 1630) in the apartment. (804.4.1)

**Table No. 1A**  
**Enclosures of Incidental Use Areas**  
**(MSBC8 Table 508.2.5)**

Furnace room where any piece of equipment is over 400,000 Btu per hour input	Provide automatic fire-extinguishing system and smoke resistant enclosure
Rooms with any boiler over 15 psi and 10 horsepower	Provide automatic fire-extinguishing system and smoke resistant enclosure
Refrigerant machinery rooms	Provide automatic sprinkler system and smoke resistant enclosure
Laboratories and vocational shops	Provide automatic fire-extinguishing system and smoke resistant enclosure
Laundry rooms over 100 square feet	Provide automatic fire-extinguishing system and smoke resistant enclosure
Waste and linen collection rooms over 100 square feet	Provide automatic fire-extinguishing system and smoke resistant enclosure