

Maine Medical Center  
East Tower Expansion  
Existing Building Code Report  
December 15, 2017



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## INTRODUCTION

Perkins + Will has retained AKF Group LLC to prepare this existing building narrative code report for the vertical addition to East Tower on the Maine Medical Center Campus located in Portland, ME. The proposed addition will add two additional stories of patient beds as well as a penthouse and helipad on the roof.

## QUICK FACTS

- Aggregate Building Area: Approximately 240,000 SF
- Project Area (Level 6 & 7): Approximately 60,000 SF
- Height: 8 stories
- Sprinkler Status: Fully sprinklered
- Standpipe System: Existing standpipe to be extended to addition
- Occupancy: Use Groups B, I-2 (Condition 2), S-1 (accessory), & S-2 (accessory)
- Construction Type: Type IA required

## 1. APPLICABLE CODES & STANDARDS

The State of Maine requires municipalities with more than 4,000 residents to adopt and enforce the Maine Uniform Building and Energy Code (MUBEC). The next edition of the MUBEC is expected to become effective in 2017 or early 2018. These codes are outlined below and serve as the basis for this report.

- International Building Code (IBC), 2015 Edition with ME Amendments
- International Existing Building Code (IEBC), 2015 Edition with ME Amendments
- International Energy Conservation Code (IECC), 2009 Edition with ME Amendments
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 62., Standard for Ventilation and Indoor Air Quality, 2013 edition

In addition to the codes identified above, the State Fire Marshal's Office promulgates the Rules of the State Fire Marshal, which adopt numerous NFPA codes and standards, including the following:

- NFPA 1, Uniform Fire Code, 2006 Edition with ME Amendments
- NFPA 13, Standard for Installation of Sprinkler Systems, 2016 Edition

The Plumbers' Examining Board promulgates the Maine Plumbing Code, which includes the following:

- International Association of Plumbing and Mechanical Officials (IAPMO), 2015 Uniform Plumbing Code (UPC), with ME amendments

The Electricians' Examining Board adopts and amends the following electrical code:

- NFPA 70, National Electrical Code, 2017 Edition

The following federal regulation also applies to the project (as referenced by the Maine Human Rights Commission – 5 M.R.S. §4594-G):

- Americans with Disabilities Act (ADA), 2010 Standards for Accessible Design

The Joint Commission also requires compliance with the following:

- NFPA 101, Life Safety Code, 2012 Edition
- NFPA 99, Health Care Facilities Code, 2012 Edition

The following design standards will also be used for the project:

- Facilities Guidelines Institute (FGI), Guidelines for Design and Construction of Hospitals and Outpatient Facilities, 2014 Edition
- ASHRAE Standard 170, Ventilation of Healthcare Facilities, 2013 edition

## 2. PROPOSED SCOPE OF WORK & USE

The proposed project will add two stories (Level 6 and 7) to the existing East Tower clinical building on the Maine Medical Center campus in Portland, ME. A penthouse and helipad structure will also be constructed on the new roof of the building. The use groups proposed in the addition are as follows:

Use Group B/business:	Office areas, staff lockers, conference/meeting space less than 750 SF and 50 people
Use Group I-2 (Condition 2)/healthcare:	Inpatient hospital care
Use Group S-1/ordinary hazard storage:	Linen storage (accessory)
Use Group S-2/ low hazard storage:	Storage/utility spaces (accessory)

As indicated in the list above, the Group S-1 and S-2 spaces qualify as accessory to the main Group B and I-2 occupancies because the spaces are less than 10% of the floor area (approximately 7% of the floor area).

## 3. ADDITION

Since the project includes an addition to the existing building, the project is subject to compliance with Chapter 11 of the IEBC, and Section 43.8 of NFPA 101 which are summarized as follows.

### 3.1 General Requirements

The addition must comply with the code for new construction while the existing building is permitted to remain without change, except as required by the provisions of IEBC Chapter 11 and NFPA 101 Section 43.8.1.1 for additions. An addition to an existing building cannot create or extend any nonconformity in the existing building with regard to accessibility, structural strength, fire safety, means of egress, or the capacity of MEP systems (IEBC 1101.2 and NFPA 101 Section 43.8.1.2). Any repair or alteration work taking place within the existing building must meet the applicable IEBC and NFPA 101 requirements for such alterations (IEBC 1101.3 and NFPA 101 Section 43.8.1.3).

### 3.2 Separation

NFPA 101 Section 43.8.1.1 requires the existing portions of the building to comply with requirements contained in NFPA 101 applicable to existing buildings. However, where the existing structure does not conform to the requirements of NFPA 101 Chapter 19 (i.e. existing healthcare occupancies), a 2-hour fire-resistance rated separation is required between the existing building and the addition (NFPA 101 Section 19.1.1.4.1). As indicated in Section 6 below, 2-hour rated floor assemblies

are required for the building. Therefore, the floor assembly will serve as this separation. As such, an evaluation of compliance with Chapter 19 has not been completed for the existing floors.

### 3.3 Height and Area

An addition cannot increase the height or area of an existing building beyond that permitted by the applicable provisions of IBC Chapter 5 (IEBC 1102.1 & 1102.2 and NFPA 101 Section 43.8.2). Refer to the height and area analysis in Section 5 of this report which describes compliance with height and area requirements.

### 3.4 Structural

While additions are required to comply with the code requirements for new construction, the Structural Engineer of Record must perform an investigation and evaluation of the impact of the proposed addition on the existing building with respect to the following elements identified in the IEBC (1103).

- Additional gravity loads,
- Lateral-force-resisting system,
- Snow drift loads, and
- Flood hazard areas.

### 3.5 Accessibility

Additions to existing buildings are subject to the applicable new construction requirements of the American's with Disabilities Act Standards (ADA) and Chapter 11 of the IBC. Where the addition affects the accessibility to, or contains a primary function area, additional alterations may be required along the path of travel to the primary function area (IEBC 1105.1 and ADA 202.2).

*Although the current ME building code does not adopt Chapter 11 of the IBC, the latest proposed state amendments to the 2015 IBC do adopt Chapter 11. Since the 2015 IBC, as amended by ME, will likely be applicable to the East Tower project, this report includes references to IBC Chapter 11 requirements. Refer to Section 11 of this report for further details. Note that the requirements of IBC Chapter 11 are similar to that of the ADA Standards, which apply regardless which edition of MUBEC is applicable.*

### 3.6 Energy Conservation

Additions to existing buildings must comply with new construction provisions of the International Energy Conservation Code (IECC), without requiring the unaltered portions to comply (IEBC 1106.1).

## 4. HIGH-RISE BUILDING FEATURES

The proposed addition increases the height of the building such that it is considered a high-rise building (i.e. there is an occupied floor located more than 75 feet above the lowest level of fire department vehicle access)(IBC 202 and NFPA 101 Section 3.3.32.7). High-rise buildings must comply with IBC 403 and NFPA 101 Section 11.8. The applicable provisions for high-rise buildings are summarized below.

### 4.1 Structural

Since the building is considered Risk Category IV per IBC Table 1604.5, the structural integrity requirements of IBC 403.2.3 apply. Section 403.2.3 requires interior exit stairway and elevator hoistway wall assemblies to comply with impact classifications of ASTM C 1629/ C 1629M. Spray fire-resistant materials (SFRM) must have a minimum bond strength of 430 psf (IBC Table 403.2.4).

### 4.2 Fire Protection Systems

The following fire protection systems are required within the building as noted. Refer to Section 9 of this report for further details regarding fire protection systems.

#### Automatic Sprinkler System

An automatic sprinkler system is required throughout the building per IBC Sections 403.3 & 903.2.6 and NFPA 101 Sections 11.8.3.1 & 18.3.5.1. A secondary onsite water supply is required if the building is located in seismic design category C, D, E, or F (IBC 403.3).

#### Standpipe System

Class I standpipes must be provided (IBC 905.3 & 403.4.3 and NFPA 101 Section 11.8.4.1).

#### Fire Alarm System

A manual fire alarm system with an emergency voice/alarm communication system must be provided in accordance with IBC 907.2.13 (IBC 403.4.2 & 403.4.4 and NFPA 101 Section 11.8.4.1).

#### Smoke Detection System

An automatic smoke detection system must be provided in accordance with IBC 907.2.13.1 (IBC 403.4.1). See Section 9.2 of this report for additional requirements for smoke detection systems.

#### Emergency Responder Radio Coverage

Emergency responder radio coverage or a two-way telephone communication system must be provided (IBC 403.4.5, NFPA 1 Section 13.7.2.27.2.2, and NFPA 101 Section 11.8.4.2).



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### Fire Command Center

A fire command center (FCC) complying with IBC 911 must be provided in a location approved by the fire department (IBC 403.4.6 & NFPA 101 Section 11.8.6). The FCC must comply with the following requirements and contain the following features. The proposed FCC must be coordinated with the local fire official.

1. Location, layout, and features must be approved by the fire chief
2. Must be separated by 1-hr rated construction
3. Must be 200 sf with minimum dimension of 10 ft
4. Unrelated storage is prohibited in the FCC
5. Emergency voice/alarm communication system control unit
6. Fire department communications system
7. Fire detection and alarm system annunciator
8. Annunciator unit visually indicating the location of the elevators and whether they are operational
9. System indicators and controls for air distribution systems
10. Fire fighter's control panel for smoke control systems
11. Controls for unlocking interior exit stairway doors simultaneously
12. Sprinkler valve and waterflow detector display panels
13. Emergency and standby power status indicators
14. Telephone for fire department use with controlled access to the public telephone system
15. Fire pump status indicators
16. Schematic building plans
17. Building Information Card

### Smoke Removal

A means of smoke removal in post-fire salvage operations must be provided in accordance with IBC 403.4.7. The means of smoke removal may be provided by natural or mechanical ventilation. Post-fire smoke purge can be achieved through natural or mechanical ventilation. Natural ventilation must consist of operable windows /panels distributed at maximum 50-foot intervals and with a total area of at

least 40 SF per 50 linear feet of perimeter. Mechanical ventilation must provide one air change every 15 minutes with return and exhaust air moved directly to the outside.

#### 4.3 Standby and Emergency Power

Standby power must be provided for the following (IBC 403.4.8.3 and NFPA 101 Section 11.8.5.2.4):

1. Power and lighting for the FCC
2. Ventilation and automatic fire detection equipment for smokeproof enclosures
3. Elevators, including elevators provided for accessible means of egress and fire service access, where applicable
4. Mechanical equipment for smoke control systems
5. Electric fire pump
6. Jockey pump
7. Air compressor serving dry-pipe and pre-action systems

Emergency power must be provided for the following (IBC 403.4.8.4):

1. Exit signs and means of egress illumination
2. Elevator car lighting
3. Automatic fire detection systems
4. Fire alarm systems
5. Electrically powered fire pumps

Standby and emergency power must comply with IBC 2702 and 3003. In addition, standby power for elevators serving as accessible means of egress must comply with IBC 1009.4. Generator sets and fuel line piping located inside the building must be protected in accordance with IBC 403.4.8.1 and 403.4.8.2.

#### 4.4 Means of Egress

Means of egress in high-rise buildings must comply with the additional provisions of IBC 403.5. These provisions include the following.

##### Remoteness

Required interior exit stairways in the high-rise portions of the building must be separated by a distance of at least 30 feet or at least one quarter of the length of the maximum overall diagonal of the building or area served (whichever is less). This separation distance is measured in a straight line between the closest points of the stairway enclosures. Where three or more interior exit stairways exist, at least two must be separated in accordance with IBC 403.5.1.

##### Stairway Communication System

Stairway doors other than the discharge doors are permitted to be locked from the stairway side if they can be unlocked simultaneously from the FCC (IBC 403.5.3). If stairway doors are locked, a stairway communication system must be provided on at

least every fifth floor. The communication system must connect to an approved constantly attended station (IBC 403.5.3.1).

#### Stairway Re-Entry

Since the stairs serve more than four stories, re-entry to other floors from inside the stairwells must be provided in accordance with NFPA 101 Sections 7.2.1.5.8 & 7.2.1.5.8.1 and the ME amendment to IBC 716.5.9.1.2 (NFPA 101 Section 18.2.2.2.9). All stair doors must release upon activation of the fire alarm system, unless selected re-entry is provided in accordance with NFPA 101 Section 7.2.1.5.8.1.

#### Smokeproof Enclosures

Every required exit stairway serving high-rise portions of the building must comply with the smokeproof enclosure requirements of IBC 909.20 and 1023.11 (IBC 403.5.4). The most common method for providing smokeproof enclosures in sprinklered buildings is through stair pressurization complying with IBC 909.20.5. A ventilated vestibule is not required using this method, provided that the pressure difference between the stair shaft and the balance of the building is a minimum of 0.10 inch of water and a maximum of 0.35 inch of water. The pressure difference must be measured with the stairway doors closed and under maximum anticipated conditions of stack effect and wind effect (IBC 909.20.5).

#### Luminous Egress Path Markings

Luminous egress path markings must be provided throughout the exit stairs in the building in accordance with IBC 1058.

### **4.5 Elevators**

The following sections provide information regarding the elevator requirements.

#### Fire Service Access Elevators

A minimum of two fire service access elevators are required in buildings with an occupied floor greater than 120 feet above the lowest level of fire department vehicle access where at least two elevators are provided (IBC 403.6.1). Based on the plans provided to AKF on December 1, 2017 the highest occupied floor (i.e. Level 7) is 112 feet 4 inches above the lowest level of fire department vehicle access. Therefore, fire service access elevators are not required.

#### Other Elevator Lobbies

Enclosed elevator lobbies are required for all other elevators that serve high-rise levels within the building (IBC 3006.2(5)). These lobbies are required to consist of smoke partitions complying with IBC 710. Doors penetrating the enclosed elevator lobby must comply with IBC 710.5.2.2, 710.5.2.3, and 716.5.9. Ducts and air transfer openings must comply with IBC 717.5.4.1.

## 5. HEIGHT & AREA

The lowest level of the building (i.e. the Basement) is considered a story above grade plane because the Ground Level is more than 12 feet above ground level (IBC 202). Therefore, the building is 8 stories above grade.

High-rise buildings are permitted a reduction in the required fire-resistance ratings for building elements where sprinkler control valves are provided with supervisory initiating devices and water-flow initiating devices on each floor. Since the building is less than 420 feet in height, the fire-resistance ratings required for Type IB construction may be used while granting unlimited height and area allowances per Type IA construction (IBC 403.2.1). NFPA 101 Table 18.1.6.1 permits 8-story healthcare buildings of Type IB (222) construction.

## 6. TYPE OF CONSTRUCTION

The following table summarizes the required ratings for modified Type IA construction (i.e. Type IB) in accordance with IBC Table 601 and NFPA 1 Table A.12.2.1. These ratings also meet the requirements of Type IB (222) per NFPA 101.

**IBC Table 601 & NFPA 101 Table A.12.2.1 Fire-Resistance Rating Requirements for Building Elements (Hours)**

Element	Modified Type IA (i.e. Type IB) Rating (hours)
Primary structural frame (see Section 202)	
Columns	3 <sup>A</sup>
Other	2 <sup>A</sup>
Bearing walls	
Exterior	2 <sup>A</sup>
Interior	2 <sup>A</sup>
Nonbearing walls and partitions	
Exterior	See Table 602 discussion below.
Nonbearing walls and partitions	
Interior	0
Floor construction and secondary members (see Section 202)	2 <sup>A</sup>
Roof construction and secondary members (see Section 202)	1

<sup>A</sup> Not less than the rating of the assemblies supported, i.e. shaft enclosures, etc.

The non-bearing exterior wall requirements for East Tower are based on the fire separation distance (FSD) of each wall. The FSD is measured perpendicularly from the face of each exterior wall to the closest interior lot line, the centerline of a street, alley, or public way, or an imaginary lot line between two buildings on the same lot. Where the FSD is greater than or equal to 30 feet, the non-bearing exterior walls do not require a fire-resistance rating.

Where Table 601 or 602 requires an exterior wall to be fire-resistance rated and the FSD is less than or equal to 10 feet, the wall must be rated for exposure to fire from both sides

(IBC 705.5). The exterior walls are required to maintain their structural stability for the duration of the time indicated by the fire-resistance rating.

**IBC Table 602 Fire-Resistance Rating Requirements for Exterior Walls Based on Fire Separation Distance  
Type IA Construction**

Fire Separation Distance = X (feet)	Group B, I-2, & S
$X < 5$	1
$5 \leq X < 10$	1
$10 \leq X < 20$	1
$X \geq 20$	0

Note: Unrated nonbearing exterior walls are permitted where the building is permitted to have unlimited unprotected openings (IBC Table 602, footnote (g)). See Section 7.1 for details.

Based on satellite images of the building and the site plan provided in the Visitor Garage Revit model (sent on August 7, 2017) East Tower is provided with a FSD of at least 20 feet around the entire exterior perimeter of the building. Therefore, nonbearing exterior walls are not required to be rated. It is our understanding that the East Tower, Richards, and Bean buildings are constructed as one building. Therefore, exterior wall protection is not required where the exterior walls of East Tower face either the Bean or Richards building.

## 7. FIRE AND SMOKE PROTECTED FEATURES

### 7.1 Exterior Walls & Opening Protectives

Openings in the exterior walls must comply with IBC 406.5.2 based on the FSD of each wall. The opening limitations are summarized below for Type IA construction.

**IBC Table 705.8 Maximum Area of Exterior Wall Openings Based on Fire Separation Distance and Degree of Opening Protection**

Fire Separation Distance (feet)	Degree of Opening Protection	Allowable Area
$X < 5$	Unprotected, Sprinklered	Not Permitted
$5 \leq X < 10$	Unprotected, Sprinklered	10%
$10 \leq X < 15$	Unprotected, Sprinklered	45%
$15 \leq X < 20$	Unprotected, Sprinklered	75%
$X \geq 20$	Unprotected, Sprinklered	No Limit

Based on satellite images of the building and the site plan provided in the Visitor Garage Revit model (sent on August 7, 2017) East Tower is provided with a FSD of at least 20 feet around the entire exterior perimeter of the building. Therefore, unlimited unprotected openings are permitted in the building's exterior walls. It is our understanding that the East Tower, Richards, and Bean buildings are constructed as

one building. Thus, exterior wall protection is not required where the exterior walls of East Tower face either the Bean or Richards building.

## 7.2 Shaft Enclosures

Vertical openings must be enclosed with shaft construction unless an alternative provision in IBC 712 and NFPA 101 Section 8.6 is met. Shafts connecting four stories or more must be enclosed with at least 2-hour fire-resistance rated construction. Shafts connecting three stories or less must be enclosed with 1-hour rated construction (IBC 713.4 and NFPA 101 Section 8.6.5).

## 7.3 Corridors

In Group I-2 occupancies, corridors must be continuous to exits and separated from other areas with walls that comply with the requirements for smoke partitions (IBC 407.2 & 407.3 and NFPA 101 Section 18.3.6.1). Doors within corridor walls are not required to be fire-resistance rated; however they must be self-latching, be provided with positive latching hardware, and must provide an effective barrier to limit smoke spread (IBC 407.3.1 and NFPA 101 Sections 18.3.6.2.2, 18.3.6.3.1, & 18.3.6.3.5). Note that there are some spaces that are permitted to be open to corridors as outlined below.

### Waiting Areas

Waiting areas that are open to corridors must comply with the following requirements (IBC 407.2.1 and NFPA 101 Section 18.3.6.1(2)).

1. Must be constructed as required for corridors;
2. Does not contain sleeping rooms, treatment rooms, incidental uses, or hazardous uses;
3. The space is protected by an automatic fire detection system complying with IBC 907;
4. The corridor into which the space opens is protected by an automatic fire detection system that complies with IBC 907 or the smoke compartment is protected by quick-response sprinklers;
5. The space does not obstruct access to required exits;
6. The aggregate waiting area open to the corridor in each smoke compartment is no more than 600 SF.

### Care Providers' Stations

Corridors may be open to spaces for care providers, supervisory staff, doctors' and nurses' charting, communications, and related clerical areas so long as such spaces are constructed as required for corridors (IBC 407.2.2).

## 7.4 Smoke Compartments

Level 6 and 7 must be divided into at least two smoke compartments, each with a maximum area of 22,500 SF (NFPA 101 Section 18.3.7.1). The smoke compartments must be separated by 1-hour rated smoke barriers with 20-minute opening protections

complying with IBC 709 and NFPA 101 Section 8.5 (IBC 407.5 and NFPA 101 Section 18.3.7.3).

Smoke dampers must be provided at each duct penetration of the smoke barrier unless one of the following conditions apply: (780 CMR 717.5.5 & NFPA 101 Section 18.3.7.3(2))

1. The openings in the ducts are limited to a single smoke compartment and the ducts are constructed of steel.
2. The HVAC system is fully ducted in accordance with the IMC Section 603; and the building is fully sprinklered and the sprinkler system is equipped with quick-response sprinklers in accordance with Section 903.3.2.

#### Travel Distance

The travel distance from the most remote point in each smoke compartment to the smoke barrier door must be a maximum of 200 feet (IBC 407.5 and NFPA 101 Section 18.3.7.1(4)).

#### Refuge Area

Each smoke compartment must contain a refuge area sized to accommodate the inpatient care occupants from adjacent smoke compartments. The refuge areas must be sized using a factor of 30 SF per patient. Refuge areas may consist of corridors, sleeping areas, treatment rooms, lounges, dining areas, and other low-hazard areas (IBC 407.5.1 and NFPA 101 Section 18.3.7.5.1). See the associated Life Safety Plans for illustrations of the refuge areas for each compartment.

#### Independent Egress

Means of egress from each smoke compartment must be arranged such that once occupants egress from a smoke compartment they are not required to return through the smoke compartment to evacuate the building (IBC 407.5.2 and NFPA 101 Section 18.2.4.4).

#### Horizontal Assemblies

Where horizontal assemblies support smoke barriers that are part of smoke compartments, such horizontal assemblies must be designed to resist the passage of smoke (IBC 407.5.3).

### **7.5 Incidental Uses**

IBC Table 509 and NFPA 101 Table 8.5 prescribe requirements for the protection of several incidental uses in Group I-2/healthcare occupancies. The requirements of these tables are provided below.

**Incidental Uses**

Room or Area	Separation and/or Protection	Code Section
Boiler and fuel-fired heater rooms	1 hour	NFPA 101 Table 18.3.2.1
Laboratories not classified as Group H	1-hour and provide automatic sprinkler system	IBC Table 509
Laundry rooms over 100 SF	1 hour	IBC Table 509 & Section 509.4.2
Physical plant maintenance shops	1 hour	IBC Table 509 & NFPA 101 Table 18.3.2.1
Waste and linen collection rooms with containers that have an aggregate volume of 64 gallons or more	1 hour	NFPA 101 Table 18.3.2.1
Storage rooms greater than 100 SF	1 hour	IBC Table 509
Storage rooms less than 100 SF but greater than 50 SF and storing combustible material	Smoke partition	NFPA 101 Table 18.3.2.1 & Section 8.7.1.2

**8. INTERIOR FINISH**

The interior finishes of the walls, ceilings, and floors of the building are governed by IBC Chapter 8 and NFPA 101 Chapter 10. These chapters outline the testing requirements for the different surfaces. The required tests and finish classifications are summarized in the tables below.

**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 <sup>2</sup> or greater
		Class II = 0.22 W/cm <sup>2</sup> up to 0.45 W/cm <sup>2</sup>
	DOC FF-1	Pass

**Notes:** FSI = flame spread index, SDI = smoke-developed index



**Interior Wall and Ceiling Finish Requirements by Occupancy (Sprinklered Building)**

Use Group	Walls & Ceilings			Floors	
	Exit enclosures and exit passageways	Corridors	Rooms and enclosed spaces	Exits and corridors	Other spaces
B	B	C	C	DOC FF-1	DOC FF-1
I-2	B	B	B <sup>A</sup>	Class II	Class II
S-1 & S-2	C	C	C	DOC FF-1	DOC FF-1

<sup>A</sup> Class C interior finish materials are permitted in rooms with a capacity of four persons or less.

The tables above show the required interior finish classes throughout the building based on the most restrictive requirements of IBC Table 803.11 and NFPA 101 Table A.10.2.2. All floors throughout the building must pass the DOC FF-1 “pill test”.

## 9. FIRE PROTECTION SYSTEMS

In addition to the systems discussed in Section 4 of this report, the following fire protection requirements also apply.

### 9.1 Automatic Sprinkler System

Since the smoke compartments contain patient sleeping rooms, listed quick-response or listed residential sprinklers must be used (NFPA 101 Section 18.3.5.6).

### 9.2 Fire Alarm and Detection System

In addition to the manual fire alarm system, an automatic smoke detection system must be provided in the corridors.

### 9.3 Standpipe System

A standpipe system is required since the building contains an occupied floor more than 30 feet above the lowest level of fire department vehicle access. A Class I standpipe is required since the building is a high-rise building. The existing standpipe system that will be extended to the addition and a Class I hose connection will be provided (i.e. 2 ½” hose connection).

### 9.4 Emergency Forces Notification

The fire alarm system must transmit an alarm automatically to the municipal fire department (NFPA 101 Section 9.6.4 & 18.3.4.3.2.1).

### 9.5 Portable Fire Extinguishers

Portable fire extinguishers must be provided in accordance with NFPA 10 (IBC 906 and NFPA 101 Section 18.3.5.12).

## 9.6 Electrical Systems

The essential electrical system for electrical components, equipment, and systems must be designed and constructed in accordance with IBC Chapter 27 and NFPA 99 (IBC 407.10 and NFPA 101 Section 18.5.1.2).

## 10. MEANS OF EGRESS

The applicable means of egress requirements for the addition are described below.

### 10.1 Egress Summary

The occupant loads of the addition were calculated based on the area of the space in accordance with IBC Table 1004.1.2 and NFPA 101 Table 7.3.1.2. The exit capacity from each floor is calculated in accordance with IBC 1005.1 and NFPA 101 Table 7.3.3.1. See sheets G01-60 through G01-90 for details.

### 10.2 Exit Access Travel Distance

The East Tower exits are required to be arranged such that the maximum exit access travel distance does not exceed the limitations in the table below (NFPA 101 Table A.7.6).

Occupancy	With Sprinkler System (feet)
B	300
I-2	200
S	400

The maximum travel distance allowed from a Group I-2 sleeping room to an exit access door in that room is 50 feet (IBC 407.4.2 and NFPA 101 Section 18.2.6.2.3). The proposed design complies with the above requirements.

### 10.3 Corridor Width

Corridors must provide the following minimum clear widths (IBC 1020.2 and NFPA 101 Section 18.2.3.4 & 38.2.3.2):

- 96 inches where serving bed movement areas;
- 44 inches in other areas where the occupant load is 50 or more; and
- 36 inches in other areas where the occupant load is less than 50 people.

The exit access must be arranged such that there are no dead ends more than 20 feet in Group I-2 corridors and no more than 50 feet in corridors serving other occupancies (IBC 1020.4 and NFPA 101 Table A.7.6).

## 10.4 Number of Exits and Continuity

Two means of egress must be provided from individual spaces where the occupant load and/or common path of travel distance exceeds the limitations of IBC Table 1006.2.1 and NFPA 101 Section 38.2.5.3.1 & 42.2.5. The proposed design complies with the below requirements.

### Spaces with One Means of Egress

Use Group	Maximum Occupant Load	Maximum Common Path of Travel Distance (ft)
B	49	100
I-2	10	75
S	29	100

In addition, habitable spaces must have an exit access door leading directly to a corridor unless an exit door is provided directly to the exterior at ground level (IBC 407.4.1 and NFPA 101 Section 18.2.5.6.1).

All spaces within each story must have access to the minimum number of independent exits from the story as required by IBC Table 1006.3.1 and NFPA 101 Section 7.4.1.2 below.

### Minimum Number of Exits Per Story

Occupant Load (persons per story)	Minimum Number of Exits (per story)
1-500	2
501-1,000	3
More than 1,000	4

Where more than one means of egress is required, the exits must be separated by  $\frac{1}{3}$  of the overall diagonal distance of the space served (IBC 1007.1.1 and NFPA 101 Section 7.5.1.3.2). This separation distance is measured between the doors to Stair 1 and 2. See Section 4.4 of this report for the required separation between the closest points of the stairway enclosures.

## 10.5 Doors

Cross-corridor door openings in corridors required to be at least 96 inches wide must have a clear width as follows (NFPA 101 Section 18.2.3.4(6)):

- 6 feet, 11 inches for pairs of doors; and
- 41 ½ inches for a single door.

The above provisions also apply to any doors in the means of egress from the patient rooms (NFPA 101 Section 18.2.3.6). However, exit stair enclosure doors are only required to provide a minimum clear width of 32 inches (NFPA 101 Section 18.2.3.7). Doors not serving healthcare occupants must have a minimum clear width

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of 32 inches (IBC 1010.1.1 and NFPA 101 Section 7.2.1.2.3.2). All doors serving an occupant load of 50 or more people must swing in the direction of egress travel (IBC 1010.1.2 and NFPA 101 Section 7.2.1.4.2).

## 10.6 Locking Devices

Unless complying with IBC 1010.1.9.6 and NFPA 101 Section 18.2.2.2.5, locking devices that restrict access to a care recipient's room from the corridor and that are operable only by staff from the corridor side must not restrict the means of egress from the care recipient's room (IBC 407.4.1.1 and NFPA 101 Section 18.1.3.2(1)).

## 11. ACCESSIBILITY

Accessibility requirements for medical facilities are provided in both the IBC and the American's with Disabilities Act Standards (ADA). All of the patient sleeping rooms must comply with ADA 805 and the requirements for Accessible units in ICC/ANSI A117.1 (ADA 223.2.2 and IBC 1107.5.4).

## 12. MECHANICAL

The addition must be provided with mechanical ventilation in accordance with ASHRAE 62.1, 2013 edition.

## 13. ENERGY CONSERVATION

Additions to existing buildings must comply with the requirements of the IECC that are applicable to new construction; however the existing, unaltered portions of the building are not required to comply with such requirements (IECC 101.4.3).

## 14. PLUMBING FIXTURES

The UPC requires a minimum number of plumbing fixtures based on the use of the building. Additions must comply with the requirements for new construction, without requiring the existing system to comply with such requirements. The addition cannot cause the existing system to become unsafe, insanitary or overloaded (UPC 102.4). UPC Table 422.1 requires plumbing fixtures in I-2 occupancies in accordance with the following table.

Group I-2 Use	Toilets		Lavatories (Each Sex)		Drinking Water Station, With Drain	Service Sink
	Female	Male	Female	Male		
Individual patient rooms	1 per room		1 per room		1 per 50	1 per floor
Patient Wards	1 per 8 patients		1 per 10 patients			
Waiting Rooms	1 per room		1 per room		1 per room	-
Employee Use	1: 1-15 3: 16-35 4: 36-55 Over 55, add 1 fixture for each add. 40 persons	1: 1-15 2: 16-35 3: 36-55 Over 55, add 1 fixture for each add. 40 persons	1 per 40	1 per 40	-	-

Drinking fountains are required as indicated in the table above. Water stations are permitted to be substituted for drinking fountains where food is consumed indoors. Water stations are considered to be any hard-piped fixture providing drinking water. Bottle filling stations are permitted to be substituted for up to 50% of the required drinking fountains (UPC 415.2). The UPC recommends that a drinking fountain also be provided with a bottle filling station. The table below summarizes the number of fixtures provided on Level 6 and 7 of East Tower.

Floor Level	Occupant Type	Toilets		Lavatories (Each Sex)		Max. Occupant Load Supported		
		Female	Male	Female	Male	Female	Male	Total
6	Staff	2	1	2	1	15	15	30
	Patient	1 per room		1 per room		32 patient rooms		
	Public	1	1	1	1	1 waiting room		
Floor Level	Occupant Type	Toilets		Lavatories (Each Sex)		Max. Occupant Load Supported		
		Female	Male	Female	Male	Female	Male	Total
7	Staff	2	2	2	2	15	35	30
	Patient	1 per room		1 per room		32 patient rooms		
	Public	1	1	1	1	1 waiting room		

## 15. HELIPAD REQUIREMENTS

The following sections summarize requirements for rooftop helipads that are applicable to the East Tower project. Note that the 2015 IBC and 2012 NFPA 101 adopt the 2011 edition of NFPA 418: Standard for Heliports. However, the Maine Fire Code adopts the 2006 NFPA 1 and 2009 NFPA 101, which adopt the 2001 and 2006 editions of NFPA 418, respectively. For the most part, the requirements of the 2011 edition are most restrictive and therefore this edition is referenced in the sections below. However, differences in the editions are noted where applicable.

## 15.1 Landing Area Size

The landing area for small helicopters (i.e. less than 3,500 lbs) must be a minimum of 20 feet in length and width. The landing area must be surrounded on all sides by a clear area having a minimum average width of 15 feet at roof level. The clear area must not be less than 5 feet wide at any point (IBC 412.8.1).

## 15.2 Landing Area Design & Construction

Helipads must be designed to withstand the loads specified in IBC 1607.6. The contiguous building roof covering located within 50 feet of the landing pad edge must have a Class A rating (NFPA 418 Section 5.4.2). The landing area must be noncombustible and nonporous and must be provided with spill confinement and drainage for flammable liquids (IBC 412.8.2). The landing pad drainage must be provided by the following (NFPA 418 Section 5.3):

1. Sloped surface between 0.5% and 2%; or
2. Passive fire protection grid surface designed and listed for fuel catchment and containment.

The drainage system must drain flammable liquids away from the primary egress path and alternate egress points serving the landing area, including exits, stairways, and structures housing exits and stairways, as well as passenger holding area(s), fire protection activation systems, hatches, and other openings not designed for drainage (IBC 412.8.2 and NFPA Section 5.3.2).

The landing area supports must also be noncombustible and the main structural support members that could be exposed to a fuel spill must have a minimum 2-hour fire resistance rating, unless the landing pad is nonporous, fuel-tight, and the drainage system prevents fuel from flowing to support members (NFPA 418 Section 5.2 & A.5.2).

***The allowance provided in Section A.5.2 to use drainage in lieu of 2-hour rated structural members is not provided in the 2001 edition of NFPA 418; however it is provided in the 2006 and 2011 editions.***

## 15.3 Fire Protection Systems

The following fire protection systems are required for the helipad:

1. Class I or III standpipe system must be extended to the roof level (IBC 905.3.6)
2. Foam fire-extinguishing system with either fixed discharge outlets or hose line(s) for use by trained personnel complying with NFPA 418 Section 5.7 and 5.8. The fixed discharge outlet system activation must be by manual pull stations at each egress point from the rooftop landing pad. An additional manual pull station must be located at an approved location inside the building from which the rooftop landing pad can be viewed (NFPA 418

Section 5.8.2). Note that video is an acceptable means of viewing per A.5.8.2.

- a. H-1 heliports are permitted to be protected by two portable foam extinguishers each with a 20-A: 160-B rating in lieu of the foam fire-extinguishing system.
3. A means of communication must be provided from the roof area to notify the fire department of emergencies (NFPA 418 Section 5.9).
4. Manual pull stations connected to the fire alarm system must be provided from each designated means of egress from the roof (NFPA 418 Section 5.9).

***The Maine Fire Code (Section 21.3.6.8) and the 2001 edition of NFPA 418 (Section 3.7) require a Class II standpipe connection to be provided. It is our understanding that the existing standpipe system will be extended to the roof and a foam extinguishing system will be provided for protection of the helipad. We recommend reviewing the proposed design with the fire official for further direction and approval.***

Two access points for fire-fighting/rescue personnel must be provided to the heliport. The access points must be located at least 90 degrees from each other as measured from the center of the landing pad (NFPA 418 Section 4.4.1). Based on the plans provided to AKF on December 1, 2017, the helipad complies with this requirement (access points are approximately 92 degrees apart).

At least one portable fire extinguisher must be provided for each takeoff and landing area, parking area, and fuel storage area. The type of fire extinguisher is based on the size of the helicopter per NFPA 418 Table 9.2 below.

**Table 9.2 Minimum Required Ratings of Portable Fire Extinguishers for Heliport Categories**

Heliport Category	Helicopter Overall Length (including tail boom and rotors)	Minimum Rating
H-1	Less than 50 feet	4A:80B
H-2	50 feet up to but not including 80 feet	10A:120B
H-3	80 feet up to but not including 120 feet	30A:240B

Based on the memo provided by HeliExperts International LLC, dated June 16, 2017, the heliport is considered an H-2 category. Therefore the minimum fire extinguisher rating is 10A:120B. A fire extinguisher will be located inside the elevator vestibule such that the extinguisher is no further than 50 feet from the edge of the heliport final approach and takeoff (FATO) area.

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## 15.4 Means of Egress

At least two means of egress that lead to a public way must be provided from the landing pad (NFPA 418 Section 4.8 & 5.5; and IBC 412.8.3). The egress points from the landing pad must be located at least 90 degrees from each other as measured from the center of the pad, and must be separated by a minimum of 30 feet. No two egress points may be located on the same side of the landing pad. Means of egress from the landing pad must not obstruct flight operations (NFPA 418 Section 5.5). The means of egress path on the roof level must be illuminated when the helipad/roof is occupied (IBC 1008.1).



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