

Wednesday, February 17th, 2016

Julie D. Mercier
Community Development Director
Town of Reading
16 Lowell Street
Reading, MA 01867

RE: Type VA Construction for Reading Village 40B

Dear Julie:

The summary provided below is based on the new construction provisions of the Massachusetts State Building Code (MSBC), 8th Edition. This memo specifically addresses construction options for the proposed Type VA Construction for Reading Village, a residential development containing residential dwelling units and residential parking located at 39/41 Lincoln St and 2-12 Prescott Street in Reading, MA

APPLICABLE CODES

- 780 CMR: Massachusetts State Building Code, 8th Edition
- 527 CMR: Massachusetts Fire Prevention Regulations
- 248 CMR: Massachusetts Fuel Gas and Plumbing code
- 524 CMR: Massachusetts Elevator Regulations
- 521 CMR: Massachusetts Architectural Access Board
- International Mechanical Code, 2009 Edition as adopted and amended by the MSBC
- National Electrical Code (NFPA 70, 2011 Edition) as adopted and amended by 527 CMR c12
- International Energy Conservation Code, 2009 Edition as adopted and amended by the MSBC

Please note that at the time of the letter, the Stretch Code has not been adopted by Reading, MA.

CONSTRUCTION TYPE – SPECIAL CONDITIONS

The code provisions of MSBC Section 509 permit the use of special conditions that are exempt from, or modify, the specific requirements of the MSBC related to height and area.

MSBC Section 509.4

Section 509.4 of the MSBC allows one (1) story of above grade Group S-2 parking garage to be provided under a building of Group R. The floor assembly between the parking garage and the Group R above shall comply with the construction type required for the parking garage. The floor assembly between the parking garage and the Group R above cannot have a fire resistance rating less than that required for occupancy separation. The parking garage is required to be of Type I construction for an enclosed parking garage, and Type I or Type IV construction for an open parking garage. The entrance to the parking garage must be located at grade. This approach permits the number of stories to be used in determining the minimum construction type to be measured from the floor above the parking garage. It is important that the parking level be classified as above grade to utilize the approach specified in MSBC Section 509.4.

BUILDING HEIGHT AND AREA MODIFICATIONS – TYPE VA CONSTRUCTION

The following sections discuss the construction type of the residential structure above the 2-hour fire-rated horizontal assembly (2-hour fire-rated assembly based on construction type of parking garage). In

accordance with MSBC Section 509.4, the parking structure below the 2-hour fire-rated assembly is Type IB construction.

Height – Residential Buildings

The building height (in stories) is measured from the 2-hour fire-rated horizontal separation and is based upon the allowances for the construction type above the horizontal assembly, in this case Type VA. Therefore, the total height (in stories) of the Type VA building is limited to four (4) stories above the 2-hour fire-rated horizontal separation which is located 1-story above grade (MSBC Table 503 and Section 504.1 permitted increase for automatic sprinkler protection). The current design complies with the height limitations (in stories) for Type VA construction (MSBC 503, 504.1, and 509.4). The actual height of a Type VA structure is limited to 70 feet. The height of the building, measured in feet, is measured from grade plane and not the 2-hour fire-rated horizontal assembly. The height of structure from the grade plane is approximately 63'.

Area – Residential Buildings

Type VA construction permits a base allowable area of 12,000 square feet. The project is protected throughout with an automatic sprinkler system installed in accordance with NFPA 13 and is permitted an area increase of 200 percent (MSBC 506.3). The total allowable area per residential floor per building is increased from 12,000 to 36,000 square feet for Type VA construction. Please note a frontage increase was not taken.

The total permitted building area in accordance with MSBC Section 506.4 is 108,000 square feet (36,000 sq. ft. x 3) for the Group R-2 occupancy. Based on the maximum permitted height of four (4) stories, each residential floor is permitted a maximum area of 27,000 square feet (108,000 sq. ft. / 4 stories). The proposed footprint area of the building is approximately 23,300 square feet. Therefore, Type VA construction is acceptable based on the area of the building.

HEIGHT, AREA, AND CONSTRUCTION TYPE EVALUATION

In order to adequately determine the height of a building, the terms 'grade plane' and 'building height' should be understood. The special provisions related to the permitted construction type of buildings are highly dependent on the height of a structure.

MSBC Section 502 defines the term grade plane. The section states:

"A reference plane representing the average of finished ground level adjoining the building at exterior walls. Where the finished ground level slopes away from the exterior walls, the reference plane shall be established by the lowest points within the area between the building and the lot line or, where the lot line is more than 6 feet from the building, between the building and a point 6 feet from the building."

The grade plane is critical in determining the height of a building and the number of stories. Since the finished ground surface adjacent to the building may vary, the mean average taken at various points around the building constitutes the grade plane.

MSBC Section 502 defines the term building height. The section states:

"The vertical distance from grade plane to the average height of the highest roof surface."

The height of a building is measured vertically from the grade plane to the average height of the highest roof surface. The upper point of measurement is the roof surface of the building, with consideration given to sloped roofs (such as a hip or gable roof). In the case of sloped roofs, the average height would be used as the upper point of measurement, rather than the eave line or the ridge line. The

average height of the roof is the mid-height between the roof eave and the roof ridge, regardless of the shape of the roof.

If the building has multiple roof levels, the highest of the various roof levels must be used to determine the building height.

Penthouses and rooftop structures do not contribute to the height of the building in number of stories above grade or in feet, provided they meet the limitations permitted by the code. Penthouses and other projections above the roof are limited to 18 feet in height unless they are used to enclose tanks or elevators which would allow for a height of 28 feet above the roof. Penthouses and rooftop structures are limited in area to one-third (1/3) the area of the supporting roof.

FIRE RESISTANCE RATINGS

The fire resistance ratings required for Type VA construction are summarized in the table below.

Building Element (MSBC Table 601)	Type VA Fire Resistance Rating Required (Hours) ^a
Primary Structural Frame	1
Exterior Bearing Walls	1
Interior Bearing Walls	1
Exterior Non-bearing Walls	0 _b
Interior Non-bearing Walls	0
Floor construction and secondary members	1
Roof construction and secondary members	1

Note A: Shaft construction must be supported by construction equivalent to the fire rating of the shaft.

Note B: Fire separation distance of exterior walls determines fire rating.

Shaft enclosures must be constructed as fire barriers. The supporting construction for a fire barrier must be protected to afford the required fire-rating of the fire barrier being supported (MSBC 707.5.1). Shafts connecting 4-stories and more must be 2-hour fire rated, including all supporting construction to meet the continuity of construction criteria for fire barriers (MSBC 707.5.1 and 708.5). This requirement applies to all shafts (i.e. elevators, stairways, mechanical).

Corridor Walls

Residential corridors are required to be provided with a minimum fire-rating of ½ hour. Corridor walls must be constructed as fire partitions in accordance with MSBC Section 709. Doors in residential corridors are required to be provided with a minimum rating of 20-minutes in accordance with MSBC Section 715.4.

Dwelling Unit Separation Walls

Residential dwelling unit separation walls in Type VA buildings are required to be provided with a minimum fire rating of 1 hour in accordance with MSBC Section 709.3. Since floors are required to have

a 1-hour fire resistance rating based on the construction type of the residential buildings, they inherently satisfy the dwelling unit separation requirement.

Exterior Walls of Exit Enclosures

Where non-rated walls of an exit enclosure are exposed by other parts of the building at an angle of less than 180 degrees, the building's exterior walls within 10 feet horizontally of a non-rated wall must have a fire resistance rating of at least 1-hour (MSBC 1020.1.4). Based on the construction type of the building the exterior walls are provided with a 1-hour rating (exterior bearing walls).

Draftstopping and Fire Blocking

In combustible construction, fireblocking must be installed to cut off concealed draft openings (both vertical and horizontal) and must form an effective barrier between floors, between a top story and a roof or attic space. Fireblocking must be installed as required by MSBC Section 717.2.2 through 717.2.7. Draftstopping is not required in floors per MSBC Section 717.3.2, Exception No. 1. Additionally, draftstopping is not required in concealed roof spaces (attics) per MSBC Section 717.4.2, Exception No. 2.

EXPOSURE PROTECTION

Type VA construction requires load bearing exterior walls to be 1-hour fire resistance rated, regardless of the fire separation distance.

Fire separation distance (FSD) is defined as follows:

“The distance measured from the building face to one of the following:

1. The closest interior lot line;
2. To the centerline of a street, an alley or public way; or
3. To an imaginary lot line between two buildings on the same property

The distance shall be measured at right angles from the face of the wall.”

For Type VA construction, fire separation distance of greater than 30 feet permits non-bearing exterior walls to be 0-hour fire resistance rated with unlimited unprotected openings in accordance with MSBC Table 602 and Section 705.8. This Table and Section also require non-bearing exterior walls to be 1-hour fire resistance rated for any fire separation distance less than 30 feet. The following table outlines requirements for non-bearing exterior walls for Type VA construction. The required exterior wall ratings and the allowable openings are determined based on the measured fire separation distance. Reading Village is designed in accordance with these requirements.

Walls Ratings and Opening Protective – <u>Non-Bearing</u> Exterior Walls (Type VA Construction)		
Fire Separation Distance (feet)	Wall Rating (hours)	Allowable Area of Openings (%)
0 to less than 3	1	Not Permitted
3 to less than 5	1	15%
5 to less than 10	1	25%
10 to less than 15	1	45%
15 to less than 20	1	75%
20 to less than 30	1	No Limit
30 or greater	0	No Limit

