



Building Code Report

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CUMBERLAND COUNTY CIVIC CENTER

PORTLAND, MAINE



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1.0 **INTRODUCTION**

This Report presents the Building Code Approach for the Cumberland County Civic Center in Portland, Maine. This Building Code Report has been developed to establish and document approaches to major fire and life safety concerns.

This Report addresses the major fire protection aspects of Cumberland County Civic Center including:

- Fire-resistive Construction
- Exiting Systems
- Smoke Control System for Atrium
- Fire Suppression Systems
- Fire Alarm System
- Emergency Alarm and Communications Systems
- Emergency and Standby Power

The approaches contained within the Building Code Approach are intended to meet the requirements of the applicable codes.



2.0 **SCOPE**

This Report outlines major fire and life safety code criteria affecting the design of the Cumberland County Civic Center. Criteria are summarized primarily from the Maine Uniform Building and Energy Code (an Amended 2009 International Building Code (IBC)) and the 2009 NFPA 101 *Life Safety Code* (NFPA 101), as well as the City of Portland Fire Prevention and Protection code, which incorporates amended 2009 Editions of NFPA 1 Fire Code and NFPA 101 *Life Safety Code*, the City of Portland Technical Standard, and the City of Portland Fire Department Rules and Regulations. Major life safety design approaches have been summarized in Section 5.0, *Fire Protection Approach*.



3.0 **BUILDING DESCRIPTION**

The Cumberland County Civic Center is an existing Arena with a maximum occupant load of 8,700 based on a concert seating arrangement. Circulation levels and amenities are as follows:

- **Mechanical Level**
(@ 50 feet – 10 inches) This level includes a mechanical room, electrical switch gear room, emergency generator, fire pump, and lobby circulation space. This level and the Event Floor are considered as one story.
- **Event Floor**
(@ 67 feet – 2 ½ inches) This level includes offices, ticketing, a meeting room, commissary, loading/staging area, locker rooms, a star dressing room, ice suites, toilet rooms, storage, and other back-of-house spaces.
- **Concourse Level**
(@ 76 feet – 0 inches) This level includes a circulation Concourse, ticketing, team store, two suites, toilets, concessions, and other back-of-house spaces.
- **Northwest Entry Level**
(@ 89 feet – 6 ½ inches) This level includes a lobby, two suites, offices, toilet rooms, and other back-of-house spaces and is considered a Mezzanine to the Concourse Level.
- **Suite Level**
(@ 103 feet – 7 ½ inches) This level includes two suites and is considered a Mezzanine to the Concourse Level.



4.0 CODES AND STANDARDS

The City of Portland, Maine is currently enforcing the Maine Uniform Building & Energy Code (an Amended 2009 International Building Code (IBC)) and the 2009 Life Safety Code (NFPA 101). The following additional codes are enforced:

- 2009 NFPA 54 National Fuel Gas Code
- 2009 NFPA 1 National Fire Code
- 2008 National Electrical Code (NFPA 70, NEC)
- 2010 Maine State Plumbing Code (2009 Uniform Plumbing Code)
- 2010 Americans with Disabilities Act (ADA)
- 2009 International Existing Building Code (IEBC)
- 2009 International Energy Conservation Code (IECC)
- ASHRAE 62.1 – 2007
- ASHRAE 62.2 – 2007
- ASHRAE 90.1 – 2007
- ASTM E1465-06
- City of Portland Technical Manual – Section 3
- 2010 NFPA 72 National Fire Alarm and Signaling Code
- City of Portland Fire Department Rules and Regulations



5.0 FIRE PROTECTION APPROACH

This Report describes the Building Code Approach for the Cumberland County Civic Center.

This Report addresses the following major issues:

- Occupancy
- Fire-resistive Construction
- Exiting Systems
- Smoke Control System for Atrium
- Fire Suppression Systems
- Fire Detection Systems
- Emergency Alarm and Communications Systems
- Standby Power
- Firefighting Access and Facilities

5.1 OCCUPANCY

The building is a three-story building with a height of approximately 77 feet (measured to the roof line), and contains use groups A-4, B, S-1, and S-2 (IBC) and Assembly >300, Business, and Storage (NFPA 101) occupancies.

The Northwest Entry Level and Suite Level are considered Mezzanines to the Concourse Level. Per the 2009 Edition of NFPA 101, Section 8.6.9.2.1 the aggregate area of Mezzanines within a room is limited to 1/3 the area of the room in which the Mezzanines are located. This is more restrictive than the 2009 IBC which allows up to ½ of the floor area when the building is non-combustible construction, fully sprinklered, and provided with an emergency voice/alarm communication system. The aggregate area of the Mezzanines is 7,569 square feet and the area of the Seating Bowl is 62,687 square feet. This 12%, which is less than 33%. Portions of the Mezzanines are enclosed. Per the 2009 Edition of NFPA 101, Section 8.6.9.3 enclosed Mezzanines are permitted if the occupancy load of the enclosed space is less than 10 or if a Mezzanine has two or more means of egress and if not less than one means of egress provides direct access from the enclosed area to an exit at the Mezzanine level. This is more restrictive than the 2009 IBC which provides leniency for Mezzanines in buildings which are fully sprinklered.

The office area is enclosed and the Suites are open to below. Since the occupant load of the enclosed portion of the office is 10 or less, the Northwest Entry Level and Suite Level meet the Mezzanine requirements of the 2009 Edition of NFPA 101 and the 2009 IBC.

The IBC and NFPA 101 recognize two approaches to address mixed uses. Occupancy separations may or may not be required between any two occupancies in a building of mixed occupancy depending on the separation approach taken. In addition, some specific use areas are required to be separated regardless of the approach chosen to address a mixed occupancy building.

The Cumberland County Civic Center will use the non-separated mixed use approach. The non-separated mixed use approach found in the IBC, Section 508.3.2 and the NFPA 101, Section 6.1.14 requires that the building construction and fire protection comply with the most restrictive, non-separated occupancy classification.



The following areas are also separated using this approach (the more restrictive of the two codes is applicable):

OCCUPANCY/SPECIFIC HAZARD	IBC REQUIRED FIRE RESISTANCE RATING	NFPA 101
Electrical Transformer Room (Containing >112.5 kVA Dry-Type Transformer)	1-hour (NEC Section 450-21)	1-hour (NEC Section 450-21)
Fire Department Command Center (Room & Access to)	1-hour (Section 911.1)	1-hour NFPA 1 Section 11.9.2
Boiler Rooms	>15 psi and 10 hp Smoke Tight Construction (Section 508.2.5)	>200,000 Btu aggregate in room Smoke Partition Section 12.3.2
Generator Room	1-hour (Section 909.11)	2-hour NFPA 110 Section 7.2.1.1
Fire Pump Room	1-hour and automatic sprinkler system throughout (Table 508.2.5)	1-hour with access approved by Fire Department 2007 NFPA 20 Section 5.12.1.2



5.2 FIRE-RESISTIVE CONSTRUCTION

The construction classification of the Cumberland County Civic Center is assumed to meet Type I-B (IBC) and Type II-222 (NFPA 101), per Table 602 of the IBC and Section 12.1.6 of the NFPA 101. New construction for the building will be required to meet the following parameters:

BUILDING ELEMENT	FIRE-RESISTANCE RATING
Exterior load-bearing walls	2-hour
Interior bearing structural members (columns, partitions, walls, etc.)	2-hour
	1-hour, if supporting roof only
Floors	2-hour
Roofs	1-hour; 0-hour where the lowest portion of the roof structure is 20 feet or more above the floor
Exit access corridors & Concourse	0-hour
Enclosed vertical shafts (including Type I grease duct enclosure) & exit enclosures	2-hour

Fire rated doors, frames, and hardware will be provided on openings in rated separations and vertical shafts. Doors will be self-closing or automatic closing.

- ¾-hour doors in 1-hour walls which are not shafts or exits
- 1½-hour doors in 2-hour enclosures and fire wall; doors at stair enclosures do not need to meet the additional temperature transmission criteria of a maximum of 450° F at the end of a 30-minute fire exposure in sprinklered buildings



5.2.3 Interior Finish

LOCATION	INTERIOR FINISH RATING IBC CHAPTER 8	INTERIOR FINISH RATING NFPA 101 SECTION 12.3.3
Stair enclosures	Class A or B	Class A or B
Corridors & lobbies	Class A or B	Class A or B
Assembly areas greater than 300 occupants	Class A or B	Class A or B
Other areas including offices & assembly less than 300 occupants	Class A, B, or C	Class A, B, or C



5.3 EXITING SYSTEMS

The building will be evaluated using both smoke protected assembly seating and traditional exiting philosophies. The building is fully sprinklered. Exits will be sized accordingly.

All areas will employ traditional exit factors until they enter a smoke protected area. At that point, the smoke protected provisions will be applied to the population. If smoke protected areas exit through areas where traditional exiting factors apply, the traditional exiting factors will apply to the entire population exiting through that area.

Traditional Exit Width Factors:

- Stairs, aisles 0.3 inches/person
(40 people/foot)
- Doors, ramps, Concourses 0.2 inches/person
(60 people/foot)

The Seating Bowl and Main Concourse will be evaluated using smoke protected assembly seating philosophies. Exits will be sized based on the smoke protected assembly seating provisions as allowed per the IBC, Section 1028 and the NFPA 101, Section 12.4.2.3. The use of smoke protected assembly seating concepts allows the following exit width factors:

Smoke Protected Exit Width Factors:

- Stairs, Aisles 0.144 inches/person
(83 people/foot)
- Doors, Ramps, Concourses 0.11 inches/person
(109 people/foot)

5.3.1 Main Exit

For assembly occupancies, if a main entrance is provided, it is required to serve 50% of the population.

5.4 SMOKE MANAGEMENT SYSTEM

A mechanical smoke control system will be provided to allow the use of smoke-protected assembly seating provisions. When activated, the smoke control system will exhaust smoke from the seating bowl or Concourse at a rate which maintains the smoke layer six feet above the floor.



5.5 FIRE SUPPRESSION SYSTEMS

5.5.1 Automatic Sprinklers and Standpipes

5.5.1.1 Sprinklers

- Sprinklers are required throughout all enclosed spaces per NFPA 13, 2010 Edition.

5.5.1.2 Standpipe Risers

- Required per the IBC, Section 905.4 and NFPA 1, Section 13.2.2
- Provide wet automatic Class I standpipes with 2½ inch outlets in all exit stairways per the IBC, Section 905.3.1, Exception 1.
- Standpipes are required to be installed per NFPA 14, 2010 Edition.

5.5.1.3 Water Supply

- Connection to the public water supply.

5.5.2 Provide Portable Fire Extinguishers

- Portable fire extinguishers are required per NFPA 1, Section 13.6.2.
- Please see Life Safety drawings for type and installation locations.

5.5.3 Automatic Extinguishing Systems Serve All Grease Laden Cooking Hoods

- Required to comply with the NFPA 101, Section 12.7.2, Chapter 50 of NFPA 1 and NFPA 96



5.6 FIRE DETECTION SYSTEMS

5.6.1 Automatic fire alarm systems required to monitor:

- a. Automatic sprinkler waterflow alarms.
- b. Smoke detectors in elevator lobbies, top of freight elevator shafts, and elevator machine rooms to initiate elevator recall.
- c. Smoke detectors within HVAC supply air ducts with fan capacities in excess of 2,000 cfm and return air ducts with fan capacities in excess of 15,000 cfm. Smoke detection within these ducts shall initiate automatic fan shutoff.
- d. Smoke detectors at locations that have fire alarm system control equipment. These areas include, but are not limited to, transponders, power supply panels, and control panels.
- e. Beam detectors which activate the smoke control system.

5.6.2 Manual

- Manual pull stations are not required per the IBC, Section 907.2.1, Exception and NFPA 101, Section 12.3.4.2.1 (1) (b).

5.6.3 Fire Alarm Equipment required to comply with NFPA 101, NFPA 1, and City of Portland Fire Department Rules and Regulations.

5.7 EMERGENCY ALARM AND COMMUNICATIONS SYSTEMS

Provide combination audio/visual devices throughout all areas of the building. A voice alarm and strobes are required. Occupant notification will be by voice announcements and visual appliances per the IBC, Section 907.2.1.1 and NFPA 101, Section 12.3.4.3. Use of the PA system for audible notification in accordance with NFPA 101, Section 12.3.4.3.6 is allowed.

Supervision per City of Portland Fire Department Rules and Regulations, NFPA 72, and other applicable codes:

- a. Fire detection and alarm system provided with trouble alarm signals.
- b. Sprinkler and standpipe systems including:
 - Valve tamper switches on all water supply control valves.
 - Waterflow switches for each system.
- c. Fire alarm annunciation panel provided at Spring Street and Free Street entrances.

Upon alarm activation, all performance sound equipment circuits will initiate shunt trip and lighting will be restored to normal levels.



5.8 SECONDARY POWER

5.8.1 Emergency power (as defined by NFPA 70) is required for the following connected loads simultaneously:

- Fire Detection and Alarm Systems
- Exit and Emergency Lighting
- Voice/Alarm Communication System
- In-Building Public Safety Radio Enhancement System if required

5.8.2 Standby power (as defined by NFPA 70) is provided for the following connected loads simultaneously by an emergency generator:

- Elevators that connect four stories or less are listed for accessible means of egress
- Smoke Control System
- Fire Pump (if provided)

5.9 FIRE FIGHTING ACCESS AND FACILITIES

5.9.1 Alarms automatically relayed via central alarm station to fire department. AES Master Box Connect will be provided per City of Portland Fire Department Rules and Regulations.

5.9.2 Sprinkler systems and standpipes provided throughout the building.

- Fire department connection provided per NFPA 13 and 14 in an accessible location approved by the Fire Department, near the front entry point of the building. Recommended locations are on the Spring Street and Free Street sides of the building.

5.9.3 Fire apparatus access roads are required to be within 150 feet of all exterior portions of the First Level.

5.9.4 Emergency Responder Radio Coverage

Emergency responder radio coverage is required per the IBC, Section 915. In addition, a central control system consolidated in a fire command center is required to be provided for the Fire Department which contains fire alarm panels, controls for the voice alarm system, two-way communication systems (if required), elevator status panels, emergency generator status panels, fire pump status panels and a public telephone. An RF Engineer will determine compliance with NFPA 1 Annex O for performance of the public safety radio system within the building.



5.9.5 Fire Command Center

The following are required in a Fire Command Center, per the IBC, Section 911 and NFPA 1, Section 11.9:

1. The emergency voice/alarm communication system control unit.
2. The fire department communications system.
3. Fire detection and alarm system annunciator.
4. Annunciator unit visually indicating the location of the elevators and whether they are operational.
5. Status indicators and controls for air distribution systems.
6. The fire-fighter's control panel required by IBC Section 909.16 for smoke control systems installed in the building.
7. Controls for unlocking stairway doors simultaneously.
8. Sprinkler valve and waterflow detector display panels.
9. Emergency and standby power status indicators.
10. A telephone for fire department use with controlled access to the public telephone system.
11. Fire pump status indicators.
12. Schematic building plans indicating the typical floor plan and detailing the building core, means of egress, fire protection systems, fire-fighting equipment and fire department access and the location of fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions.
13. Work table.
14. Generator supervision devices, manual start and transfer features.
15. Public address system, where specifically required by other sections of this code.
16. Elevator fire recall switch in accordance with ASME A17.1.
17. Elevator emergency or standby power selector switch(es), where emergency or standby power is provided.

5.9.6 Shaftway Markings

- Exterior access – Outside openings accessible to the fire department that open directly on a hoistway or a shaftway communicating between two or more floors are to be marked “shaftway” in red letters at least six inches high on a white background.
- Interior Access – Interior door or window openings to a hoistway are to be plainly marked “shaftway” in red letters at least six inches high on a white background.
 - Exception: Markings are not required if the opening to the shaft is readily discernable as an opening by the construction or arrangement.
- Per the IBC, Section 914.1 and NFPA 1, Section 10.12.2



5.9.7 Equipment Room Identification

- Rooms containing controls for air conditioning systems.
- Rooms with sprinkler riser valves or other fire detection, suppression, or control elements.
- Per the IBC, Section 914.2, NFPA 101, NFPA 1, and City of Portland Fire Department Rules and Regulations.

