

Lexington Ski Club Fire Alarm and Fire Sprinkler System Report September 18, 2018

Background:

I was recently tasked to review the arrangement we have with the Lexington Ski Club's fire alarm and fire sprinkler system vendor to determine what, if any, repair issues or upgrades need to be addressed, and whether there were any other vendors that may provide a more competitively priced service than our existing vendor, AMTEC Fire Protection Services.

I began back in the summer trying to contact service vendors that would be interested in meeting with me at the lodge to evaluate the system. This proved to be a surprisingly difficult task. There appears to be a very limited number of companies in NH that service and maintain fire sprinkler systems. I called a total of 3 vendors (1 in MA that advertised their service area as "All of New England" and 2 in Southern New Hampshire; I was unable to find any fire sprinkler contractor based in Northern NH). At one company, I was able to speak to a technician who indicated his company had no interest in servicing or upgrading a sprinkler system as small and as old as the one in the ski lodge. The other vendors had receptionists who took my information by telephone along with a brief summary of what I was looking for, but ultimately I never received a return call from anyone at their companies. I called one company (Tri-State Fire Fire Protection in Londonderry, NH) twice, as I was told they are the largest sprinkler service company in NH, and service many sprinkler-equipped hotels, condos, and ski resorts in NH. After leaving my info with the receptionist, I also left a voicemail message for the "new customer" sales rep, but I never received a return call.

Based on this lack of success, I contacted the Lincoln, NH Fire Department, and without identifying the ski club specifically, I left a voice message for Fire Chief Ron Beard. In my message I asked for a return call with some recommendations on local fire alarm/sprinkler system vendor that he might recommend for a small building with sprinklers. I never received a call back from Chief Beard.

Because of this, I am unable to determine at this time whether we would be able to get a more competitive price for a sprinkler system/fire alarm vendor. However, I continued with the second portion of this assignment, and met with our existing contactor, Rick Crocker, from AMTEC Fire Protection Services.

Objectives:

Based on this, my objectives for this meeting with AMTEC were:

1. Determine exactly what services AMTEC currently provides to LexSki.
2. Obtain an overall assessment of the existing fire alarm and sprinkler system at LexSki.
3. Identify any immediate system deficiencies/needs/upgrades.
4. Identify long-term system needs/upgrades.
5. Discuss solutions to the existing problem of false alarms, and the use of "orange covers" to prevent the false alarms.

Summary of Meeting and Discussion with Rick Crocker from AMTEC

On September 17, 2018, I met with Rick Crocker of AMTEC at the lodge for nearly 4 hours. As my technical knowledge of fire alarms and sprinkler systems is limited, I brought with me for this meeting a friend of mine who is the fire chief in a local MA community in the Lexington Ski Club membership area to get some helpful and unbiased advice, as well as technical interpretation of whatever information Mr. Crocker provided.

AMTEC History and past fires at the Club

Mr. Crocker is the owner and operator of AMTEC Fire Protection Services, Inc, and he is the company's sole employee. AMTEC has been the club's fire alarm/sprinkler system

contractor for approximately 25 years or more. He indicated that he is certified as a fire alarm and sprinkler inspector in NH. He is the former fire chief of a southern NH town and has been servicing fire alarms and sprinkler systems for over 30 years. He indicated to me that he invoices the club yearly in advance for his inspection services, and that there are additional charges for preventative maintenance and other work performed if repairs are required. He can perform small repairs to the system himself, but AMTEC sub-contracts larger repairs out when appropriate. The minimum inspections required in New Hampshire for a building such as the Lexington Ski Club Lodge are quarterly inspections of the entire fire sprinkler system, annual testing of certain components of the fire sprinkler system, annual inspection and testing of the fire alarm system, and five-year internal visual pipe inspections.

During the time Mr. Crocker has been contracted by the club, there have been two fires in the building. He described an incident in the 1980's where an arsonist had dumped gasoline and lit on fire the rear section of the family wing behind Motel 3 and Motel 4. The club was unoccupied at the time, and a large fire broke out. The fire was completely extinguished and the building saved by the activation of three sprinkler heads under the family wing porch. The damage was very limited considering the gasoline accelerant used to start the fire. The arsonist was eventually identified as a local youth in the area and was referred to the court system.

In a second fire incident, the Club was occupied during the ski season. A mattress in the Derivative Wing had caught fire, and a smoke detector sounded. The fire alarm drew the attention of members, several of who were able to remove the burning mattress from the building quickly and extinguish the fire before it spread. Notably, both Mr. Crocker and my fire chief friend indicated such an incident today may have been far more dangerous. They explained that modern materials used in today's furnishings are far more comfortable and durable. The tradeoff to this benefit is that when items such as mattresses burn, the modern materials give off a far more thick and toxic smoke, and it would be extremely dangerous to enter a smoke filled room and attempt to extinguish a fire in the way the members had done in this incident.

During both incidents above, Lex Ski's life-safety systems worked as designed and prevented any injuries, death, and minimized damage to the building. Mr. Crocker and I discussed a strong desire to ensure that any future fire incident at the club has the same outcome.

Fire Alarm System Overview

The existing fire alarm at the lodge was installed around 2014. It was a significant upgrade to the previous fire alarm system, and as designed, it met or exceeded NH code requirements. It is centrally monitored via a cellular transmitter in the boot room by a UL listed 24-hour monitoring service, and any alarms or sprinkler activations are reported to a central station, who in turn contact the Woodstock Fire Department. This should generate a prompt response to any alarm incident. During a tour of the building, there were several generally minor deficiencies noted that need to be addressed, but overall the system is in excellent working order, and it should provide adequate warning to any occupants to the presence of smoke or fire in the club.

AMTEC explained that generally speaking, New Hampshire law requires that there be smoke detectors on every level of the building, in the common areas outside of the sleeping rooms of the club, and on each level in the vicinity of the stairwells. These detectors are required to trip the building's central alarm system which generate a fire department response. (The attic is exempt from smoke detectors since it is equipped with temperature sensors, which are more appropriate for the building design.) Under the fire code, the lodge essentially is treated similar to an inn or hotel, and therefore is generally also required to have smoke detectors inside of each sleeping area, but these smoke detectors can be "local" sounding only. This means the individual bedroom detectors do not need to trip the club's central alarm or trigger a fire department response. Although the NH fire code is far more

complex than this summary, these are the main issues the club needs to be concerned with as explained to me by AMTEC.

Prior to the 2014 upgrade, AMTEC was consulted during the design of the fire alarm system and had recommended the installation of “local” alarms in the club’s bedrooms, and “central” alarms in the club’s common areas. An alternative design plan was chosen by the Club, and the system that was ultimately installed has every detector in the club trip wired to the “central” alarm panel. Due to the placement of smoke detectors and because there are no bathroom exhaust fans, several bedroom detectors have caused false alarms due to shower steam. This is undesirable for obvious reasons: it creates a fire department response, undermines confidence in the system, and brings unwanted attention to the club, among other problems. As a preventative measure, members are instructed to utilize orange maintenance covers on smoke heads during showers. Frequently, covers are left on detectors even after shower steam has dissipated.

Redesigning or re-wiring the fire alarm system to create “local” smoke detectors and “central” smoke detectors would require extensive re-wiring and modifications to the existing system and panel. After discussion about this with AMTEC, this option was eliminated from consideration.

Several deficiencies were noted by AMTEC with the existing fire alarm system:

- The attic, like the other areas of the club, was wired to have fire alarm strobe-light “horns,” but they appear to have never been installed. During an alarm, there would be no sound in the attic. As a walk-up attic, strobe-light “horns” are required by the NH fire code.

- The basement smoke detector appears to have been removed or never installed. There is currently no smoke detector or other sensor in the basement of the club. A smoke or other type of detector is required in the basement by the NH fire code in the vicinity of the bottom of the stairs. AMTEC speculated that the smoke from ski waxing equipment could have been causing false alarms, which lead to the detector’s removal.

- As we toured the club, it was noted that a smoke detector is installed in the kitchen ceiling. This is specifically not permitted by the fire code, as this placement typically causes false alarms.

Automatic Sprinkler System Overview

Members of the club made a substantial financial investment to the property by adding a fire sprinkler system to the building around 1973. The system is approximately 45 years old, but the club has made continual investments in upgrades and maintenance. By adding sprinklers, the club dramatically reduced the likelihood of a devastating fire spreading to the entire building. However, it was stressed to me that sprinklers are generally considered as a means to prevent the spread of a fire and to protect a building from burning to the ground. I was told that most fire injuries and deaths are a result of smoke, and therefore it is important to not be over-reliant on the club’s sprinkler system capabilities, as during a fire, a tremendous amount of deadly smoke could be present in the lodge before any sprinklers would typically activate. For this reason, the sprinkler system should be considered only as a supplement to an effective fire-alarm system.

The sprinkler system at the lodge is equipped with both fusible link sprinkler heads and frangible bulb sprinkler heads. In the club, you can identify the type of sprinkler head type by its appearance: fusible link heads have a temperature sensitive solid metal plug at the tip, while the frangible bulb heads have a red and clear glass type plug. AMTEC stated that currently the NH fire code requires either 10% annual testing or complete replacement of each fusible link sprinkler head on a sprinkler system after a period of 50 years. Currently in NH, frangible link heads do not need to ever be replaced or tested, although this standard

could change in the future. After 50 years, the fusible link sprinkler head testing requirement is an annual requirement, and it is “destructive” testing - meaning that every sprinkler head that is tested is destroyed during the testing process. This essentially means that even if every head passes the test, you are replacing at least 10% of the heads every year for 10 years or more. If any of the heads tested were to fail, every head in the system must be replaced within 30 days or sooner, or the building’s occupancy permit could be at risk. AMTEC advised me that each sprinkler head in the club is stamped with a year of manufacture. The date stamp was inspected on a sampling of the fusible link heads at the club and all were found to have the year “73” on them, making them currently 45 years old.

AMTEC reported that the dry sprinkler system that is installed in the lodge requires significant preventative maintenance. Condensation frequently builds up in the system and must be regularly drained from as many as 20 low-points throughout the lodge. AMTEC attributed this to modifications to the building and an overall poor design layout. AMTEC performs this maintenance quarterly at a minimum. This is not a particularly difficult task, but one must be thoroughly knowledgeable of the system to prevent an accidental discharge of water, to properly re-activate the system, and to ensure all low-points are accessed. Mr. Crocker stated that he comes by far more frequently than quarterly, because he “drops in” when he services several other client buildings nearby, including the Alpine Lodge condos located next to the club. He attributed the good condition of the system to this aggressive draining effort, and he stated that the system has needed a far less than typical number of pipes replaced due to rust through. He stated that an inside/outside piped system that was 45 years old would typically have seen far more deterioration than the club’s system.

The sprinkler system compressor is a critical component as it is designed to hold the water back from the pipes and keep the system dry. If the compressor were to fail, the system would fill with water. During the winter, cold temperatures could lead to burst pipes, and flooding conditions. The compressor was recently replaced and upgraded and is currently in very good working order. However, due to “pinhole” air leaks in the system, the compressor cycles on and off far more often than what is considered optimal. This is problematic if there were a long-term power outage at the lodge from a storm or other event. Although I am uncertain of exactly how often the compressor cycles, I believe it is approximately daily. Ideally, AMTEC indicated the compressor should cycle far less, perhaps as infrequently as weekly or less. These pin hole leaks are attributed to the age of the system and have been more prevalent in the attic than any other area of the lodge. AMTEC attributed this to a poor design of the layout of the sprinkler system in the attic, and the wide temperature fluctuations in the attic which stress the seals of the pipe joints. There has previously been leak mitigation work done by AMTEC that targeted this area, and this work did help reduce the frequency of compressor cycles. AMTEC stated that over time, it is likely that leaks will continue to increase, and that this is something that should be addressed.

AMTEC stated that failing to remove the condensation could have serious consequences for the club beyond the system not working in an emergency. Most notably, if condensation is not removed from the pipes, the pipes in the unheated areas (attic and outdoors) could freeze and burst. He indicated thousands of gallons of water could spill before the fire department would arrive and turn off the water to the building. This amount of water discharging in the attic would be a particularly devastating occurrence.

Several other large components of the sprinkler system have been replaced in the past few years, and overall Mr. Crocker described the fire sprinkler system as in very good working order.

Overall Recommendations:

Following a review of the system with AMTEC, the following recommendations were made:

High Priority:

1. It should be a priority to install a smoke detector in the basement near the bottom of the stairs. Because of the ski tuning and waxing equipment in the basement, AMTEC recommended installing a 110v “local” smoke detector in the basement, and attaching this to a second “local” smoke or heat detector in the boot room so that the alarm could be easily heard by occupants of the lodge, even though it would not trip the main alarm. This would be a relatively inexpensive installation, and would prevent false alarms from ski tuning from automatically calling the fire department. This installation would ensure the building is in compliance with the NH fire code. AMTEC could perform this service if requested, but suggested it could also be done by any electrician or skilled member.
2. It should be a priority to re-locate smoke detectors within the bedrooms or to install bathroom exhaust fans where possible, and thereby eliminate the use of orange covers. Either option is expected to completely eliminate false fire alarms from shower steam. The work could be prioritized based upon which rooms have caused false-alarms in the past, which AMTEC speculated was likely limited to one or two rooms. AMTEC provided me a list of how they would address this problem on a room by room basis and I have attached the list at the end of this report. Most of the smoke detector relocations are only by several feet, but the increase in distance is enough to separate the smoke detector away from steam that comes from a typical unvented shower. Some of these move are very simple projects, while others are clearly more complex jobs. Once the locations are prioritized and the work performed, the use of any orange covers should be discontinued. Generally speaking, disabling a detector with the orange covers while the building is occupied violates the NH fire code. The covers could reduce the effectiveness of the entire fire alarm system should a real fire exist, particularly if the covers were forgotten after a shower. AMTEC noted that because there are so many open transoms above bedroom doors this risk is somewhat mitigated, but not eliminated altogether. However, it was also suggested that the use of the covers could result in the club’s insurance company refusing to pay for or challenging a claim if an actual fire in the building did occur. It was explained to me that most insurance policies could deny a fire damage claim if there was any intentional act done to disable any protection system in violation of the fire code that delayed the response of the fire department. Based on this, it was the recommendation of AMTEC that the club prioritize fixing this false alarm issue, and discontinue use of the orange covers. [By comparison, in Massachusetts, under MGL 148, 27A it is actually a criminal offense to cover a smoke detector with an orange cover, unless you have a permit each time you cover it from the fire department. While I’m not familiar with the NH statute, I think the MA law demonstrates the seriousness of the issue and how it is important that the club work towards immediately discontinuing the use of the covers at the lodge.]
3. It should be a priority to add strobe light “horns” to the attic. This appears to possibly have been an oversight when the new system was brought online in 2014. The majority of the wiring is already in place. AMTEC stated that 4 horns would be required to bring the building up to what is required by the NH fire code. These are relatively inexpensive items running \$50.00-100.00 each, and could be wired by a skilled member, and then programmed at the panel by AMTEC. AMTEC can also be hired to wire these devices if preferred.
4. It was recommended that the ceiling smoke detector be removed from the kitchen altogether. With few exceptions, a smoke detector is prohibited in the kitchen by the NH fire code. The layout of the kitchen does not qualify for any of the exceptions. The dining area smoke detector provides ample protection for the entire kitchen and dining room space. AMTEC stated that the smoke detector could be removed easily, the box capped, and the location unprogrammed from the alarm panel. This should be done with AMTEC supervision to prevent an alarm or malfunction at the panel.

5. The club should consider a 5 year plan to replace the fusible link sprinkler heads. By 2023, the club will be required to have at least 10% of the heads tested each year. This is expensive, and can be prevented if the heads are replaced before the 50 year expiration date. If we do not act, and if even a single sprinkler head were to fail the required test, the club could be forced to close until the upgrades are completed. This is an unnecessary and avoidable risk. AMTEC indicated that they would be willing to oversee club members doing this work on a work weekend or weekends as a way to reduce the cost of the project. The sprinkler system would need to be shut down in advance, some basic tools would need to be utilized, and there is a moderate risk of breaking some pipes while completing the work, so AMTEC recommended that they be onsite during this project if done on a work weekend. Sprinkler heads vary widely in price but currently can be purchased for about \$5.00-10.00 per head. AMTEC stated that if they performed the work without member assistance it would run \$20-30 per head depending on the exact work performed.
6. It was highly recommended that we conduct 1-2 fire drills a ski season when the building is at peak capacity. (perhaps during Christmas/February Vac?) This costs nothing. AMTEC demonstrated to me how to do this at the panel, and it is a very easy process that I could teach to a few other members as well. AMTEC also stressed that the club should establish and all members should be aware of a pre-designated meeting spot to gather outside of the club for whenever the alarm sounds so that it will be immediately apparent if any one is missing.

Other Recommendations:

1. AMTEC recommended having an architect review and propose a redesign of the existing sprinkler system layout, with particular attention to redesign of the attic area. AMTEC estimated the cost of this review/redesign would be typically be \$2000-4000. Once designed, any replacement system in the attic would be done with CPVC piping approved for fire sprinkler installations which requires much less maintenance than the current steel piping. AMTEC opined that if the attic sprinkler piping was replaced, the majority of the system's air leaks would be eliminated. This would make the system much more reliable in the long-term, less prone to a major failure (i.e. devastating flooding leak) and allow the system to remain pressurized without the compressor running constantly. AMTEC indicated that replacing the attic sprinklers could be very expensive - possibly as much as \$20,000, although it was not possible to know exactly how much until an architect proposes a design. As a rough idea, I was told that currently sprinkler pipe installation in NH typically costs \$1.50-\$2.00 /sq foot. AMTEC indicated that another benefit of a new design would be that in the very long term, it is recommended that the club slowly begin replacing steel sprinkler pipe with CPVC piping throughout the lodge as the steel inevitably deteriorates. AMTEC suggested it would be unwise to do this without a re-design plan in place, as the current design has too many design flaws. To mitigate costs, this could also use work-weekend labor under AMTEC supervision. Overall, I believe this recommendation would need significant further research, discussion and debate.
2. AMTEC indicated that many of the fire extinguishers in the club are not inspected currently and are past their 6 year required inspection date. He stated that he has never been asked to inspect the extinguishers for the club, but would perform the six year inspection for no extra charge if requested. He stated that because the 10-year testing of a fire extinguisher is cost-prohibitive, he would instead recommend replacement of extinguishers after 10 years. All of the extinguishers on the premises he viewed were under 10 years old. It was noted that some of the fire extinguishers appear to be subject to a manufacturer's recall by Kidde and may able to be replaced for free by Kidde now. (I am working to follow-up with Kidde on this).
3. The kitchen fire extinguisher is not properly placed. According to AMTEC, it needs to be re-located to a hook near the exit door to be in conformance with the NH Fire

Code, and a wall sign needs to be placed above it. It was suggested that this be replaced with a “K” (Kitchen) class fire extinguisher instead of an ABC rated model, however this is not a mandated requirement.

4. AMTEC strongly suggested the installation of a kitchen hood and hood fire suppression system over the stoves. AMTEC does not install or service this type of equipment, but strongly recommended it even though the kitchen is only used on a part time basis. Grease residue around the stove and on the countertops was pointed out as an example of how much flammable material is spread about around the cook-tops, and how quickly “grease-laden vapors” could result in a large fire.
5. AMTEC recommended that fire escapes be covered the next time the exterior stairs are replaced. Though this is outside of the scope of their inspection, they reported that most local building codes in NH now require fire escapes to be covered because of snow. In the interim, AMTEC recommended making sure the front and rear fire escape stairs are kept shoveled in the winter, which seems to already be the current routine.

Conclusion:

The Lexington Ski Club Lodge has an excellent fire protection system. There is modern fire alarm system that was installed around 2014, and a sprinkler system that has been properly maintained. Both systems are centrally monitored by a UL rated 24 hour monitoring station. The club contracts AMTEC to conduct yearly fire alarm system and sprinkler system tests, and quarterly sprinkler system inspections, as is the industry standard. I am not aware of any complaints about repairs or deficiencies not being properly addressed by AMTEC when directed.

The high priority recommendations and some of the other recommendations of AMTEC appear to be appropriate and viable improvements that the club should consider quickly acting upon, even if it requires some substantial expenditures. Although, with the exception of fire drills, none of these recommendations will be without cost, preventing a fire, and keeping occupants of the building safe is a worthwhile investment.

I found Rick Crocker to be extremely knowledgeable of the appropriate codes, state requirements, and to generally have an excellent working knowledge of the existing Lexington Ski Club fire alarm and sprinkler systems. I also found him to be very understanding of the budget constraints and reality that the club operates under. He had an extensive knowledge of the infrastructure of the club, and seemed to be eager to work with members to complete improvements in a financially viable manner.

Based upon the specialized skills needed, and difficulty and limited access to fire sprinkler contractors in the Woodstock, NH area, I recommend we continue the club’s business relationship with AMTEC Fire Protection Services.

Respectfully Submitted,
Kevin Baker
9/18/18

It is likely only one or two of the rooms are causing the alarms activations. If these room can be identified, prioritize them so that orange cover use can end.

Room 1 - Vent bath or relocate smoke detector to over bed.

Room 2 - Appears challenging to vent bath. No proposed changes to smoke detector location.

Room 3 - Vent bath. No proposed changes to smoke detector location.

Room 4 - Vent bath. No proposed changes to smoke detector location.

Room 5 - Vent bath. No proposed changes to smoke detector location.

Room 6 - Vent bath or relocate smoke detector towards headboard.

Room 7 - Vent bath or relocate smoke detector towards headboard.

Room 8 - Vent bath or relocate smoke detector towards headboard.

Room 9 - Vent bath or relocate smoke detector towards headboard.

Room 10 - Vent bath or relocate smoke detector towards headboard.

Room 11 - Vent bath or relocate smoke detector towards headboard.

Room 12 - Vent bath or relocate smoke detector towards headboard.

Room 14 - No proposed changes.

Room 15 - No proposed changes.

Room 16 - No proposed changes.

Room 17 - No proposed changes.

Room 18 - No proposed changes.

Room 19 - No proposed changes.

Room 20 - Vent bath or relocate smoke detector to over bed.

Room 21 - Vent bath or relocate smoke detector away from bath door.

Room 22 - Vent bath or relocate smoke detector away from bath door.

Room 23 - Vent bath or relocate smoke detector away from bath door.

Room 24 - Vent bath or relocate smoke detector toward bunk bed wall.

Upper Dorm - Main area - vent bath or relocate smoke detector away from bath door. No changes proposed to dorm side rooms.

Lower Dorm - No proposed changes.