

HKTA / a r c h i t e c t s

Building Code Summary:

Re: Apartments, 133 York Street, Portland, Maine

Applicable Codes: International Building Code, 2009 (IBC)

International Energy Conservation Code, 2009 (IECC)

NFPA 101 (Life Safety)

Adopted as part of the MUBEC:

(ASHRAE) Standards:

62.1 - 2007 (Ventilation for Acceptable Indoor Air Quality)

90.1 - 2007 (Energy Standard for Buildings except Low-Rise Residential Buildings)

Summary: New three story wood framed residential structure for 6 two bedroom living units at approximately 1,000 ft² each, constructed on top of a lower level concrete foundation and a three hour horizontal assembly. The lower level is an open garage for parking of six vehicles.

Residential Building Footprint: 2,419 ft².

Garage Level Parking Footprint: 2,335 ft²

Building Height: 41'-4"

Structure is equipped throughout with an approved automatic sprinkler system in accordance with Chapter 9 of the IBC.

International Building Code, 2009 (IBC)

Chapter 3 Occupancy Classification

Section 311 and 311.3; Group S-2 – Parking

Section 310; Group R-2 - Residential

Chapter 4 Special Detailed Requirements Base of Use and Occupancy

Section 406.2 Parking Garages – 406.2.6 Asphalt surface permitted

Section 406.2.7 Mixed occupancy separation - See Section 508.1

Section 406.3.2 Opening Parking definition - Section 406.3.3.1

Section 406.3.3 Construction - Type I, II or IV. See Section 509, 509.2 Type IA is used.

Section 406.3.3.1 Openings - 20% of the total perimeter wall area of each level – this project needs 430 ft²; provided 626 ft². The aggregate length must be 40% of the perimeter; project needs 92 lin. ft.; provided 95 lin. ft.

Section 420 Occupancy in R-2; shall comply with the provisions of this section. Section 420.2 Walls separating dwelling units shall be considered fire partitions and constructed in accordance with Section 709.

Section 420.3 Horizontal separation floor assemblies shall be constructed as horizontal assemblies in accordance with Section 712

Chapter 5 Building Height and Areas

Sections 503 and 504 – see table 503

Group S-2; Type IA, unlimited; per Section 509.2

Group R-2; Type VB, 2 stories and 7,000ft² per story.

Section 504.2 – Automatic Sprinkler system Increase – For Group R, buildings equipped through out with an approved automatic sprinkler system in accordance with Section 903.3.1.2, the values in the table for height may be increased by 20 feet and the number of stories is increased by one.

Section 508.3.3 Group R-2 shall be separated other dwelling units per requirements of Section 420.

Section 509 Special Provisions; modifies the requirements regarding the allowable height and areas based on occupancies and type of construction.

Section 509.2 – Horizontal building separation allowance.

Building considered separated for purpose of determining area limitations, limitations of stories and type of construct where all seven conditions are met:

1. Three hour horizontal separation
2. The story below is no more than one story above grade plane.
3. Building below the horizontal assembly is type 1A construction.
4. Stairways and shafts through horizontal assembly not less than two hour rating.
5. The building above the horizontal level is permitted to have Group R.
6. The building below the horizontal assembly shall be protected by an approved sprinkler system and permitted to be S-2.
7. Max. Building height shall not exceed allowable in Section 503. Max. allowable height is 60 feet with sprinkler system see 504.2; Building is 41'-4".

Chapter 6 Types of Construction

Section 602 - Building elements shall have the fire-resistance rating not less than that specified in Table 601 and exterior walls not less than specified in table 602.

Table 601:

Type IA construction for below horizontal building separation assembly:
Three hours for structural frame and bearing walls. - Required by **Section 509.2**

Type VB for construction above horizontal building separation assembly:
0 Hours

Table 602:

Fire-Resistance Rating Requirements for Exterior Walls Based on Fire Separation Distance.

Fire Separation for distances between 5 feet and ten feet for type VB construction for Occupancy Group R is 1- hour.

Chapter 7 Fire and Smoke Protection Features

Section 704.1 - Fire-resistance ratings of structural members are to comply with the type of construction in Table 601.

Section 705.2.2 - Projections from walls of Type V construction shall be of any approved material.

Section 705.5 - Exterior walls shall be rated in accordance with Table 601 and 602.

Section 705.8.1 – The maximum area of unprotected and protected openings permitted in the exterior wall in any story shall not exceed the percentages in Table 705.8; Fire Separation = 5 to less than 10 feet, Degree of opening protection = Unprotected, Sprinklered, Allowable area = 25%.

Section 707.3.2 - Exit enclosures fire resistance ratings separating exits shall comply with Section 1022.1.

Section 708.4 - Shaft enclosures connect four or more stories must have a 2 hours fire-resistance rating.

Section 709 – Walls separating dwelling units shall be 1 hour, **Section 709.3** - Fire partitions shall have a rating of not less than 1 hour, exception: in Type VB construction unit separation walls shall have ½ hour rating when building is has a sprinkler system in accordance with 903.3.1.1.

Section 712 - Horizontal Assemblies, 712.3 fire resistance rating of floor and roof assemblies shall not be less than required by building type construction.

Type VB allows 0 hour rating, see table 601.

Section 713 – Penetrations, Through Penetrations of Horizontal Assemblies And Rated Wall Assemblies: Section 713.3, Rated Walls, 713.3.1.1 and Section 713.4, Penetrations of fire resistance-rated floor; through penetrations shall be protected by an approved firestop system tested in accordance with ASTM 814 or UL 1479. Floor penetrations contained in the cavity of the wall does not need a T rating.

Section 715 – Opening Protectives, Section 715.4, Doors shall have fire protection ratings of table 715.4; required assembly rating 2 hours; Door shall be 1 ½ hour. Applies to unit entry door from stairs.

Section 717 – Concealed Spaces, Section 717.3 Draftstopping in floors, 717.3.2 Group R-2, Exceptions: Not required in building equipped with a Sprinkler system in accordance with Section 903.3.1.1 and 903.3.1.2.; Section 717.4.2:

Exception, In occupancies In Group R-2 not exceeding four stories, the attic space to be subdivided into areas not exceeding 3,000 ft². (Roof area 2,416 ft²).

Chapter 9 Automatic Sprinkler System

Section 903.2.8 - Group R: Requires automatic sprinkler system. **Section**

903.3.1.2.1 - Automatic sprinkler systems in Group R occupancies up to and including four stories permitted to be installed in accordance with NFPA 13R.

Section 903.3.1.1 - NFPA 13 sprinkler systems. Where code requires the building or portion thereof is to be equipped throughout with an automatic sprinkler system in accordance with this section, sprinklers are to be installed in accordance with NFPA 13. Reference Section 509.2 - Building below the horizontal assembly, Type 1A construction and the horizontal assembly shall be protected by an approved sprinkler system and permitted to be S-2.

Chapter 10 Means of Egress

Section 1007.3 - Stairways: **Exception:** The areas of refuge are not required in Group R-2 occupancies.

Section 1009.1 - Stairway widths shall not be less than 44 inches.

Section 1015.1 - Exit access doorways from spaces; Table 1015.1 Space with one exit, maximum occupant load 10, **Exception** in Group 2 one means of egress from an individual dwelling unit with a maximum occupant load of 20 where the dwelling unit is equipped with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.

Section 1021.1 – Number of Exits: all spaces within each story are to have the number of exits as specified in Table 1021.1. **Exception**, in Group R-2 one means of egress is permitted from an individual dwelling unit where equipped by an automatic sprinkler system. Only one exit shall be required from stories as indicated in Table 1021.1, See foot note reference to Section 1029.

Section 1022.1 Enclosure required - Exit enclosures shall have a fire-resistance ratings of not less than **2 hour** where connecting four or more stories.

Section 1029 – Emergency Escape; provisions shall be made for emergency escape in Group R. **Exception:** in other than Group R-3, buildings equipped with throughout with and approved automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.

International Energy Conservation Code, 2009 (IECC)

Chapter 4: Residential Energy Efficiency

Section 402 contains the insulation R-value requirements and the window U-factor requirements for the building envelope.

Section 401.1 This chapter applies to residential building as defined. Note that for the purposes of the code, a residential buildings is one used for residential occupancies, R-2, and that is less than four stories. *Commentary: There is a conflict here when considering this particular building because of **Section 509 Special Provisions**; modifies the requirements regarding the allowable height and areas based on occupancies and type of construction. For the purpose of this analysis the R-2 portion is considers a three-story building separated from the lower story parking level. While the building is a four-story building, and*

hence, might be considered by Chapter 5 a commercial building, the horizontal separation allows (Section 509.2 – Horizontal building separation allowance) two occupancies to be considered as two separate buildings.

Section 402.1.1 - Insulation and fenestration criteria: the building thermal envelope shall meet the requirements of Table 402.1.1 based upon climate zone.

TABLE 402.1.1

Climate Zone 6	
Fenestration U-Factor	0.35
Glazed Fenestration SHGC	NR
Ceiling R-Value	49
Wood Framed Wall R-Value	20
Floor R-Value	30

NFPA 101, 2012 (Life Safety Code)

Chapter 4 General

Section 4.6 – General Requirements

Section 4.6.3 – Unless specified in another provision the (1) stories in height shall be counted starting at the level of exit discharge. (5) Where a maximum one-story above grade parking structure, of Type I construction with grade entrance is provide under the building, the number of stories shall be permitted to be measured from the floor above such parking area.

Chapter 6 Classification of Occupancy

Section 6.1.8 Residential

Section 6.1.8.1.5 Apartment Building, Three or more dwelling units

Section 6.6.13 - Storage occupancy, (7) Parking Structure

Section 6.1.14.2.3 Separated Occupancy - By fire- resistive assemblies as specified in Table 6.1.14.4 – Required separation is two hours but where the building is protected throughout by an approved automatic sprinkler system in accordance with 9.7.1.1(1), and supervised in accordance with 9.7.2 then the fire resistance rating is permitted to be reduced by 1 hour.

Chapter 7 Means of Egress

Section 7.1.3.2 - Exits, - Code require exits be separated from other parts of the building, separating construction shall meet the requirements of 8.2 and the following. Minimum one hour when connecting three or fewer floors, separation shall be supported by construction of not less than 1-hour, separation shall be 2-hour where exit connects four or more stories unless the minimum 1-hour enclosure in accordance with **Section 30.2.2.1.2**, In buildings protected by an approved supervised automatic sprinkler system in accordance with Section 30.3.5, exit enclosures shall have a minimum 1-hour rating and doors shall be 1-hour protection rating.

Section 7.4 – Number of means of Egress - This section specifies the number of means of egress unless specified by occupancy chapter, (30.2.4 Apartment Buildings, **Section 30.2.4.6 - Single Exit**)

Section 7.5.1.1.3 - The arrangement of means of egress shall not apply where a single exit is permitted.

Section 7.6 Measurement of Travel Distance – Table A. 7.6:

Residential Apartment Buildings – Sprinklered

Common Path Limit 50 feet

Dead–End Limit 50 feet

Travel Distance limit 325 feet

Chapter 8 Features of Fire Protection

Section 8.1.2 - Automatic Sprinkler Systems, - When another provision of this chapter requires a sprinkler system, the Automatic sprinkler system shall be installed in accordance with subparts 9.7.1.1.

Section 8.2.1.1 See Section 30.1.6 -No special requirements

Section 8.2.1.2 Construction - See Table A.8.2.1.2; Type I(332) and V N

Chapter 30 New Apartment Buildings

Section 30.2 Means of Egress, Section 30.2.2 Means of egress Components – 30.2.2.1.2 – In buildings protected by a approved supervised automatic sprinkler system in accordance with **30.3.5**, exits shall have a minimum rating of 1-hour fire protection.

Section 30.2.2.2 Doors - Doors complying with 7.2.1 are permitted.

Section 30.2.2.3 Stairs - Stairs complying with 7.2.2 are permitted.

Section 30.2.4 Number of Means of Egress, Section 30.2.4.6 - A single exit is permitted where the total number of stories does not exceed four provided:

1. Four or fewer dwelling per floor
2. Building protected throughout by a Sprinkler system in accordance with 30.3.5.
3. Exit stairway does not serve more than one-half story below level of exit discharge.
4. Travel distance is less than 35' from door to exit.
5. Exit stair is completely enclosed or separated from the rest of the building by barriers having a minimum of 1- hour fire resistance rating.
6. All openings are protected by self-closing assemblies having a 1-hour protection rating.
7. All corridors serving a access to exits are 1-hour rated.
8. Horizontal and vertical separation having a minimum 1/2 - hour fire resistance rating is provided between dwelling units.

Section 30.3 Protection - 30.3.1 Vertical Openings, 30.3.1.1.4 In Buildings protected throughout by an approved supervised automatic sprinkler system in accordance with 30.3.5, wall enclosing the vertical openings shall have a one hour fire resistance rating and doors are to be min. 1-hour fire protection rating.

Section 30.3.5 Extinguishment Requirements - 30.3.5.2 Where an automatic sprinkler system is installed, the system shall be installed in accordance with Section 9.7. In buildings, four or fewer stories above grade plane, systems in accordance with NFPA 13R, shall be permitted.

Assembly Design Criteria

UL Design: Fire Resistance Assemblies

- A. Exterior Walls: 1-hour, U344 or U305: for walls adjacent to property lines.
- B. Horizontal Assemblies; 3-hour, D918 and D919; For floor between occupancy types
- C. Floors between Dwelling units; 1-hour, L-515
- D. Walls between Dwelling Units; 1-hour, U-305
- E. CMU Wall Ground floor: 3-hour, U904: for compliance with **IBC Section 509.2** – Horizontal building separation allowance.
- F. CMU Walls above horizontal assembly: 2-hour, U905: for compliance with **IBC Section 509.2** – Horizontal building separation allowance.