

Christiana Fire Department



Insurance Service Office Audit Report UT-MTAS Review

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Introduction and Scope of Work

The staff of the University of Tennessee Municipal Technical Advisory Service (UT-MTAS) strives daily to meet its consensus mission. As an agency of the University of Tennessee and in collaboration with the Tennessee Municipal League, MTAS leverages the resource of the university to improve the lives of the people of Tennessee with technical consulting, research, and training for municipal governments. This study works toward UT-MTAS's mission and was conducted at the request of Chief Michael Tapp, Fire Chief for the Christiana Volunteer Fire Department. Information provided as a part of this study was drawn from an Insurance Service Office (ISO) audit report dated June 2015, through an in-person visit to the department, and interview with the department's ISO committee members conducted on February 28, 2019. The purpose of this study is to assist the department in evaluating and interpreting their ISO audit report and recommend actions that may assist the department improve their public protection classification in the future.

The University of Tennessee Municipal Technical Advisory Service (UT-MTAS) will provide the final version of this report to the Christiana Fire Department, in an electronic as well as a physical hardcopy binder.

Background

Christiana is an unincorporated community located in Southeastern region of Rutherford County between the cities of Murfreesboro and Shelbyville. Christiana is located entirely in Rutherford County. Fire protection and public safety is a local policy issue. A community must balance available local resources against what is determined to be acceptable risk. Data provided for this study was provided via an ISO Audit report completed in June 2015 and through data collected at in person visits to the fire department. The Christiana Fire Department provides fire services to an estimated population of just over 2,600 residents, based on the United States census. From a historical perspective, Christiana is on the move; growing in population annually.



Fire Department-Description

Organizational Overview

The fire department is led by a fire chief and governed by a non-profit board of directors. The department is made up of approximately 25 volunteer firefighters that provide for all-hazards response in the community they serve. The department further provides mutual aid services throughout Rutherford County when requested.

ISO Public Protection Classification

Christiana’s Insurance Services Office (ISO) Public Protection Classification (ISO rating) is currently a Class 6/6x. The Class 6/6x ISO rating places Christiana in the middle tier of the percentages of communities in Tennessee (Figure 1) as well as in the middle tier percentage of communities across the nation (Figure 2) in terms of fire protection. This rating indicates that the department’s leadership has made good decisions in the past. However, there may be opportunities to improve training and preplanning thus improving services provided to the community.

Figure 1 – Public Protection Classification (ISO Rating) in Tennessee

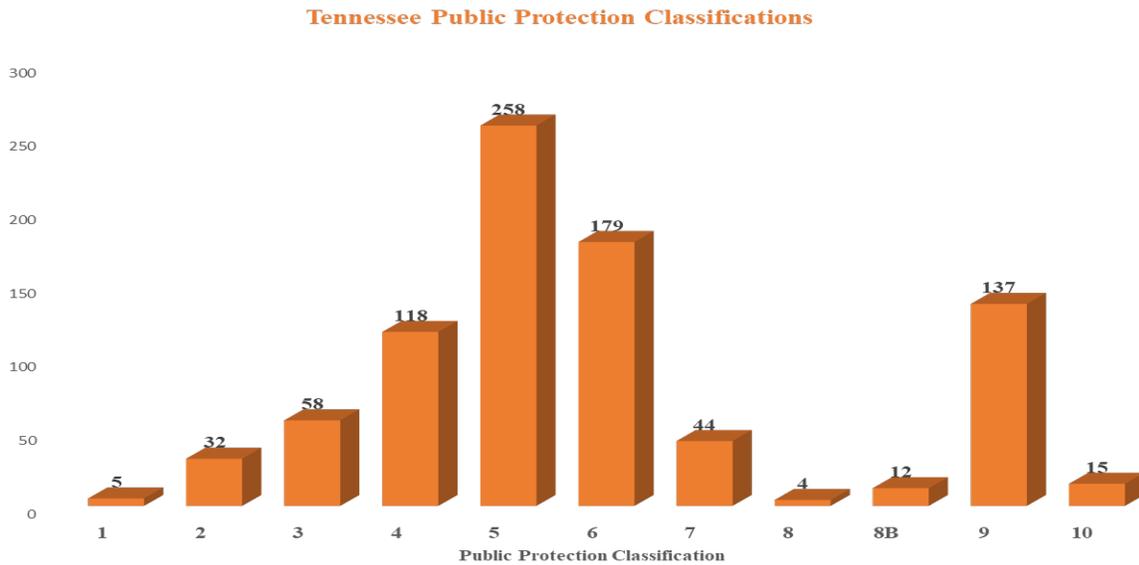
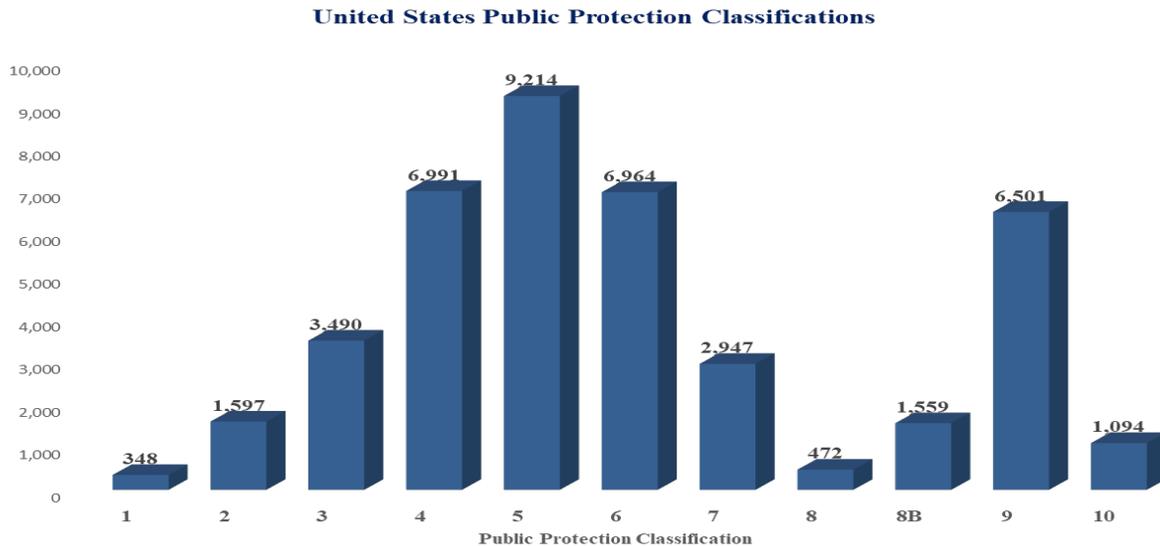


Figure 2 – Public Protection Classification (ISO Rating) in the US



Christiana’s ISO “6” is the classification assigned to the community for structures located within five (5) road miles of a fire station and within 1,000 feet of a fire hydrant. The “6X” classification is assigned to the community for structures located within five (5) road miles of a fire station but not within 1,000 feet of a fire hydrant.

ISO Public Protection Report by Category

In analyzing the ISO report dated June 2015, we reviewed each section of the Public Protection Classification report to determine what actions has and/or what actions should be implemented in the future in order to possibly improve the community’s public protection classification.

Emergency Communications

The emergency communications office earned a total of 7.80 of a possible 10.00 points in this category. This section analyzes the emergency communications center emergency reporting, telecommunicators, and dispatch circuits.

Credit for Emergency Reporting

The department earned 2.40 of a possible 3.00 points in this category. In order to earn full credit in this section, the communications center should provide Basic computer aided dispatch, computer aided dispatch with a management information system, a computer aided dispatch with appropriate interoperability, and a fully integrated computer aided dispatch with geographical information system equipment with automatic vehicle location that provides dispatch assignments.

- **Recommendation for Improvement:** The communications center needs to ensure they have complied with interoperability requirements and that the center and apparatus are equipped with geographical information system and automatic vehicle location system that assigns resources to each incident. The Christiana FD staff believe that the communication center has been upgraded since the 2015 audit and the department is currently in the process of equipping apparatus with GIS/AVL technology.

Credit for Telecommunicators

The department earned 2.40 of a possible 3.00 points in this category. In order to earn full credit in this section, the communications center must provide documentation that it meets National Fire Protection Association (NFPA) 1221 as it pertains to call processing and dispatch time performance. This section also reviews the communication center to ensure there are policies in place, that communicators are trained/credentialed, and that communicator receive on-going in-service training.

- **Recommendation for Improvement:** The communications center received full credit with the exception of having an on-going in-service training program. The center must develop and implement an in-service training program for the communicators and document all attendance.

Credit for Dispatch Circuits

The department earned 2.40 of a possible 3.00 points in this category. In order to earn full credit in this section, the communications center must meet NFPA 1221 in providing the proper number of supervised dispatch circuits for the number of calls dispatched annually from the center. The number of calls is not just the number dispatched to the Christiana Fire Department but the total dispatched through the center to all agencies that use the center.

- **Recommendation for Improvement:** The communications center must evaluate the center's call volume and evaluate that number against NFPA 1221 to ensure they have the proper number of primary and secondary dispatch circuits. The communications center must further work with their equipment vendor to ensure that all dispatch circuits are monitored for integrity.

Fire Department

The department earned a total of 16.87 of a possible 50.00 points in this category. This section analyzes engine companies, service companies, ladder companies, fire station locations, staffing, staff training, and operational considerations. The Basic Fire Flow for the jurisdiction is calculated at 1,750 gallons per minute. This number is used to determine the number of engine companies that should be dispatched on each structure fire and to meet the basic fire flow requirements.

Credit for Engine Companies

The department earned 2.84 of a possible 6.00 points in this category. In order to earn maximum credit in this section, the engine apparatus must be equipped the correct inventory of hose, tools, and equipment as well as current pump test as required in NFPA 1901.

- **Recommendation for Improvement:** In order to earn maximum credit, the department must acquire the required hose, tools, and equipment for each apparatus as well as test the fire pump annually as required by NFPA.

Credit for Reserve Engine Companies

The department earned 0.00 of a possible 0.50 point in this category. In order to earn maximum credit, the department should have pre-arranged a reserve engine apparatus to put into service if the primary apparatus is out of service.

- **Recommendation for Improvement:** The department must pre-arrange for the use of a reserve engine apparatus to be put into service when primary apparatus is out of service. The reserve engine must be equipped with the proper hose, tools, and equipment as well as be tested annually as a front line apparatus.

Credit for Pump Capacity

The department earned 2.14 of a possible 3.00 points in this category. The department was evaluated to determine if there was sufficient pump capacity to meet the community's basic fire flow of 1,750 gallons per minute.

- **Recommendation for Improvement:** In order to receive maximum credit, the department must assign, at minimum, two pumper apparatus with enough pump capacity to meet or exceed the stated basic fire flow of 1,750 gallons per minute on each structure fire.

Credit for Ladder/Service Companies

The department earned 0.71 of a possible 4.00 points in this category. In order to earn maximum credit in the section, the department must provide a ladder truck if there are five (5) or more buildings 32' or higher or five (5) or more buildings that have a needed fire flow of 3,500 gallons per minute or more or any combination of buildings that meet the height or needed fire flow requirements.

- **Recommendation for Improvement:** In order to receive maximum credit, the department must inventory all structures within its response district that meet the requirement for a ladder truck. If there are five or more buildings that meet the definition stated above, the department would need to acquire an aerial apparatus to deploy to structure fires. If there are not enough buildings in the response district to require a ladder truck, the department must provide for a service company. The department must collaborate with Rutherford County to ensure that any building planned for the community is limited in height and needed fire flow as to not overwhelm the fire forces assigned to this district. The needed fire flow can be controlled by requiring buildings to be equipped with automatic fire sprinkler systems.

Credit for Reserve Ladder/Service Companies

The department earned 0.00 of a possible 0.50 point in this category. In order to earn maximum credit, the department should have pre-arranged a reserve ladder/service apparatus to put into service if the primary apparatus is out of service.

- **Recommendation for Improvement:** The department must pre-arrange for the use of a reserve ladder/service apparatus to be put into service when primary apparatus is out of service. The reserve ladder/service apparatus must be equipped with the proper hose, tools, and equipment as well as be tested annually as a front line apparatus.

Credit for Deployment Analysis

The department earned 0.62 of a possible 10.00 points in this category. The department was evaluated on the number and adequacy of engine apparatus and aerial/service apparatus located within the 1.5 mile engine company service area and 2.5 mile ladder/service company service area. Credit is earned through existing engine apparatus and engine apparatus equipment credit earned and ladder/service and ladder/service equipment credit earned. The number of engine and ladder/service apparatus needed is calculated based upon the percentage of built upon area falls within the response zones above.

- **Recommendation for Improvement:** In order to earn maximum credit, the department must conduct a fire apparatus equipment inventory audit and a fire station location study. Fire apparatus must be equipped with the tools, appliances, and equipment as specified in NFPA 1901. The scope of the fire station study should analyze the jurisdiction to ensure fire stations are located strategically to service the community within that meet the NFPA 1710 deployment requirements. Figure 3 denotes the two current fire station locations and the associated 1.5 mile engine company response area. It is noted that target facilities located near Interstate 24 interchange, industrial facilities, multiple schools, and multiple residential developments are located outside the optimal engine company service area.

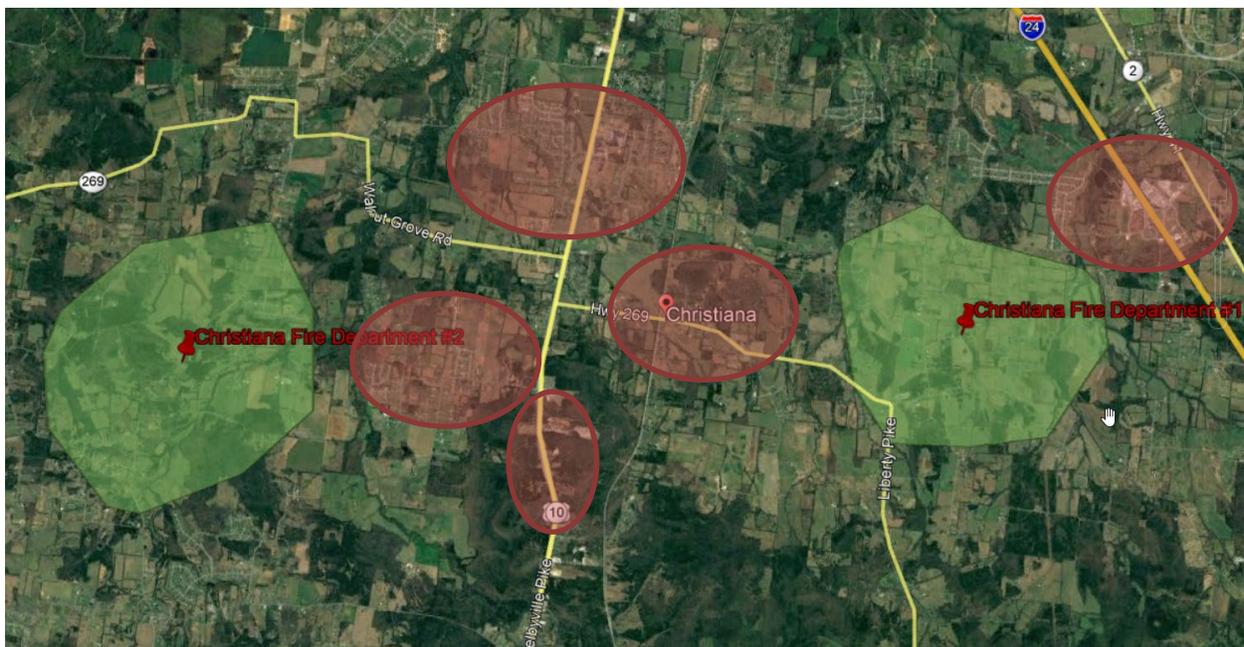


Figure 3 – Christiania Fire Department Fire Station Locations

The adoption of an automatic fire sprinkler ordinance and the strategic deployment of fire apparatus are imperative to maximize your citizens' chances survival should they experience a structure fire. Time is the fire department's worst enemy. Refer to Figure 4- Home Fire Timeline on the following page. This graphic illustrates the consensus agreed upon timeline that visually reflects the elapsed time from fire ignition to flashover (moment when contents of room/home ignite) in the home, and fire department arrival at the emergency.

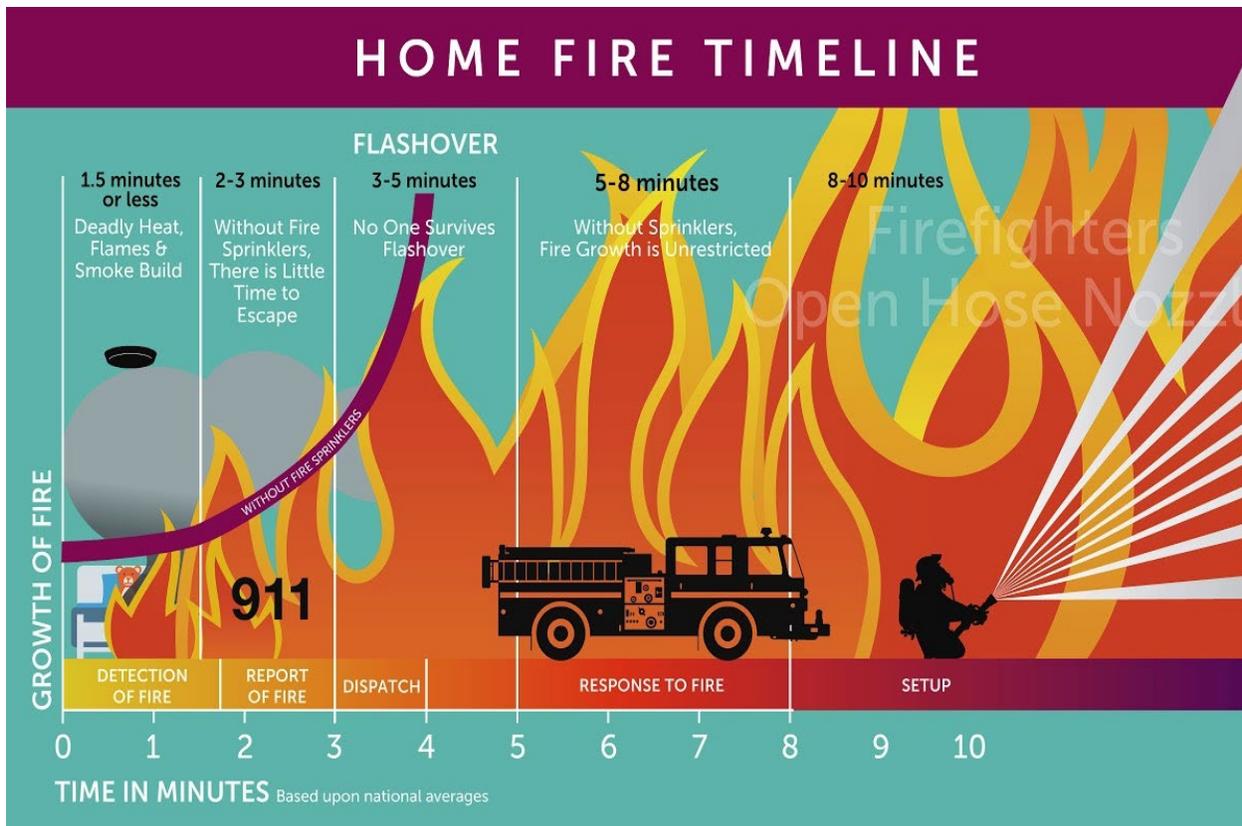


Figure 4 – Home Fire Timeline

Credit for Company Personnel

The department earned 8.00 of a possible 15.00 points in this category. The department was evaluated on the number on-duty personnel and average number of on-call personnel that responded to each structure fire. ISO credited the department with 0.00 on-duty personnel and an average of 8.0 on-call personnel responding to each structure fire.

- Recommendation for Improvement:** In order to earn maximum credit, the department should develop a staffing program whereas firefighters are documented as being on-duty when they are at the station. The department should consider a volunteer shift staffing program where members sign up and are approved to be on-duty during as much of the day/night as possible. The fire stations are not equipped with living-sleeping quarters and/or automatic fire sprinkler systems, so it is recommended that firefighters not sleep at the fire stations. However, this on-duty staffing during waking hours each day/night can have a tremendous positive effect on community safety thus earning more staffing credit. On-duty members count as one firefighter on-duty equals one firefighter staffing (1 to 1 ratio); on-call members count three firefighters equals one firefighter staffing (3 to 1 ratio).

Credit for Training

The department earned 0.56 of a possible 9.00 points in this category. The department was evaluated on training facilities and use, company training, officer training, new driver training, existing driver training, hazardous materials training, new recruit training, and pre-fire planning activities. Training is an imperative component of a successful and safe fire department. The department must aggressively address training activities and documentation in the department.

Facilities and Use: The department earned 0.00 of a possible 35.00 points available in this category.

- **Recommendation for Improvement:** In order to earn maximum credit, the department must develop a program that includes the use of a training facility and document at minimum 18-hours of firefighter training annually. We discussed the use of existing Rutherford County training centers as well as utilization of the state fire academy and/or the state fire academy's portable training facility.

Company Training: The department earned 2.19 of a possible 25.00 points available in this category.

- **Recommendation for Improvement:** In order to earn maximum credit, the department must develop and document a minimum of 16-hours of monthly training for each firefighter that meets the NFPA 1001 standard. It is important to note that ISO does award fractional credit so if firefighters average 8-hours monthly, corresponding credit should be earned.

Officer Classes: The department earned 0.00 of a possible 12.00 points available in this category.

- **Recommendation for Improvement:** In order to earn maximum credit, the department must develop an officer training program to ensure each officer participates in a minimum of 12-hours annually of specialized training related to officer knowledge, skills, and abilities. In addition, each officer should be certified at minimum at the Fire Officer I level from the Tennessee Fire Commission, IFSAC, and/or ProBoard.

New Driver Operator Training: The department earned 0.67 of a possible 5.00 points available in this category.

- **Recommendation for Improvement:** In order to earn maximum credit, the department must develop a new driver operator training program to ensure each new driver operator participates in a minimum of 60-hours of initial specialized training program related to driver operator knowledge, skills, and abilities.

Existing Driver Operator Training: The department earned 1.67 of a possible 5.00 points available in this category.

- **Recommendation for Improvement:** In order to earn maximum credit, the department must develop an existing driver operator training program to ensure each existing driver operator participates in a minimum of 12-hours of specialized training annually related to driver operator knowledge, skills, and abilities.

Hazardous Materials Training: The department earned 0.00 of a possible 1.00 point available in this category.

- **Recommendation for Improvement:** In order to earn maximum credit, the department must ensure that all members participate in a minimum of 6-hours of hazardous materials training as outlined in NFPA 472.

Recruit Training: The department earned 1.67 of a possible 5.00 points available in this category.

- **Recommendation for Improvement:** In order to earn maximum credit, the department must develop a recruit firefighter training program to ensure each new firefighter participates in a minimum of 240-hours of firefighter training as outlined in NFPA 1001. ISO awards fractional credit if an average of less than 240 creditable hours of training is evaluated.

Pre-Fire Planning: The department earned 0.00 of a possible 12.00 points available in this category.

- **Recommendation for Improvement:** In order to earn maximum credit, the department must develop a pre-fire planning program and practice where all commercial, industrial, institutional facilities in the jurisdiction are pre-planned at a minimum of once annually. Pre-plans should be documented with current notes, dates of inspections, and a sketch of the facility.

Credit for Operational Considerations

The department earned 2.00 of a possible 2.00 point available in this category. The department was evaluated on its Standard Operating Guidelines and use of an Incident Management System at structure fires.

- **Recommendation for Improvement:** The department should continue its current practices by reviewing/revising its Standard Operating Guidelines at minimum annually. This review should be documented to illustrate a practice of annual review. The department must also continue its practice of utilizing the incident management system to manage resources at emergency incidents.

Water Supply

The water purveyor earned 28.60 of a possible 40.00 points available in this category. The following categories were evaluated to calculate the credit awarded for the water supply category.

Water System: The department earned 19.20 of a possible 30.00 points available in this category. Water system evaluates the adequacy of the jurisdictions water supply as it pertains to fire suppression. In communities where there is a needed fire flow of 2,500 gallons per minute or less, the system should be capable of delivering this for a minimum of two hours. In communities where there is a needed fire flow of over 3,000 gallons per minute, the system should be capable of delivering this amount of water for a minimum of three hours. In addition, the jurisdictions fire hydrant locations, fire hydrant inspection, and fire hydrant flow testing programs are evaluated to ensure national standards are met.

- **Recommendation for Improvement:** The department should work closely with the water purveyor to ensure adequate water volume and pressure is available in the district for fire suppression activities. The department must also have pre-designated plans for tender support when structure fires are reported in areas of the district with no fire hydrants.

Fire Hydrants: The department earned 3.00 of a possible 3.00 points available in this category. The water system has done well in this category. At the time of the audit, the department had 156 fire hydrants in the response district. All fire hydrants are consistent size, threads, and operation.

- **Recommendation for Improvement:** The department should work closely with the water purveyor to ensure consistent fire hydrants are installed within the district. Each hydrant should have consistent size, wrench type, and turn on/off in the same direction.

Hydrant Inspection: The department earned 4.00 of a possible 4.00 points available in this category.

- **Recommendation for Improvement:** The department should continue its current practice of inspecting fire hydrants annually and proper documentation is maintained on the inspections.

Hydrant Flow Testing: The department earned 2.40 of a possible 3.00 points available in this category.

- **Recommendation for Improvement:** The department should work with the water purveyor to ensure that fire hydrants are flow tested per NFPA (multi-hydrant flow tests) at minimum every five years and that proper documentation is maintained on the flow tests.

Divergence

The jurisdiction earned -7.55 divergence rating score. Divergence is the mathematical reduction of the fire department credit based on the relative difference between the fire department and water scores. It is important to build capacity in both categories rather than investing primarily in one category.

- **Recommendation for Improvement:** The department should focus on implementation of recommendations to improve the fire department's administration and operation thus having the potential of improving the fire department's score. Improving the fire department's credit has a synergistic effect on the total public protection classification credit earned. As the fire department's credit improves the divergence score will be reduced.

Community Risk Reduction

The department earned 2.63 of a possible 5.50 points available in this category. In this category, the department earns credit through its proactive approach to fire prevention and fire safety. The department is evaluated on fire prevention and code enforcement, public fire safety educators, and fire investigations programs.

Fire Prevention and Code Enforcement: The department earned 0.78 of a possible 2.20 points available in this category. In this category, the department was evaluated on fire prevention code adopted, fire prevention staffing, fire prevention training and certification, and fire prevention programs. Each of these categories are evaluated for their individual score then translated into the overall Community Risk Reduction credit.

Fire Prevention Code Adopted: The department earned 10.00 of the 10.00 the points available.

Fire Prevention Staffing: The department earned 0.70 of the 8.00 the points available.

Fire Prevention Training and Certification: The department earned 3.00 of the 6.00 the points available.

Fire Prevention Programs: The department earned 0.40 of the 16.00 the points available.

- **Recommendation for Improvement:** In order to earn maximum credit, the department must continue to ensure the fire prevention code adopted is within seven years of the most current code. The department should designate members as fire prevention officers and ensure they are trained and certified to that level. Finally, the department must develop and implement fire prevention/inspection programs to ensure the safety of facilities within the jurisdiction.

Public Fire Safety Educators: The department earned 0.91 of a possible 2.20 points available in this category. In this category the department was evaluated based on public fire safety educator training/certification as specified by the department and public fire safety programs available.

- **Recommendation for Improvement:** In order to earn maximum credit, the department must develop a public fire safety education program for the department. The program should outline the initial and ongoing training and certification requirements for public safety educator credentials. Then the department must develop and present fire safety programs for the public. This can be in person at schools and civic groups, billboards, mailings, and other such initiatives.

Fire Investigation Program: The department earned 0.94 of a possible 1.10 points available in this category. In this category, the department was evaluated on fire investigation organization and staffing, fire investigator training and certification, and the department's use of the national fire incident reporting system.

Fire investigation organization and staffing: The department earned 8.00 of the 8.00 the points available.

Fire investigator training and certification: The department earned 3.00 of the 6.00 the points available.

Use of national fire incident reporting system: The department earned 6.00 of the 6.00 the points available.

- **Recommendation for Improvement:** In order to earn maximum credit, the department must continue its practice of providing organization and staffing for fire investigations as well as reporting to the national fire incident reporting system. The department must focus efforts on ensuring that fire investigations staff members are trained and certified at this level.

Recommendation Implementation

To provide for firefighter safety, excellence in customer service, while making efforts to maintain or improve Christiana's Class 6/6x ISO Public Protection Classification rating, Christiana should consider the recommendations of this study and develop a comprehensive plan to implement each recommendation. The recommendations made, in this report, will require considerable resources and must be planned for accordingly. Consideration must be made for any initial capital outlay as well as annual sustainability.

Summary

Growth has occurred and with the amount of development is projected to continue to occur in Christiana. Christiana's fire station #1 is a nice facility but is not strategically located to provide NFPA 1710 coverage to the most densely populated portions of the unincorporated town response district. Fire station #1 facility is well kept in great condition but is lacking the infrastructure needed to house firefighters serving 24-hour per day. The facility would need to be upgraded to include a fire sprinkler system and living quarters. Fire Station #2 meets the minimum requirements to be considered a fire station but would require major renovation in order to staff the fire station.

The department's leadership must continue to demonstrate a priority on firefighter safety. Fire stations must provide for decontamination, rehabilitation, and training of firefighters. The facility should meet the adopted fire codes and provide for a safe work environment.

Based on the scope and findings of this study, Christiana should implement as many of the recommendations made in this report as feasible. This action will greatly improve firefighter safety, provide for quick and efficient emergency services to the public, and could improve but surely prevent a possible future reduction (worsening) of Christiana's Class 6/6x ISO rating. It is important to note that a worsening of the ISO by 1 classification most likely would lead to an increase in insurance premiums for residents of one and two family dwellings.

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Recommendations

The most efficient and cost effective way for the Christiana to provide for an all-hazards fire service delivery program that addresses community risks and needs is addressed in the previous and following recommendations. These recommendations were based on the credit earned in the latest ISO evaluation of the jurisdiction dated June 2015.

1. Adopt a comprehensive automatic fire sprinkler ordinance for all new construction and incentives for retrofit of existing buildings. Use resources like the National Fire Sprinkler Association as a resource as you plan for this step. It is worth noting that buildings equipped with fire sprinkler systems are much safer and occupants are more likely to survive if a fire occurs. Also, when determining the basic fire flow for a community, ISO does not consider properties protected by a code compliant automatic fire sprinkler system. In a sprinkled building, the amount of time between the occurrence of a fire and reopening for business can be as little as a few hours or days versus months, years or even never rebuilding for a non-sprinkled building. This will help provide greater safety for the citizens/visitors to the community as well as help ensure a steady revenue stream for the city.
 - Tennessee’s fire mortality rate for civilians has been among the highest in the nation. During 2002-2010, the time period for the Tennessee Fire Mortality Study, the national fire mortality rate declined, but the rate in Tennessee increased. Residential structure fires account for about three-fourths of all civilian fire deaths in the state. Residential sprinklers save money and lives and are a good investment in a home, but they are controversial in many communities which is why this study recommends research on residential sprinklers before considering adopting an ordinance. Adopting an ordinance to require automatic fire sprinkler systems is a proactive community risk reduction rather than reactive fire response and suppression.
2. Adopt a response time standard for the community. Christiana Fire Department is a perpetual organization that will outlast current leaders, and this study looks at current and anticipated future needs. Once adopted, the response time standard will serve as a planning guide for future leaders. This study recommends a response time standard of a maximum of 6:35 (six minutes, 35 seconds) for 90% of all responses, which is based upon recommendations found in NFPA Standard 1710, Standard for the Organization and Deployment of Fire Suppression Operations. The 6:35 breaks down as follows: ring time: 15-seconds, call processing time: 60-seconds, firefighter turnout time: 80-seconds, and travel time: maximum 240-seconds. Using this standard, planners would look for fire station locations to maintain a 4 minute travel time to as much of the area to be protected as possible future needs.

3. Adopt a comprehensive Community Risk Reduction Program. This will assist the fire department in identifying fire service related risks posed throughout the response district. As a comprehensive program, the intent would be to have a team of leaders from all areas of government to identify risks posed at all levels of government and then systematically mitigate these risks. This practice will pay huge dividends in providing for safety and livability of the city.
 - Adopt and enforce the current fire code.
 - Investigate the cause of all fires.
 - Provide public education programing to meet the needs of the community.
 - Utilize the national fire incident reporting system to document all fires in the community.
4. Review, plan for, and implement recommendations provided in each category throughout this report.

References

Insurance Services Office. (2017). *Fire Protection Rating Schedule*. Jersey City, NJ: Insurance Services Office (ISO).

Insurance Services Office. (2015). *Fire Protection Rating Schedule*. Christiana Fire Department Dated June 2015.

City Data: <http://www.city-data.com/city/Christiana-Tennessee.html>

<https://www.bestplaces.net/people/zip-code/tennessee/christiana/37037>

