

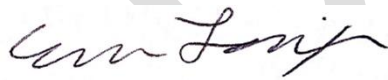
FIRE AND LIFE SAFETY REPORT

THE MASONIC TEMPLE **Littleton, NH**

DRAFT

November 25, 2021

Prepared by:



Evan Lacroix, E.I.T.

Reviewed by:



Chris Lizewski P.E.

Table of Contents

Introduction and Executive Summary.....	3
Applicable Codes	3
Building Information.....	4
Occupancy	4
Construction Type.....	5
Building Height and Area	5
Impacts of Major Renovation	5
Exterior Wall Fire-Resistance Ratings	5
Impacts of Major Renovation	6
Vertical Openings	7
Impacts of Major Renovation	7
Fire Alarm and Detection.....	7
Impacts of Major Renovation	8
Automatic Suppression System	8
Impacts of Major Renovation	8
Portable Fire Extinguishers.....	8
Means of Egress.....	9
Occupant Load.....	9
Egress Capacity.....	9
Number of Means of Egress	10
Exit Access.....	10
Stairway Tread Dimensions and Landings	11
Handrails and Guards.....	11
Doors	11
Impacts of Major Renovation	11
Accessibility.....	12
End of Report	12

Introduction and Executive Summary

SFC Engineering Partnership, Inc. is providing a fire protection and life safety feasibility report for the Masonic Temple in Littleton, NH. This report is intended to provide the owner and project architect with information related to the building's current level of code compliance with the major fire protection and life safety requirements in the Applicable Codes as defined below. It is expected that this information will be integrated into the master planning for the building.

It is SFC's understanding that currently the owner wants to maintain the existing occupancies in the building, and to confirm whether or not the building meets the existing building codes. This report will also indicate what the major impacts are to the building if a full change of use to an Assembly occupancy and a Level 3 Alteration were to take place.

The content of this report is based on the following:

1. Documentation provided by the Client including: "Masonic Temple Site Plan", "Upstage Players Needs", "Masonic Temple, Littleton, NH rough floor plans"
2. Site survey performed by Chris Lizewski, P.E. (SFC) and Michael Bruss (Bruss Project Management) on November 10, 2021.

Applicable Codes

This analysis has been performed in accordance with the current applicable codes in the Town of Littleton and the State of New Hampshire including the following:

Building: New Hampshire State Building Code, which is an amended version of the International Building Code (IBC) – 2015 Edition.

As part of the above building codes, the International Existing Building Code (IEBC) – 2015 Edition, is adopted and amended for existing structures undergoing renovations.

Fire: New Hampshire State Fire Code which adopts and amends the following standards via SAF C 6000 and SAF-FMO 300:
NFPA 1, Fire Code – 2015 Edition
NFPA 101, Life Safety Code – 2015 Edition

Accessibility 2009 ANSI A117.1 Accessible and Usable Buildings and Facilities

The state fire code, through SAF-C 6000 and SAF FMO 300 is applicable regardless if there is ongoing renovation work. Specifically, the existing occupancy provisions of NFPA 101 are applicable, retroactively, to buildings. Where corrective actions are necessary to bring a building into compliance, RSA-153:5 permits such required alteration work to be completed within a reasonable time, as determined by the state fire marshal. NFPA 1, also adopted as part of the fire code, is generally applicable with respect to maintenance of the building's fire and life safety features. The application of the fire code's existing building requirements is outlined throughout this report. Commentary is provided following each major section indicating major impacts if the building were to undergo a significant renovation.

Building Information

Address	137-141 Main Street, Littleton, NH
IBC Building “Use” Groups	B (Business), A-3 (Assembly, General), A-1 (Assembly, Theaters), M (Mercantile) Nonseparated mixed use
NFPA 101 Building Occupancy	Existing Business, Existing Assembly, Existing Mercantile
Number of floors above grade	3 Stories ¹
Building Footprint Area (Approximately)	4,000 ft ²
Type of Construction	IIIB (IBC); V (200) (NFPA)
Hazardous Materials	N/A
Site Access	Via Main Street (front/A-side)), Amonoosuc Street (B-side), Green Street (rear/C-Side)
Suppression System	None existing
Standpipe System	None existing
Fire Alarm System	None existing

Occupancy

The building is currently occupied with multiple uses, including office space and a fitness studio on the lower level, an assembly hall and retail clothing store on the first floor, and a larger assembly hall and a Jiu Jitsu studio adjacent to the large assembly space.

Floor	IBC Classification	NFPA Classification	Use/Location
Lower	Group B	Business	Open Office, Cycling Studio
First	Group A-3	Assembly	Function Hall
	Group M	Mercantile	Retail Store
	Group B	Business	Open Office
Second	Group A-3	Assembly	Function Hall, Jiu Jitsu Studio

Table 1: Existing Occupancies

It is anticipated that a majority of the building will eventually be converted into theater space, including black box performance areas that are classified as a Group A-1 occupancy.

If a full change in use to a Group A-1 Theater Assembly occupancy were to take place, the extent to which a change of occupancy is required to comply with new construction by NFPA 101 and IEBC is determined by the relative hazard of the new occupancy compared to the previous occupancy. Applicable code requirements based on major impacts of the potential change of use are provided throughout the remainder of this document.

In general, where a change of occupancy classification creates an assembly occupancy, and the change occurs within the same or lesser hazard classification category, the building must meet the requirements of the

¹ Although building elevation drawings are not available, it is conservatively assumed that the Lower Level is classified as the first story above grade since the First Floor is assumed to be at least 6' above the building's grade plane (IBC 202). This should be confirmed as part of a future detailed study.

existing assembly occupancy Chapter 13 and the requirements for automatic sprinkler and detection, alarm and communications systems, requirements for hazardous areas, and requirements for main entrance/exit of Chapter 12 for new assembly occupancies (NFPA 101 §43.7.2.2).

Construction Type

Based on observations made on site, it is assumed that the construction type of the building is classified as Type III(200) construction, per NFPA 101, due to a combustibile interior frame (observed only roof/attic framing – hard ceilings elsewhere) with substantial masonry exterior walls. It is assumed that the exterior walls are 2-hour rated if load bearing. This construction type is classified as Type IIIB construction per the IBC.

Building Height and Area

The building code does not regulated the height and area of an existing to remain occupancy. Buildings containing existing assembly occupancies are required to comply with NFPA 101 Chapter 13 for allowable height limitations.

NFPA 101, Table 13.1.6 permits assembly occupancies only on the First Floor of a nonsprinklered Type III(2000) building. If sprinklered, an assembly occupancy with an occupant load of up to 300 is permitted on the Second Floor. Note that NFPA 101 Chapter 13 is permitted to be waived in full or partially, where occupancy of the building occurred before the effective date of the code and that it is the opinion of the AHJ that reasonable life safety against the hazard of fire, explosion, and panic is provided and maintained. Additionally, if deemed as a historic structure, the provision of a sprinkler system may be considered as mitigation for not meeting the construction requirements of the base code (NFPA 101, 43.10.4.11.1).

The building is required to be sprinklered regardless if it is ultimately determined to be 2 or 3 stories tall based on height limitations. If the building is able to be considered 2 stories and a basement, either by determination or variance, when sprinklered, the building is permitted to have an assembly occupancy of up to 300 occupants on the Second Floor. If confirmed as 3 stories tall, a variance will be required for the building to have assembly occupancies on the basis of the building being existing assembly to remain and that reasonable fire and life safety is provided.

Note that the height limitation precludes the attic space as being used as occupiable space/as a story unless approved by the AHJ.

Impacts of Major Renovation

The height limitations per NPFA 101 are applicable regardless of alteration work.

A height and area analysis per the New Hampshire State Building Code is only required where a building undergoes a change of occupancy to a higher hazard. A Group A occupancy is the second highest hazard. The only higher hazard occupancy is Group H, High Hazard (IEBC Table 1012.5). It is not expected that a Group H occupancy (e.g. occupancy using or storing hazardous materials such as flammable liquids) will be created. Therefore, a height and area analysis per the building code is not anticipated or considered by this assessment (change of use from Group A to Group A is a change to an equal hazard).

Exterior Wall Fire-Resistance Ratings

The exterior wall fire-resistance rating of the building is determined by the New Hampshire State Building Code which adopts and amends the 2015 International Existing Building Code (IEBC). As renovations are not yet proposed in the scope of work, exterior walls are permitted to remain as-is. Existing fire-resistance

ratings (if provided/inherent) and openings in the wall are deemed compliant. Note that it is assumed exterior walls are 2-hour fire resistance rated if load bearing based on the construction type assumption noted earlier.

Impacts of Major Renovation

When a change of occupancy classification changes from a lower hazard to a higher hazard, according to Table 1012.6 of the IEBC, existing nonload bearing exterior walls are required to comply with the fire resistance ratings and opening limitations of the IBC for new construction. Table 2 indicates the hazard classifications for exterior wall exposure based on occupancy type. Note that this table differs from height and area hazard classifications and means of egress hazard classifications.

Exposure of Exterior Walls Hazard Categories	
Relative Hazard	2015 IEBC Table 1012.5
	Occupancy Classification
1 (Highest Hazard)	H
2	F-1, M, S-1
3	A, B, E, I, R
4 (Lowest Hazard)	F-2, S-2, U

Table 2: Exposure of Exterior Walls Hazard Categories

Assuming the building remains an assembly occupancy, it is not expected for the exterior wall hazard category to change. This means that the non-loadbearing exterior walls are not required to be upgraded to comply with the requirements for new construction. If the building is converted to a Group M Mercantile occupancy, a study into the exterior wall’s fire rating and surface area of opening’s will be required.

The existing occupancy chapters in NFPA 101 do not govern exterior wall ratings or openings, therefore the existing exterior walls are not required to be upgrade per NFPA 101.

If exterior walls are altered, or opening’s surface areas are increased, they are required to comply with the IBC for new construction. This includes IBC Table 602 for non-loadbearing exterior wall fire resistance rating and IBC Table 705.8 for the maximum percentage of openings (i.e. windows) that are allowed. The following table indicates these criteria based on the building’s separation distance to an adjacent lot line or the centerline of a public street.

Fire Separation Distance (ft)	Not Sprinklered		Sprinklered	
	Fire Resistance Rating	Allowable Area of Openings	Fire Resistance Rating	Allowable Area of Openings
$X < 3$	1 hour	Not Permitted	1 hour	Not Permitted
$3 \leq X < 5$	1 hour	Not Permitted	1 hour	15%
$5 \leq X < 10$	1 hour	10%	1 hour	25%
$10 \leq X < 15$	1 hour	15%	1 hour	45%
$15 \leq X < 20$	1 hour	25%	1 hour	70%
$20 \leq X < 25$	1 hour	45%	0 hour	No Limit
$25 \leq X < 30$	1 hour	70%	0 hour	No Limit
$30 \leq X$	0 hour	No Limit	0 hour	No Limit

Table 3: Exterior Non-Loadbearing Wall Protection

Vertical Openings

NFPA 101 requires that all vertical openings be enclosed or protected in accordance with Section 8.6. For exit enclosures in existing buildings that connect three or fewer stories, a 1-hour shaft enclosure (comprised of fire barriers and horizontal assemblies) is required (NFPA 101 §7.1.3.2.1). Openings within the stairs are to be protected by 1-hour self-closing fire doors (NFPA 101, 8.3.4.2). Stair enclosures are not permitted to be used for any purpose other than those directly related to the stair (NFPA 101, 7.1.3.2.3). Additionally, only normally occupied spaces are permitted to open into a stair (NFPA 101, 7.1.3.2.1(9)).

It is generally accepted that within existing buildings, existing walls in good repair and consisting of lath and plaster, ½” gypsum wallboard, or masonry units, can usually provide satisfactory protection where a 1-hour shaft enclosure is required (NFPA 101, §A.7.1.3.2.1(3) and 13.3.1(5)).

If the building is classified as a historic structure, stairways are permitted to remain unenclosed where connecting only two stories. In three story buildings, stairs are permitted to be nonrated, however, are required to be enclosed in smoke tight construction with tight fitting doors and solid elements (NFPA 101 43.10.4.7.2).

- In general the grand stair connecting the First and Second Floors appeared to be constructed of lath/plaster, or gypsum board and is assumed to be compliant. Unless classified as historic, the doors serving the stair are required to be upgraded to fire resistance rated door assemblies. If not historic, the sitting space and usable area on the First Floor of the grand stair “enclosure” is not permitted. Additionally, if not historic, The bathroom under the stair is not permitted as it is not considered a “normally occupied” space.
- If used/required as a means of egress, the two story open stair connecting the First Floor and Lower Level is required to be enclosed in 1-hour rated construction. Note that this stair is not permitted to act as a means of egress in its current arrangement as it connects through a separate tenant on the floor below and was observed to be locked (NFPA 101, 7.5.1.6). If not a means of egress, the stair is required to be enclosed in at least 30-minute construction (NFPA 101, 8.6.5(3)). Existing drywall or lath/plaster as noted above is sufficient. If not an exit, partial enclosure of the stair only on the Lower Floor is permitted, and appears to be the current condition (NFPA 101, 8.6.8). Unless classified as historic, the door on the Lower Level serving the stair is required to be upgraded/confirmed to be a fire door. If classified as historic, this stair is permitted to remain unenclosed.

Impacts of Major Renovation

In Group A occupancies, a minimum of 30-minute enclosure is required to be provided to protect all vertical openings not exceeding three stories regardless of sprinkler protection (IEBC §803.2.1). If historic, exit stairs connecting three stories or less are only required to be smoke tight (IEBC 1203.6). All newly constructed shafts are required to be 1-hour rated (IBC §713.4). Construction supporting new fire resistance rated walls and floors is required to be afforded the same rating as the element(s) being supported where serving to protect a vertical opening/exit enclosure (NFPA 101, §8.2.3.3). I.e. supporting construction (columns, beams, floors, etc.) for a 1-hour stair is required to have a 1-hour rating as well.

Fire Alarm and Detection

The building is currently not provided with a fire alarm system. Assembly occupancies with occupant loads of more than 300, and all theaters with more than one audience viewing room, are required to be provided

with an approved fire alarm system (NFPA 101 §13.3.4.1.1). The requirement of §13.3.4.1.1 does not apply to assembly occupancies where, in the judgement of the AHJ, adequate alternative provisions exist or are provided for the discovery of a fire and for alerting the occupants promptly (NFPA 101 §13.4.1.1). The existing assembly occupancy will require a fire alarm system, as it is expected the aggregate calculated occupant load will exceed 300.

In existing business occupancies, a fire alarm system is required to be provided where any one of the following conditions exist (NFPA 101 §39.3.4.1):

1. The building is three or more stories in height.
2. The occupancy is subject to 100 or more occupants above or below the level of exit discharge.
3. The occupancy is subject to 1000 or more occupants.

The existing business occupancy on the Lower Level does not require a fire alarm system.

Existing Class A mercantile occupancies shall be provided with a fire alarm system (NFPA 101 §37.3.4.1). The existing mercantile space in the building is Class C as it is not more than 3,000 SF. Therefore the retail occupancy does not trigger a fire alarm system.

Impacts of Major Renovation

Where the building is to be converted to assembly use, the requirements for new construction are required to be applied throughout the building with regards to sprinklers, fire alarm and communication, hazardous area protection, and main entrances/exits (NFPA 101 §43.7.2.2). Similarly, IEBC §1012.2 requires that where there is a change of occupancy (complete or partial), a fire alarm and detection system is to be provided based on the threshold requirements of Chapter 9 of the IBC. Assembly occupancies with occupant loads of more than 300 and all theaters with more than one audience viewing room shall be provided with an approved fire alarm system (IBC §907.2.1 & NFPA 101 §12.3.4.1.1).

Automatic Suppression System

The building is not currently provided with an automatic sprinkler system. A sprinkler system is required to be provided based on the height of the building and its existing uses (see Height and Area section earlier).

Impacts of Major Renovation

Note that a sprinkler system is required for the existing building regardless of a major renovation project as noted above.

Portable Fire Extinguishers

Portable fire extinguishers are required to be provided in accordance with NFPA 1 Section 13.6 (NFPA 101, §9.9) and NFPA 10 (NFPA 1, §13.6.1.1). The maximum travel distance to a Class A fire extinguisher shall not exceed 75 feet based on an ordinary hazard fire risk (NFPA 10, Table 6.2.1.1). All fire extinguishers must be wall mounted or stored in an approved marked cabinet in a conspicuous location along normal paths of travel (NFPA 10, §6.1.3).

Means of Egress

Occupant Load

The occupant load of each space varies based on its use and has a corresponding occupant load factor. The occupant load factors are determined by NFPA 101 Table 7.3.1.2 and are presented in Table 4 below.

Function	Factor (ft ² per occupant)
Office	100 gross
Mercantile	30 gross
Kitchen	100 gross
Exercise (with equipment)	50 gross
Exercise (without equipment)	15 gross
Assembly (Seating, not fixed)	7 net
Assembly (Tables and Chairs)	15 net
Assembly (Fixed)	# Seats
Stage	15 net

Table 4: Occupant Load Calculation

The following table summarizes the calculated approximate occupant loads for the existing building:

Floor	Area (Occupancy)	Area (ft ²)	Occupant Load Factor (ft ² /occ)	Occupant Load
Lower Level	Cycling Studio	Unknown ²	50 gross	Unknown
	Office	Unknown ²	100 gross	Unknown
	Total			Unknown
First	Office	795	100 gross	8
	Kitchen	367	100 gross	4
	Assembly Hall	1,685	7 net	240
	Mercantile	338	30 gross	12
	Total			264
Second	Assembly Hall	1,685	7 net	240
	Jiu Jitsu Studio	334	15 gross	23
	Total			263

Table 5: Occupant Load Calculation

Egress Capacity

The required egress capacity for doors is based on the 0.20 inches per occupant and for stairs is based on 0.30 inches per occupant (NFPA 101, Table 7.3.3.1). Where means of egress from a story above and a story below converge at an intermediate story; the capacity of the means of egress from the point of convergence shall be not less than the sum of the required capacity of the two means of egress (NFPA 101 §7.3.1.5). Sufficient egress width is provided.

² Drawings of the basement level were not available to SFC Engineering for this analysis.

Number of Means of Egress

All stories, and spaces within, are required to be provided with access to at least two means of egress unless specifically exempted (NFPA 101, §7.4.1.1).

The basement level of the building is provided with a single means of egress from both tenant spaces. A single exit is permitted from an existing business occupancy where the travel distance to an exit is less than 100', the space has an occupant load less than 100, and the exit discharges directly to the exterior at grade (NFPA 101, 39.2.4.3). Although drawings were not provided for the Lower Level tenant spaces, it is expected that each of these criteria is met and a single exit is permitted from each tenant space.

Floor 1 has access to the main entry/exit doors on Main Street as the main exit from the floor. A secondary exit stair is provided via an open stair that leads to the tenant spaces on the Lower Level. In its current arrangement, the stair cannot be used as an exit since egress is not permitted to include paths of travel through different tenants where obstruction of an exit is possible (NFPA 101, §7.5.1.6). At least two means of egress are required to be provided for the floor's occupants (NFPA 101, 13.2.4.2). There are no exceptions for assembly occupancies.

Floor 2 is provided with an exit stair and a fire escape. This level is required to have two exits. Fire escape stairs complying with NFPA 101 §7.2.9 are permitted in Existing Assembly occupancies as a means of egress (NFPA 101 §13.2.2.9). On the site visit, SFC observed that the fire escape was in unsafe condition due to rust and was not suitable for a second means of egress. SFC was not able to measure the fire escape or its components as the stepping surfaces are not safely walkable. To act as a secondary exit, the fire escape is required to be properly replaced or repaired in accordance with NFPA 101 §7.2.8. Alternatively, an additional exit stair can be provided. Note, new fire escape stairs are not permitted to be provided (NFPA 101, §12.2.2.9).

Exit Access

NFPA 101 regulates the length of common paths of travel, dead-end corridors, and maximum travel distance to an exit. The table below has the travel distance limitations for existing buildings with the applicable occupancies (NFPA 101, Table A.7.6).

Occupancy	Maximum dead-end corridor (ft)	Maximum common path of travel (ft)	Maximum travel distance (ft)
Assembly	20	20 (where > 50 persons) 75 (where ≤ 50 persons)	250
Business	50	75	200
Mercantile	50	75	150
Storage	NL	NL	NL

Table 6: Travel Distances

NL: Not limited.

Access and egress routes shall be maintained so that crowd management, security, and emergency medical personnel are able to reach any individual at any time, without undue hinderance (NFPA 101 §13.2.5.4.3). The width of aisle accessways and aisles shall provide sufficient egress capacity for the number of persons accommodated (NFPA 101 §13.2.5.4.4). The provision of required number of exits from each space is expected to change exit travel distances and correct deficiencies.

Stairway Tread Dimensions and Landings

All existing interior and exterior stairs must comply with the dimensional requirements for an existing stair per NFPA 101 §7.2.2.2 and §7.2.2.4, unless the AHJ considers the stairs to be previously approved noncomplying stairs per NFPA 101 Section 7.2.2.1.2(2). Existing stairs are required to have a minimum width of 36-inches, minimum tread depth of 9 inches and a maximum riser height of 8 inches (NFPA 101 Table 7.2.2.1.1(b)). The variations in riser height and tread depth may not vary more than 3/16-inch for adjacent treads or risers and not more than 3/8-inch over the entire flight of stairs.

Both of the business tenants on the Lower Level have doors to grade that require two steps up. The steps are not uniform in tread and riser dimensions and exceed the variations specified.

Handrails and Guards

Existing stairs are required to be provided with a minimum of one handrail that extends the full length of the stair. The handrail must be located between 30 inches minimum and 38-inches maximum above the tread and meet the graspability requirements, which limits the perimeter of the handrail to 6 ¼-inches with a maximum cross section of 2 ¼-inches (NFPA 101 §7.2.2.4.5.2 and §7.2.2.4.5.6). The minimum required headroom clearance along a means of egress is 80-inches. Existing guards on existing stairs shall be permitted to be not less than 30 inches high (NFPA 101 §7.2.2.4.6.2). Open guards, other than approved existing open guards, shall have intermediate rails such that a sphere 4” in diameter is not able to pass through any opening (NFPA 101 §7.2.2.4.6.3). If deemed historic, existing grand stairs are exempt from the handrail and guard requirements. Existing handrails and guards that are structurally safe are permitted to remain in use (NFPA 101, 43.10.4.9.1).

Both of the tenants on the Lower Level have steps up to an exit door without handrails. Both steps are required to have at least one handrail.

Doors

Existing doors are required to have a minimum width of 28” and a height of 80” (NFPA 101, §7.2.1.2.3.2 and §7.1.5.1). The doors from the Lower Level to grade do not meet the minimum required headroom clearance of 80”, as only 75.5” is provided.

Impacts of Major Renovation

All newly constructed or configured means of egress shall comply with IBC Chapter 10 for new construction.

Where a change of use occurs that converts a Group B occupancy to Group A it is considered a change to a higher hazard and all means of egress serving that space are required to comply with new construction requirements (IEBC 1012.4). A change of use to Group A-1 from other existing Group A-1 spaces and Group M spaces is considered as a change in hazard to an equal hazard. When the use stays within the same hazard category existing elements of the means of egress are required to comply with IEBC section 805 and Chapter 13 for Existing Assembly occupancies in NFPA 101 (as noted throughout this section).

Egress upgrades expected to be included as part of an alteration include providing two means of egress from the First and Second Floors, enclosing existing exit stairs, providing adequate egress lighting (including emergency lighting), and providing adequate exit signage.

Accessibility

All renovation areas and altered elements are required to be designed as accessible unless technically infeasible in which case alterations are to provide access to the greatest extent feasible (IEBC 705.1). Where an alteration affects the accessibility to, or contains, a primary function area, the route to the primary function area shall be made accessible to the maximum extent before costs are disproportionate. The accessible route to the primary function area shall include the of travel and includes toilet facilities and drinking fountains serving the area of primary function (IEBC §705.2). Upgrades to provide accessibility are considered disproportionate when the costs of providing the accessible route exceed 20% of the costs of the alterations affecting the area of primary function.

Where an alteration includes providing a stair where one did not exist before, an accessible route (i.e. elevator) is required to be provided to connect all floors (IEBC 806.2 and IBC 1104.4).

Where the project includes a change of use throughout the building, minimally the following are required to be provided:

1. At least one accessible entrance.
2. At least one accessible route from an accessible entrance to primary function areas on all floors.
3. Accessible signage
4. Accessible parking
5. At least one accessible loading zone, where loading zones are provided
6. At least one accessible route connecting accessible parking and loading zones to entrances.

The building is currently not provided with accessible features including entrances, bathrooms, or an accessible route within.

End of Report