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NATIONAL, STATE-OF-THE-ART
FIRE STATION SPECIALISTS

TOWN OF ORLEANS

FIRE STATION FEASIBILITY STUDY

August 11th, 2021

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TOWN OF ORLEANS

FIRE STATION FEASIBILITY STUDY

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THE GALANTE ARCHITECTURE STUDIO

The Orleans Fire Department aims high with their mission statement, vision statement, and core values. Further, professional adjacencies in 911 dispatch centers and surrounding communities providing mutual aid require a professional level of services be available.

From the Orleans Fire Department:

MISSION STATEMENT

The Town of Orleans Fire Rescue Department is a dedicated professional organization committed to serving the community protecting life, property, and the environment through performance of Fire Suppression and Prevention, Emergency Medical and Rescue Services, and Community Outreach and Education.

VISION STATEMENT

The most esteemed Fire Rescue organization on Cape Cod achieved through operational excellence, enhanced training and professional development, effective communications, robust community engagement and a focus on a culture of wellness and values.

CORE VALUES AND BELIEFS

We will build an enduring Department that:

- Upholds Service before Self in the Finest Tradition of the OFD.
- Takes pride in and preserves our valued reputation.
- Consistently conducts all relationships with honesty, transparency, integrity, empathy and respect.
- Creates a team-oriented workplace that values both team and personal accountability.
- Continuously improves our service performance, processes and skills.
- Celebrates victories along the way.

The Orleans Fire Department aims high with their mission statement, vision statement, and core values. This is the first in depth analysis of this site and facility and defines our recommendations for the Town of Orleans.

EXISTING CONDITIONS

The 1987 fire station is located at 58 Eldredge Park Way, with access to the station by a single driveway. The topography of the site required that the station be built with apparatus bays on two different levels. It is fed by single phase electric, does not have fire suppression, and has a septic system sized for the current size facility.

The Orleans Fire Station is a split face masonry structure built on a site that is bounded on all sides by school and private property. It is a single story on the side with the building entrance, rear of the building, side and portion of the building front. The middle front of the building is two stories with an outdated hose tower. It has an asphalt roof and “punched” window openings and concrete decorative arches over the apparatus bay doors.

Due to site topography, the interior has multiple floor levels (tri-level) with various rooms on each level. Originally designed with one large bunk room and a fitness room on the same level, the station has been renovated and retrofitted over the years to accommodate changing needs. The most recent renovation included adding temporary HVAC upgrades to correct interior air quality concerns.

PARTIAL DESCRIPTION OF DEFICIENCIES

The short- and long-term health and safety of the first responders is at risk within the existing site and building (critical issue)

Site topography has the building placed down in a valley which promotes buildup of ice and snow on roads with severe grade, leading to unsafe conditions in winter and periods of heavy rain

There is only one access road mixing emergency traffic with “civilian” traffic with potential for accidents between the two.

The driveways and parking areas were not constructed for truck traffic and are universally failing

The “tri-level” nature of the building imposes a constant obstacle of traversing stairs to initiate almost every first responder task

Interior space efficiency is very low and not easily corrected

The building is outdated as State & Local Codes have evolved. For example;

Any attempt at expanding and renovating this facility will trigger full and complete building and life safety code upgrades

There are seismic (earthquake), wind, storm impact and life safety code requirements for a current era category IV public safety facility (Category IV buildings are those designated as essential facilities such as fire, rescue, police, emergency shelters, emergency operations centers, etc.).

The existing building does NOT meet category IV requirements for a public safety facility. These buildings now must withstand major events and remain standing for continued delivery of services. The existing building would need major upgrades to bring it into compliance.

The building does NOT have a fire suppression system. Any expansion of the existing building requires the retroactive installation of a full fire suppression system and fire alarm system

The building has very limited Massachusetts Architectural Access Board (MAAB) compliance. Any expansion of the building will trigger varying levels of MAAB compliance

The septic system for the building is sized for the current facility. Any expansion of the building would trigger replacement of the septic with an adequately sized system meeting today’s nitrogen emission standards

The building does NOT meet any level of Energy Code. Any building expansion area must meet energy code – including HVAC systems. Mixing older and newer HVAC systems does not work since there is no possibility of an air barrier. An expansion of the existing building would trigger compliance with energy code.

Orleans Green Community Guidelines have been put in place in Town and this building is NOT designed to be energy efficient in today’s standards

The doors, roof, windows, and walls are simple construction and not impact resistant as today’s public safety buildings are required to be

Most of the reconfigured bunk rooms are windowless, not code compliant, and cut up in a way that limit functionality

The 2009 vehicle direct capture exhaust venting system is not adequate and its installation limits performance

Decorative arches on overhead doors are too low for ever growing fire service vehicles

Many areas of the building do not meet National Fire Protection Association (NFPA) standards that are customarily met by fire departments

There are additional items that could be added to this list, and outlined in the Building Code summary herein

RECOMMENDATIONS

The most financially sound approach is to select a site or portion of an adjacent site and develop a new facility designed to today's firefighting standards, align the goals of the fire department with the town, and provide a safe, contaminant free building and environment for our first responders while they finish using the current building.

Renovating the current facility will require a temporary facility to be put in place costing in the range of $2 to 4 million. This money would be best used in a new facility (See Appendix H pg. 86)

Building a new facility allows this building to be used as a "temporary" facility during construction

Renovating the existing facility may still result in a "tri-level" complicated building which does NOT improve fire fighter response time

Inefficiencies in the existing building have capital cost implications that a new facility will not have

A new facility would support the town's recent designation as a Green Community by implementing energy efficient systems

Based on this brief summary, and the detailed reports that follow, it is our strong recommendation that the most fiscally sound and safest approach is to develop a portion of the adjacent site and build a new fire station closer to Eldredge Park Way.

We would like to take this opportunity to thank all of you for the opportunity to investigate this site and facility. We specialize in the design of public safety facilities and work hard to take care of our first responders. We take pride in our work and believe our findings to be in the best long term interest of the Town of Orleans and the Orleans Fire Department. As always, we are available to discuss this report or any aspect of the project in greater detail.

Thank you,

Theodore (Ted) Galante AIA LEED AP

The Orleans Fire Station Site

The Orleans fire station is located on a site with significant deficiencies. Many of the design decisions made when the original building was built would simply not be made today. The existing building is situated in a way that is most unfitting for fire stations. There are numerous problems with the site that are not easily overcome without significant expenditure. Even with this expenditure the resultant building would likely not be the most efficient for the Town and the Fire Department and therefore result in committing significant funds for a mediocre outcome.

One very clear result of our study is to suggest that the site and building do not meet contemporary firefighting standards, are not suitable to hurricane resistance, do not meet criteria to withstand gale force winds that current emergency services buildings are required to meet, etc.

The building sits on a limited site area with complicating levels of grade and topography. These varying conditions have detrimental impact on delivery of emergency services by limiting how quickly fire responders can get from where they are sitting when a call comes in, to the trucks, exiting the site, and on to the road. NFPA standards call for response times of 4 to 8 minutes, with 8 being the least desirable and only for certain vehicles. These standards are in place to save lives, limit brain damage, and not cause longer term health issues, and / or healthcare costs.

The topography of the site requires the apparatus bays be set on multiple levels. The building is placed in a valley with existing site grades that have an approximately 8% slope dropping down and then rising back up between the building and the roadway. Locating an emergency services building on two levels was not a good idea since maneuvering AASHTO rated vehicles the size and complexity of fire trucks is very difficult on such complex grades – especially in icy or snowy New England winters. Sloping in one direction is possible, sloping in a number of directions puts first responders at great risk. The existing portion of the site that is set back from Eldredge Park Way is much less than ideal and should be seen as an unacceptable condition by the town for the safety of their first responders.

It is highly recommended to locate public safety facilities on relatively flat sites, as close to the street as possible.

Moreover, the facility currently has a single drive lane for emergency responders as well as for civilians visiting the station. It is a narrow curving drive lane and carries risks the town may not be considering. If the sloping roadway was icy, and an ambulance was careening out of the station while someone was driving to the station, the narrow drive lane poses risk of accident. Since it is the only drive lane to and from the building, a follow on emergency vehicle would not be able to get to the original call since the drive lane would be blocked, and there would be limited ways of safely handling the accident on fire station property. For this reason (and more) current day fire station design requires at least two drive lanes – one for emergency vehicles and one for civilian traffic. By separating the two, each group is kept safe, and first responders are able to get to their planned destination in as timely a manner as possible.

It is highly recommended to provide two drive lanes for safety, with clear visibility.

The Orleans Fire Station Interior

The Orleans fire station has a confusing, inefficient interior layout that causes delays in getting personnel to the trucks, as well as deploying the trucks from the site. The layout is poorly planned, has multiple floor heights, poor and complicated storage locations, re-purposed rooms that are inefficient and are in violation of some of the Building Code. Modern fire stations are designed for efficient "turn out and response times". They are designed to be better than simply code compliant, and focus on immediate as well as longer term fire-fighting solutions.

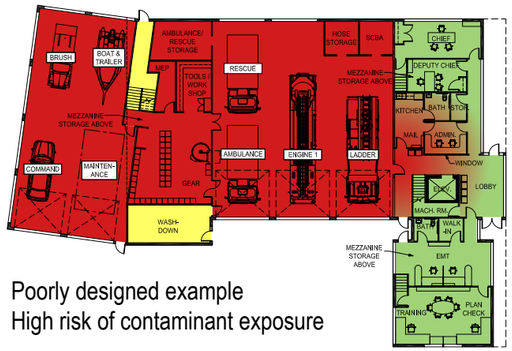
As illustrated in the enclosed existing building circulation diagrams, the facility is poorly planned, outdated, less secure, and unsafe for the occupants. The multiple levels of the building complicates circulation as do the room layouts, and chopped up nature of the rooms which have been changed or modified over time. As a result the entire building is less than adequate for reasonable use.

Further, and more critically for the occupants of the building, the Orleans fire station is NOT designed to limit carcinogen transfer, potentially leading to long term health impacts on its inhabitants. Many functions and room designations indicate potential risks for fire fighters in how they use the building. A Plymovent (direct vehicle exhaust capture) system was installed in 2009 but the building housed fire diesel emitting vehicles for almost 25 years prior to then. As a result, the walls may be covered in soot from that period and soot is one of the elements that is unhealthy for fire fighters. The venting system was installed with limited understanding and consideration for the range of possible vehicles housed in the apparatus bays, and therefore limits possible truck placement, truck orientation, and type of truck that can be housed there. In short, it is one more limiting factor in this facility that prevents the efficient and professional delivery of emergency services. The fan motor for the retrofit vehicle exhaust system was placed in whatever available space, not in a designated area. As a result it was installed in the out dated hose tower being used for storage, and in a manner that has potential for injury.

Due to a general lack of square footage and space, there is no fitness room in the building. Fire Fighters are known as occupational athletes and keeping fit so they can perform their line of duty is essential. Any contemporary fire station being designed today has a fitness room for the health and well-being of the fire fighters.

In Orleans, the fitness equipment is located directly on the apparatus floor – the biggest Hot Zone in a fire station – and the worst possible place for deep breathing caused by exercise. Anyone working out on an apparatus floor is breathing in the history of soot, but also potentially any current day carcinogens that return with the trucks and / or the diesel exhaust the trucks emit as they enter the building – even with the Plymovent system. This is a very big hazard and needs to be corrected.

Today's fire stations are designed to separate areas of high internal hazard such as apparatus bays from areas of no internal hazard such as living quarters. Fire fighters are faced with more types of cancer diagnoses than most other career choices. Until recently the design of fire stations were not considered part of the solution. Given extensive research and development, it is clear that the "second home" of the first responder needs to be designed to promote their long term health and well-being. As a result, we now focus on Hot zone, Warm zone, and Cool zone design strategies. These use both architectural separations (walls, doors, windows) as well as mechanical, electrical, and plumbing system separation.



Poorly designed example
High risk of contaminant exposure

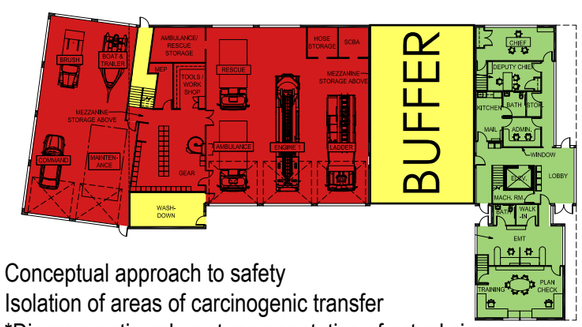
Hot -High Hazard

Transition - Moderate

Cold - Low Hazard

The express result is isolation and removal of as many carcinogens as possible from all areas of the building. Hot zones are those where response vehicles are stored, turn out gear is stored, tools and equipment are stored. They also include areas for a fire fighter to decontaminate themselves. Warm areas are those transitional zones as one is leaving a hot zone. These are short corridors or vestibules, or enclosed vertical circulation. Cool zones are those where first responders rest, eat, sleep, exercise, and similar activities. As occupational athletes, fire stations should be designed to help their strength, endurance, and general fitness. The existing Orleans fire station is NOT designed in this manner, and may have a negative impact on its inhabitant's long term health.

It is highly recommended that a building be planned and designed to take care of the town's first responders long-term health and welfare by protecting them from carcinogen transfer in the station.



Hot -High Hazard

Transition - Moderate

Cold - Low Hazard

Conceptual approach to safety
Isolation of areas of carcinogenic transfer
*Diagrammatic only, not representative of actual size

Where the Site and Building meet

Fire stations have what is known as an “apron” at the outside edge of each overhead door. The design and material choice of the apron is of critical importance to fire station operations, safety, and longevity of town owned trucks, ambulances, trailers, (collectively Apparatus). These expensive vehicles endure best when the apron is a smooth transition from the interior to the exterior, and the apron is safest for our first responders when it is not slick or slippery.

The aprons in place at the existing station are made of asphalt. Today this material would NOT be used for the reasons above and more. Asphalt settles, cracks, and moves radically with temperature changes. It is slippery when wet and builds ice easily. It is a more dangerous material to first responders for this reason, and much more abusive to the Town’s trucks and property leading to long-term expensive truck repair or replacement. Further, it does NOT last as long as concrete, which can be designed specifically for these areas. The current aprons are outdated, failing, cracked, not draining properly, and are a general safety hazard and nuisance to the fire department. Repairing them would require extensive reworking and we suggest this would be a poor use of tax dollars.

Today’s fire stations have “light broom finished” concrete aprons that are longer than the trucks that use them for safe maneuverability. They are structurally reinforced, align with the apparatus bay interior, and designed for proper drainage to eliminate rain, snow, and ice buildup. The goal is a non-slip, safe surface to protect the health and welfare of those who are responding to emergencies. In some cases we design them with in-slab radiant heat that melts ice and snow and allows emergency vehicles to dispatch safely any time of day or night regardless of New England winter conditions.

It is recommended that concrete aprons be incorporated into any future design thinking

Beyond safe design to limit carcinogen transfer, and the poor interior layout, the Orleans fire station has a wide range of other concerns that impact their ability to properly function in the world we live in today. An easy place to start is the size of the overhead doors where fire apparatus deploys. The low point of these arch shaped openings is 10’-0” to 11’-6” which limits the ability for emergency apparatus. These existing arches are designed and built in a way that prevents them from being easily increased in size. Any work on these openings would require a major overall of this portion of the building. Fire apparatus manufacturers are responding to NFPA standards and as a result, trucks keep getting larger, both in terms of height and in terms of width. Many historic fire stations have trucks custom made at great expense and cannot host visiting fire companies or have dual coverage should their own apparatus be out of service. Today’s standards for fire stations include doors that are 14’-0” tall and 14’-0” wide. The decorative precast archways limit the door’s effective clearance height.

There are numerous other building deficiencies ranging from re-purposed or poorly planned functional spaces, outdated spaces that no longer serve current function, as well as spaces that are simply missing that are essential to a current day functioning fire station. For example, the bunkrooms in the building are adaptations of what used to be one large bunkroom. When it was divided into smaller rooms some space efficiencies were lost, but more importantly there are rooms with code violations now in place. Some of the rooms are oddly shaped (inefficient) and some do not have any natural daylight or ventilation. These are not professional ways to treat our first responders, and all items that need re-planning and correction.

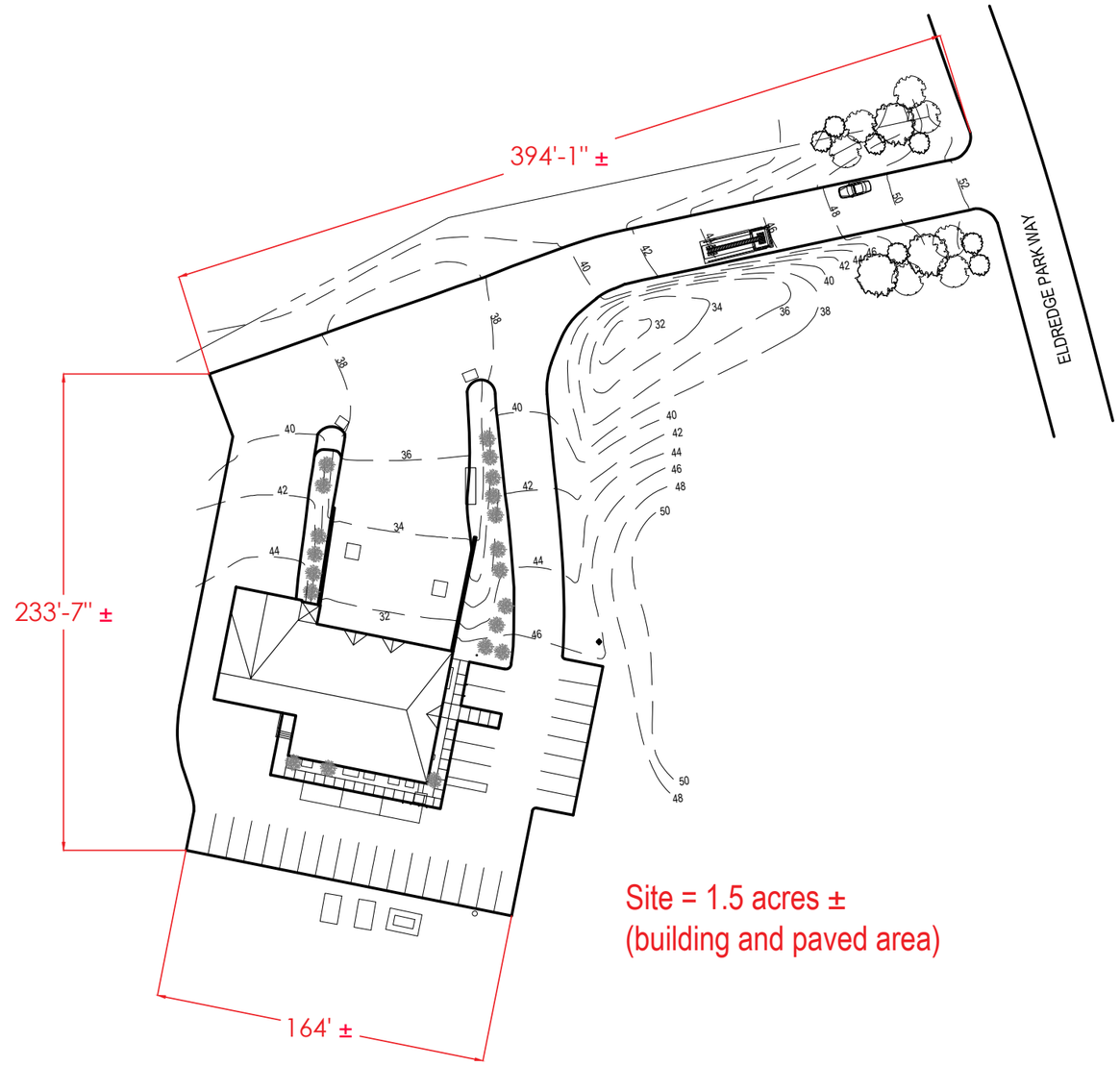
The kitchen is far too small for current staff needs. It does not have emergency shutdown switches needed for when the department is cooking but then needs to rush out to a fire. Systems like these provide safe places for fire fighters to live and work. The kitchen is NOT accessible to those in wheelchairs or others with physical impairments and without a regulatory variance in place, it needs to be. All elements of the kitchen are outdated, inadequate, with limited functionality. It is very clear they lack storage for all that is required in a modern day fire station.

The training room is too small to meet department needs. It has no storage, and seems it is currently used as a combination storage room / training room. Beyond being outdated in almost every possible way, new duct work was added through a window that protrudes into the room and is in visible way of everything around it. The fact that this was accepted as a solution speaks to the near crises mode and limits the department has, in order to “fix” portions of the building and advance their cause. A modern day fire station requires at least a 30 – 60 person training room with proper heating, cooling, and ventilation, lighting, sound, and communication systems. These rooms have storage for tables and chairs and allow for flexibility and use by other members of the community. Training is an essential part of a fire fighter’s and an EM T’s life, with more and more training becoming essential in our complex world. Orleans needs a training facility befitting of the needs of the department and more.

It is highly recommended the interior of the new fire station be designed in a way that meets today’s fire station working and living conditions, is durable with limited maintenance, and plans for future department growth and safety.

Respectfully,

Theodore Galante AIA LEED AP



Site = 1.5 acres ±
(building and paved area)

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Project Number
2106

Project Title
Orleans Fire Dept
58 Eldredge Park Way
Orleans, MA 02653

Drawing Title
Feasibility Study
Site Plan

Date/Issued For
08.11.21

NOT FOR CONSTRUCTION

Print 11x17

Scale
1/64" = 1'0"

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Drawing Number
Ex Site 1

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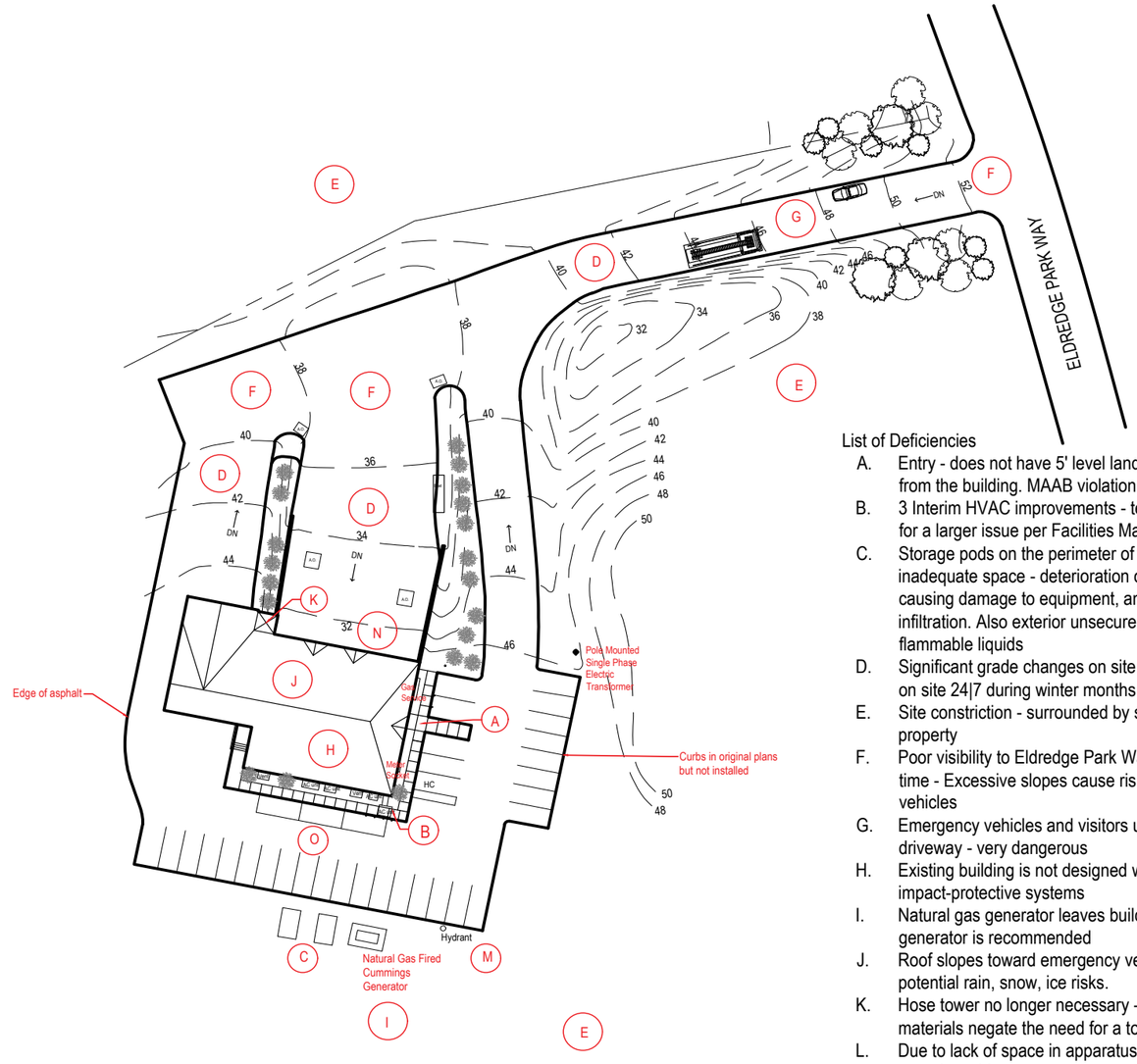
Existing Site Conditions



List of Deficiencies

A. Entry - does not have 5' level landing - slopes away from the building. MAAB violation
B. 3 Interim HVAC improvements - temporary solutions for a larger issue per Facilities Manager
C. Storage pods on the perimeter of the building due to inadequate space - deterioration of containers causing damage to equipment, and animal/rodent infiltration. Also exterior unsecured storage of flammable liquids
D. Significant grade changes on site requiring snowplow on site 24|7 during winter months.
E. Site constriction - surrounded by school and private property
F. Poor visibility to Eldredge Park Way reducing turnout time - Excessive slopes cause risk to emergency vehicles
G. Emergency vehicles and visitors use the same driveway - very dangerous
H. Existing building is not designed with impact-protective systems
I. Natural gas generator leaves building at risk. Diesel generator is recommended
J. Roof slopes toward emergency vehicles causing potential rain, snow, ice risks.
K. Hose tower no longer necessary - modern hose materials negate the need for a tower
L. Due to lack of space in apparatus bay - rescue boat stored outside
M. When hydrant is used for training it causes low pressure at the Orleans Elementary School
N. No concrete apron at the exit of the apparatus bays.
O. Drive aisles in the parking areas appear to be undersized for two-way traffic, as minimum should be 24' wide

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Orleans Fire Dept
58 Eldredge Park Way
Orleans, MA 02653

Drawing Title
Feasibility Study
Site Plan

List of deficiencies

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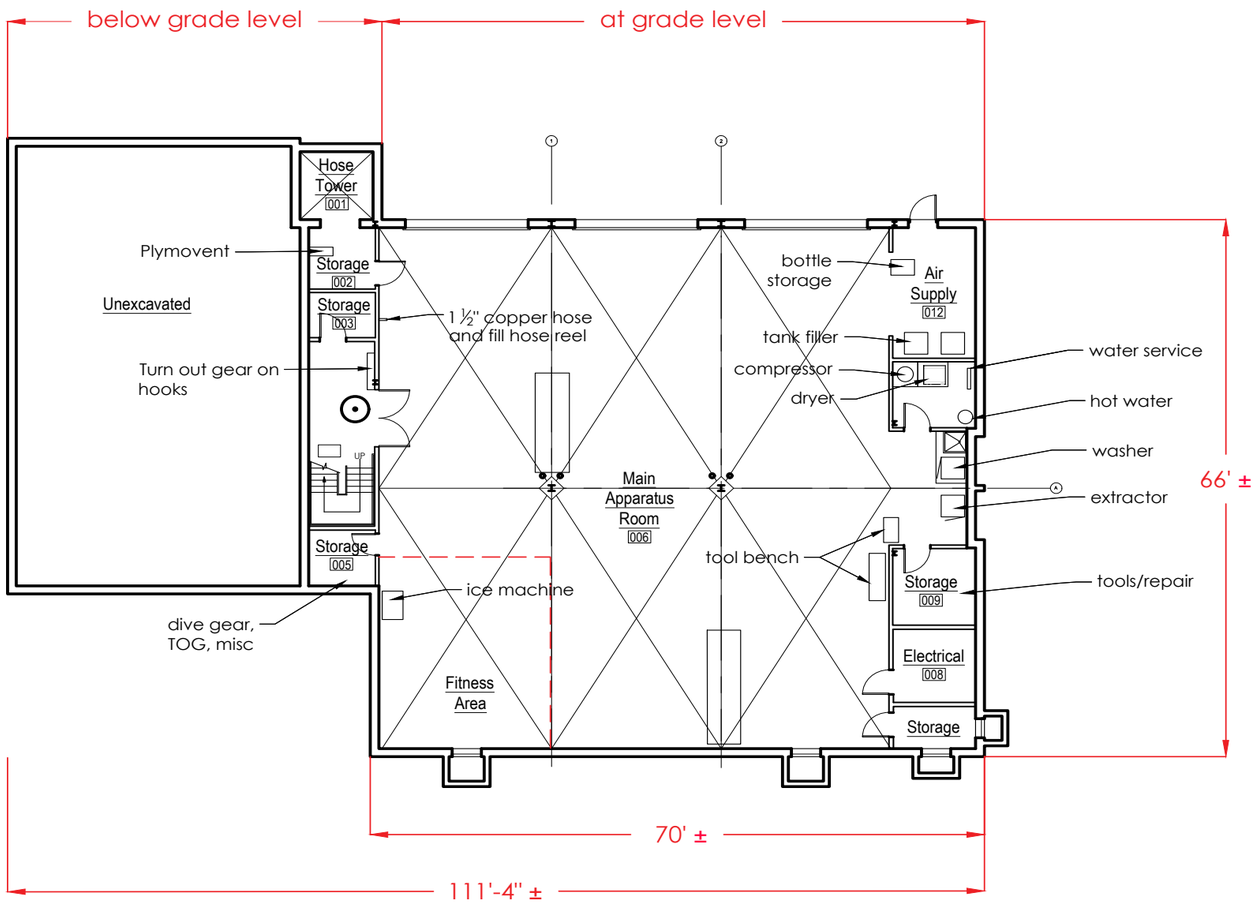
List of Deficiencies - Site



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Project Title
Orleans Fire Dept
58 Eldredge Park Way
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Drawing Title
Feasibility Study
Basement

Existing Conditions

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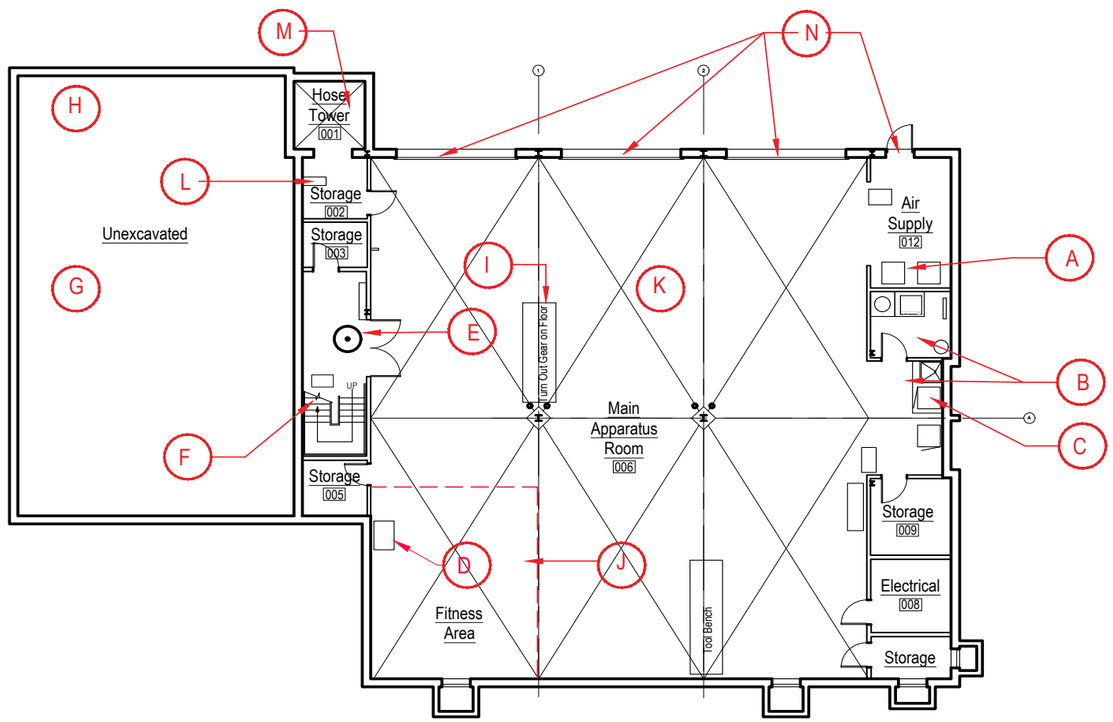
Existing Conditions - Basement



List of Deficiencies

A. SCBA - Cascade type filling system compressor produces a noise concern and should be in its own room
B. Gear laundry area - No floor drains - Not installed correctly, no exhaust in area. Not in a designed/dedicated space. Waste water pumps remove water from extractor and washing machine to sink - routinely overwhelmed and floods
C. Domestic washer/dryer in gear area - Hazardous chemical exposure to all occupants and bedding
D. Ice Machine location - should be located in area safe from carcinogenic contamination. Currently piped to floor drain - tripping hazard
E. No transition areas between hot/cold zones of the station - ease of carcinogenic transfer
F. Stairway to apparatus bay has no air separation from living quarters
G. EMS Supplies storage is not centralized and inadequate, on apparatus floor, in contaminated areas, near office and lobby areas
H. Truck repair - inadequate space for repairs due to ceiling height
I. Turn out gear stored in apparatus bay - NFPA violation
J. Fitness area in apparatus bay - leading to carcinogenic exposure
K. Apparatus floor drains clog and routinely back up, drains go to a septic leech pit, not a tight tank
L. Plymovent system not designed for vehicles that must be turned around during winter storms due to grade. Installed 2009 - soot stained walls from pre-2009
M. Hose tower floor drain easily overwhelmed - contaminated water from hose cleaning spills into lower apparatus bay toward gear racks.
N. Door often blocked by ice and snow in winter storms. Apparatus doors do not seal properly at floor causing consistent energy loss.

Additional Notes

- Lower floor Apparatus door height/Ceiling height - Inadequate for apparatus. Door height at lowest point is currently 11'6", contemporary standards require 14'-0" doors
- Very limited storage
- Electrical service will be insufficient for new service requirements
- Flooding and equipment loss on basement level - potential mold on walls where supplies are stored

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Basement

List of deficiencies

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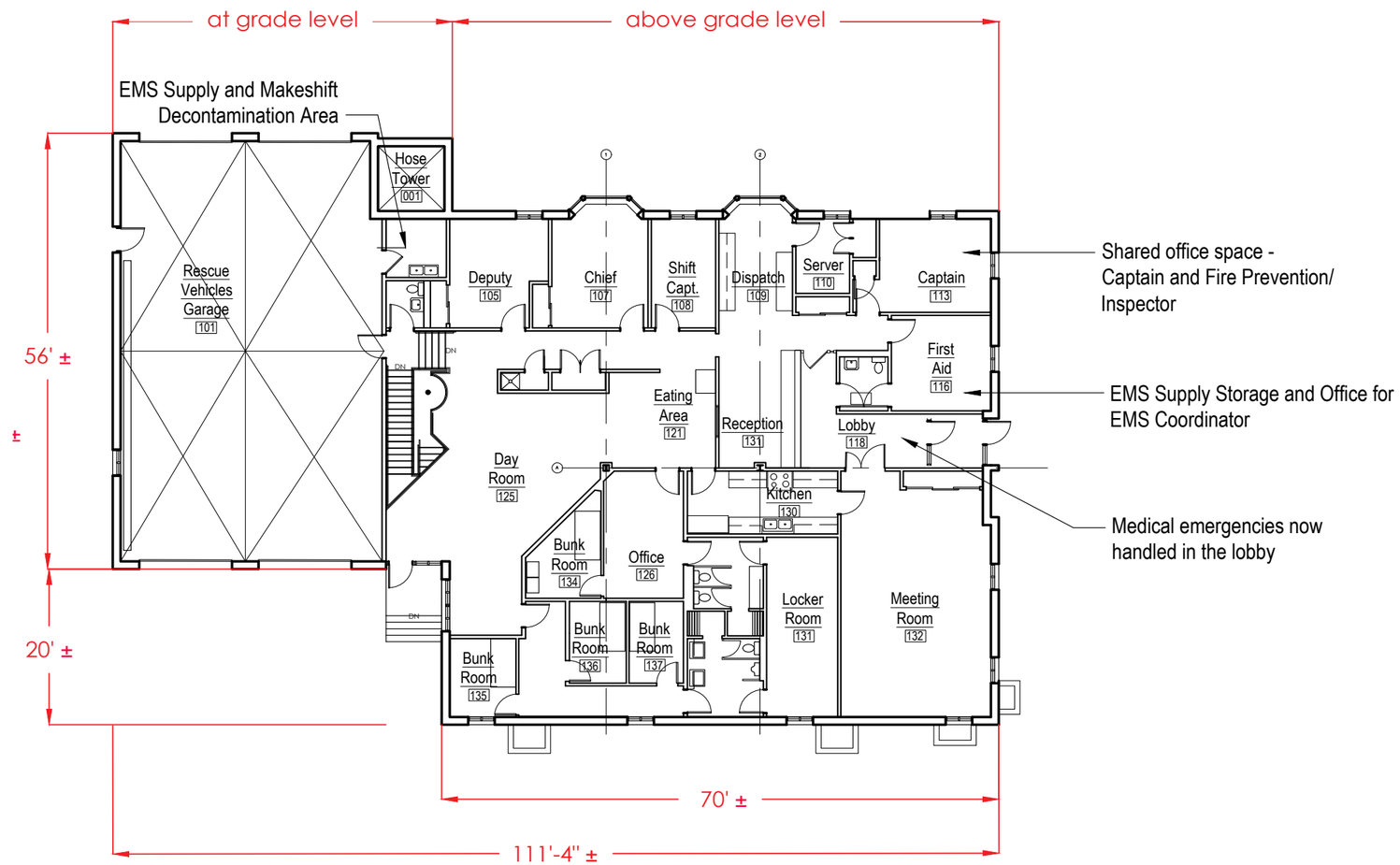
List of Deficiencies - Basement



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Orleans Fire Dept
58 Eldredge Park Way
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Drawing Title
Feasibility Study
First Floor

Existing Conditions

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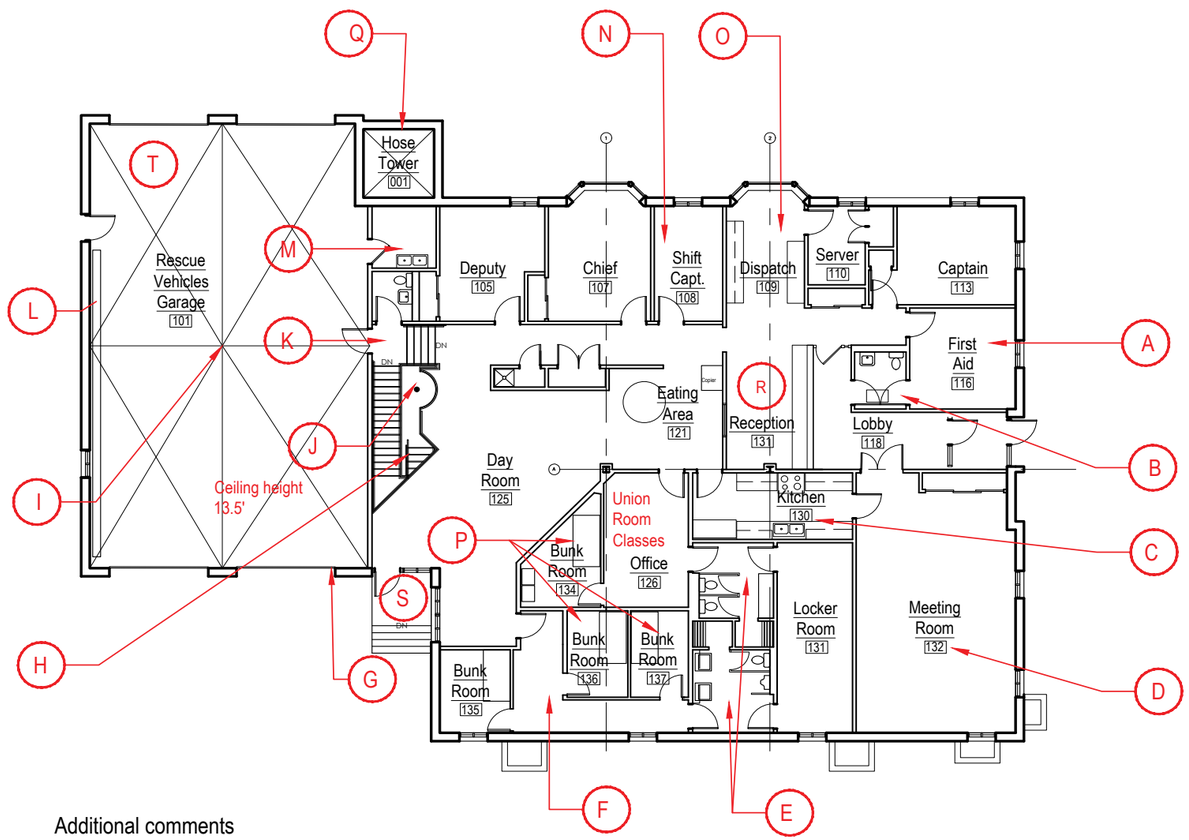
Existing Conditions - First Floor



List of deficiencies

A. First Aid Room - has been repurposed for EMS Coordination and Supplies. First Aid is now handled in the lobby which was not the original plan and therefore does not function as well as it could (ie no sink).
B. Public restroom (MAAB Violation) - Unsecured location and privacy issues (odor, etc)
C. Kitchen - Current facility has been outgrown, is outdated and inadequate for personnel. Not MAAB compliant
D. Training/Meeting Room - Not large enough to accommodate 30+ station personnel, and to function as backup Emergency Operations Center. Temporary HVAC repair takes up space.
E. Restrooms - Not handicap accessible and not easily accessible to station personnel. Women need to go through men's locker room. Bathroom sinks drain slowly/back up routinely due to design issues.
F. Laundry facilities - No domestic laundry available leading to potential carcinogen transfer.
G. First floor apparatus door height/Ceiling height - Inadequate for apparatus. Door height at lowest point is currently 10', ceiling height is 13.5'Contemporary standards require 14'-0" doors
H. Stairway to apparatus bay has no air separation from living quarters potentially leading to carcinogen transfer
I. No decontamination area for personnel near the apparatus bay potentially leading to carcinogen transfer
J. Fire Pole - currently not used therefore wasted space, safety issues, air penetration from hot zone
K. No transition area between hot/cold zones of the station potentially leading to carcinogen transfer
L. Turnout gear on apparatus floor - does not conform to NFPA standards
M. EMS Medical Supply - Space inadequate Two bay sink blocks door swing
N. Shift capt. office - Used for sleeping but was not designed for this. Poorly located
O. Dispatch area - No longer used therefore inactive space
P. Bunk rooms in violation of building codes. No natural light or ventilation. Too small as built.
Q. Hose tower no longer used
R. Reception desk not MAAB compliant
S. No separation of the dayroom from the exterior - door not tight and cold air infiltrates
T. Vehicles must be driven out of the back of the upper apparatus bay - can not back up the hill during minimal snow and ice (even with plowing and sanding)

Additional comments

- Exterior wall and roof assembly that defines the conditioned air envelope is not a proper thermal barrier
- Exterior CMU wall is coated with a bituminous mastic containing asbestos
- Water infiltration into building during rainstorms - needs roof replacement
- Fire alarm altered due to water infiltration
- Exterior trim rot - animal/rodent infiltration

Decontamination:

- Equipment - done in apparatus bay or outside due to EMS storage room configuration. Equipment must be placed outside to dry or hung in apparatus bay.
- Personnel - remove uniforms in apparatus bay - traverse living area/hallways/bunk space wrapped in blankets to reach showers. No separate area for male/female. Two showers in the entire building - inadequate.

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Project Number
2106

Project Title
Orleans Fire Dept
58 Eldredge Park Way
Orleans, MA 02653

Drawing Title
Feasibility Study
First Floor

List of Deficiencies

Date/Issued For
08.11.21

NOT FOR CONSTRUCTION

Print 11x17

Scale
1/16" = 1"0"

Drawn By
TGAS

Drawing Number
EX-102a

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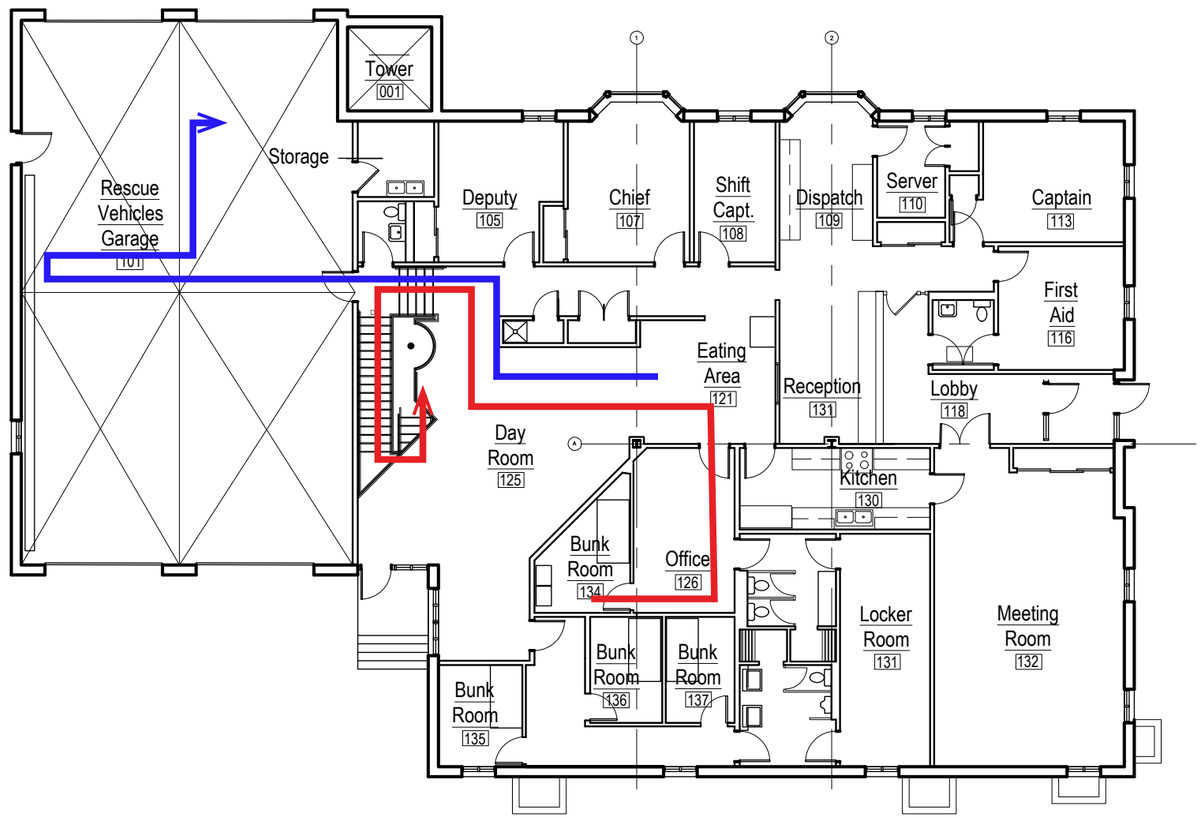
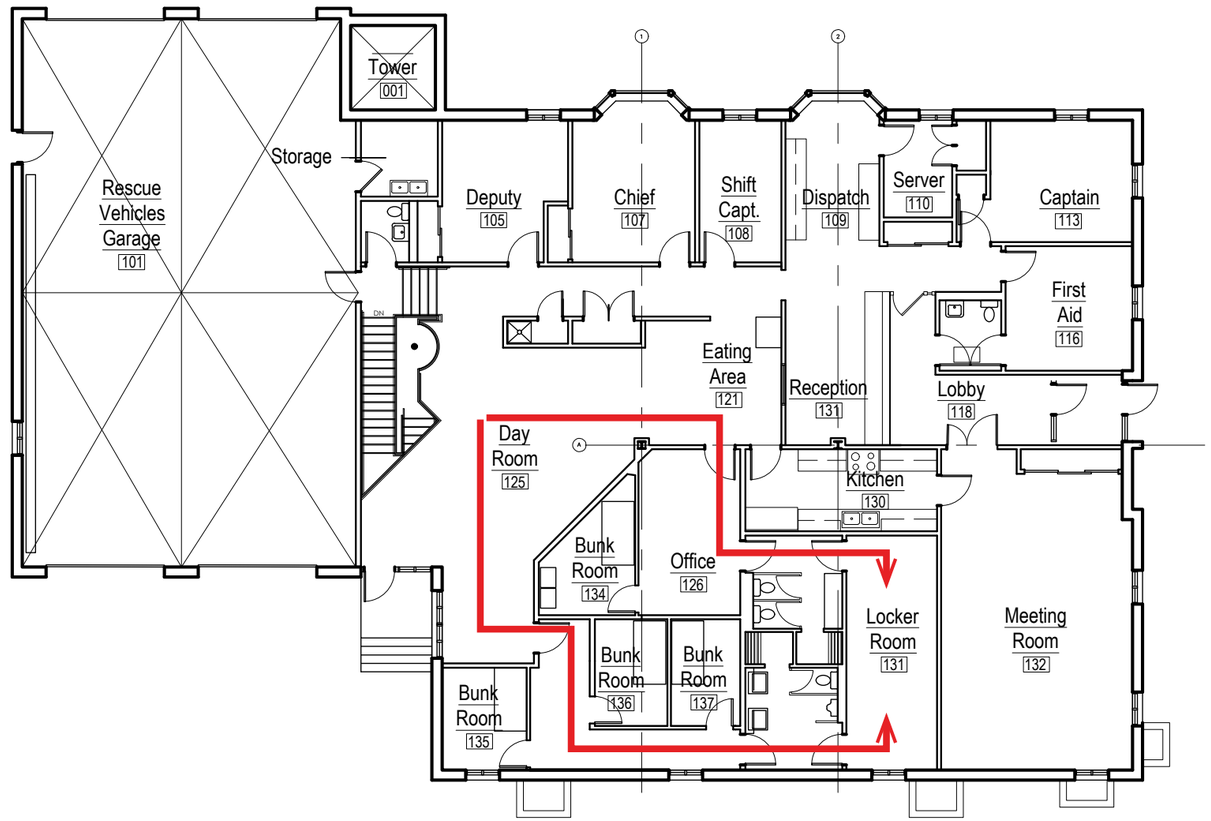
List of Deficiencies - First Floor

No direct path to apparatus



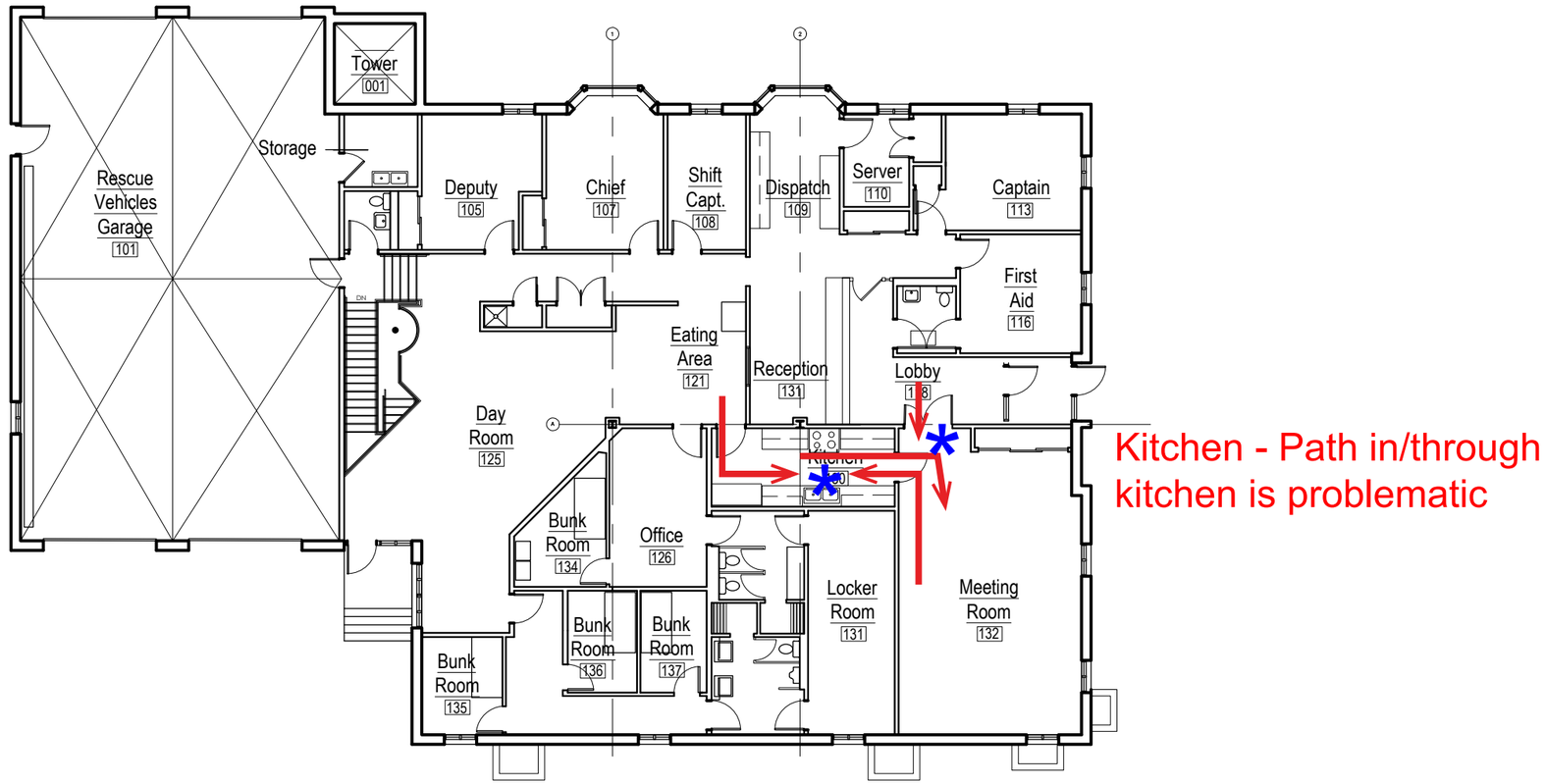
Slow response times due to poor layout

Complicated Path to Apparatus Bay

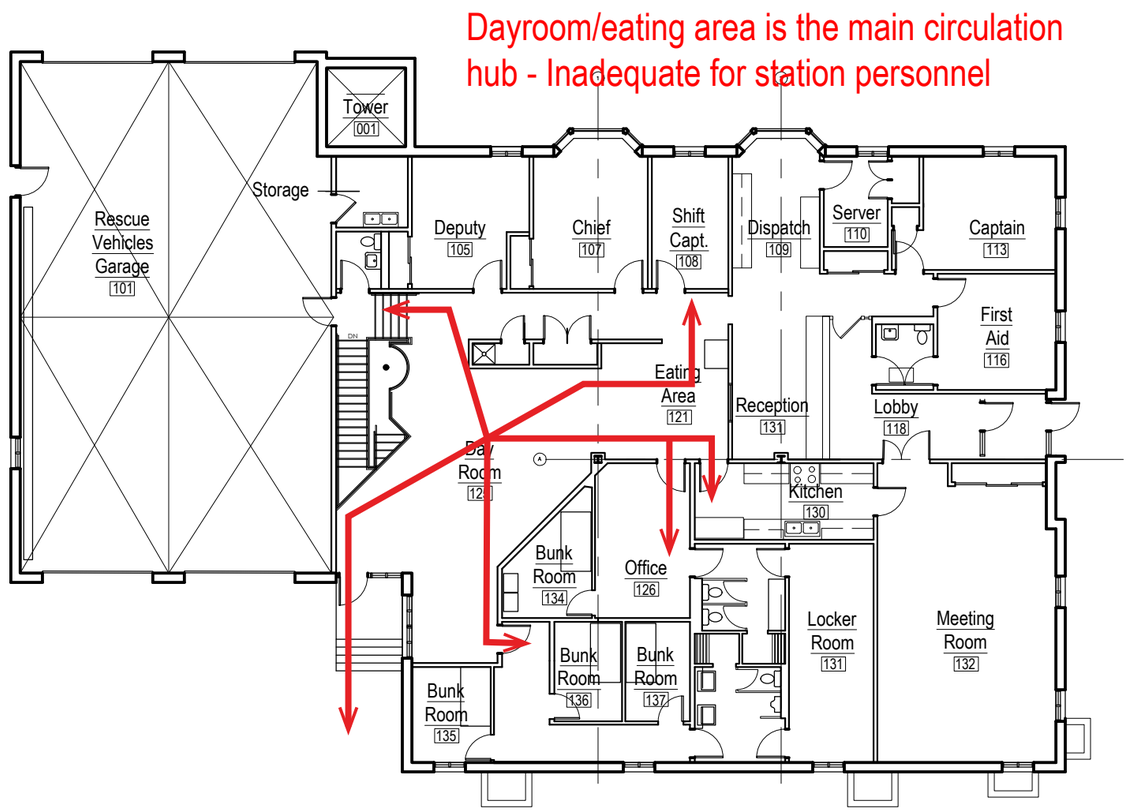


Locker room - path is through the male/ female bathrooms. Poor circulation path

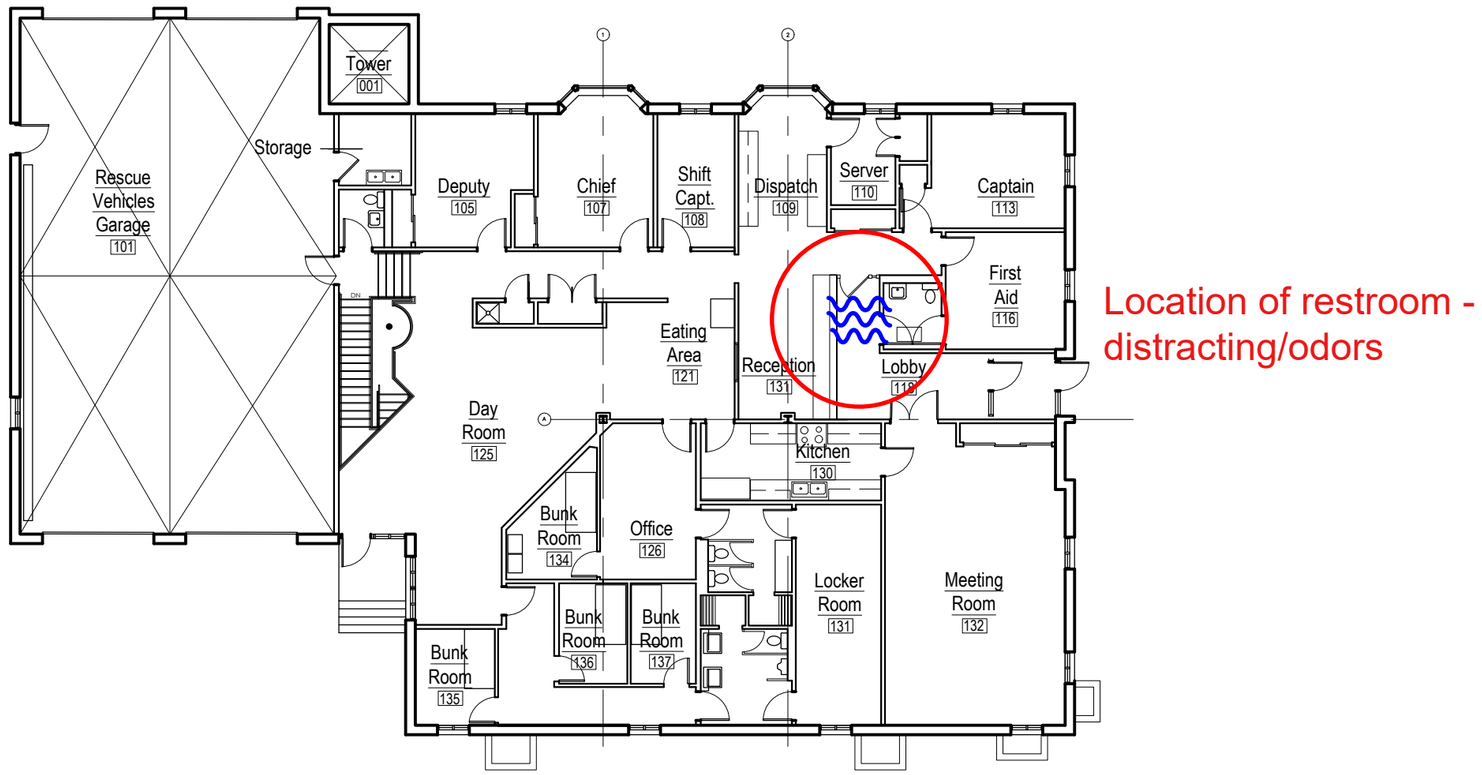
Awkward Path to Locker Room



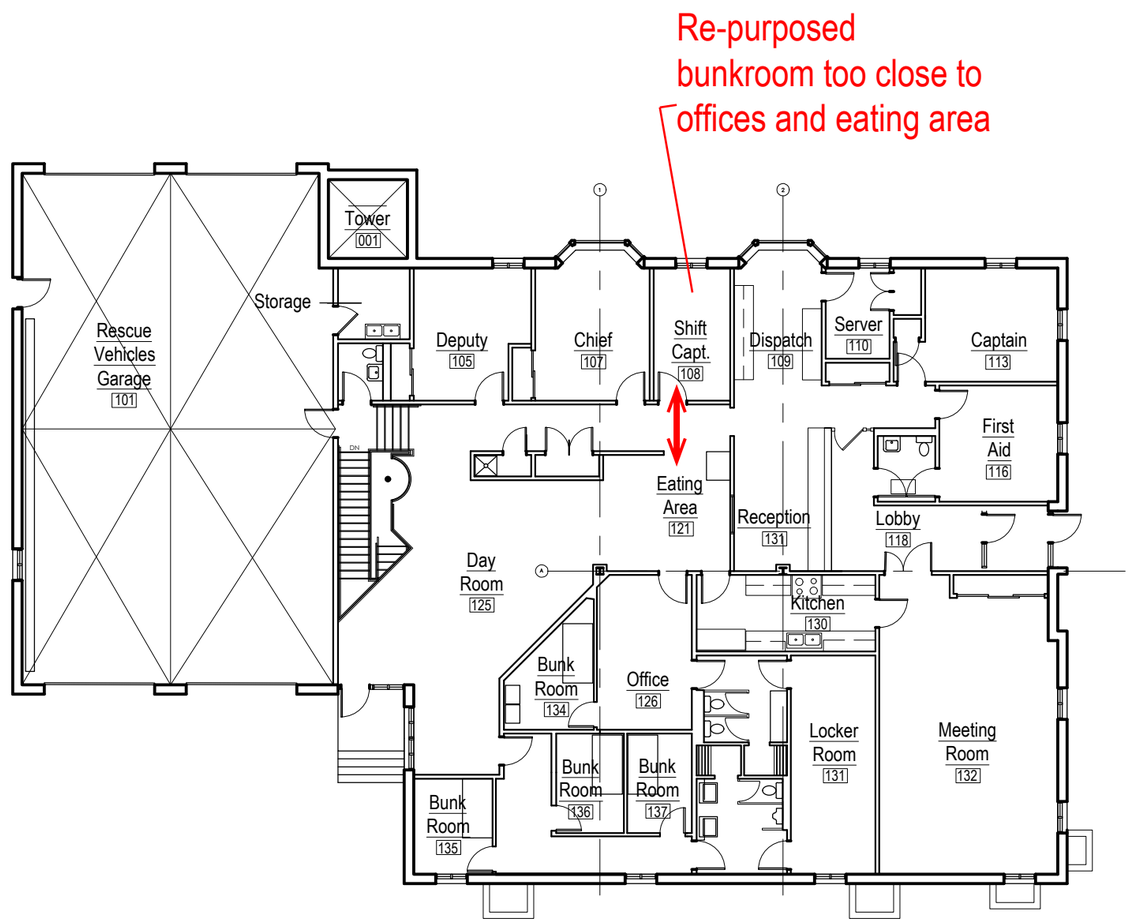
Unavoidable Collisions - Kitchen Circulation



Disruptive Dayroom Circulation



Mediocre Location for Restroom

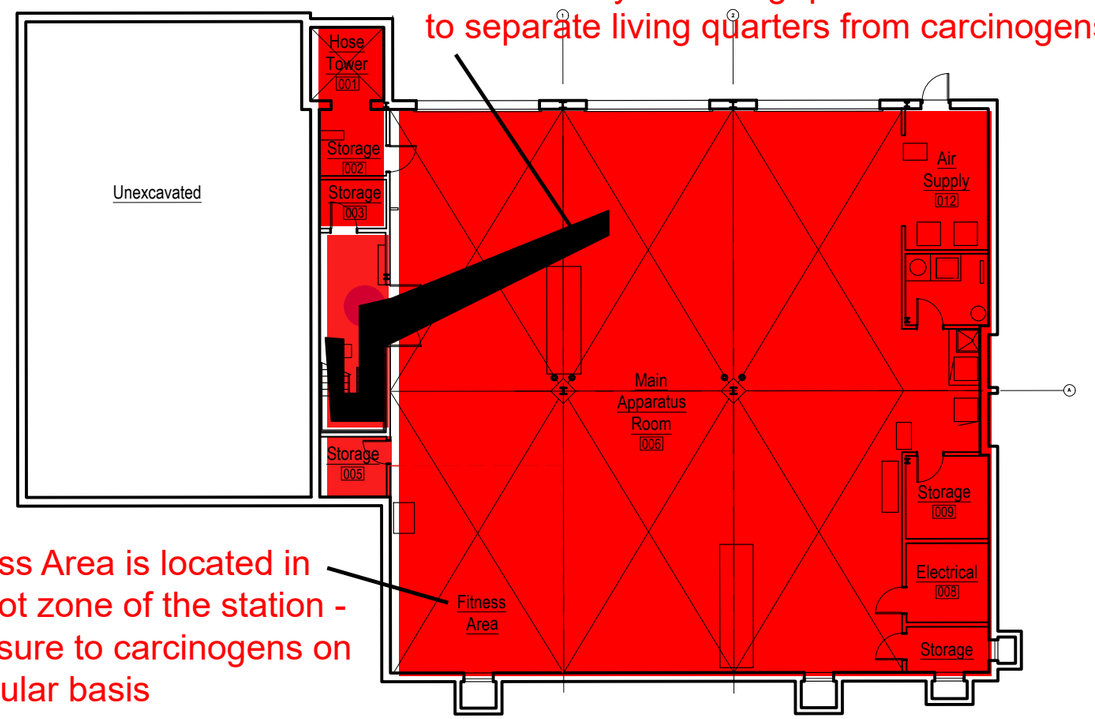


Unsuitable Bunkroom Location

No air separation between apparatus (hot) zone and showers allowing for dangerous exposure in the living quarters

Carcinogenic Contamination

Path from apparatus bay to upstairs showers leads directly into living quarters- no buffer zone to separate living quarters from carcinogens



Fitness Area is located in the hot zone of the station - exposure to carcinogens on a regular basis

Carcinogenic Contamination

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FEASIBILITY STUDY SUPPORTING EVIDENCE OF DEFICIENCIES

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Significant grade changes causing slow turnout time in winter storms

Main Entry to building is not clear, and access has non-compliant slope

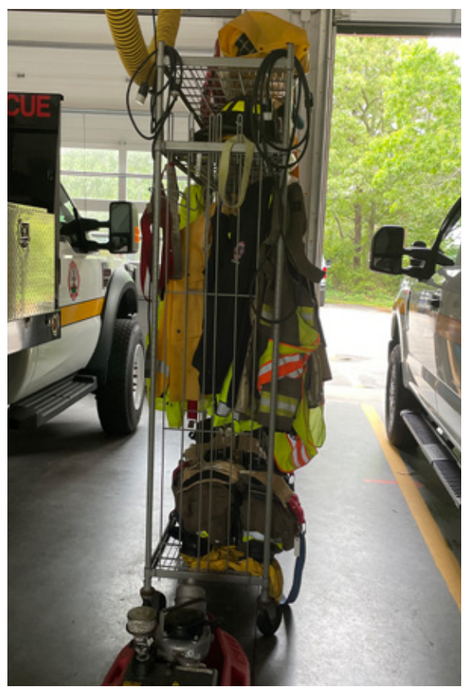
Site Deficiencies

Apparatus bays lack a concrete apron, and asphalt is in poor condition. Precast arch shaped lintels limit effective overall height of doors which limits apparatus selection

Storage pods at perimeter of site due to lack of storage space and do not provide adequate protection from the elements

Interim HVAC improvements located to minimize sound issues and structure modifications

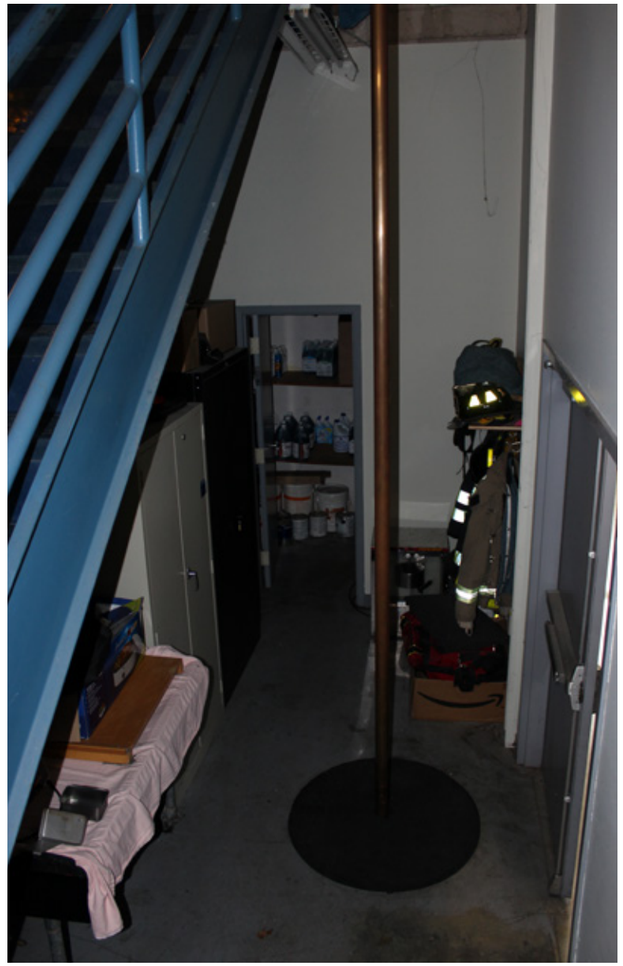
Site Deficiencies



Apparatus bays are too small for current fire-rescue vehicles

Turnout gear is stored in unsafe conditions in the apparatus bays and does not conform to NFPA standards

Building Deficiencies

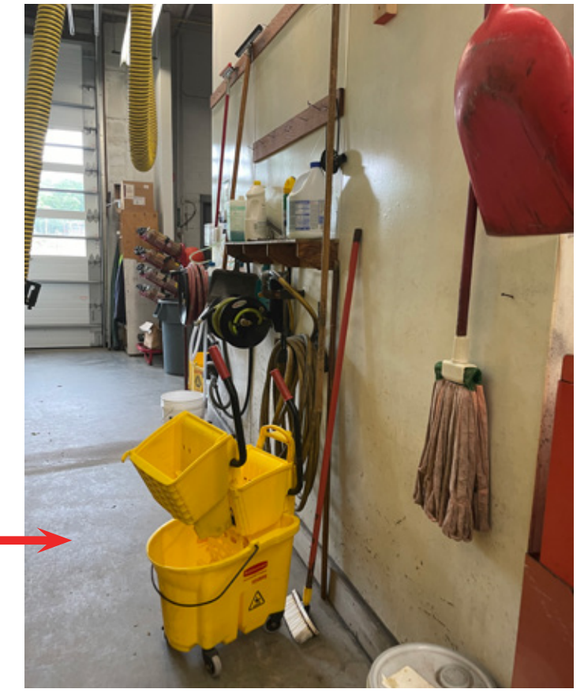


- No air separation between the apparatus bay and the living quarters
- Pole does not meet safety guidelines
- Pole is not used and is a space waster

Building Deficiencies

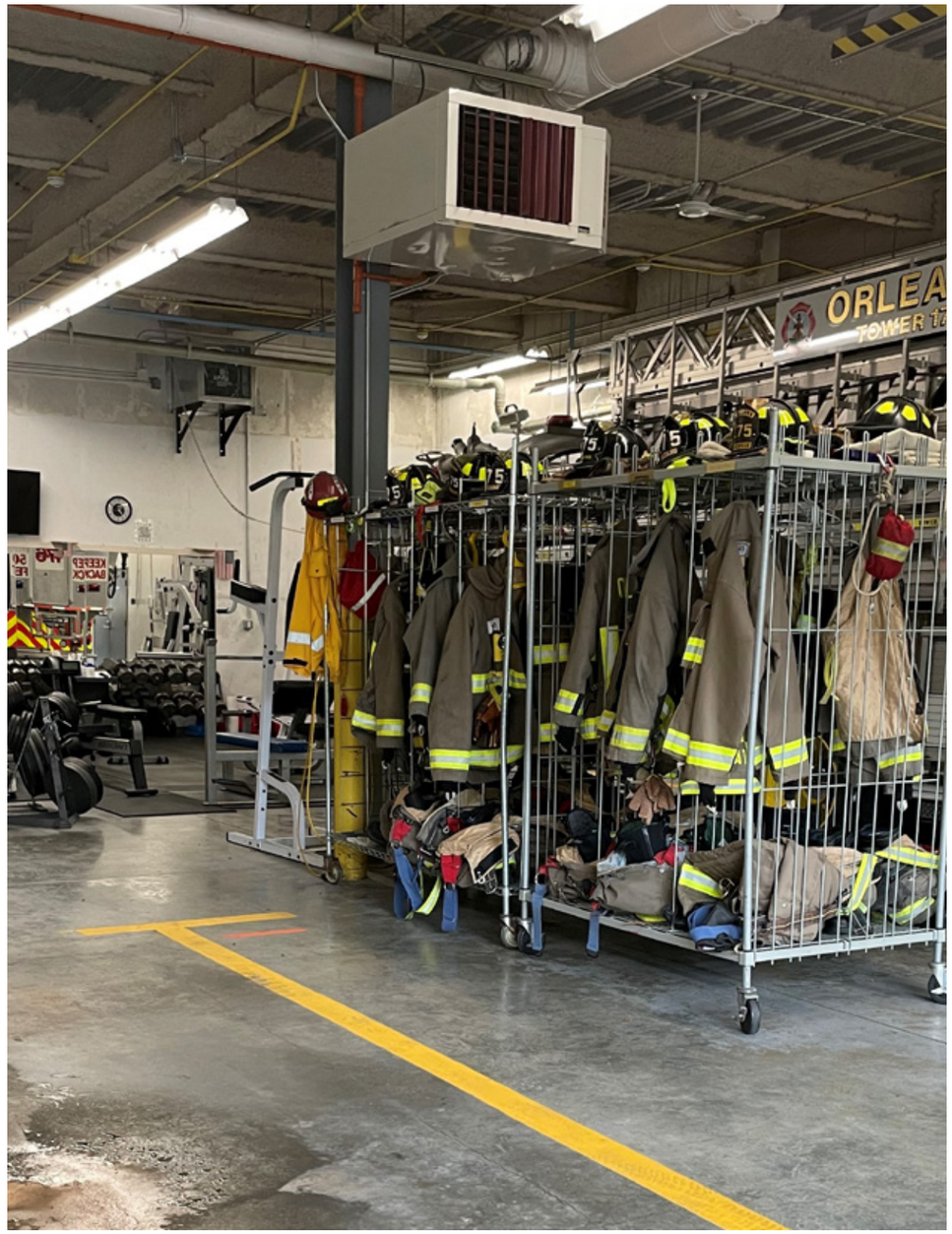
Fitness area in the apparatus bay puts personnel at risk of constant carcinogenic exposure

No janitor's closet so cleaning supplies are continually exposed too



Ice machine located in apparatus bay HOT zone

Building Deficiences



Lower Apparatus Bay

Lacks designated storage for turnout gear - not compliant with NFPA standards

Protective gear is often dried in apparatus bay or outdoors

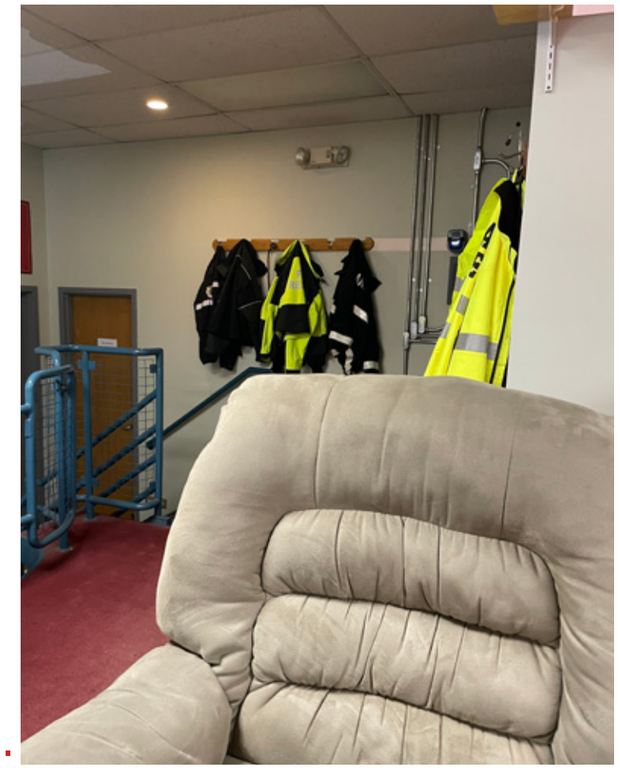
Lower Apparatus Bay Issues

- Inadequate and not isolated laundry facilities
- Inadequate repair space
- No proper ventilation
- Inadequate plumbing services

Dayroom

1. The main circulation paths of the station are through the dayroom and eating area which is less than ideal for the shared living space.
2. No designated turnout gear storage area so sometimes ends up in the house.
3. Exterior entry directly into the dayroom makes climate control difficult.

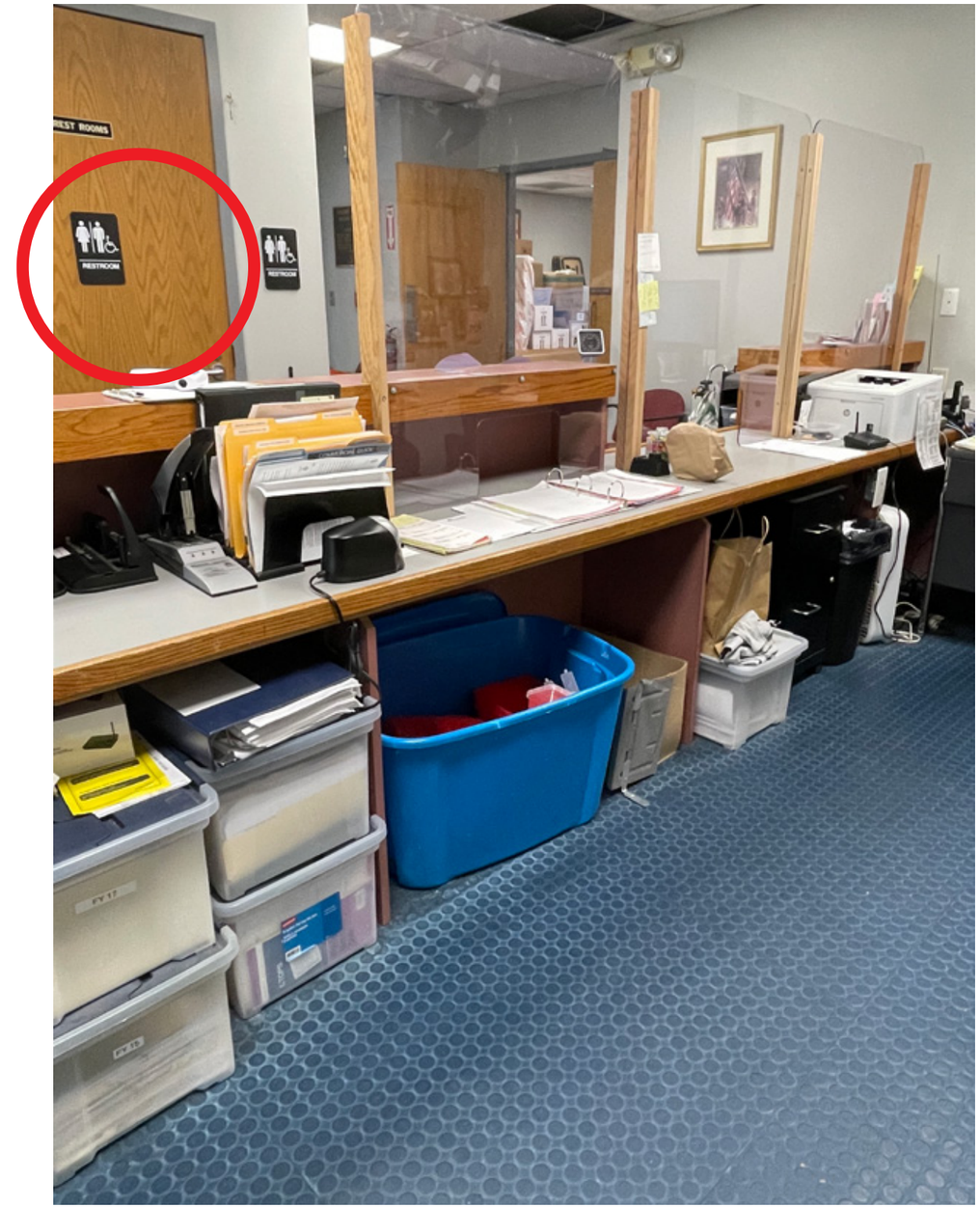
1.

2. 

3.

First Aid handled in the lobby,
not the original plan and lacks privacy

Public, handicap accessible bathroom is directly
opposite Reception area - odors can be distracting



Kitchen:

- Inadequate Facilities
- Outdated and outgrown
- Not MAAB Compliant

Building Deficiencies

Training/Meeting Room currently serves primarily as storage. Space needed for station meetings/back up Emergency Operations Center

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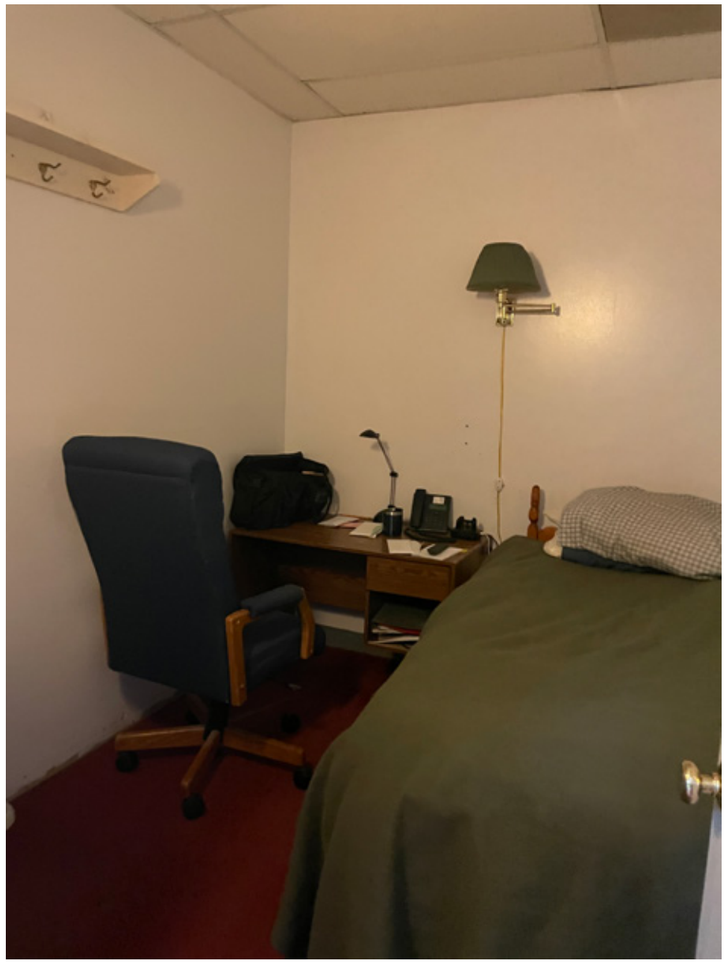
Building Deficiencies

Bunkrooms are not Building Code and MAAB compliant as three of five rooms have no exterior walls and no windows



Bunkroom Bathrooms

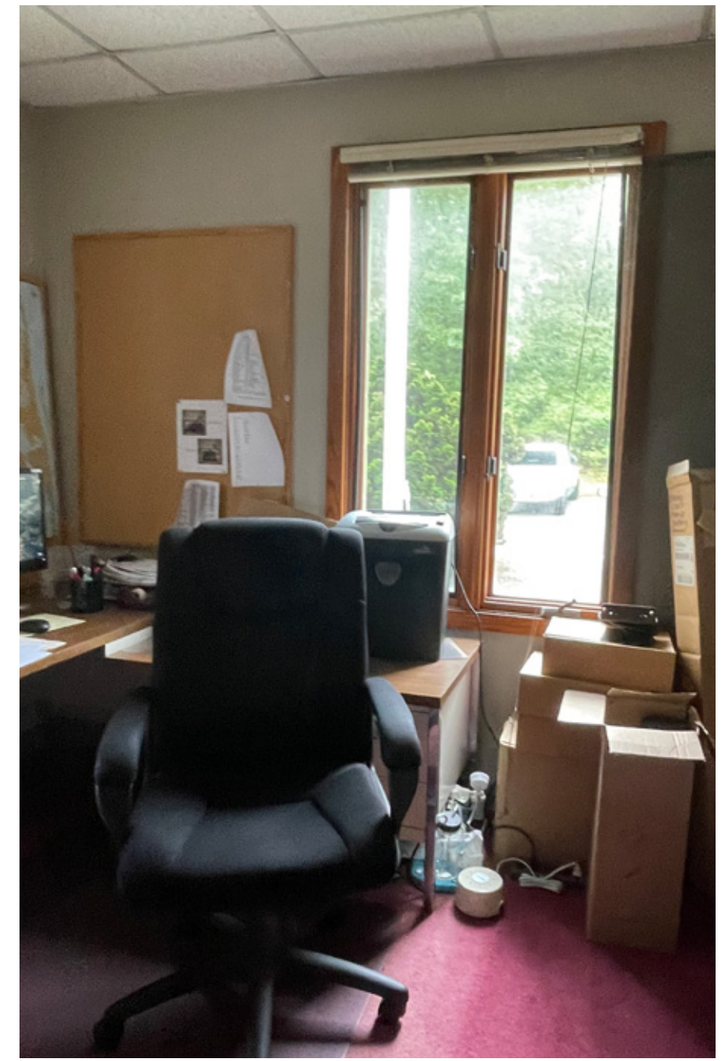
- There are two showers that are not MAAB compliant in the entire station (one for males, one for females).
- Due to their location in the center of the living quarters personnel must traverse the whole station following a call.
- Locker room is only accessible through the bathrooms.
- In general, living space is very cramped.

Misuse/Lack of Use of Spaces

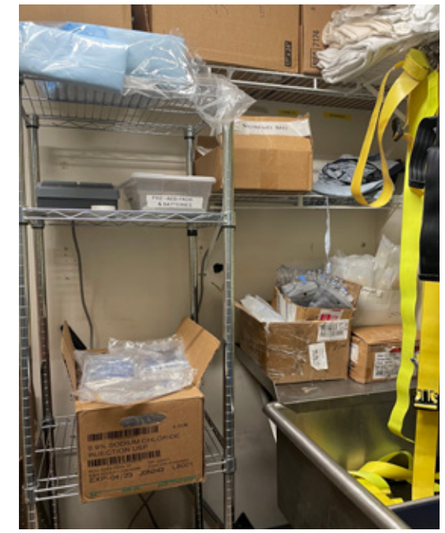
Office currently used as a bunkroom, poorly located

Dispatch area no longer used

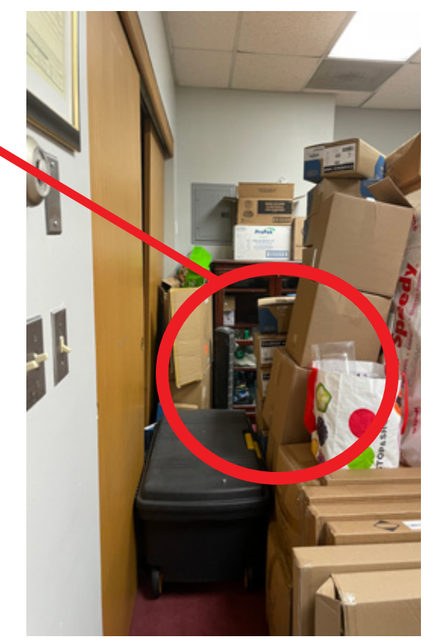
Office space crowded with stored equipment and supplies



EMS Supply Room was retrofitted with a sink. Because of crowded conditions door can not fully open.



Throughout the station there is evidence of not enough storage.



No dedicated decontamination space

Building Deficiencies

Storage found throughout the building in non-designated areas including in the dayroom, under stairs, and on top of cupboards

Building Deficiencies

Town	Chatham	Brewster	Wellfleet	Harwich	Dennis	Orleans
Population - 2019	5,982	9,775	3,481	12,142	13,871	**5,788**
Est. Summer Population	35,000	20,000	16,000	63,000	63,000	**20,000**
Current Fire Station • Area	21,184 SF	22,500 SF	18,662 SF	Station #2 9,500 SF	Station #2 21,922 SF	**11,500 SF**
• Cost	$10.6 million	$13.5 million	$5.5 million	$6.75 million	Estimate $14 million	
• Built	2016	2018	2009	2018	Projected 2022	**1987**
Total # of Calls 2020	2,785	2,644	1,152	4,351	5,030	**2,364**
Personnel/Station	32 Personnel 1 Station	31 Personnel 1 Station	18 Personnel 1 Station	31 Personnel 2 Stations	55 Personnel 2 Stations	**34 Personnel 1 Station**
Size Acres(est)	1.75	2.5	1.35	1.0	3.0	**1.5**

Current Dollars

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Comparative Analysis of Local Fire Stations

PROGRAM COMPARISON (Recent Complete Station Program for Dennis FD/ Base Request from Orleans FD)

Dennis	Area (SF) Designed	Orleans	Area (SF) Proposed	Notes
Pop. 13,871/5,030 calls 2020 55 personnel/2 stations	1 new station	Pop. 5,788/2,364 calls 2020 34 Personnel/1 station		
Lobby Area (incl. H/C Lav+ 216 SF 1st floor restrooms)	662	Lobby	630	Admin. Asst. w/appropriate barriers/separation from public
Training Room	362 Conference Room 1838 Community Room	Conference/Training Room	360 1,000	For Chief [Could also serve as Community Room]
Fitness Room	606	Fitness Room	800	
I.T. Room	74	IT Room	100	
Station Supply Room	312	Station Supply Room	300	
Records Room	250	Records room	200	
EMS Supply Room	241	First Aid room	300	Near entrance
		EMS Supply Room	500	Near ambulances
(3) Apparatus Bays	4,588	Apparatus Bays	7,560	Height/Length to accommodate apparatus
(2) Apparatus Floor Restrooms	73	Apparatus Restrooms	80	
Turnout Gear Room	651	Negative pressure/Turnout gear room	700	
Turnout Gear Laundry Room	170	TOG Laundry room	180	Large capacity extractor, gear dryer, regular washer/dryer
Decontamination Room	190	Decontamination room/showers	190	Separate entrance
Workshop Room	85	Workshop Room	80	
Hose Storage/Firematic Storage Rooms	695	Hose Storage/Firematic Storage Rooms	400	
SCBA Room	127	SCBA Room	150	
(12) Bunk Rooms	983 6 rooms x 2	Bunk Rooms	1,100	7-10 Bunk rooms
(4) Unisex Bunk Restrooms	384	Bunk Restrooms	400	
Bunk Room Janitor Closet	43	Bunk Room Janitor Closet	40	
Laundry room	26	Laundry Room	50	
Computer Workstations		Computer workstations	80	
Dayroom	396	Dayroom	400	
Kitchen and Dining room	961	Kitchen and Dining Room	1,000	
Patio Area	545 Deck off Kitchen/Dayroom			
Locker Rooms (2nd Fl. Men/Women)	697	Locker Rooms	700	
Dispatch/Offices (includes PD office)	698	Offices	1700	
		Helicopter landing pad		
		Medical Simulation Lab		
Basement First Floor Second Floor	2,650 13,465 5,807	Net to Gross Factor – Existing Building	**1.5**	
Net SF	19,454	Net SF – New Building	**19,000**	
Gross SF	21,922	Gross SF – New Building	**22,800**	
Net to Gross Factor	1.13	Net to Gross Factor - New Building	**1.2**	
		Existing Facility - SF **Program Requirements - SF** **BUILDING SHORTFALL - SF**	**11,500** **22,800** **11,300**	*Existing building was decreased 1,400 SF from original plan per Deputy Chief Gula

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Program Comparison

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FEASIBILITY STUDY REPORTS

- Structural
- Mechanical, Electrical, Plumbing
- Civil
- Hazardous Materials

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Orleans Fire Station – Structural Assessment

A structural inspection of the Orleans Fire Station located at 58 Eldredge Park Way, Orleans, MA 02653 was conducted on June 4, 2021. The visual inspection (no test) was performed to evaluate the overall condition of the existing building as part of the feasibility study for the Fire Station.

Executive Summary

This stand-alone masonry bearing wall building, with steel interior framing and wood truss hip roof was constructed in 1987 using the 4th Edition of the Massachusetts Building Code (780 CMR). The building presents a basement as the apparatus room with 6 vehicle bays, first floor as administrative office with living space at the north end and the rescue vehicles garage with 4 vehicle bays at the south end plus an attic. Generally the building is structurally sound with little distress exhibited in the primary masonry bearing wall elements or within the steel interior framing support systems. The hip roof was observed to be without obvious deflection given the straight and well aligned roof slopes that were observed this day. The structure exhibited no obvious sign of water entry through the walls or roof and there was no obvious evidence of steel deterioration, wood decay or failure from decay. The details of the site inspection are in the following findings with selected photos.

Findings:

1. Basement: The 66'x77' area for the main apparatus room consists of rooms for the hose tower access, storage, electrical and emergency generator with the open floor for the 3 bays with 2 rows of vehicles each. The three sides (north, west, south) of the basement are the foundation walls (and the masonry wall with the 3 overhead doors on the east side for access to the vehicle bays. Steel framing supporting the first floor directly above complete the construction in the basement.
   a. The concrete foundation wall and exterior masonry wall at the basement, stairwell and the hose tower is in good condition with no visible cracks and no sign of water entry. Some of the interior paint exposed to moisture has faded, bubbled and peeled.
   b. The exposed floor concrete slab is in satisfactory condition with a few cracks observed mainly at the first row of the vehicle bays from the entrance. The cracks appear to be shrinkage cracks with no visible differential observed.
   c. The first floor steel framing and deck is in good condition with some surface rusting observed at the base of the steel columns and minor rusting at the underside of the steel deck and around the floor penetrations observed at the main apparatus room.

2. First Floor: The first floor consist of 66'x77' area directly above the basement on the south side for the office administration and living space and 33'-4"x60'-0" area on unexcavated soil on the north side for the rescue vehicles garage with 2 bays of 2 rows of vehicles each. There are two overhead doors on both the east and west sides of the garage for access to the vehicle bays. The perimeter masonry bearing walls and interior steel framing at about the center of the building supports the wood hip roof trusses with attic spaces above the whole first floor areas.
   a. Typical gypsum board walls, flooring and hung ceiling covered the structure from view at the office administration and living space areas.
   b. The exterior masonry bearing wall at the rescue vehicles garage is in good condition with no visible cracks and no sign of water entry. Some of the interior paint exposed to moisture has faded, bubbled and peeled.
   c. The exposed floor concrete slab at the rescue vehicles garage is in satisfactory condition with a few shrinkage cracks with no visible differential observed.

3. Attic: The attic above the office administration and living space area provide the space for mechanical equipment's and it is accessible from the ceiling opening near the west exit door. The attic above the rescue vehicles garage is accessible from the wood stair & platform (the wood stair and platform is not shown on the construction drawings) at the southwest corner of the garage.
   a. The wood roof trusses and catwalk structure in the attic are in good condition with no visible wood decay or failure from decay.

4. Exterior Façade and structures:
   a. The exterior masonry was generally in good condition with some minor efflorescence.
   b. Some efflorescence and hairline cracks observed at the precast concrete lintels above the 5 overhead doors at the building east elevations to access the main apparatus room and the rescue vehicles garage.
   c. No surface erosion observed around the base of the building and soil line.
   d. Both retaining walls in front of the main apparatus room entrance were generally in good condition with some hairline cracks but no sign of movement or settlement.
   e. Minor rusting and cracks are observed at the face of the exterior concrete steps at the building west exit.

Photo #1 Building South Elevation
Main Entrance at the 1st Floor

Photo #2 Building West Elevation

Photo #5 Building North Elevation

Photo #6 Building East Elevation
Rescue Vehicle Garage Doors are at the 1st floor near the northeast corner

Photo #3 Building West Elevation
Rescue Vehicle Garage Doors

Photo #4 Building West Elevation
Concrete steps with minor cracks and surface rusting observed

Photo #7 Building East Elevation
Hose Tower and the Main Apparatus Garage Doors at the basement level

Photo #8 North Retaining Wall

Photo #9 South Retaining Wall

Photo #10 Basement Apparatus Room slab
Shrinkage cracks at the front north bay

Photo #11 Basement Apparatus Room slab
Shrinkage cracks at the front middle bay

Photo #12 Basement Apparatus Room slab
Shrinkage cracks at the front south bay

Photo #13 First floor steel framing above the main apparatus bays

Photo #14 Basement Apparatus Room Surface rust is observed at the bottom of the steel column

Photo #15 Underside of first floor concrete deck above the apparatus front north bay
Surface rust is observed at the steel deck and floor penetrations

Photo #16 Hose Tower - interior masonry

Conclusions

The structural existing condition finding is one of a building in satisfactory to good condition. The continued use of the current structure as its original capacity and function does not require any immediate repair or upgrade. However, it is the understanding that the current needs of the fire stations have surpassed the existing building capacity and function where the alteration and addition to the existing building is anticipated. The following are items to be considered in regard to the alteration and addition to the existing building in order to meet the current building codes. The 2015 International Existing Building Code (IEBC) is referenced for the alteration, repair, addition and change of occupancy of existing structures under chapter 3 prescriptive compliance method.

1. Additions to the building shall comply with the 2015 International Building Code (IBC) for new construction. Alterations to the existing building shall be made to ensure that the existing building together with the addition are no less conforming to the provisions of the IBC than the existing building was prior to the addition.
2. Any existing gravity load-carrying structural element for which an addition and its related alterations cause an increase in design gravity load of more than 5 percent shall be strengthened, supplemented, replaced or otherwise altered as needed to carry the increased load required by the 2015 International Building Code (IBC) for new structures.
3. Where the addition is structurally independent of the existing structure, existing lateral load-carrying structural elements shall be permitted to remain unaltered. Where the addition is not structurally independent of the existing structure, the existing structure and its addition acting together as a single structure shall be shown to meet the requirements of sections 1609 Wind loads and 1613 Earthquake loads of the IBC unless the demand-capacity ratio with the addition considered is no more than 10 percent greater than its demand-capacity ratio with the addition.

In conclusion, the noted requirements of IEBC above will require the upgrade of the existing building to meet the current code for any moderate to significant alteration and addition.

LIN ASSOCIATES, INC.
2001 Beacon Street
Brighton MA 02135

MECHANICAL, ELECTRICAL, PLUMBING AND FIRE PROTECTION NARRATIVE

APPLICABLE CODES AND STANDARDS
The mechanical, electrical, plumbing, and fire protection systems has been reviewed in conformance with the requirements of the following codes and regulations and all applicable local authority requirements.

1. 2015 International Building Code (IBC) as amended by 780 CMR (MA Building Code, 9th Edition)
2. 2015 International Existing Building Code (IEBC)
3. 248 CMR 10.00: Uniform State Plumbing Code
4. 2015 International Mechanical Code (IMC)
5. 2015 International Energy Conservation Code (IECC)
6. Illuminating Engineering Society Lighting Handbook (IESNA), 9th Edition.
7. 2020 NFPA 70 - National Electrical Code as amended by 527 CMR 12.00

OVERALL SUMMARY MEP/FP SYSTEMS:

The existing fire station and its systems appear to have been well maintained but are original and beyond their predicted life. While still operational, the MEP systems do not meet the current energy code requirements. CES' overall recommendation is that as the building is expanded/renovated, all systems are replaced within the spaces being renovated and all systems in an expanded building will be new. Some significant items include the following below. Refer to the recommendations and requirements section for additional items.

1) Lack of a fire protection system. The new expansion will require an NFPA 13 sprinkler system to be installed and therefore likely a new service to the building.

2) Existing electrical service is at capacity. A new 3-phase service with higher amperage would be brought to the building concurrent with the expansion. A larger generator will also be required.

3) An outdoor air system was recently added but due to limitations of budget and construction space, it was installed in a way that is not conducive to proper balancing and control. If the building is expanded, a new outdoor air system would be provided as the existing system is not adequately sized for future expansion.

PLUMBING SYSTEMS:

Existing Plumbing Utilities

1. Domestic Water Service: The existing building is currently served by a 2-1/2" domestic water service fed from the local water company. The service equipment includes a water meter and isolation valves. If the building is expanded, a new domestic water service would be required.

2. Natural Gas Service: The existing building is currently served by a single natural gas service which enters the building at grade level outside of the First Aid room. The gas service serves the water heater, unit heaters, fan coil furnaces, generator, and kitchen equipment. Natural gas piping within the building is schedule 40 black steel pipe. Shut-off valves and regulators are provided where required. Natural gas supply is regulated at the building exterior prior to the gas piping entering the building. If the building is expanded, a new larger gas service would be required.

Gas Service

3. Sanitary Service: The existing building is currently served by a 4" sanitary main that leaves the building in the Northwest corner of the Main Apparatus Room and continues to the septic system. The piping material is cast iron. Refer to the civil engineer's section pertaining to the septic system. If the building is expanded, a new sewer connection would be provided to the septic system.

Existing Plumbing Fixtures and Specialties

1. Water Closets: Water closets are wall mounted flush valve vitreous china fixtures. These fixtures do not have low-flow water usage and do not meet current code. It is recommended that these be upgraded to current plumbing code standards for water usage.

2. Urinal: Urinal is a wall mounted vitreous china fixtures with manual flush valves. These fixtures do not have low-flow water usage and do not meet current code. It is recommended that these be upgraded to current plumbing code standards for water usage.

3. Lavatories: Lavatories are wall hung vitreous china with two twist or two lever handle faucets. These fixtures do not have low-flow water usage and do not meet current code. It is recommended that these be upgraded to current plumbing code standards for water usage. It was brought to CES' attention that the lavatories drain slow and backup routinely. This problem is commonly because of an undersized waste and/or vent pipe

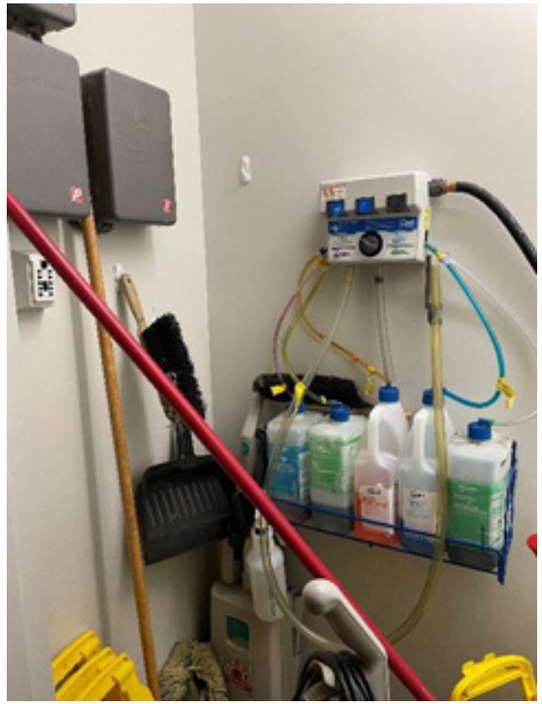
Existing Water Closet

Existing Urinal

Existing Lavatory

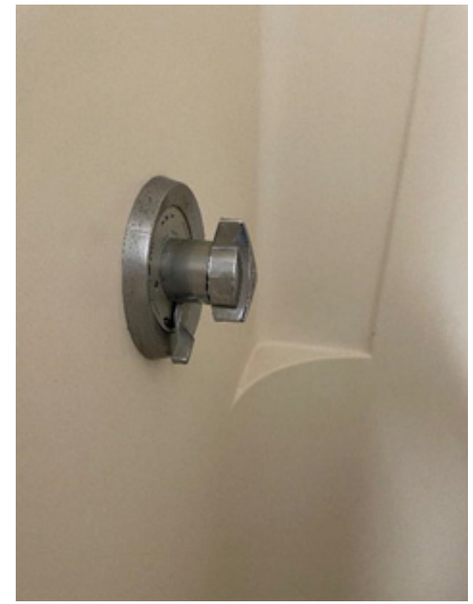
4. Janitor's Sink: The janitor's sink is a laundry tub style with two lever faucets. The sink is in good condition but space is tight inside the room with number of chemicals and cleaning supplies. The sink is provided with a cleaning chemical dispensing unit mounted on the wall. There is no testable backflow preventer installed between the unit and the water supply in order to protect the water supply from contamination. It is recommended to install a testable backflow preventer.

Janitor Sink

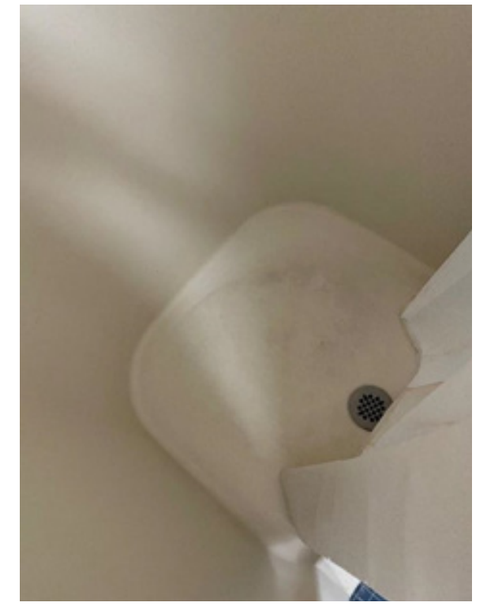


Chemical Dispensing Unit

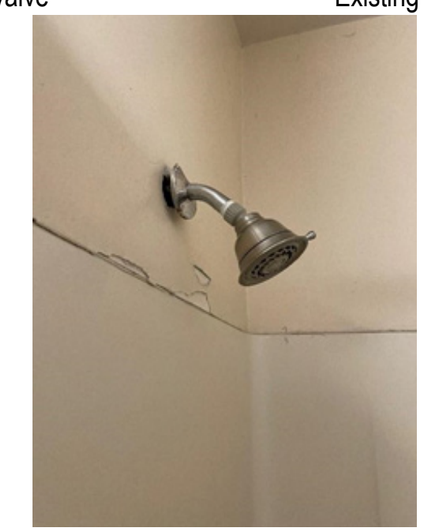
5. Showers: The two showers in the building are fiberglass units with integral thermostatic mixing valves. The showers appear to be in poor condition and it is recommended that these be replaced.



Existing Shower Valve



Existing Shower Drain



Existing Shower Head

6. Air Compressor: An air compressor is provided for compressed air throughout the facility. The air compressor appears to be in good condition but there are no acoustical barriers between the compressor and washer/dryer room

Air Compressor

7. Kitchen: The Kitchen is provided with a residential oven and exhaust hood. These appliances are both significantly outdated and not sufficient for a modern day fire station. It is recommended that these be removed and updated with commercial appliances and proper exhaust to meet MAAB requirements

Kitchen Oven and Cooktop

8. Apparatus Bay Floor Drains: The Apparatus Bays and Hose Tower are provided with floor drains and are in good condition. They currently back up which is commonly caused by the waste and/or vent pipe being undersized. They drain into the septic system. A new or renovated system will require a tight tank.

9. Extractor and Washing Machine Waste: The waste from the extractor and washing machine in the Apparatus Bay drain into a laundry tub sink. The waste from the sink is then pumped up via an ejector pump and taps into the gravity waste. It was brought to CES' attention that the sink routinely overflows onto the floor when the extractor and washing machine are running. This issue is likely caused by an undersized ejector pump which cannot handle the amount of water flow.

Ejector Pump for Laundry Tub

Domestic Hot Water Systems

1. Hot Water Heater: The existing building is currently provided with hot water through the use of (1) 100 gallon gas-fired hot water heater. The water heater is in good condition.

Gas Fired Water Heater

MECHANICAL SYSTEMS:

Existing Heating and Cooling System

1. Heating and Cooling System: Heating and cooling is provided for the non-apparatus bay portions of the building via gas furnaces with duct mounted DX cooling coils. These units are located in the attic space of the building and ductwork is distributed to each space. The furnaces are at the end of their useful life and only in fair condition.

Furnace Unit in Attic Space

Furnace Unit in Attic Space

2. Gas-Fired Unit Heaters: The apparatus bays are provided with gas-fired unit heaters. These units appear to be relatively new and are in good condition.

Gas Fired Unit Furnace

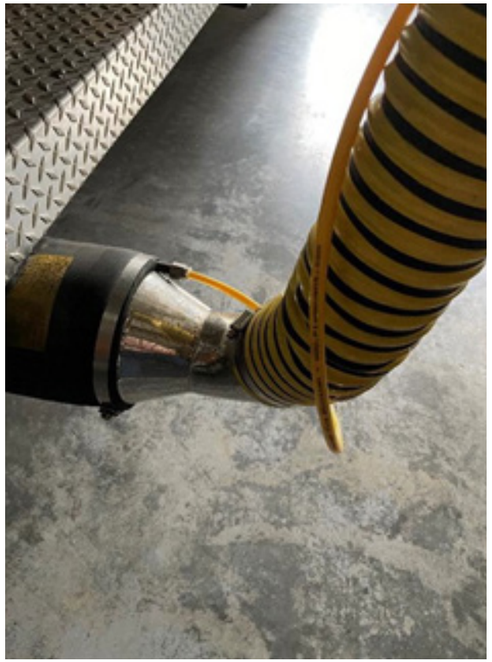
Ventilation and Exhaust Systems

1. Energy Recovery Ventilator: Ventilation is provided to the building via an energy recovery ventilator (ERV) mounted outside on the ground and ducted into the building attic space. The outdoor air is ducted into the return mains of the furnace units and the exhaust air is ducted directly to the spaces. The ERV is new and is in good condition, however, the unit is located in order to minimize the amount of structural penetrations. The unit's ductwork enters the building in the conference room, protruding into the space and taking up floor area.

Outdoor Energy Recovery Ventilator (ERV)

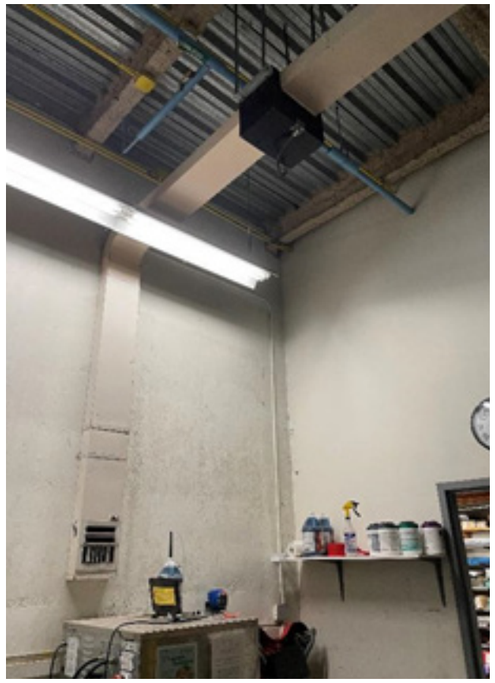
2. Plymovent System: A Plymovent vehicle exhaust extraction system is utilized to capture and release vehicle exhaust outdoors. The exhaust extraction system consists of hose reel assemblies with pneumatic grabbers and a central exhaust fan. This equipment is in good condition. The hose grabbers locations are not designed for vehicles to enter the apparatus bay in reverse. It was brought to CES' attention that this is a common issue during the winter months when vehicles have to back into the apparatus bay. The fumes from vehicles in the bay that aren't able to be connected to the Plymovent system can reach dangerous and toxic levels to individuals.

Plymovent Exhaust Fan

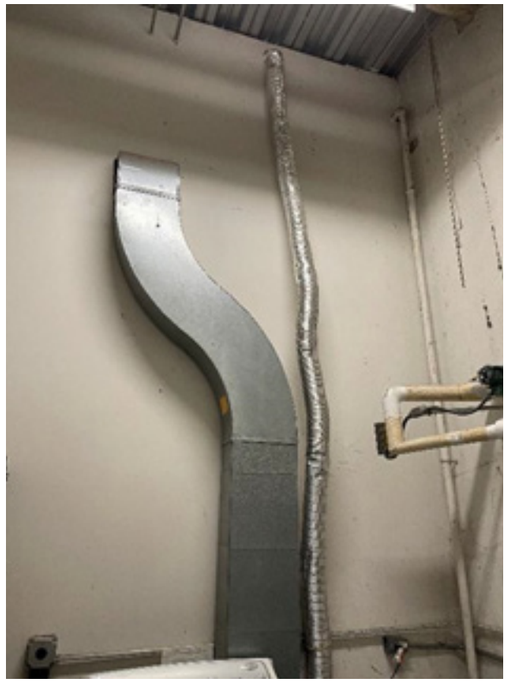


Vehicle Exhaust Pneumatic Grabber

3. Laundry Area Exhaust: The Gear Laundry area is provided with exhaust ductwork for the dryer and makeup air. This room does not have any general space exhaust which is recommended for the gear that is currently being stored in this room. The adjacent extractor/washing machine space is provided with an exhaust fan and grille mounted on the wall behind the equipment. CES did not verify the amount of airflow from this fan because of the location of the fan and the need for a flow hood.



Washing Machine Area Exhaust Fan



Dryer Exhaust and Relief Ductwork

Controls

1. Each furnace is provided with local thermostats in the space. There is currently no centralized building management system at the facility. Thermostats do not appear to have energy saving controls. It is recommended that these be replaced with programmable thermostats at a minimum. The ideal solution is to bring in a building management system (BMS) for the overall building for better control and energy efficiency.

Existing Thermostat

Electrical Systems:

1. Electrical Service: The existing electrical service is a 400 amp, 240/120volt, 1-phase, 3-wire service that consists of a main disconnect switch and distribution panelboards. The main disconnect switch is manufactured by Square D. The distribution panelboard is manufactured by Siemens/I-T-E. This equipment is in good condition. If the building is renovated or expanded, the current service size would not be adequate. It is recommended that a 3-phase service with higher amperage be brought to the building. Single phase power is not adequate for the electrical needs of a modern day fire station.

Electrical Service Equipment

Distribution Panelboard

2. Generator: A 60kW natural gas fired generator is manufactured by Cummins and is approximately 9 years old. This provides back-up power to the entire building. This equipment is located outside of the building in a fenced-in enclosure. There is an automatic transfer switch located in the main electrical room. This switch is manufactured by Asco. This equipment is in good condition. This generator is not adequate to handle the additional load if the building is expanded and cannot be categorized by code as a life safety generator if it's not a diesel generator. Life safety generators must be sized for the entire load of the building without derating and must have 3-days' worth of diesel storage. The life safety equipment inside the building must be located in 2-hour rated enclosures.

Generator

Automatic Transfer Switch

3. Panelboards: There are a number of branch circuit panelboards in the Main Electrical Room. These panelboards are original to the building and manufactured by Square D. There are missing blank-off plates in one panel. These original panelboards are in fair condition and have very limited spare capacity. There are also newer panelboards that were installed with the generator. These panels are manufactured by Siemens/I-T-E and are in good condition.

Older Electrical Panels

Newer Electrical Panel

4. Lighting: Lighting throughout the facility consists of a number of type of light fixtures including but not limited to the following below. Fixtures are technologically outdated. There is a rudimentary Fire Station Alerting System that is tied to the building lighting systems. However, given the age of the lighting and wiring in the existing building, this type of Fire Station Alerting System cannot be used. It is recommended that the Fire Station upgrades their lighting systems to incorporate with the Fire Station Alerting System.

a. Pendant mounted industrial fixtures

b. Surface mounted industrial fixtures

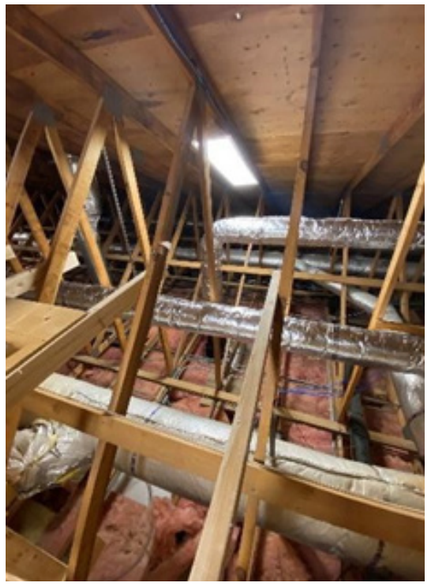
c. Wall mounted fixtures

d. Recessed fixtures

e. Recessed compact downlights

f. Lamps

Pendant Industrial Fixture



Surface Mounted Fixture

Recessed Fixtures

5. Lighting Control: Lighting control for the building consists of local toggle switches and selected local occupancy switches. As spaces are renovated, a lighting control system for energy savings should be incorporated as the current mixed system is not energy efficient and does not meet the requirements for the Town's Green Community Mandate for Public Buildings.

6. Fire Alarm: The fire alarm system is operational but looks to be at maximum capacity. A new system should be incorporated into the expansion and designed to back feed existing spaces that will be upgraded as they are renovated. The entire system will eventually need to be replaced.

7. Data/Technology: Data/technology consists of wired computer stations throughout the building. Most of this has been added over the years as needed or to adapt to technology changes. This equipment is in good condition but is not adaptable and will need to be replaced with a new system. The security system is outdated and does not provide an adequate level of security for this type of facility. It is recommended that this system be upgraded to a new state of the art system.

Fire Protection Requirements for a Renovation/Expansion:

- Provide a NFPA 13 sprinkler system.

Plumbing Requirements to Meet Current Codes:

- Replace existing shower with new low-flow model.
- Replace existing urinals, water closets, and lavatories with new low-flow fixtures.
- Remove and update kitchen appliances and exhaust systems.
- Install a testable backflow preventer for the Janitor's Sink chemical dispensing unit.

Plumbing Recommendations:

- Upgrade the ejector pump for the extractor and washing machine to a larger pump.
- Upsize waste/vent piping for lavatories.
- Upsize waste/vent piping feeding Apparatus Bay floor drains.

Mechanical Recommendations:

- Upgrade the HVAC control system to a new electronic system with energy management capability.
- Relocate temporary ERV system and ductwork.
- Replace existing furnace units in attic space.
- Add general space exhaust for the Gear Laundry Room.

Electrical Recommendations:

- Upgrade the existing fire alarm system with one that can support ADA compliant devices. The existing system will not support ADA compliant devices and additional devices are required for proper coverage. This will include pull stations, ADA compliant horn/strobe units, smoke and CO detectors, power supplies, and electrical wiring from a local power source.
- Repair damaged wiring devices, including occupancy sensors.
- Upgrade the lighting control systems with a new state-of-the-art system.
- Upgrade the data/technology systems with a new state-of-the-art system.
- Upgrade the security system with a new state-of-the-art system.
- Upgrade the electrical service and replace older panelboards and circuit breakers.

MEP Services for Future Expansion:

- The current MEP services are not sized for future expansion. If future expansion is pursued, the following items would be needed for the services to the building:
  - A 3-phase service would be brought in from Eldredge Park Way in order to upgrade the current single-phase service and to also bring in more available amperage.
  - A new domestic water and fire protection mains and gas service would be brought to the facility to provide for the increased load of the expanded building.
  - A new gas service would be brought to the facility to provide for the increased load of the expanded building.
  - A new sewer main would leave the expanded building and connect to the septic system.

CES
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Norwood MA 02062
617.261.7161
ceseng.com

Re: Orleans Fire Station – 58 Eldredge Parkway SCI File #51030.00

To: Theodore Galante AIA, LEED AP

From: Danell Baptiste July 9, 2021
Stephen Powers, PE

Assessment Overview
The following are preliminary research and findings of the existing site infrastructure and potential permitting requirements for the proposed Orleans Central Fire Station located at 58 Eldredge Park Way in Orleans, Massachusetts. The Central Fire Station shares the property with the Orleans Elementary School (located to the west). The Fire Station site has significant changes in topography throughout the development.

Overview (Civil + Infrastructure)
The existing utility information was obtained from existing record plans (See Enclosed Attachments), on-site investigation, as well as MassGIS mapping software.

Additionally, an existing conditions survey was provided by Ryder & Wilcox, Inc. While it provided some good initial information, we would request more detail including, but not limited to expansion of topography (additionally in areas where a potential helicopter area could be sited - location TBD), underground utilities, detailed grading (i.e. spot grades) around the current structure. Note: Falmouth Hospital's helicopter pad is approximately 100' x 100'.

Some utilities (water, gas, & power) are public and available within the immediate vicinity of the existing site, with the exception to sanitary sewer which is mitigated by an existing onsite Soil Absorption System (SAS). Additionally, while there were no site drawings to confirm, it appears all on-site stormwater infrastructure is contained on the fire station/school property with no visible connections to a public conveyance system.

Site Access/Parking
Access to the site is provided via one (1) signalized two-way access driveway (20'± width) off Eldredge Park Way. The existing driveway slopes down from the public road at approximately 8-9% slope before sloping up again to the main parking areas and upper vehicle bays.

Based on our site visit, review of the existing conditions survey, and feedback from the Town, we conclude that the existing access to the site is inadequate for the current use due to diminished sight lines, narrow driveway width for two-way traffic and driveway slopes that approach or exceed maximum recommended grades. Any new or redevelopment of the property should involve remediating the current site access (i.e. improving sight distances, slope, surface drainage, possible relocation, etc.).

Site currently accommodates thirty (34) parking spaces (including one ADA accessible space). Parking spaces appear to be appropriately sized (9'x18' minimum), however drive aisles serving these parking areas appear to be undersized for two-way traffic, as minimum should be 24' wide drive aisles. We would recommend reconfiguration/expansion of the parking areas to be code compliant with any future development.

Pavement
Based on visual inspection, the on-site parking areas and access drives are primarily asphalt pavement and in fair to poor condition (See Figure 6). Lateral cracking was visible throughout, with conditions approaching gross failure (i.e. alligator cracking) in some areas – specifically adjacent to the lower vehicle bay driveway area. Multiple asphalt patches were also present in the bay driveway area, surrounding below grade utility structures.

Records of existing pavement profiles (i.e. pavement/stone thickness) are currently unavailable. It is recommended representative pavement cores be performed prior to any project redevelopment/expansion. Depending on the core reports, it is likely the entire asphalt pavement area would need to be mill/overlayed and/or repaired with a full-depth replacement.

ADA Compliance
Based on a site visit on June 4th, 2021, it was observed that 34 existing on-site parking spaces were provided. One (1) parking space was dedicated as ADA accessible. The existing ADA space did not appear to be code compliant as it appears to exceed standard slope tolerances for pedestrian travel way to the front door of the public entrance. Furthermore, a van accessible parking space (8' wide stall with 8' wide loading area) needs to be provided for a total of two (2) ADA parking spots. At minimum, these areas should be reviewed and modified to comply with ADA standards for any future development.

Water Service
According to an as-built sketch dated April 1988 (See Figure 2), the fire station is serviced by a 2" PVC pipe that runs 20-25 feet from the existing foundation and is buried 12'-14' deep. The water service connects to an existing 8" water main branch via a 2" saddle located just off the pavement of the western parking area. The 8" water main branch appears to extend off the water main (size unknown) that serves the existing Orleans Elementary school located to the west. Additionally, there is an existing Hydrant (#861) located to the SW of the fire station (adjacent to the western parking area) that provides coverage to the property. There was no visible evidence/record drawings of water service to this site connecting off Eldredge Park Way. There is currently no building fire protection service, and any future expansion/development will need to consider a new fire line for fire protection. Condition of domestic water service will also need to be evaluated by the site MEP to determine the viability for reuse. A Hydrant flow test is recommended prior to design to ensure proper flow is provided.

Sanitary Sewage
According to the town record documents dated 6/25/01 (See Figure 3) there is an existing on-site septic system located north of the existing fire station. The existing sanitary sewer pipe exits to the rear of the building and connects to a 1,500-gallon septic tank located within the existing driveway (access covers to grade) which then conveys the effluent to a leaching facility, consisting of five (5) absorption chambers surrounded by stone. An inspection of the on-site septic system should be performed to ensure it meets current Title V and Town Board of Health (BOH) regulatory standards prior to any future design work.

As previously mentioned, no public sewer is currently available in this area of the Orleans. Any building and/or program expansion may likely require a new septic system. Sizing of a new system would be based on usage and sized in accordance with 310 CMR 15.000 design standards. New sanitary/kitchen waste sewer services and an external grease trap (sized by the MEP) may also be required. The Town should be cognizant that any new internal truck bay drainage systems shall connect to a tight tank in accordance with Title V and MADEP guidelines, as flow from these structures are not allowed to be discharged to an on-site septic system.

Stormwater Management
There is existing on-site drainage infrastructure that captures overland stormwater run-off. Two (2) catch basin inlets at the site access drive, appear to collect run-off from a portion of Eldredge Park Way and discharge it to depression along western side of the access drive. There are at least three (3) existing catch basin inlets that serve the area around the lower bays. It is unknown where stormwater conveyance pipes may tie into on-site infrastructure (e.g. tanks, detention system, etc.) There are other paved areas surrounding the site that sheet flow directly to adjacent depressed areas. Existing roof leaders appear to be hard piped and perhaps connect to a subsurface drainage system. As previously noted, stormwater management/conveyance system records are currently not available.

As part of any new construction on this site, a stormwater detention/infiltration system would likely be necessary to detain/treat the on-site stormwater runoff prior to connecting to any municipal stormwater conveyance systems. Due to site constraints, it is anticipated that this system design would likely entail underground chambers set in stone and supplemented with mechanical Water Quality Units. All Best Management Practices (BMP) will implement design standards set forth within the Massachusetts stormwater handbook.

Gas Service
Per our site walk and existing conditions survey (by others), the station is fed from a gas service that extends from south side of Eldredge Park Way, north along the driveway shoulder, to a gas meter located adjacent to the station's public entrance. The size of the existing service is unknown at this time.

Electric/Telecom Service
The existing Fire station is fed via overhead wires and utility poles off Eldredge Park Way to a pole mounted transformer on the property. Electrical service then runs underground to an electric meter located just south of the public entrance to the building. Telecom service also appears to follow the same path (overhead wires to underground feed). In reviewing the on-site conditions, it is presumed that electric and telecom service would continue to be fed off infrastructure along Eldredge Park Way.

Wetland Resource Areas
Based on a desktop review (e.g. Oliver MassGIS), there appears to be no wetlands resource areas (e.g. BVW, ILSF, perennial streams, etc.) within 200' of the existing development. The closest resource area appears to be Boland Pond, which is located 600'+/- from the edge of the existing fire station development.

Flood Plain
There are no FEMA floodplain zones identified within 500' of the property (see Figure 4).

Permitting:

Site Plan Review Process
Any new construction or proposed redevelopment that entails an addition that expands the existing structure by more than 1,000 sf in gross floor area requires informal submittal to the Site Plan Review Committee. The Committee will outline to applicants the specific section of state laws and local bylaws, rules, regulations and explain what is legally required get the project approved.

We anticipate any proposed development scheme will require appearance in front of this Committee. The extent of the redevelopment (or new construction) will dictate the complexity of the jurisdictional permitting.

Town of Orleans Wetland Protection Ordinance
Due to the lack of wetland resource areas within any notable distance of the subject site, it is not anticipated that the Wetland Protection Act (WPA) regulations would be applicable to the proposed project.

Town of Orleans Curb Opening Permit
Any new curb cut off Eldredge Park Way will require a Permit through the Town. These curbs cut openings would need to be permitted via a Curb Cut Application process through the City Department of Public Works (DPW).

Town of Orleans Stormwater Management Permit
A Stormwater Management Permit may be required by the DPW to confirm that the stormwater and drainage system design meets the Town regulations and specifications (Note: Orleans is subject to following MS4 Permit requirements through US ESPA and MassDEP). If required, this permit would be pursued concurrently with any Site Plan Review process through the Town (e.g. Planning Board), with the DPW and Engineering departments being the primary reviewing entity.

Town of Orleans Board of Health Permit
Any significant expansion to the building (or new construction) may require designing and permitting a new on-site sewage disposal system through the Board of Health to ensure the system is appropriately sized to accommodate the usage.

EPA NPDES Construction General Permit (CGP) and Stormwater Pollution Prevention Plan (SWPPP)
A NPDES Construction General Permit (CGP) and a Stormwater Pollution Prevention Plan (SWPPP) will need to be obtained by the contractor from the EPA prior to the start of construction should disturbance associated with the property exceed 1 acre.

Conclusion
Our Team discussions have included possible expansions/renovations to the existing building. Given the challenges of the existing site with significant changes in topography, limited access from the street, and potentially unsafe emergency response areas; expansion of the facility might prove difficult at best. Further, if the area in and around the building were to undergo significant construction activity, a temporary site and facility, with a full compendium of underground utilities, grading, drainage, emergency response paths, vehicle parking, and much more would be required. It is unclear if the adjacent fields are appropriate to accommodate this temporary use, or if the Town has ability to temporarily abandon this site and construct a temporary fire station elsewhere. This condition would require significant expense and take resources away from any overall, permanent expansion/renovation project.

If you have any questions or comments regarding this memo, please call or email me at dbaptiste@samiotes.com at 508-877-6688 (ext 26) or Stephen Powers, PE at spowers@samiotes.com (ext. 14).

Samiotes Consultants, Inc.
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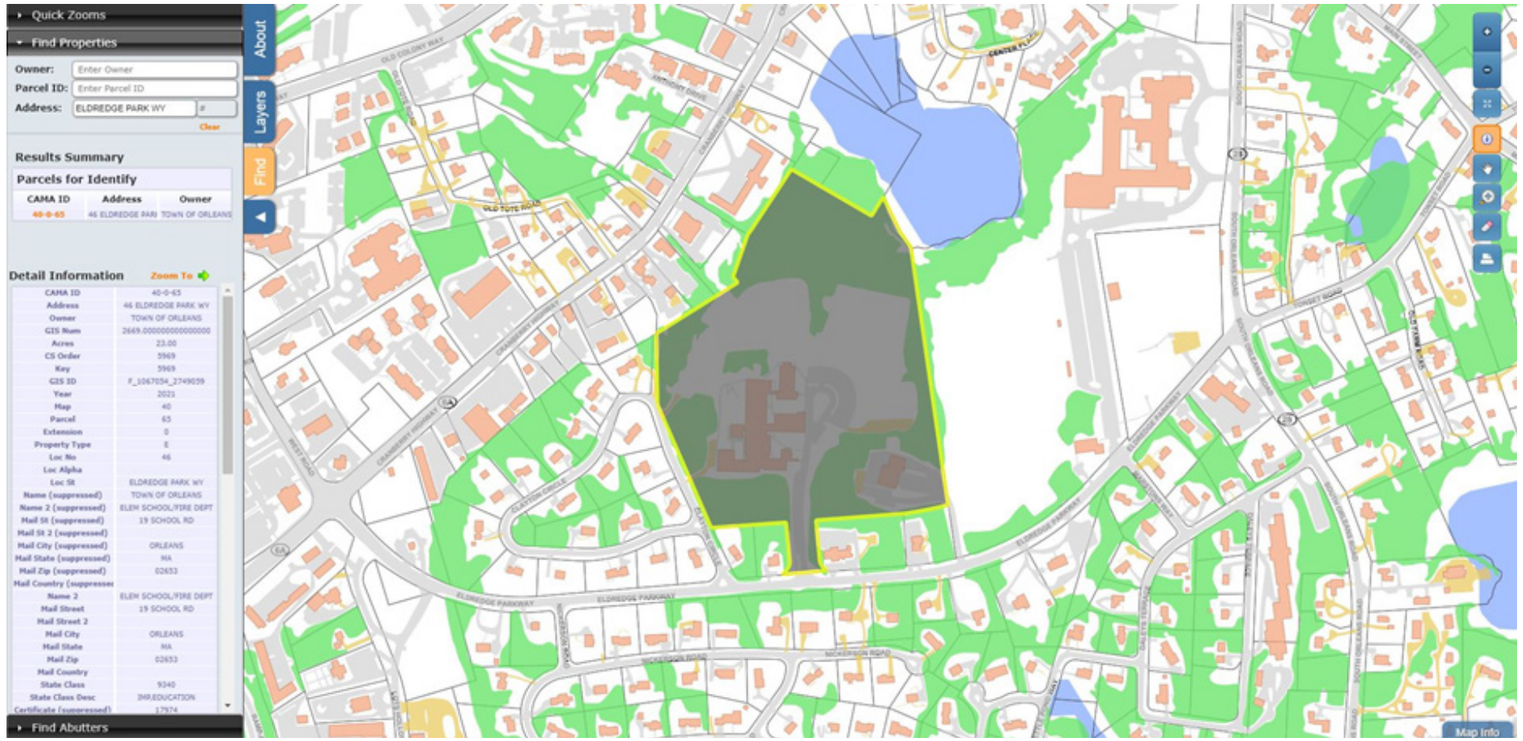
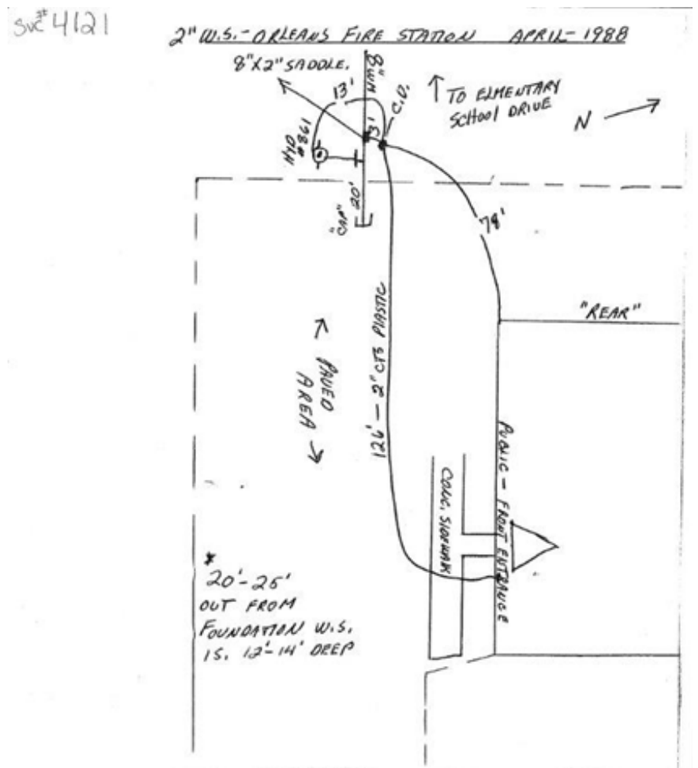
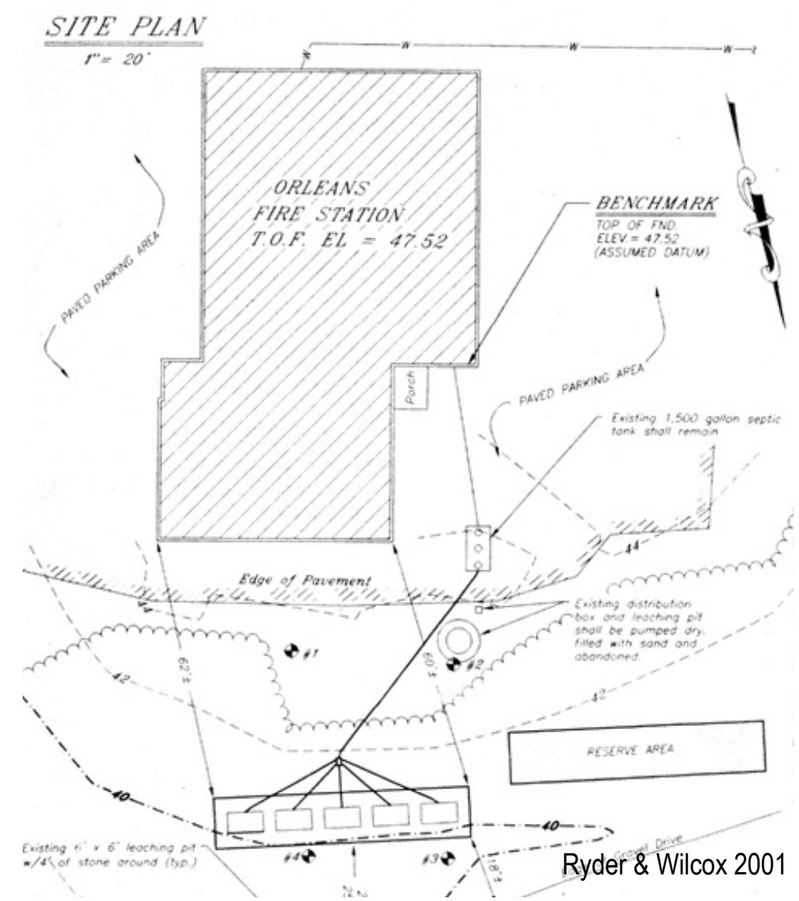


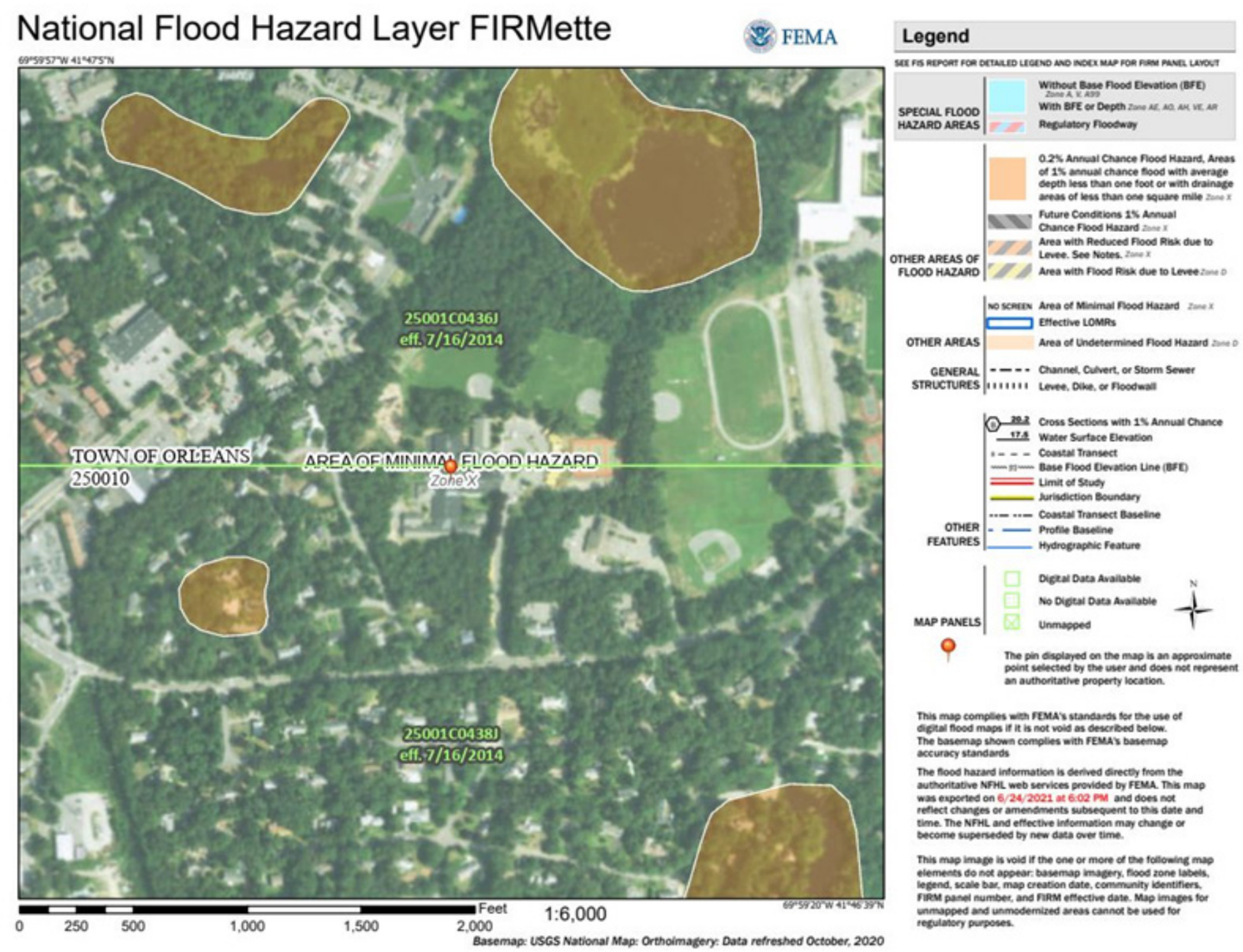
Orleans GIS Map Overview





Ryder & Wilcox 2001

Water Service As-Built Card/Septic System Design



FEMA FIRMette Map

Aerial View of Existing Station/Google Maps

Figure 6: Existing asphalt conditions - Public entrance (left); Lower Apparatus Bays (right). Varying levels of pavement deterioration.

Existing Asphalt Conditions

Hazardous Materials Identification Study - Orleans Fire Station

1.0 INTRODUCTION:

Universal Environmental Consultants (UEC) has been providing comprehensive asbestos services since 2001 and has completed projects throughout New England. We have completed projects for a variety of clients including commercial, industrial, municipal, and public and private schools. We maintain appropriate asbestos licenses and staff with a minimum of thirty-two years of experience.

UEC was contracted by The Galante Architecture Studio, Inc to conduct the following services at the Orleans Fire Station, Orleans, Massachusetts:

- Asbestos Containing Materials (ACM) determination inspection and sampling

The scope of work included the inspection of accessible ACM, collection of bulk samples from materials suspected to contain asbestos, determination and quantities of types of ACM found. Bulk samples analyses for asbestos were performed using the standard Polarized Light Microscopy (PLM) Method in accordance with Environmental Protection Agency (EPA) standard. Bulk samples were collected by a Massachusetts licensed asbestos inspector Mr. Leonard J. Busa (AI-030673) and analyzed by a Massachusetts licensed laboratory Asbestos Identification Laboratory, Woburn, MA.

This report should not be used to demolish the building as only limited destructive testing was performed and roofing materials were not sampled.

Samples results are attached.

2.0 FINDINGS:

Asbestos Containing Materials (ACM):
The regulations for asbestos inspection are based on representative sampling. It would be impractical and costly to sample all materials in all areas. Therefore, representative samples of each homogeneous area were collected and analyzed or assumed.

All suspect materials were grouped into homogeneous areas. By definition, a homogeneous area is one in which the materials are evenly mixed and similar in appearance and texture throughout. A homogeneous area shall be determined to contain asbestos based on findings that the results of at least one sample collected from that area shows that asbestos is present in an amount greater than 1 percent in accordance with EPA regulations. Per the Department of Environmental Protection (DEP) any amount of asbestos found must be disposed as asbestos. No additional suspect and accessible ACM were found during this survey.

Hidden ACM may be found during the renovation and demolition activities.

Number of Samples Collected:
Twenty-six (26) bulk samples were collected from materials suspected of containing asbestos, including:

Type and Location of Suspect Material

1. Fireproofing at upper engine bay
2. Fireproofing at upper engine bay
3. Fireproofing at upper engine bay
4. Fireproofing at lower engine bay
5. Fireproofing at lower engine bay
6. Joint compound at lower bay
7. Joint compound at public entrance vestibule
8. Textured joint compound at upper engine bay
9. Textured joint compound at upper engine bay
10. Joint compound at second floor closet
11. Linoleum floor covering at second floor hallway
12. Linoleum floor covering at second floor hallway closet
13. Exterior window framing caulking
14. Exterior window framing caulking
15. Exterior window framing caulking
16. Exterior window framing caulking
17. Exterior window framing caulking
18. Exterior roll-up door framing caulking
19. Exterior roll-up door framing caulking
20. Damproofing behind exterior CMU
21. Damproofing behind exterior CMU
22. Damproofing behind exterior CMU
23. Damproofing on foundation wall
24. Damproofing on foundation wall
25. 2' x 4' Suspended acoustical ceiling tile
26. 2' x 4' Suspended acoustical ceiling tile

Sample Results:

Type and Location of Suspect Material	Sample Result
1. Fireproofing at upper engine bay	No Asbestos Detected
2. Fireproofing at upper engine bay	No Asbestos Detected
3. Fireproofing at upper engine bay	No Asbestos Detected
4. Fireproofing at lower engine bay	No Asbestos Detected
5. Fireproofing at lower engine bay	No Asbestos Detected
6. Joint compound at lower bay	No Asbestos Detected
7. Joint compound at public entrance vestibule	No Asbestos Detected
8. Textured joint compound at upper engine bay	No Asbestos Detected
9. Textured joint compound at upper engine bay	No Asbestos Detected
10. Joint compound at second floor closet	No Asbestos Detected

11.	Linoleum floor covering at second floor hallway	No Asbestos Detected
12.	Linoleum floor covering at second floor hallway closet	No Asbestos Detected
13.	Exterior window framing caulking	No Asbestos Detected
14.	Exterior window framing caulking	No Asbestos Detected
15.	Exterior window framing caulking	No Asbestos Detected
16.	Exterior window framing caulking	No Asbestos Detected
17.	Exterior window framing caulking	No Asbestos Detected
18.	Exterior roll-up door framing caulking	No Asbestos Detected
19.	Exterior roll-up door framing caulking	No Asbestos Detected
20.	Damproofing behind exterior CMU	10% Asbestos
21.	Damproofing behind exterior CMU	10% Asbestos
22.	Damproofing behind exterior CMU	10% Asbestos
23.	Damproofing on foundation wall	2% Asbestos
24.	Damproofing on foundation wall	10% Asbestos
25.	2' x 4' Suspended acoustical ceiling tile	No Asbestos Detected
26.	2' x 4' Suspended acoustical ceiling tile	No Asbestos Detected

Observation and Conclusions:
The condition of ACM is very important. ACM in good condition does not present a health issue unless it is disturbed. Therefore, it is not necessary to remediate ACM in good condition unless it will be disturbed through renovations, demolition, or other activity.

1. Damproofing behind exterior CMU was found to contain asbestos.
2. Damproofing on foundation wall was found to contain asbestos.
3. Vermiculite insulation was previously found not to contain asbestos.
4. All other suspect materials were found not to contain asbestos. Hidden ACM may be found during renovations and demolition activities. It should be noted that no destructive testing was performed.

3.0 DESCRIPTION OF SURVEY METHODS AND LABORATORY ANALYSES:

Asbestos samples were collected using a method that prevents fiber release. Homogeneous sample areas were determined by criteria outlined in EPA document 560/5-85-030a. Bulk material samples were analyzed using PLM and dispersion staining techniques in accordance with EPA/600/R-93/116.

4.0 LIMITATIONS AND CONDITIONS:

This report has been completed based on visual and physical observations made and information available at the time of the site visits, as well as an interview with the Owner's representatives. This report is intended to be used as a summary of available information on existing conditions with conclusions based on a reasonable and knowledgeable review of evidence found in accordance with normally accepted industry standards, state, and federal protocols, and within the scope and budget established by the client. Any additional data obtained by further review must be reviewed by UEC and the conclusions presented herein may be modified accordingly.

This report and attachments, prepared for the exclusive use of Owner for use in an environmental evaluation of the subject site, are an integral part of the inspections and opinions should not be formulated without reading the report in its entirety. No part of this report may be altered, used, copied, or relied upon without prior written permission from UEC, except that this report may be conveyed in its entirety to parties associated with Owner for this subject study.

Inspected By:

Leonard J. Busa Asbestos Inspector

PROJECT NO: 221 357.00
Survey Date:
July 10, 2021

CONDUCTED BY:

UNIVERSAL ENVIRONMENTAL CONSULTANTS
12 Brewster Road
Framingham, MA 01702

Asbestos Identification Laboratory
165 New Boston St., Ste 227
Woburn, MA 01801
781-932-9600
Web: www.asbestosidentificationlab.com
Email: mikemanning@asbestosidentificationlab.com

Batch: 66363

NVLAP Testing Lab Code: 200919-0

July 14, 2021

Ammar Dieb
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Project Name: *58 Eldredge Park Way, Orleans, MA*
Project Number:
Date Sampled: 2021-07-10
Work Received: 2021-07-13
Work Analyzed: 2021-07-13

Analysis Method: BULK PLM ANALYSIS EPA/600/R-93/116

Dear Ammar Dieb,

Asbestos Identification Laboratory has completed the analysis of the samples from your office for the above referenced project. The information and analysis contained in this report have been generated using the EPA /600/R-93/116 Method for the Determination of Asbestos in Bulk Building Materials. Materials or products that contain more than 1% of any kind or combination of asbestos are considered an asbestos containing building material as determined by the EPA. This Polarized Light Microscope (PLM) technique may be performed either by visual estimation or point counting. Point counting provides a determination of the area percentage of asbestos in a sample. If the asbestos is estimated to be less than 10% by visual estimation of friable material, the determination may be repeated using the point counting technique. The results of the point counting supersede visual PLM results. Results in this report only relate to the items tested. This report may not be used by the customer to claim product endorsement by NVLAP or any other U.S. Government Agency.
Laboratory results represent the analysis of samples as submitted by the customer. Information regarding sample location, description, area, volume, etc., was provided by the customer. Asbestos Identification Laboratory is not responsible for sample collection activities or analytical method limitations. Unless notified in writing to return samples, Asbestos Identification Laboratory discards customer samples after 30 days. Samples containing subsamples or layers will be analyzed separately when applicable. Reports are kept at Asbestos Identification Laboratory for three years. This report shall not be reproduced, except in full, without the written consent of Asbestos Identification Laboratory.

- NVLAP Lab Code: 200919-0
- Massachusetts Certification License: AA000208
- State of Connecticut, Department of Public Health Approved Environmental Laboratory Registration Number: PH-0142
- State of Maine, Department of Environmental Protection Asbestos Analytical Laboratory License Number: LB-0078(Bulk) LA-0087(Air)
- State of Rhode Island and Providence Plantations. Department of Health Certification: AAL-121
- State of Vermont, Department of Health Environmental Health License AL934461

Thank you Ammar Dieb for your business.

Michael Manning
Owner/Director

July 14, 2021

Ammar Dieb
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Project Name: *58 Eldredge Park Way, Orleans, MA*
Project Number:
Date Sampled: 2021-07-10
Work Received: 2021-07-13
Work Analyzed: 2021-07-13

Analysis Method: BULK PLM ANALYSIS EPA/600/R-93/116

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
1 / 738117	Fireproofing (FP)	Upper Engine Bay	gray	Cellulose 40 Non-Fibrous 60	None Detected
2 / 738118	Fireproofing	Upper Bay	gray	Cellulose 35 Non-Fibrous 65	None Detected
3 / 738119	Fireproofing	Upper Bay	gray	Cellulose 35 Non-Fibrous 65	None Detected
4 / 738120	Fireproofing	Lower Engine Bay	gray	Cellulose 30 Non-Fibrous 70	None Detected
5 / 738121	Fireproofing	Lower Bay	gray	Cellulose 35 Non-Fibrous 65	None Detected
6 / 738122	Joint Compound (Smooth)	Lower Bay	white	Non-Fibrous 100	None Detected
7 / 738123	Joint Compound (Smooth)	Public Entrance Vestibule	white	Non-Fibrous 100	None Detected
8 / 738124	Joint Compound (Smooth)	2nd Floor Sleeping	white	Non-Fibrous 100	None Detected
9 / 738125	Textured Joint Compound (Loft Wall)	Upper Engine Bay	white	Non-Fibrous 100	None Detected
10 / 738126	Textured Joint Compound (clg)	Upper Bay	white	Non-Fibrous 100	None Detected
11 / 738127	Joint Compound	2nd Floor Closet	white	Non-Fibrous 100	None Detected
12 / 738128	Linoleum	2nd Floor Hall	multi	Cellulose 30 Synthetic 10 Non-Fibrous 60	None Detected
13 / 738129	Linoleum	2nd Floor Hall Closet	multi	Cellulose 20 Synthetic 20 Non-Fibrous 60	None Detected
14 / 738130	Window Frame Caulk	Exterior Random	gray	Non-Fibrous 100	None Detected

Wednesday 14 July

FieldID / LabID	Material	Location	Color	Non-Asbestos %	Asbestos %
15 / 738131	Window Frame Caulk	Exterior Random	white	Non-Fibrous 100	None Detected
16 / 738132	Window Frame Caulk	Exterior Random	white	Non-Fibrous 100	None Detected
17 / 738133	Window Frame Caulk	Exterior Random	white	Non-Fibrous 100	None Detected
18 / 738134	Roll-Up Door Frame Caulk	Exterior Upper Bay	white	Non-Fibrous 100	None Detected
19 / 738135	Roll-Up Door Frame Caulk	Exterior Upper Bay	white	Non-Fibrous 100	None Detected
20 / 738136	Damproofing Behind Exterior Brick	Attic @ End Wall	black	Non-Fibrous 90	Detected Chrysotile 10
21 / 738137	Damproofing Behind Exterior Brick Wall	From Attic, Pubic Entrance	black	Non-Fibrous 90	Detected Chrysotile 10
22 / 738138	Damproofing Behind Exterior Brick Wall	From Attic, Public Entrance	black	Non-Fibrous 90	Detected Chrysotile 10
23 / 738139	Damproofing on Foundation	Exterior Rear @ Upper Bay Area	black	Non-Fibrous 98	Detected Chrysotile 2
24 / 738140	Damproofing on Foundation	Exterior by Public Entrance	black	Non-Fibrous 90	Detected Chrysotile 10
25 / 738141	2x4 SAT	Random @ 2nd Floor	gray	Fiberglass 40 Cellulose 40 Non-Fibrous 20	None Detected
26 / 738142	2x4 SAT	Random @ 2nd Floor	gray	Fiberglass 40 Cellulose 40 Non-Fibrous 20	None Detected

Wednesday 14 July

Analyzed by: Michael Thomas

End of Report

Batch: 66363

Hazardous Materials Identification Study

CHAIN OF CUSTODY

1 of 2

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

Town/City: Orleans, MA Building Name 58 Eldredge Park Way

Sample	Result	Description of Material	Sample Location
1		Fireproofing (FP)	upper engine Bay
2		FP	upper Bay
3		FP	upper Bay
4		FP	lower engine Bay
5		FP	lower Bay
6		Joint Compound (smooth)	JC lower Bay
7		JC	Public Entrance vestibule
8		JC	2nd Fl sleeping
9		Textured JC (ceiling)	upper engine Bay
10		Textured JC (clg)	upper Bay
11		JC	2nd Fl closet
12		Linoleum	2nd Fl hall
13		Linoleum	2nd Fl hall closet
14		window frame caulk	exterior rear door
15		win fr	
16		win fr	
17		win fr	
18		roll-up door frame caulk	upper bay
19		roll-up door fr	" "
20		dampproofing behind exterior brick	attic e end wall

Reported By: [signature] Date: 7-10-21 Due Date: 24-hr

Received By: [signature] Date: 7/13/21

CHAIN OF CUSTODY

2 of 2

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

Town/City: Orleans, MA Building Name 58 Eldredge Park Way

Sample	Result	Description of Material	Sample Location
21		dp behind exterior brick wall	from attic, Public Entrance
22		dp behind ext. brick wall	from attic, Public Entrance
23		dampproofing on foundation	Exterior rear e upper bay area
24		dp on foundation	Exterior by Public Entrance
25		2x4 SAT	random e 2nd Fl
26		2x4 SAT	" " "

Reported By: [signature] Date: 7-10-21 Due Date: 24-hr

Received By: [signature] Date: 7/13/21

APPENDIX

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H Study - Cambridge MA Temp Facilities 86

Harold R. Cutler
Consulting Fire Protection Engineer
165 Landham Road
Sudbury MA 01776

There are thresholds in the Ninth Edition of the Existing Building Code of Massachusetts (EBCM9), Massachusetts General Laws, Chapter 148, Section 26G and the Massachusetts Accessibility Regulations (521 CMR) that will affect when sprinklers are required, when accessibility upgrades and when structural upgrades are required. References to new construction requirements are to the Ninth Edition of the Massachusetts State Building Code (MSBC9).

For purposes of this memo, it is assumed the building and project have the following basic characteristics:

Building height is one story and <25 feet (except the hose tower)
Building area is 11,500 sf.
Building is Construction Type IIB (unprotected, noncombustible)
Occupancies include Use Group B, S-2, R-2 and A-2/3
The occupancies present are arranged in a non-separated mixed use relationship.
No change of occupancy is anticipated
No expansion of the building is anticipated
The building is not sprinklered.

The separate thresholds for specific upgrades are summarized below.

Sprinkler Requirements - EBCM9

Under these circumstances, the EBCM9 has one provision that might result in a requirement for sprinklers in the building. The work within the existing building will be subject to the requirements for EBCM9 Chapter 8 concerning Level 2 or Level 3 Alterations.
In accordance with EBCM9 Section 804.2.2, in buildings with any of the occupancies in this building, work areas that include exits or corridors shared by more than one tenant or that serve an occupant load greater than 30 shall be provided with automatic sprinkler protection where all of the following three conditions occur:

1. The work area is required to be provided with automatic sprinkler protection in accordance with the MSBC9 as applicable to new construction;
2. The work area exceeds 50 percent of the floor area; and
3. The building has sufficient municipal water supply for design of a fire sprinkler system available to the floor without installation of a new fire pump.

The area thresholds of MSBC9 for new construction sprinkler requirements in the MSBC9 range from 0 sf for Use Group R-2 and S-2, 5,000 sf for Use Group A-3 and 12,000 sf for Use Group B. Therefore, sprinklers would be required in this building if constructed new. Condition 1 above is, therefore, satisfied.

The work area (area being reconfigured) within the existing building will be limited to the immediate area of the new interior or exterior walls, demolished interior or exterior walls or new or closed openings through interior or exterior walls. If the aggregate area of the individual work areas exceeds 50% of the area of the floor on which they are located, Condition 2 above would be met and sprinkler protection would be required under Section 804.2.2.

I assume the water supply requirement of Condition 3 is also met.
Assuming the work area exceeds 50% of the floor area, sprinklers would be required by the EBCM9.
MGL Chapter 148, Section 26G

Massachusetts General Laws, Chapter 148, Section 26G, requires retroactive installation of sprinklers in an existing building when the aggregate area measured to the exterior side of exterior walls on all levels is more than 7,500 sf and the building is undergoing major alterations or being expanded.

The proposed project may include “major alterations” of the existing building as defined is the attached advisory document from the Department of Public Safety Automatic Sprinkler Appeals Board. The threshold for applicability of Section 26G as explained in that advisory document is the following:

> The Board has established the following two presumptions that may be used to determine if the scope or the cost of the planned alterations or modifications are “major” thus requiring sprinklers to be installed throughout a building.
> 1) Major alterations or modifications are reasonably considered major in scope when such work affects thirty-three (33) % or more of the “total gross square footage” of the building, calculated in accordance with section 26G.
> 2) Major alterations or modifications are reasonably considered major in scope or expenditure, when the total cost of the work (excluding costs relating to sprinkler installation) is equal to or greater then thirty-three (33) % of the assessed value of the subject building, as of the date of permit application.

The bottom line is that renovations and alterations affecting 33% or more of a building would trigger the requirement of Section 26G for sprinklers.

Accessibility

Requirements of 521 CMR concerning accessibility will be applicable to those portions of the building that are open to the public. That applicability might be limited to meeting rooms and business areas. However, it may be that the entire building is potentially considered to be open to the public because tours of the station are offered to school groups or the general public. In addition, although I’ve not seen discussion of the subject, it may be that a fire station utilized by volunteer or paid-on-call firefighters and EMT’s from the community would be regulated as a public accommodation by 521 CMR.

The thresholds for applicability of 521 CMR to an existing building are the following:

3.3.1 If the work being performed amounts to less than 30% of the full and fair cash value of the building and

a. if the work costs less than $100,000, then only the work being performed is required to comply with 521 CMR

or

b. if the work costs $100,000 or more, then the work being performed is required to comply with 521 CMR. In addition, an accessible public entrance and an accessible toilet room, telephone, drinking fountain (if toilets, telephones and drinking fountains are provided) shall also be provided in compliance with 521 CMR.

Exception: General maintenance and on-going upkeep of existing, underground transit facilities will not trigger the requirement for an accessible entrance and toilet unless the cost of the work exceeds $500,000 or unless work is being performed on the entrance or toilet.

Exception: Whether performed alone or in combination with each other, the following types of alterations are not subject to 521 CMR 3.3.1, unless the cost of the work exceeds $500,000 or unless work is being performed on the entrance or toilet. (When performing exempted work, a memo stating the exempted work and its costs must be filed with the permit application or a separate building permit must be obtained.)

a. Curb Cuts: The construction of curb cuts shall comply with 521 CMR 21.00: CURB CUTS.

b. Alteration work which is limited solely to electrical mechanical, or plumbing systems; to abatement of hazardous materials; or retrofit of automatic sprinklers and does not involve the alteration of any elements or spaces required to be accessible under 521 CMR. Where electrical outlets and controls are altered, they must comply with 521 CMR.

c. Roof repair or replacement, window repair or replacement, repointing and masonry repair work.

d. Work relating to septic system repairs, (including Title V, 310 CMR 15.00, improvements) site utilities and landscaping.

3.3.2 If the work performed, including the exempted work, amounts to 30% or more of the full and fair cash value (see 521 CMR 5.00) of the building the entire building is required to comply with 521 CMR.

a. Where the cost of constructing an addition to a building amounts to 30% or more of the full and fair cash value of the existing building, both the addition and the existing building must be fully accessible.

Under any of these circumstances, new construction of features within the building affecting accessibility is required to comply with 521 CMR.

TABLE 1604.5
RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV.
III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to: • Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing Group E occupancies with an occupant load greater than 250. • Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500. • Group I-2 occupancies with an occupant load of 50 or more resident care recipients but not having surgery or emergency treatment facilities. • Group I-3 occupancies. • Any other occupancy with an occupant load greater than 5,000.[a] • Power-generating stations, water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category IV. • Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that: Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and Are sufficient to pose a threat to the public if released.[b]
IV	Buildings and other structures designated as essential facilities, including but not limited to: • Group I-2 occupancies having surgery or emergency treatment facilities. • Fire, rescue, ambulance and police stations and emergency vehicle garages. • Designated earthquake, hurricane or other emergency shelters. • Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. • Power-generating stations and other public utility facilities required as emergency backup facilities for Risk Category IV structures. • Buildings and other structures containing quantities of highly toxic materials that: Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the *International Fire Code*; and Are sufficient to pose a threat to the public if released.[b] • Aviation control towers, air traffic control centers and emergency aircraft hangars. • Buildings and other structures having critical national defense functions. • Water storage facilities and pump structures required to maintain water pressure for fire suppression.

a. For purposes of occupant load calculation, occupancies required by Table 1004.1.2 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load.

b. Where approved by the building official, the classification of buildings and other structures as Risk Category III or IV based on their quantities of toxic, highly toxic or explosive materials is permitted to be reduced to Risk Category II, provided it can be demonstrated by a hazard assessment in accordance with Section 1.5.3 of ASCE 7 that a release of the toxic, highly toxic or explosive materials is not sufficient to pose a threat to the public.

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Appendix B. Risk Category Chart

Excerpts from the 2015 International Building Code

[BS] **HURRICANE-PRONE REGIONS.** Areas vulnerable to hurricanes defined as:

1. The U. S. Atlantic Ocean and Gulf of Mexico coasts where the ultimate design wind speed, V_{ult}, for Risk Category buildings is greater than 115 mph (51.4 m/s);
2. Hawaii, Puerto Rico, Guam, Virgin Islands and American Samoa.

❖ This definition identifies the areas where hurricane-force winds are expected.

pg. 2-61

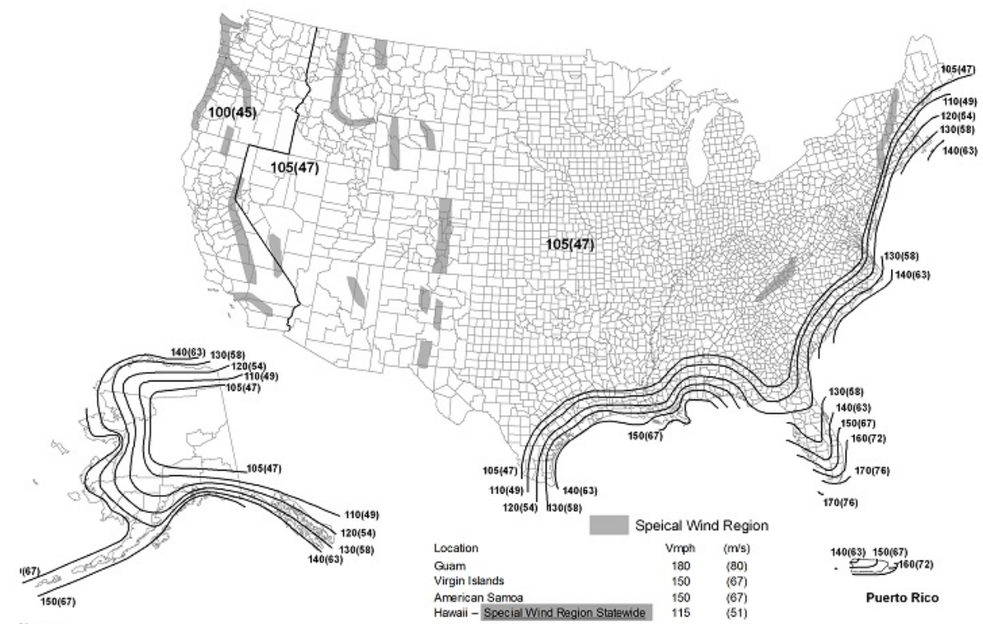
[BS] WIND-BORNE DEBRIS REGION. Areas within hurricane-prone regions located:

1. Within 1 mile (1.61 km) of the coastal mean high water line where the ultimate design wind speed, V_{ult}, is 130 mph (58 m/s) or greater; or
2. In areas where the ultimate design wind speed is 140 mph (63.6 m/s) or greater; or Hawaii.

For *Risk Category* II buildings and structures and *Risk Category* III buildings and structures, except health care facilities, the wind-borne debris region shall be based on Figure 1609.3.(1). For *Risk Category* IV buildings and structures and *Risk Category* III health care facilities, the wind-borne debris region shall be based on Figure 1609.3(2).

pg. 2-103-104

FIGURE 1609.3(2) ULTIMATE DESIGN WIND SPEEDS, v_{ult}, FOR RISK CATEGORY III AND IV BUILDINGS AND OTHER STRUCTURES



Notes:
1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
5. Wind speeds correspond to approximately a 15% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00333, MRI = 300 Years).

MA State Building Code 780 - 9th edition

Table 1604.11 Snow Loads, Wind Speeds and Seismic Parameters

	SNOW LOADS		BASIC WIND SPEED, V_{ult} (mph)			SEISMIC PARAMETERS (g)	
City/Town	Ground Snow Load, P_g (psf)	Minimum Flat Roof Snow Load, P_f[1] (psf)	Risk Category I	Risk Category II	Risk Category III or IV	S_s	S_1
New Ashford[2]	50	40	105	115	120	0.173	0.068
New Bedford	30	30	129	139	150	0.170	0.058
New Braintree	50	35	111	121	131	0.176	0.066
New Marlborough	50	40	105	115	120	0.171	0.065
New Salem	50	35	106	117	125	0.177	0.068
Newbury	50	30	114	125	136	0.263	0.077
Newburyport	50	30	114	124	135	0.265	0.078
Newton	40	30	117	127	138	0.208	0.068
Norfolk	40	35	119	129	140	0.186	0.065
North Adams[2]	60	40	105	115	120	0.175	0.069
North Andover	50	30	113	123	134	0.251	0.076
North Attleborough	35	30	121	131	142	0.180	0.063
North Brookfield	50	35	112	122	132	0.176	0.066
North Reading	50	30	115	125	136	0.240	0.073
Northampton	40	35	106	117	124	0.171	0.066
Northborough	50	35	114	124	135	0.188	0.067
Northbridge	40	35	116	127	137	0.179	0.065
Northfield	60	35	105	115	120	0.179	0.069
Norton	35	30	122	133	144	0.184	0.063
Norwell	35	30	123	133	144	0.203	0.065
Norwood	40	35	119	129	140	0.195	0.066
Oak Bluffs	25	25	133	140	154	0.144	0.053
Oakham	50	35	111	121	131	0.179	0.067
Orange	60	35	106	117	124	0.180	0.069
Orleans	25	25	132	140	152	0.144	0.053
Otis	50	40	105	115	120	0.170	0.066
Oxford	50	35	115	125	136	0.174	0.064
Palmer	40	35	111	121	131	0.173	0.065
Paxton	50	35	112	122	133	0.180	0.066
Peabody	50	30	117	127	138	0.240	0.073

American Society of Civil Engineers Minimum Design Loads 7-10

26.10.3.1 Wind-borne Debris Regions

Glazed openings shall be protected in accordance with Section 26.10.3.2 in the following locations:

1. Within 1 mi of the coastal mean high water line where the basic wind speed is equal to or greater than 130 mi/h (58 m/s), or
2. In areas where the basic wind speed is equal to or greater than 140 mi/h (63 m/s).

For Risk Category II buildings and other structures and Risk Category III buildings and other structures, except health care facilities, the wind-borne debris region shall be based on Fig. 26.5-1A. For Risk Category III health care facilities and Risk Category IV buildings and other structures, the wind-borne debris region shall be based on Fig. 26.5-1B. Risk Categories shall be determined in accordance with Section 1.5.

EXCEPTION: Glazing located over 60 ft (18.3 m) above the ground and over 30 ft (9.2 m) above aggregate-surfaced-roofs, including roofs with gravel or stone ballast, located within 1,500 ft (458 m) of the building shall be permitted to be unprotected.

26.10.3.2 Protection Requirements for Glazed Openings

Glazing in buildings requiring protection shall be protected with an impact-protective system or shall be impact-resistant glazing.

Impact-protective systems and impact-resistant glazing shall be subjected to missile test and cyclic pressure differential tests in accordance with ASTM E1996 as applicable. Testing to demonstrate compliance with ASTM E1996 shall be in accordance with ASTM E1886. Impact-resistant glazing and impact-protective systems shall comply with the pass/fail criteria of Section 7 of ASTM E1996 based on the missile required by Table 3 or Table 4 of ASTM E1996.

EXCEPTION: Other testing methods and/or performance criteria are permitted to be used when approved.

Glazing and impact-protective systems in buildings and other structures classified as Risk Category IV in accordance with Section 1.5 shall comply with the "enhanced protection" requirements of Table 3 of ASTM E1996. Glazing and impact-protective systems

pg. 255, 257

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Appendix D. MA Building Code Parameters
ASCE Minimum Design Loads

The Commonwealth of Massachusetts
Executive Office of Public Safety and Security
Department of Fire Services
P.O. Box 1025 ~State Road
Stow, Massachusetts 01775
(978) 567~3100 Fax: (978) 567~3121

DEVAL L. PATRICK
GOVERNOR

TIMOTHY P. MURRAY
LT. GOVERNOR

KEVIN M. BURKE
SECRETARY

STEPHEN D. COAN
STATE FIRE MARSHAL

THOMAS P. LEONARD
DEPUTY STATE FIRE MARSHAL

MEMORANDUM

TO: Heads of Fire Departments

FROM: Stephen D. Coan
State Fire Marshal

DATE: November 1, 2009

***SUBJECT*:** **Advisory regarding recent amendments to M.G.L. c. 148, s. 26G (Chapter 508 of the Acts of 2008) which requires enhanced sprinkler protection in certain buildings which total more than 7,500 gross square feet in floor area.**

Enclosed please find an advisory memorandum issued by the Fire Safety Commission's, Automatic Sprinkler Appeals Board, regarding the recent amendments to M.G.L. c. 148, s. 26G. The law takes effect January 1, 2010. This document provides guidance to the heads of fire departments who are charged with enforcing this law.

The new amendments to M.G.L. c. 148, s. 26G arose out of the aftermath of a tragic commercial building fire, which occurred in Newton, Massachusetts, in February 2000, resulting in the death of five individuals.

For your convenience, a copy of this advisory memorandum is also posted on the Department of Fire Services' website for members of the fire service, building service, and other interested parties. In the next several weeks, the Department of Fire Services will begin a series of informational seminars relative to this advisory memorandum and the new law. **Watch for an e-mail with the training schedule**.

If you have any questions, or require assistance, please contact the Code Compliance & Enforcement Unit at (978) 567-3375 or in western Massachusetts at (413) 587-3181.

SDC/bhs

Administrative Services • Hazardous Materials Response
Massachusetts Firefighting Academy • Office of the State Fire Marshal

The Commonwealth of Massachusetts
Executive Office of Public Safety and Security
Fire Safety Commission
Automatic Sprinkler Appeals Board
P.O. Box 1025 ~ State Road
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(978) 567-3181 Fax:(978) 567-3121

DEVAL L. PATRICK
GOVERNOR

TIMOTHY P. MURRAY
LT. GOVERNOR

KEVIN M. BURKE
SECRETARY

JOHN J. MAHAN
CHAIRMAN

MAURICE M. PILETTE
VICE CHAIRMAN

MEMORANDUM

TO: **Interested persons**

FROM: **Commonwealth of Massachusetts, Fire Safety Commission's Automatic Sprinkler Appeals Board**

DATE: **October 14, 2009**

RE: **Advisory regarding recent amendments to M.G.L. c. 148, s. 26G (Chapter 508 of the Acts of 2008) which requires enhanced sprinkler protection in certain buildings which total more than 7,500 gross square feet in floor area.**

Introduction

Because of the unique characteristics of each building construction project, the Board realizes that it is not possible to address all aspects of this law in a single guidance document. As the Board hears appeals based upon the newly revised law, the Board anticipates that some of the conclusions found in this document may be subject to further review and possible modification. Accordingly, persons should closely monitor further guidance and decisions from the Board regarding this matter.

The Commonwealth of Massachusetts' Fire Safety Commission and the Automatic Sprinkler Appeal's Board (hereinafter referred to as "the Board"), has received several requests for guidance regarding the recent amendments to M.G.L. c.148, s.26G (Chapter 508 of the Acts and Resolves of 2008), which requires an adequate system of automatic sprinklers to be installed in certain buildings or structures totaling more than 7,500 square feet. Under s. 26G, this Board has jurisdiction to hear appeals from orders issued by heads of the fire department who are charged with enforcing the law. Under the authority of M.G.L. c. 30A, s. 8, the Board is issuing this advisory guidance document to assist heads of fire departments and building owners to understand the basic requirements of this law.

In developing this document, the Board has used its best efforts in developing guidance consistent with the language of the statute, legislative intent, related cases and common sense. This

document is not intended to be the final word on this matter or meant to be a substitute for a good faith, reasonable interpretation of the statute by the head of the fire department. In determining whether a building is subject to this law, the head of the fire department should make fair, consistent and well-reasoned determinations, based upon the reading of the law and the specific factors that exist for a particular building.

1. How did the law change?

The law changed in two significant ways. First, the law will now be applied uniformly throughout the state in all cities and towns. The provisions of M.G.L c. 148, s. 26G, in various forms, have been law since 1982. However, until this recent amendment to M.G.L. c. 148, s. 26G (c. 508 of the Acts of 2008), the law only applied within those cities and towns that adopted the law by local option. However the law now applies to all municipalities on a statewide basis.

The second major change expanded the instances in which sprinkler systems will be required. The law limits the installation of sprinklers to new buildings and buildings subject to major alterations or additions if said buildings feature more than 7,500 gross square feet in floor area. Under the old law, the construction of an addition required sprinklers in the "addition only." The new law requires sprinklers to be installed based upon the building's sum total of square feet (s.f.) in floor area "in the aggregate." As an example, under the new law, if you have an existing building that has 5,000 s.f. of floor area and you are constructing a 3,000 s.f. addition, you will now be required to install an adequate sprinkler system throughout the building, since the building will now total over 7,500 s.f. in the aggregate (8,000 s.f.).

2. Why was the law changed?

The legislative activity to amend the provisions of M.G.L. c. 148, s. 26G arose in the aftermath of a tragic commercial building fire, which occurred in Newton, Massachusetts in February, 2000, resulting in the death of five individuals. It was the Legislature's intent to apply the law throughout the state. This reasoning is based upon the long-standing, fire safety principal that sprinklers save lives. Additionally, there was the desire to eliminate a perceived loophole, which existed in the old s. 26G. Under the old law, if you were only constructing an addition to a building without any major modifications to the existing building, a sprinkler system was required in the "addition only" if the addition itself contained over 7,500 s.f. in floor area. A building could have been added to by means of a series of smaller additions (7,500 s.f. or less) over the course of many years, resulting in the significant enlargement of the original building without the need to ever install sprinklers.

3. When does the law take effect?

The new law clearly applies to "the construction of buildings, structures or additions or major modifications thereto which total, in the aggregate, more than 7,500 gross square feet ***permitted after January 1, 2010"***. (Sec. 6, c. 508 of the Acts of 2008). Therefore, if the date of the issuance of the permit is after January 1, 2010, the enhanced requirements will be applicable.

4. What type of buildings or structures are covered by the law?

The law, in general applies to "every building and structure…" and does not specify which particular use groups or building classifications are subject to the law. However the law does include several specific exemptions. The law does not apply to:

- Buildings or additions used for residential purposes;
- Rooms or areas of a telephone central office equipment building when such rooms or areas are protected with an automatic fire alarm system;
- Open-air parking structures, defined as: buildings, structures, or portions thereof, used for parking motor vehicles and having not less than twenty- five per cent of the total wall area open to atmosphere at each level, utilizing at least two sides of the structure; and
- Buildings used for certain agricultural purposes, as defined in M.G.L. c. 128 s. 1A.

Additionally, the statute contains some exceptions, if certain conditions or circumstances exist. They include:

- Buildings or structures, or certain areas of such buildings or structures, where the discharge of water would be an actual danger in the event of a fire, the head of the fire department shall permit the installation of such other fire suppressant systems as are prescribed by the state building code in lieu of automatic sprinklers; and
- No such sprinkler system shall be required unless sufficient water and water pressure exists.

It should also be noted that buildings owned by the Commonwealth are generally not subject to the provisions of s. 26G. In accordance with long standing case law and confirmed by a fairly recent Opinion of the Attorney General (No. 00/01-1), buildings owned by the state are not subject to the statutory requirements of laws such as s. 26G, unless there is express statutory language indicating that the state is subject to the law. However, buildings that are owned by state authorities or other similar entities created by the Legislature, may not necessarily be considered "state owned" and therefore exempt. In such situations, the particular statute creating the authority or entity should be reviewed by the head of the fire department with the assistance of the town attorney to determine if an exemption exists.

5. Does the law apply retroactively to all existing buildings, which are within the scope of the law?

No, the Legislature intended to give some protection to owners of existing or older buildings against the large expense of installing sprinklers by requiring the installation only upon some triggering event. The law is only triggered if: (1) a new building or structure is constructed or (2)

an addition is built onto an existing building or structure or (3) major alterations or modifications are planned for an existing building. Additionally, it should be noted that the building must total more than 7,500 gross s.f. in floor area, in the "aggregate" (existing building and addition). In short, if you are not constructing a new building, adding onto an existing building or undertaking major alterations to an existing building, or if the building does not total more than 7,500 gross s.f. in the aggregate, you are not required to install sprinklers under this particular law.

6. What method is used to determine if a building totals, in the aggregate, more than 7,500 gross square feet in floor area?

The statute specifically states that for the purposes of this law, "the gross square footage of a building or structure shall include the sum total of the combined floor areas for all floor levels, basements, sub-basements and additions, in the aggregate, measured from the outside walls, irrespective of the existence of interior fire resistive walls, floors and ceilings". It should be noted that this calculation is unique and is somewhat different from the method used in the state building code, which in general, uses interior measurements to determine floor area.

7. Is a sprinkler system always necessary when there is an addition to a building, which is within the scope of the law?

It will depend upon how large the building will be after the addition is built. If an addition is being constructed to an existing building and the addition creates a building with a combined total of more than 7,500 s.f. "in the aggregate", an adequate system of sprinklers will now be required throughout the building (addition and the existing building), without regard to the existence or extent of alterations, if any, to the previously existing building.

The legislative activity to amend the provisions of M.G.L. c. 148, s. 26G arose in the aftermath of a tragic commercial building fire, which occurred in Newton, Massachusetts in February 2000, resulting in the death of five individuals. The elimination of the limiting words "addition only," in the old law and the requirement that the square footage determination be conducted "in the aggregate", indicates the clear intent of the Legislature to require the enhanced sprinkler protection throughout the building when the building is added to and if the gross s.f. of the addition, combined with the existing building, totals more than 7,500 s.f. "in the aggregate." If the building, including the new addition, totals less than 7,500. s.f., sprinklers are not required under the provisions of this law.

8. Is a sprinkler system always required if renovations are taking place in a building, which is within the scope of the law?

This depends upon whether the renovations are considered ***"major"*** alterations or modifications, as those terms are used in the statute. The Board realizes that the determination to install sprinklers, is often difficult and should be decided on a case-by-case basis, based upon the unique characteristics of the building and the nature and extent of the work. However, the Board suggests that such decisions be made in a predictable and consistent manner throughout the Commonwealth. Therefore, the Board suggests that fire officials, in deciding if "major alterations or modifications" are taking place, should be guided by the Massachusetts Appeals Court case

Congregation Beth Shalom & Community Center, Inc. v. Building Commissioner of Framingham et. Al., 27 Mass. App. Ct. 276 (1989).

In this case, the Court discussed the meaning of the terms "major alterations" as those words are used in M.G.L. c. 148, s. 26G. (It should be noted that those terms remain in the law, notwithstanding the amendments to s. 26G) The Court said that the terms "major alterations" shall include "any work, not repairs, which is "major" in scope or expenditure, and which results in changes affecting a substantial portion of the building". In its decision, the Court looked at the nature of the planned work and would require sprinklers throughout the building if "the extra cost of installing sprinklers would be moderate in comparison to the total cost of the work contemplated…" or "if the physical work being done is of such scope that the additional effort to install sprinklers would be substantially less than would have been if the building were intact."

At this time, it is the intent of the Board to consider the following factors established in the Congregation Beth Shalom case, to determine whether "major" alterations or modifications are taking place, thus requiring sprinklers to be installed throughout a building in accordance with M.G.L. c. 148, s. 26G.

A. What is the nature of the actual work?

- Is the planned physical work the type of work that would make the effort to install sprinklers substantially less than it would have been if the building were intact?

- Is the work merely minor repairs or cosmetic vs. major alterations? Examples of "major" alterations or modifications, include, but may not be limited to:

  - The demolition or reconstruction of existing ceilings or installation of suspended ceilings;

  - The removal and/or installation of sub flooring, not merely the installation or replacement of carpeting or finished flooring;

  - The demolition and/or reconstruction or repositioning of walls or stairways or doorways; or

  - The removal or relocation of a significant portion of the building's HVAC, plumbing or electrical systems involving the penetration of walls, floors, or ceilings.

B. What is the scope of the work or cost/ benefit of sprinkler installation?

This involves a review of the scope of the major alterations or modifications. Does it affect a substantial portion of the building? This requires a review to determine how much of the building is being affected by the work; **or** a determination that the cost of installing sprinklers is moderate in comparison to the total cost of the work.

To assist fire officials, building owners and construction project managers in making decisions, the Board has established the following two presumptions that may be used to determine if the scope or the cost of the planned alterations or modifications are "major" thus requiring sprinklers to be installed throughout a building.

1) Major alterations or modifications are reasonably considered major in scope when such work affects thirty-three (33) % or more of the "total gross square footage" of the building, calculated in accordance with section 26G.

2) Major alterations or modifications are reasonably considered major in scope or expenditure, when the total cost of the work (excluding costs relating to sprinkler installation) is equal to or greater then thirty-three (33) % of the assessed value of the subject building, as of the date of permit application.

It is the conclusion of the Board, at this time, that if the nature of the work is the type of work described in **A** **and** also meets at least one of the two presumptions described in **B** above, then it can be reasonable to conclude that the alterations or modifications are "Major", thus requiring sprinklers throughout the building.

The Board is aware that buildings and circumstances vary from one project to another and that it would be unreasonable to expect that a single set of criteria could reasonably apply to all situations. Therefore, this list of described factors is not necessarily all-inclusive, but is meant to provide a common sense guideline for fire departments and building owners to determine if a sprinkler system is probably required under the provisions of this particular law.

9. What if the work is not "major" in scope for this particular permitted project, but appears to be part of a long-range plan?

If the specific permitted alterations or modifications are not considered "major," as described, but appear to be one phase of a series of modifications being conducted over a reasonably short period (i.e. 5 years or less), it may be reasonable to conclude that such work could be part of a long range project resulting in "major alterations" to the entire building, or a substantial portion of it, thus triggering the sprinkler requirements. Although this occurrence may be rare, fire officials should be aware of future and past recent projects to determine if there is a series of planned projects that, taken together, may be considered "major" alterations or modifications, which would trigger the sprinkler requirements.

10. The statute states that "no such sprinkler system shall be required unless sufficient water and water pressure exists". How is it determined if there is a lack of sufficient water and water pressure?

This language, creating an apparent exemption for situations involving lack of sufficient water and water pressure, has remained unchanged in the new amendments. In determining cases in which this issue has been raised, the Board has been guided by the Massachusetts Appeals Court case of *Chief of the Fire Department of Worcester v. John Wibley, et al. 24 Mass. App. Ct. 912 (1987).*

In that case the court concluded that:

> "The term "sufficient water and water pressure exists" means that the owner of a building or addition to which the statute applies must have access to a source of water sufficient to operate an adequate system of sprinklers, or the exemption applies. The source may be either on the land on which the new building or addition is constructed or off the land, provided that it is legally available to the owner of the building or addition."

In the Wibley case, the court, in agreeing with the fire chief, concluded that sufficient water and water pressure existed, notwithstanding the fact that the source of water was not on the owner's land, but was legally available by means of a connection requiring the excavation to a legally available water main located 500 yards away.

11. Who has the responsibility to enforce the sprinkler installation requirements of this new law?

Under both the old and new version of M.G.L. c. 148, s. 26G, the head of the fire department is given the statutory authority to enforce the law.

12. What action should be taken by the head of the fire department at this time?

It is recommended that the head of fire department coordinate with the local building official and confirm that the building official is aware of the new law, its applicability and the statute's unique method of determining a building's total floor area. Additionally, it is suggested that procedures be established to assure that the building official communicate to the appropriate fire department personnel the existence of construction activities to buildings in excess of 7,500 s.f., which may be subject to the provisions of M.G.L. c. 148, s.26G. Once the head of the fire department determines that a planned building construction project is subject to s. 26G, the building owner/construction manager should be informed of the determination and the reasons for it by a written notice signed by the head of the fire department. The notice should also contain the information about the ability to appeal such determination to the Commonwealth's Automatic Sprinkler Appeals Board within 45 days of the receipt of such notice.

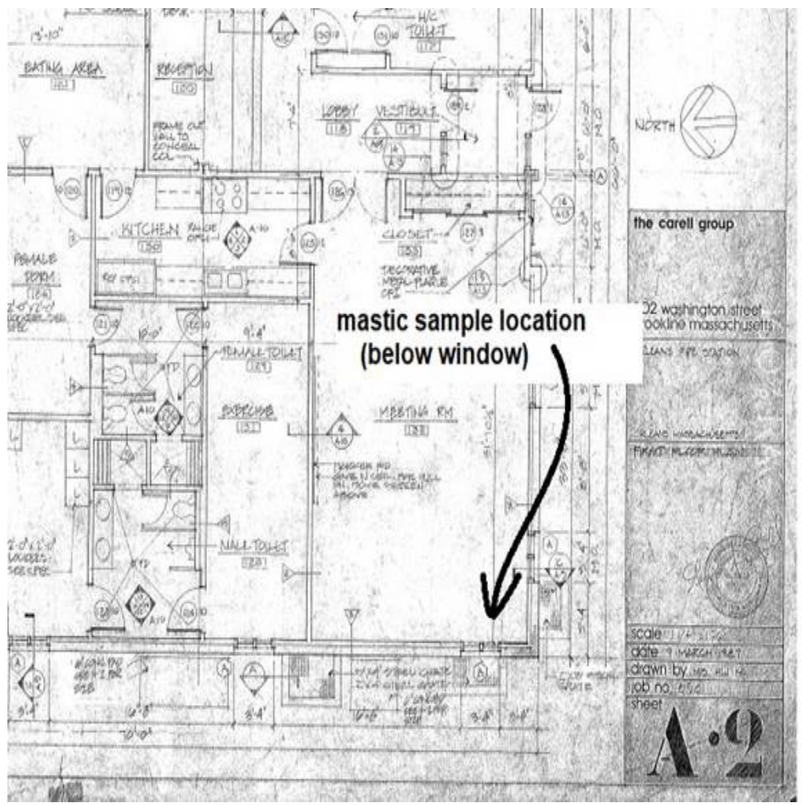
13. How are appeals filed with the Board?

The law allows for any person aggrieved by an interpretation, order, requirement or direction of the head of the fire department, (or the failure to so act) to file an appeal with the Automatic Sprinkler Appeals Board. Such appeals must be filed ***within 45 days*** after receiving service of notice of the head of the fire department's determination. The Board has a formal application form that must be completed by the person seeking the appeal. In addition to the application form, a detailed statement of the basis for the appeal, a copy of the chief's determination and an appeal application fee ($100.00) must accompany each application. Automatic Sprinkler Appeals Board application forms may be obtained by calling: 978-567-3181 or on the web at www.mass.gov/dfs (right side of the page Mass. Automatic Sprinkler Appeals Board).

14. What are the Board hearings like?

Members of the Commonwealth's Fire Safety Commission hold hearings of the Automatic Sprinkler Appeals Board. The hearings are informal and the strict rules of evidence used in a court of law are not used. The hearings require the presence of the appellant and the head of the fire department or their agent or attorney. The parties should be fully prepared to present their positions at the hearing. All plans, drawings, photographs expert findings/analysis or any other documents, information and testimony and arguments should be presented at the hearing to assist the Board in making its findings and determination.

Information regarding collection of mastic samples at the Orleans Fire Station
July 10, 2021



FIREHOUSE

TGAS

RENOVATE OR REPLACE?

By Ted Galante

The decision to renovate or replace an existing fire station leaves many things to be considered. Costs are often the biggest drivers in such a decision, but many other issues must be considered as well. Temporary quarters for equipment and personnel will weigh on the decision to renovate or replace a station. Sustainability is having greater influence on decision-making when it comes to our buildings, and some municipalities have set sustainable goals. In addition, local zoning ordinances define setbacks and building size—factors that could impact the decision. Historic preservation is also an issue, as a beloved station may only gain support if it is renovated and not replaced. Let's look at a few factors related to the decision to renovate or replace.

HISTORIC PRESERVATION

Historic preservation starts with the idea that the existing building—also known as "original building fabric" to regulatory agencies—is noteworthy enough to preserve for cultural reasons. Fire stations are part of our civic identity and, as such, may be worth preserving for future generations to come.

Preservation requires an architect with experience renovating historic structures and sometimes even a dedicated preservation consultant. One key is to understand how far to take the renovation, as many historic buildings could really use a total makeover. However, budgets don't allow for complete renovations, and a project is often influenced by multiple structural requirements and various building code required upgrades.

Here are some examples of historic preservation issues: Foundations below historic buildings were built very differently than our modern-day facilities. They are often stone of varying sizes and shape, perhaps battered away from the building. It's important to determine exactly how to sort this out before trying to place new columns or new foundations adjacent to the existing structure, or be subject to potential cost change orders during construction. Historic buildings were also subject to much smaller forces than our buildings are today. For example, a full stable of horses weighs a lot less than the ASSHTO-rated fire trucks we use today. As a result, structural slabs were much weaker and often need to be replaced with slabs that can support modern-day rigs.

Preservation also involves careful treatment of the building envelope. Brick often needs to be repaired, re-pointed and occasionally replaced. Finding brick that is similar in size, shape,

color or even structural density requires a lot of effort on the part of the architect. Moreover, mortar needs to be replicated in a way that matches existing conditions, but also structurally performs in equal capacity to exiting mortars. However, historic preservation provides the opportunity to save beloved building elements like an old cornice line, a limestone carving or some other element that shows the public that we believe in preserving the department's institutional heritage.

Further, many materials that were historically used in construction are now deemed hazardous materials. Removal and disposal of these items can be quite involved from a regulatory perspective and quite costly from a remediation point of view. Preserving a building requires a battery of testing be done to determine the presence and quantity of specific materials to determine if abatement is necessary. One should operate very cautiously when it comes to considering which materials to change, use, match, etc., as these can run the gamut of environmental regulatory hazards. In contrast, new facilities are built with materials that meet all modern-day environmental requirements and, if selected carefully, may also be 200-year materials made from recycled content—a good solution for a planet with limited resources.

SUSTAINABILITY

One reason to consider preserving an existing building fabric is sustainability. Keeping a building in tact might also be understood as keeping all that material out of the landfill. If a city or town would like to pursue LEED (Leadership in Energy and Environmental Design) certification, limiting material waste could be an easy set of points. This position is becoming ever more popular, and younger generations simply expect this approach.

An equally important sustainability factor is that most buildings being renovated perform well below modern-day energy standards. Specifically, fire and EMS stations built before the 1990s are likely cold and drafty in a number of places. Building envelopes were assumed to be nothing more than non-insulated places to store equipment and therefore designed for minimal energy performance. One clear result is that all of them need radical upgrades to perform in a way that meets current standards.

Upgrading a building envelope is a costly and complicated endeavor. If the building is masonry, changing the building's thermal properties will most likely have major implications on overall performance—structural, moisture absorption, air barrier, etc. Masonry is dry and brittle; both water and air

particles enter through its surface, and they need reasonable paths of travel. A properly designed wall allows this water and air to enter, but more importantly, provides ways for it to get back out. One could say the wall breathes in order to keep the building healthy. Performance requirements are being put on these older masonry buildings as energy codes become more stringent and what was a reliable system of construction is simply less able to keep up. For a number of years, people thought adding spray foam to the interior of a masonry wall was a viable solution. It was easy to install, it provided great thermal insulation, and it even helped with moisture entering the building—or so they thought. Soon, cracks started to appear and mold started to build up between masonry and insulation. The energy code requirement is still high, but design professionals who renovate older buildings now know how to insulate a masonry wall so it complies on all levels and does not end up cracking.

If the building is wood-frame, there are more opportunities to increase sustainable performance; however, providing a proper air and moisture barrier requires extensive work on both sides of the building envelope. If not handled properly, air and moisture do an equal amount of damage to these wall types and could significantly increase costs.

Renovating to achieve these levels of thermal performance is not necessarily something to shy away from, as it has merit on many levels. Further, it may be mandated by the municipality. However, if not carefully managed, costs are likely to escalate quickly, not to mention costly repairs a few years down the road if things are not renovated properly. If you do go this route, the best approach is to consult a professional, specifically one with years of experience renovating fire and EMS stations. Of course, it's also important to keep in mind that simply replacing the station may be the better approach. Putting money into a response time is money better spent than trying to patch up an old, drafty wall. A new building may well be a better use of funds.

ZONING SETBACKS

Another little understood reason to consider keeping an existing station is that most buildings standing for 25 years or more are located well outside of required setbacks. The buildings are known as "existing non-conforming." Zoning ordinances are legal regulations that establish use of a particular parcel of land, but also define how far a building needs to be set back from property lines on all sides of the parcel. They also identify allowable heights of a building and how much of the property it is allowed to cover. Because these ordinances are updated periodically, and setbacks increased to minimize new building size on a parcel of land, most existing buildings sit outside of newer setback lines and are therefore under the category of "existing non-conforming."

The implications of this for renovation are a bit more favorable. If the building is existing non-conforming, it is often easier to expand that building farther outside the setbacks, as it already does not conform. Trying to construct a new building outside the setback lines is often more of a regulatory hurdle. The theory seems to be that if an existing building was built before regulations were imposed, then the regulations do not apply as stringently as they do to new construction that comes after adopting new setback lines. Sometimes municipalities want to lead by example, and gaining zoning relief on newer buildings may be difficult. However, it is always best to have your architect check with local authorities on this one, as public safety buildings are often exempt from zoning ordinances.

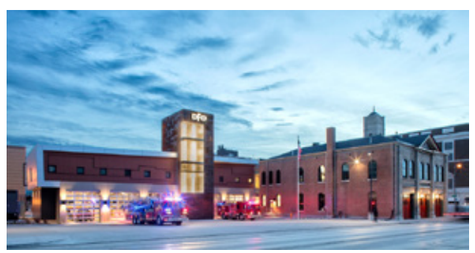
COSTS

In general, it is often much more expensive to renovate a fire or EMS station than it is to replace one. Taking down a building is inexpensive, and replacement is a very cost-effective approach. Renovation requires much more time from the professionals to the contractors, as there is time involved with measuring and re-integrating pieces of the building with the new elements planned to be added.

We all know that there are many heating, air conditioning, exhaust, electrical, plumbing and fire protection systems intertwined within our stations. In decades of experience, I have never seen these systems not completely entangled with one another. Untangling them and determining which to save and which to replace is a very difficult and messy task that runs the risk of costing more as the project develops. Replacing these systems wholesale is very costly, and usually requires that expensive solutions be developed to allow each system full integration in and around an existing building. Contrast this with a new facility where all conduit, ducts, exhaust and related systems can be planned and organized from the start. It is much easier for all professionals, architects, engineers, contractors and service personnel to understand and document these systems in all their detail.

Historic preservation is the most expensive renovation approach as compared to replacing the structure with a new building, which is the most cost-effective. However, replacement with a building that tries to replicate a historic design is also very expensive due to costly materials and details, needing to move mechanical, electrical and fire protection systems to unused spaces, like attics and eaves. Recent construction cost trends have driven many projects designed this way over budget, sending a few architects back to the drawing board.

Because the construction industry is set up for speed and efficiency, modern buildings are the most cost-effective solution. Fire and EMS departments that use modern construction methods for their buildings will be the ones able to put the most money back into personnel, equipment and provide the best services to the public. Further, efficient use of construction funds on a building allows for a larger facility, more room for growing equipment as well as more durable materials, furniture, fixtures and equipment for living spaces.



TEMPORARY FACILITY STUDY

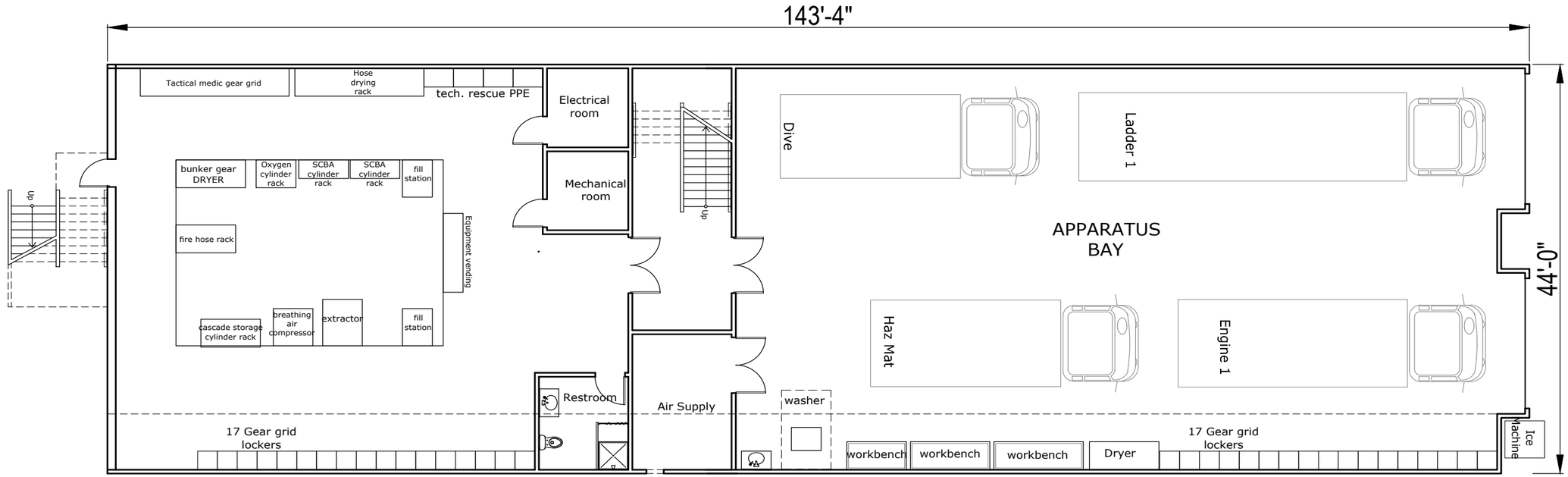
CAMBRIDGE MA

SCHEDULE/BUDGET

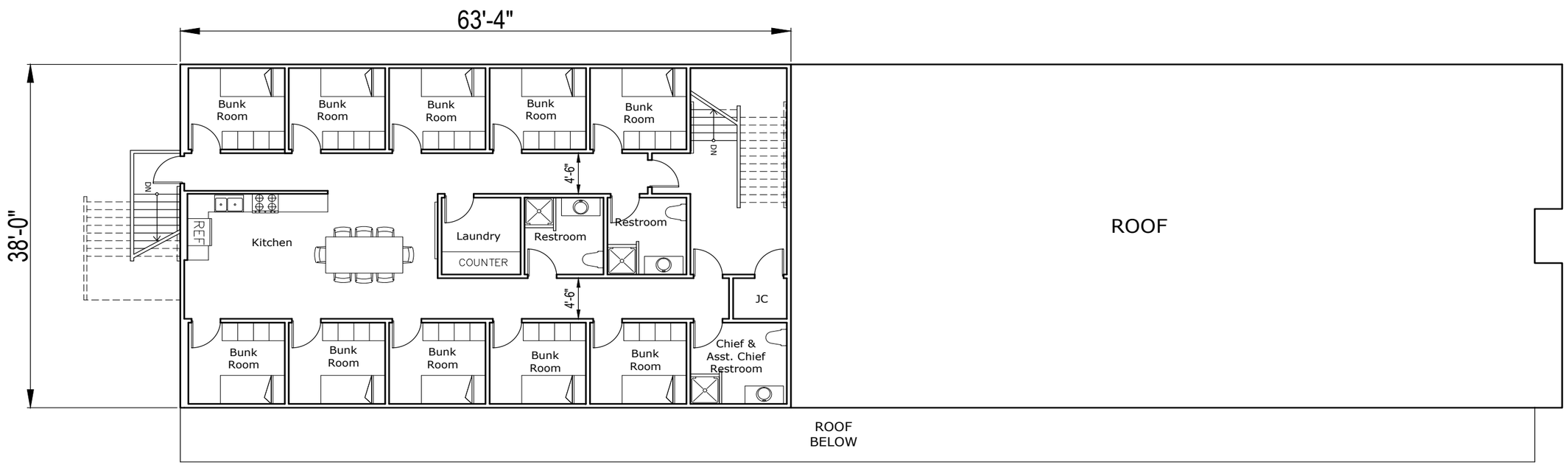
Appendix H.

TGAS

98 Hovey Avenue (Spaulding Parking Lot)



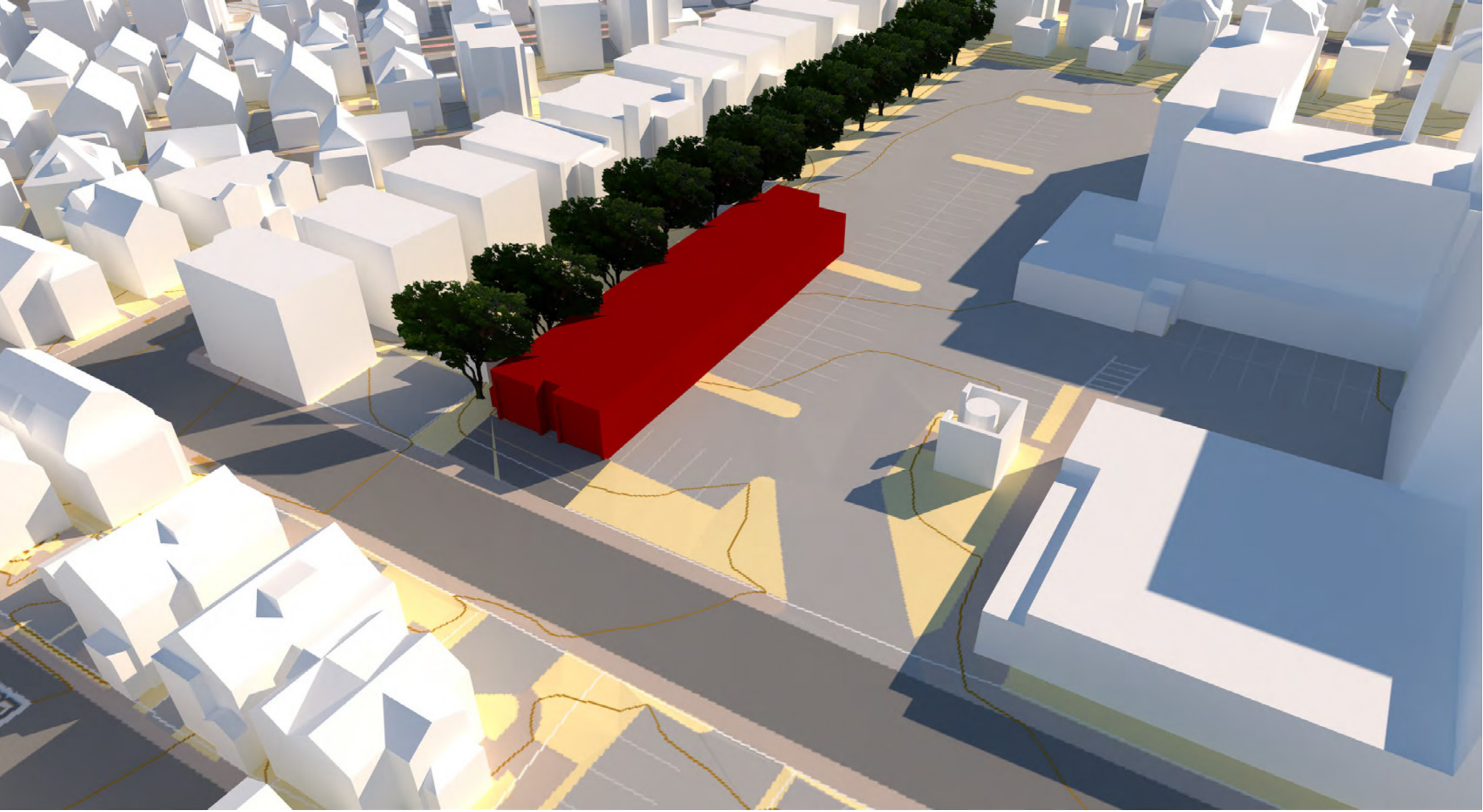
FIRST FLOOR
(Apparatus Bay)



SECOND FLOOR
(Living Quarters)

TGAS

98 Hovey Avenue (Spaulding Parking Lot)



TGAS

98 Hovey Avenue (Spaulding Parking Lot)

APPROXIMATE BUDGET

$400/sq. ft x 8,825 sq. fr **$3,530,000**

APPROXIMATE SCHEDULE

± 3 months of community feedback

3 months of design time following city's confirmation of site

6 months of construction time after placement of order

TGAS +