FIRE RISK MANAGEMENT, INC.
1 Front St., Bath, ME 04530
207/442-7200 [207/221-1295 (fax)]
www.fireriskmgt.com

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 10/03/14

Date: 16 July, 2014

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 Building "B" at Canal Landing Boatyard**

As requested, Fire Risk Management, Inc. (FRM) has reviewed the building information you provided with regards to the 2nd phase addition of the boat storage and repair building that is to be constructed at the Canal Landing Boatyard in Portland, ME. It is understood that this new building is to be directly connected to the west end of the steel and tensioned fabric building that currently exists at the site; effectively more than doubling the building space. Since there is to be no specific fire separation between the existing and new buildings, they will effectively be treated as a single building by the codes.

The focus for this review is to evaluate the necessary fire protection and life safety features that will be needed for both the new building itself and the overall site to ensure that all State-adopted and Municipal codes, regulations, and ordinances are adequately addressed within the proposed building design and site layout. This review is primarily based on the architectural Elevation drawings, Dwg's 1.0 & 2.0, dated 06/24/14, and the site's Amended Fire Protection Plan, Dwg C11.1, dated June 2014, that were provided by FST to support this assessment. Additional structural drawings were reviewed to assess the likely internal configuration for the building.

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 – Fire Code®,
   b. NFPA 10 – Standard for Portable Fire Extinguishers
   c. NFPA 13 – Standard for the Installation of Sprinkler Systems
   d. NFPA 24 – Standard for the Installation of Private Fire Service Mains and Their Appurtenances
   e. NFPA 72 – National Fire Alarm and Signaling Code®
   f. NFPA 101 – Life Safety Code®, and
   g. NFPA 303 – Fire Protection Standard for Marinas and Boatyards

The addition of the new structure (building) that is being connected to the existing maintenance building will result in the need to extend the fire access lanes to ensure that all aspects of NFPA 1, Chapter 18 and Annex E, continue to be met. The Amended Fire Protection Plan indicates that a fire access lane will be provided around the north side of the building complex, along with the addition of a new fire hydrant that will be located on the north side of the access road, at a point near the northeast corner of the new building. The location of the hydrant should be such that it is at least 40 ft away from the building to ensure compliance with NFPA 24 requirements. The site plan indicates that the access lanes are to provide at least 30 ft of clear width; well above the 20 ft minimum required by NFPA 1. The location of the fire access lanes are such that all portions of the building will easily be within the 450-foot maximum distance that is allowed by NFPA 1 for buildings with installed sprinkler systems. Additionally, the site plan is such that there will be sufficient space provided to allow for fire department vehicles to turn

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around on the north side of the building complex, since this portion of the access lanes does constit "dead-end" that is more than 150 ft in length.

Based on the size and construction of the building complex, along with the fact that the building(s) will be fully protected with installed fire sprinkler systems, the required fire flow rate that must be provided by the fire water supply system is approximately 1350 gpm. Based on hydrant flow test data of the existing hydrants near this site, it is not anticipated that there will be any problems with the water supply system being able to meet the fire flow demands for this building.

Where the information provided for the new building 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 the following paragraphs of this report. The following represents a listing of the various fire and life safety code requirements that are applicable to this new building. For the majority of the code requirements listed below, only the requirements for the new building are addressed, since the existing building has previously been reviewed for code compliance. However, when addressing the overall building type and classification, along with the associated height and area limitations, the requirements for the entire facility (Building B plus the existing Maintenance Building) are evaluated based on the premise that this is a single building.

Building Information

Building Classification: Based on the use of this structure, it would be generally classified as an "Industrial" occupancy per NFPA 101 (§ 6.1.12) or a F-1, Factory Industrial per the IBC (306.2).

Height & Area: Based on the architectural elevation and site plan drawings provided, the new (combined) building is shown as having a maximum height of 58'-10" (2 Story) and having 46,800 ft^2 of floor area (footprint) for the combined buildings.

Construction type: The combined building will continue to generally be considered as a Non-combustible, unprotected structure; NFPA 101 Type II (0,0,0) or IBC Type IIB. The maximum permitted height for this structure is 3 stories and/or 75 ft and the maximum permitted area is approximately 65,000 ft^2 per floor as outlined in IBC Table 503 and Sections 504.2, 506.1 and 506.3, which provide for an increase in the allowable building area and height due to the installation of a fire sprinkler system and having fire department access on at least three (3) sides of the building. The height and area limitations of the IBC will not be exceeded by this newly combined building. No minimum construction type is required per NFPA 101 § 40.1.6.

Interior Finish: Minimum Class C permitted. The interior wall and ceiling finish is permitted to be Class A, B, or C in operating areas, with no requirements for the floor finish (NFPA 101 § 40.3.3.2 and IBC Table 803.9). Although the drawings provided for the new structure do not show any exit enclosures, future plans for this building do include the installation of 2nd floor levels. It will be necessary that exit enclosures be provided for the means of egress from the 2nd floor. The ceiling and wall finish within an exit enclosure must be a minimum of Class B. The floor finish in such enclosures must be a minimum of Class II.

Extinguishment: No requirement exists in NFPA 101 to provide portable fire extinguishers in this building; NFPA 101 § 40.3.5. However, both the IBC (906.1) and NFPA 303 do include requirements 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 throughout this (new) 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

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Occupant Load: A maximum occupant load of 276 people is calculated for the main floor of t (new) building, based on an occupant load factor of 100 ft^2 per occupant; NFPA 101, Table 7.3.1.2 and the IBC, Table 1004.1. This calculation is based on the "gross" area of the main floor 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. If/when the 2nd floor level is installed, whether used for additional shop or office space, these areas are also likely to use the same occupant load factor of 100 ft^2/person. Based on the drawings provided, it is estimated that the occupant load for the 2nd floor level, including both the north and south sides, would be approximately 165 persons.

Number of Exits: It is required that two (2) exits be provided for all floors and/or portions thereof. The building plans include eight (8) exits from the ground floor level. The drawings available for this review did not provide any details regarding the proposed layout for the 2nd floor areas. The drawings do indicate a set of double doors in the south exterior wall that provide access to an exterior balcony at the 2nd floor level, but no others. The 2nd floor levels on both the south and north sides of the building will each need to have access to at least two (2) separate means of egress, whether leading directly to the exterior of the building at the 2nd floor level or via exit enclosures to a ground floor exit.

Egress Capacity: At least one door is provided on each side of the new building. Based on the eight (8) personnel doors that are shown as being provided from the main floor level, the available exits can accommodate more than 1300 people; well above the calculated occupant load for the new building. This estimate is based on an assumption that each door is a "standard" 36-inch door with approximately 34 inches of clear width and using an egress factor of 0.2 inches per occupant as outlined in NFPA 101, Table 7.3.3.1. Although a set of double doors is shown on the south exterior wall at the 2nd floor level, which is more than adequate to accommodate the calculated occupant load for this side of the 2nd level, at least one additional means of egress will be required from this portion of the building, along with at least two means of egress for the north side of the 2nd floor.

Distance Limitations: The maximum "common path of travel" allowed for this facility is 100 ft. Based on the location of the exit doors, there would be no areas of the main floor that would exceed this limitation; NFPA 101, Table 40.2.5. This restriction will also apply to the 2nd floor areas as well and must be considered when designing those areas. The maximum allowed exit access travel distance is 250 ft. Based on the size and proposed configuration of the building, it is not anticipated that any exit access travel distance within the new building will exceed this restriction; NFPA 101 Table 40.2.6 and IBC Table 1016.1. Distance limitations were determined using those allowed when a supervised, automatic sprinkler system is provided throughout the building.

Egress Marking: Illumination throughout the building will need to 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 (§ 40.3.2 and 40.3.5) this building would not require an automatic sprinkler system. However, based on the requirements of NFPA 303 (§ 6.3.2) and the IBC (903.2.4), the (new)

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building will need to be fully protected by an automatic fire sprinkler system designed in accordance with NFPA 13.

Fire Alarm and Notification System:	A fire alarm / notification system is required for this building by NFPA 101, since the occupant load is calculated to exceed 100, NFPA 101 § 40.3.4. The system shall be designed for compliance with NFPA 72.
Initiation:	The fire alarm system will be initiated by the automatic fire sprinkler system. Manual activation of the system by properly located manual pull stations will also need to be provided to meet City requirements. 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 will need to 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 § 40.3.4.3.1.

Consideration was not given for storage and equipment configurations within the building, since no floor plans were provided for this review. It is unknown what fixed equipment and walls/partitions may be installed within this building, including the 2nd floor areas. The configuration and use of the building should be arranged so that storage and maintenance operations do not obstruct egress access or result in an increase in any travel distances beyond the maximums outlined above, including that required to reach exits and portable fire extinguishers.

It will need to be verified that fire sprinkler and alarm/notification systems are to be installed in the new building areas and that adequate fire department access will be provided for the new fire department connection(s) (FDCs).

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 and site plan design, this building complex will continue to meet all applicable code requirements.

Should there be any questions regarding this assessment and the recommendations contained herein, please do not hesitate to contact me.

W. Mark Cummings, P.E.
Principal Fire Protection Engineer