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Inspections Division
Date: 11/19/13

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Memo Report

From: W. Mark Cummings, P.E.

To: Mr. Steve Bushey, P.E.; Fay, Spofford & Thorndike, Inc. (FST)

Subject: **Fire / Life Safety Code Review, ICW Boat Repair and Storage Facility at Canal Landing Boatyard**

As requested, Fire Risk Management, Inc. (FRM) has reviewed the building information you provided with regards to the new boat storage and repair building that is to be constructed at the Canal Landing Boatyard in Portland, ME. It is understood that this to be an unheated building that will consist of a steel frame covered by a tensioned fabric. The primary use for this building is to be "dry storage" for boats, but this would also include repair activities as is typical for standard boatyard operations.

The focus for this review is to evaluate the necessary fire protection and life safety features for the building to ensure that all State-adopted and Municipal codes, regulations, and ordinances are adequately addressed within the proposed building design. This review is based on the structural drawings, dated 10/07/13, and a fire sprinkler system drawing, dated 09/27/13, that were provided by FST to support the code assessment.

The primary codes and regulations used as reference for this review included;

1. The City of Portland Code of Ordinances; primarily Chapter 10, *Fire Prevention and Protection,*
2. City of Portland Fire Department Rules and Regulations, and
3. The Maine Uniform Building and Energy Code (MUBEC); inclusive of the 2009 International Building Code (IBC) and amendments.
4. The National Fire Protection Association's (NFPA's) Codes and Standards, including;
   a. NFPA 1 - The Fire Code®,
   b. NFPA 10 – The Standard for Portable Fire Extinguishers
   c. NFPA 13 – The Standard for the Installation of Sprinkler Systems
   d. NFPA 101 – The Life Safety Code®, and
   e. NFPA 303 – Fire Protection Standard for Marinas and Boatyards

Where the information provided is incomplete with regards to the specific internal design parameters, including installed electrical and mechanical systems, the code requirements that must be met will be highlighted within this review. It is also assumed that any repair or maintenance activities that might be performed within this facility will be limited to that which is typically allowed within boat storage facilities of this type; including adherence to those restrictions on any hazardous operations as outlined in Chapter 8 of NFPA 303. The following represents a listing of the various code requirements that are applicable to this building:

Building Information

Building Classification: Based on the primary use of this structure, it would be generally classified as a "Storage" occupancy per NFPA 101 (§ 6.1.13) or a S-1, Storage per the IBC (311.2).

Height & Area: Based on the structural drawings provided, the building is shown as being 47'-11" (1 Story) high and having 19,260 ft^2 of floor area.

Construction type: The building would be generally considered as a Non-combustible, unprotected structure (NFPA 101 Type 0,0,0) (IBC Type IIB). For a single-story building that is to be protected by an automatic sprinkler system, the maximum permitted height is 3 stories and/or 75 ft and the maximum permitted area is 52,500 ft^2 per floor as outlined in IBC Table 503, Sections 504.2 & 506.3. The height and area limitations of the IBC are not exceeded by this building. No minimum construction type is required per NFPA 101 § 42.1.6. However, for a tensioned fabric building, § 11.9 of NFPA 101 would require that the fabric material meet the Classification requirements for a Class A flame spread rating. The drawings indicate that the fabric which forms the exterior "walls" and "roof" of this building meets the requirements for a Class I (Class A) flame spread rating.

Interior Finish: Minimum Class C permitted. The interior wall and ceiling finish is permitted to be Class A, B, or C in operating areas (NFPA 101 § 42.3.3 and IBC Table 803.9). The fabric that will form the exterior walls/ceiling does meet the requirements for a Class A rating.

Extinguishment: No requirement exists in NFPA 101 to provide portable fire extinguishers in this building (NFPA 101 § 42.3.5), but Section 906.1 of the IBC will require their installation. Equally, NFPA 303 includes a requirement to provide portable extinguishers as required by NFPA 10. This building would be classified as an "Ordinary" hazard occupancy and it is anticipated that Class B hazards (flammable / combustible liquids) will exist within this building. As such, portable extinguishers should be located throughout the structure such that the maximum travel distance to an extinguisher does not exceed 50 feet.

Means of Egress

Occupant Load: Neither NFPA 101 or the IBC provide specific occupant load factors for buildings that are classified as "storage" (NFPA 101 Table 7.3.1.2 and IBC Table 1004.1). However, for similar use occupancies, such as for an aircraft hangar/storage and warehousing facilities, the IBC uses an occupant load factor of 500 ft^2/person. Given the use of this building, this would be a reasonable assumption for providing the necessary egress for persons working within this building. Using that factor, a maximum occupant load of 39 people is calculated for this building. This calculation is based on the "gross" area of the building and does not account for the fact that this building is likely to have numerous boats located inside that would result in a "net" floor area that is much less. However, for the calculation of the means of egress the use of the gross floor area represents a conservative approach.

Number of Exits: Required: Two (2), Provided: Five (5). A minimum of two (2) means of egress are required for the building; NFPA 101 § 42.2.4 and IBC 1015.1(1).

Egress Capacity: Based on the five (5) personnel doors that are shown on the building plans, the means of egress could accommodate up to 750 people. At least one door is provided on each side of the building; with a second door being provided on the east wall. Based on the structural drawings, each door is assumed to be a standard 32" door. It is assumed that 30 inches of clear width are available at each door and an egress factor of 0.2 inches per occupant was applied (NFPA 101 Table 7.3.3.1 and IBC 1005.1).

Distance Limitations: The maximum "common path of travel" allowed is 100 ft. Based on the location of the exit doors, there would be no areas subject to this limitation. (NFPA 101, Table 42.2.5). The maximum allowed exit access travel distance is 400 ft based on NFPA requirements and 250 ft using the IBC (NFPA 101 Table 42.2.6 and IBC Table 1016.1) for buildings protected by an automatic sprinkler system.

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Based on the configuration of the building, no exit access travel distance will exceed 80 ft.

Egress Marking: Illumination should be provided in accordance with NFPA 101 § 7.8 and IBC 1101.2. Emergency lighting should be provided in accordance with NFPA 101 § 7.9 and IBC 1006. Egress signs shall be provided in accordance with NFPA 101 § 7.10 and IBC 1011.1.

Fire Protection Systems

Fire Sprinkler System: Based on the requirements outlined in NFPA 101 (§ 42.3.2) this building would not require an automatic sprinkler system. However, based on the requirements of NFPA 303 (§ 6.3.2) and the IBC (903.2.9), the building will need to be protected by an automatic fire sprinkler system. The proposed building design includes the installation of two (2) dry-pipe fire sprinkler systems; each protecting one-half of the building. These systems must be compliant with NFPA 13 and be properly supervised.

Fire Alarm and Notification System: A fire alarm system would not be required for this building since it has a floor area less than 100,000ft^2 and is protected by an automatic sprinkler system (NFPA 101 § 42.3.4). The IBC does not require a fire alarm system in this building per Section 907. However, it is understood that due to a desire to allow greater flexibility in the potential use of this building in the future, a fire alarm system is to be installed. As such, manual pull stations and notification devices will need to be installed and located in accordance with NFPA 72.

Initiation: The fire alarm system will be initiated by both the automatic fire sprinkler system and manual pull stations as outlined by NFPA 101 § 42.3.4.2 The fire alarm system will also need to be compliant with all applicable requirements outlined in the City's Fire Department Rules and Regulations.

Notification: Occupant notification should be provided in accordance with NFPA 101-9.6.3 and an audible and visual alarm should be initiated at a constantly supervised location per NFPA 101-42.3.4.3.1.

Consideration was not given for storage and equipment configurations within the building, since no floor plans were provided for this review. Other than what is indicated on the fire sprinkler system drawing that was provided, it is unknown what fixed equipment and walls/partitions may be installed within this building. The configuration and use of the building should be arranged so that storage and operations do not obstruct egress access or result in an increase in any travel distances beyond the maximums outlined above, such as that required to access portable fire extinguishers.

Based on a brief review of the fire sprinkler drawing and hydraulic calculations provided, it appears that these systems are compliant with all applicable codes and regulations. It will need to be verified that adequate fire department access will be provided for each of the two (2) fire department connections (FDCs) shown on the drawing.

The building design drawings provided for this review did not provide sufficient detail to determine if the building will, in fact, be fully code compliant. However, if all code requirements highlighted above are incorporated into the building design, it will not only meet, but exceed, all applicable code requirements. Should there be any questions regarding this assessment and the recommendations contained herein, please do not hesitate to contact me.

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Principal Fire Protection Engineer